POTENTIAL USE OF AERATED LIGHTWEIGHT CONCRETE FOR ENERGY EFFICIENT CONSTRUCTION

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By

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To my beloved wife and family

ABSTRACT

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Ng Soon Ching

For energy efficient construction investigation, ordinary aerated lightweight concrete (ALC) panels of varied densities that incorporating different aerial intensities of membrane-sandwiched were produced to investigate their thermal insulation properties under steady and transient states. For sustainability reason, earthy soils were used in addition to the conventional sandy materials. Wall is the focus of this study since it is an important building component responsible for thermal heat transfer into the building. Guarded hot plate method was used to determine the thermal conductivity values of ALC panels under steady state of heat transfer while prototype ALC panels were tested under transient state. Generally, density of the panel is directly proportional to its thermal conductivity. The existence of membrane-sandwiched in ALC panel retarded the heat transfer thus resulted in lower thermal conductivity. Transient heat transfer indicated that lower thermal diffusivity resulted in reduced decrement factors and lower inner wall surface temperature but longer time lags. For theoretical computation, ordinary finite difference method (FDM) was employed to yield the theoretical surface temperatures on the outer and inner wall of the prototype panels. The average differences between the observed and predicted outer wall surface temperature lied between 0.9-2.4% whereas for the inner wall surface, the range was 1.3-2.2%. Aided by back substitution, a modified FDM model was developed which produced better agreement on the predicted outer surface temperature,

the average differences were between 0.9-1.9%. This was achieved by assigning one constant to the original equation to quantify the effects of additional factors: relative humidity and wind direction. The modified FDM developed is envisaged to be a useful basic tool in selecting the wall material with required thermal conductivity value in order to achieve the targeted inside wall surface temperature and then the indoor temperature which is the important parametric consideration for energy efficient building construction.

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APPROVAL SHEET

This thesis entitled "**<u>POTENTIAL USE OF AERATED LIGHTWEIGHT CONCRETE FOR ENERGY EFFICIENT CONSTRUCTION</u>**" was prepared by NG SOON CHING and submitted as partial fulfillment of the requirements for the degree of Doctor of Philosophy in Engineering at Universiti Tunku Abdul Rahman.

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SUBMISSION OF THESIS

It is hereby certified that ***Ng Soon Ching*** (ID No: ***07UED02914***) has completed this thesis entitled "***Potential Use of Aerated Lightweight Concrete for Energy Efficient Construction***" under the supervision of ***Assoc Prof. Dr. Ir. Low Kaw Sai*** (Supervisor) from the Department of Civil Engineering, Faculty of Engineering.

I understand that University will upload softcopy of my thesis in pdf format into UTAR Institutional Repository, which may be made accessible to UTAR community and public.

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(Ng Soon Ching)

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

Name: NG SOON CHING

Date: 05 March 2012

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LIST OF ABBREVIATIONS

ALC	Aerated Lightweight Concrete
ASEAN	Association of Southeast Asian Nations
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BEI	Building Energy Intensity
BIPV	Building Integrated Photovoltaic
FDM	Finite Difference Method
GBI	Green Building Index
HVAC	Heating, Ventilating and Air-conditioning
Lalang	Imperata cylidrica, a weed commonly found in Malaysia.
LEO	Low Energy Office
LL	Liquid Limit
MEWC	Ministry of Energy, Water and Communications
MOR	Modulus of Rupture
Newspaper Membrane	Newspaper as a thin physical membrane
OPC	Ordinary Portland Cement
OTTV	Overall thermal transfer value
PFA	Pulverized Fuel Ash
PL	Plastic Limit
Plant Leaves Membrane	Plant leaves formed into a thin physical membrane
RH	Relative Humidity
SPSS	Statistical Package of Social Science
UBBL	Uniform Building By-Laws

WD	Wind Direction
1kg	10 N

CHAPTER 1

INTRODUCTION

1.1 Introduction

The existence of serious worldwide energy crisis is now recognised by the government and various industry leaders. In most countries, energy consumption for building indoor heating and cooling is increasing from year to year. This huge energy consumption not only reduces the available fossil energy but also seriously pollutes the atmospheric environment (Filippin et al., 2008). As a result, numerous jargons and concepts such as energy conservation, energy efficient, green and sustainable developments have been introduced.

The terms 'energy conservation' and 'energy efficiency' have often been used interchangeably in policy discussions but they do have very different meanings. Energy conservation has been defined by Winter and Cox (1978) as the strategy of adjusting and optimizing energy using systems and procedures to reduce energy requirement per unit of output without affecting socio-economic development or causing disruption in lifestyles. In short, it means to reduce energy consumption through lower quality of energy services as suggested by Herring (2006). On the other hand, energy efficiency means getting the most out of every unit of energy and it is a by-product of other social goals such as productivity, comfort, monetary savings or fuel competition (Herring 2006).

In construction industry, green and sustainable developments have emerged which encompass a wider spectrum not only in energy efficiency issues but also cover indoor environment quality, proper site management, water efficiency and others. Sustainable development can be defined as a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Bordeau, 1999). For green construction, it is a practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's lifecycle (Chen, 2010). There is a similarity of all these jargons and concepts in the construction industry, which is to efficiently utilize the resources with minimal impact to the environment for the comfort of building occupants.

Efforts and commitments from the government and construction industry players to reduce energy consumption have been intensified in the new millennium. A large variety of examples of low energy buildings are already under operation since several years. The results and experiences on these buildings are also available in different publications and countries (Wagner et al., 2007).

In Malaysia, air-conditioners are used in almost all commercial buildings to cool the space or room due to hot air outside the building and to absorb the heat produced by the people and electrical appliances from inside the building (Mahlia et al., 2008). This equipment is operated continuously all the time in tropical countries to provide comfortable working and dwelling environment. As a result, huge amount of money has been spent for electricity on air-conditioning buildings every year especially with the recent hike of fossil fuel's price (Al-Jabri et al., 2005). Hence, the Malaysian government has implemented various policies to promote energy saving and energy efficiency programmes since the 9th Malaysia Plan. Building sector has been identified as the sector where energy savings can be substantially achieved in Malaysia through the adoption of appropriate energy efficiency measures. Therefore, energy efficient construction concept has been encouraged and led by the government. The then Ministry of Energy, Water and Communications (MEWC) office building has become a showcase to demonstrate energy efficient and low environmental impact office building. A 12-month post-occupancy monitoring programme indicates that the Low Energy Office (LEO) building has achieved a monitored Building Energy Intensity (BEI) of 114 kWh/m^2. This represents a 50% in energy saving compared to conventional office buildings. (Ministry of Energy, Water and Communication, 2005).

The guiding principle of energy efficient buildings is about integrating best energy efficient measures in both passive and active approaches. Wall and roof insulation has been identified as effective passive design of energy efficient building. Mahlia et al. (2007) have claimed that wall has been proven as the largest component of cooling load for spaces in building. Wall element contributes significantly to the energy conservation during the entire lifespan of the buildings by controlling the heat exchange between space and environment. Furthermore, it also promotes the development of a natural comfortable building environment, leading to a substantial energy conservation and operational cost reduction of the employed heating, ventilating and air conditioning (HVAC) systems in the building (Tsingiliris, 2004; Tsingiliris, 2006). Therefore building envelope plays an important role to impede the transmission of heat into the building, thus reduces the cooling load which is one the greatest energy consumer in a building (Zhang et al., 2006; Mahlia et al., 2007).

Research findings obtained so far clearly shown that regardless of the location on Earth, the positive role of aerated lightweight concrete (ALC) in temperature insulation for buildings is long-established (Glenn et al., 1999; Kilic et al., 2003). In hot climate countries, ALC walls effect thermal insulation and keep the spaces inside a building relatively cool compared to conventional wall throughout the year and the same will happen during the summer in those temperate or cold climate countries. In addition, ALC walls can be used in temperate or cold regions to insulate buildings against the prevailing cold air outside the building and at the same time keep the heat inside the room during winter. It is in a way similar to 'double glazing wall' construction except it can be achieved in a much neater manner involving thinner section when compared with the conventional double glazing type. Thus, the potential of ALC in energy efficient construction is not only enormous but it is independent of spatial and time. The reasons being its application is suitable for all regions on earth, hot and temperate or cold alike - independent of spatial. It is also applicable to countries with or without much fossil fuel supply; for those ‘without’, energy saving for economy would be the reason, whereas those ‘with plenty’ such as middle-eastern countries, rate of burning fossil fuel must now be slowed down in order not to accentuate the global warming problem, a global environmental hazard that adversely affects everyone.

1.2 Problem Statement

Soaring fossil fuel price and accentuation of global warming effects due to the increase on energy production accompanied by a corresponding rise in the release of green house gases have jointly heightened the pressing need for energy conservation and energy efficient design and construction (Papadopoulos and Giama, 2007). Based on these considerations, it is clear that regardless of the level of fossil fuel supply and amount of fossil fuel reserve that the earth might have thrifty, the efficient use of energy must be upheld by everyone as from now onwards (Demirboga, 2007).

Research has shown that energy use in commercial and residential buildings contributed a fair bit of total energy consumption. For instance, close to 22% of all energy consumed in the United States is used in heating and cooling residential and commercial buildings (Elzafraney et al., 2005). This phenomenon suggests that there is a potential to reduce the energy consumption and resultant green house gas emissions from the construction sector. Careful long term decisions in the design of buildings and selection of building materials can significantly improve their thermal performance and reduce the consumption of energy.

1.3 Aims and Objectives

The main aims of this study are:

- to investigate the potential use of ALC for energy efficient construction;
- to devise a method of analysis and formulate a design tool for energy efficient construction;
- to come out with a material for energy efficient construction.

The specific objectives of this research are as follows:

1. To determine the compressive strength and flexural strength of sand-based and soil-based ALC for unit weights range between 11.0 kN/m^3 to 18.0 kN/m^3.

2. To determine the thermal conductivity, *k* value of newspaper membrane sandwiched and non-newspaper membrane sandwiched sand-based and soil-based ALC plates.

3. To compare the thermal insulation property in terms of temperature gradient of ALC panels.

4. To produce full scale prototype wall panels and observe the thermal behaviour subject to natural weather in Malaysia.

5. To compute and compare the decrement factors and time lags of the prototype panels

6. To compare the performance in terms of total energy transfer of the prototype panels under transient state.

7. To determine the theoretical inner surface temperature based on finite difference method.

8. To compare the accuracy of predicted surface temperature with the observed temperature and improve on the prediction.

9. To propose the suitable thermal property of the wall material for comfortable indoor temperature.

1.4 Scope of Research

This research concentrates on investigating the thermal insulation property of ALC for energy efficient construction. Newspaper, lalang and banana leaves are encased to further enhance the thermal insulation property of ALC. However, due to time limitation, the chemical, physical and environmental properties of the embedded materials are not investigated in this study.

The investigation on the thermal insulation properties of ALC panels starts from determining the panels' thermal conductivity and temperature gradient in the laboratory. Then, prototype wall panels will be constructed and tested under natural environment. Despite the usefulness and importance of incorporating newspaper, lalang and banana leaves as a physical shield in resisting heat penetration but inability to conduct even greater number of tests on experiment to enable more conclusive findings to be drawn is another shortcoming of the current investigation.

Apart from thermal insulation property, unit weight and strength properties namely compressive strength and flexural strength of ALC will also be investigated. Compressive strength investigation is crucial and must be conducted before thermal properties tests. This is to ensure that the ALC panels produced has sufficient strength and can be physically constructed. The ALC is produced by mixing organic foaming agent in conjunction with foam generation machine. This research also focused on a bold attempt to produce soil-based ALC. This means that soil or earth is used in place of traditional sand filler in producing ALC.

The inner and outer surface temperatures of prototype ALC panels are predicted based on finite difference method. This study also proposed an improved finite difference method to provide better prediction of inner surface temperature based on the results generated from the single-storey prototype house. The improved finite difference method is limited to the walls facing east and west directions located at 3.217 ^{0}E and 101.733 ^{0}N. Inability to quantify the effects due to factors such as humidity in the air and wind direction in the equation formulation is considered another limitation that prevent an accurate theoretical model and thus a reliable design tool to be devised.

1.5 Importance of this Research

This research on the thermal insulation aspect of ALC wall panels addresses the issue of energy efficiency, industrialised building system and lightweight construction which are some of the essential aspects in building construction. Efficient use of energy is a global issue in recent years due to the depletion and soaring costs of fossil fuels. The efforts have been intensified recently under new brand names such as sustainability and green buildings due to the adverse effects of global warming (Ho, 2000) and research related to energy efficient buildings are of great importance (Zhang et al., 2006). This has become the reason for many researchers to invent and introduce various solutions to mitigate or minimise this problem. The core of this research which focuses on investigating the thermal insulation aspect of ALC wall panels is also an effort working towards energy efficient building construction.

In the local context, energy efficient construction and industrialised building system are the policy of the Malaysian government. This policy was clearly stated in 9th Malaysia Plan. Moreover, energy efficient construction has gained more attention recently with the introduction of Green Building Index (GBI) from the professional stakeholders in the construction industry. Obviously, lightness of ALC will reduce construction cost in foundation design, erection and installation. Therefore, the novelty of this research is clearly justified and its contribution towards mankind is significant judging from the aspects of energy efficiency, lightweight construction and industrialised building system of construction.

1.6 Organisation of Thesis

This Thesis is divided into nine chapters and the synopses are as follows:

Chapter 1 Introduction

This chapter discusses the background of this study, justification on the reasons that warrant this study to be conducted, the objectives and aims to be achieved. This chapter also discusses the significant contribution of this research towards the construction industry specifically and mankind generally.

Chapter 2 Literature Review – Energy Efficient Construction and Aerated Lightweight Concrete

This chapter discusses the global and local efforts in promoting energy efficient and green construction. It also highlights the directions and policies of the Malaysian government on this issue. Apart from that, this chapter also focuses on the application of ALC as energy efficient construction material.

The mechanical and thermal properties of ALC are also being discussed. On top of that, other advantages of employing ALC as building materials are also highlighted.

Chapter 3 Literature Review - Heat Transfer Theory

This chapter presents the heat transfer theory and the thermal properties of building materials. The heat transfer theory discussed in this chapter is not confined to steady state heat transfer but also include transient heat transfer.

Chapter 4 Research Methodology

This chapter discusses the materials used, the procedures on specimens preparation and the type of tests conducted based on the relevant standards.

Chapter 5 Mechanical Properties of Aerated Lightweight Concrete

This chapter presents and discusses the test results on the mechanical properties of ALC. The mechanical properties included in this study are compressive strength and flexural strength. Equations to correlate the factors influencing the strength properties are developed using statistical tool.

Chapter 6 Thermal Properties of Aerated Lightweight Concrete

This chapter presents and discusses the test results on the thermal insulation property observed namely temperature gradient and thermal conductivity of ALC panels. The effects of the newspaper membrane embedment, unit weight and types of filler of the specimens towards the thermal insulation property are also highlighted in this chapter.

Chapter 7 Transient Thermal Behaviour of Prototype Panels

This chapter focuses on the thermal performance of the prototype wall panels under natural weather condition for a period of twelve months. The discussions emphasize on the normalised surface temperature of the panels.

Chapter 8 Theoretical Prediction of Surface Temperature and Thermal Conductivity Recommendation for Comfortable Indoor Temperature

This chapter presents the formulations used to determine the inner surface temperatures for each and every panel. The surface temperatures were predicted using finite difference method (FDM) and modified FDM. Comparisons between observed values with predicted values from FDM and modified FDM were made and discussed.

Chapter 9 Conclusions and Recommendations for Future Research

This chapter highlights the conclusions drawn based on the results obtained from the research. Besides that, a few recommendations are highlighted to facilitate future research.

CHAPTER 2

LITERATURE REVIEW –
ENERGY EFFICIENT CONSTRUCTION AND AERATED LIGHTWEIGHT CONCRETE

2.1 Introduction

The way buildings are designed and built has evolved through many cycles. However, a strong sense of the environment remains critical in building construction that is both practical and good-looking. In the West, many architects and designers are coming back full circle to adopt greener ways of construction in both methods of construction and selection of materials used. This reflects the awareness towards the environment, a trend that has been gaining ground in the last few years (Teh, 2009).

Throughout the world, people are paying more attention to sustainable and green initiatives. The United States President, Mr. Barack Obama has declared to go green and pledging US$15 billion a year in renewable sources of energy. Indirectly, this will create five million new energy related jobs over the decade as claimed. This policy will have a major impact on housing development and the way houses are built in the future.

Generally, there are two main reasons that serve as the driving force to the pressing needs of energy efficient construction. Firstly, it is due to the dwindling reason of fossil fuel that is widely used in generating power supply globally. The middle-eastern countries have also embarked in energy efficient research even though they have adequate supply of fossil fuel for power and energy generation (Luai and Ahmad, 2009). Secondly, it is attributed to global warming effects as a result of burning of fossil fuel.

2.1.1 Malaysian Government Initiatives and Policies

Malaysian government is aware that energy efficiency is a vital component and cornerstone of sustainable future. Energy is the key ingredient to any activity and the adequacy of energy supply is important for the acceleration of economic development. The single largest non-renewable energy resource available in Malaysia is petroleum for instance oil and gas. This resource has and still actively been exploited in power generation. Consumption of fossil fuel based energy however produces some undesirable impacts on the environment and climate. Hence, sustainable use of energy is being given increasing attention in Malaysia (Ministry of Energy, Water and Communication, 2007). The government is committed to promote efficient use of energy by implementing a few initiatives and policies.

Recently, the completion of the new Low Energy Office (LEO) Building in Putrajaya becomes a showcase building in the public sector which exemplifies the government commitment and serious efforts in achieving sustainable development through energy efficiency. It is the first government building in Malaysia to incorporate a wide range of energy efficient features and technologies.

Another government's initiative stated in the 9^{th} Malaysia Plan is to focus on enhancing energy efficient initiatives in government buildings, industrial, transportation and commercial sector (Loo, 2006). The implementation of energy efficient programmes will focus on energy saving features in the industrial and commercial sectors. In this regard, energy efficient lighting, air-conditioning and establishing a comprehensive energy management system will be encouraged.

In year 2006, National Suria 1000 programme was launched, its targets include installing a minimum of 1000 kWp of building integrated photovoltaic (BIPV) system on residential and commercial buildings. This programme provides an opportunity to individuals to generate their own electricity (Pusat Tenaga Malaysia, 2009). The government also offers import duty and sales tax exemption for companies implementing energy efficiency projects for their own consumption (Loo, 2006). These are among some of the initiatives proposed and are being conducted by Malaysian government in an effort to steer the country working towards sustainable development.

In year 2009, Malaysian construction industry's professionals have developed a building rating tool which is coined Green Building Index (GBI) for new building construction. GBI is developed in the environmental and developmental context for buildings in Malaysian-tropical climate. The main objective of GBI is to promote sustainability in the built environment and to raise awareness among developers, architects, engineers, planners, designers, contractors and the public at large about environmental issues and our responsibilities to the future generations (Green Building Index, 2010).

The GBI rating tool provides a platform for developers and building owners to design and construct green, sustainable buildings. In return, these offer energy savings, water savings, a healthier indoor environment, enhanced connectivity to the public transport and the adoption of recycling activities and greenery for their projects. It is envisaged that such initiative will reduce the negative impact of those buildings to the environment.

The Department of Standard Malaysia has drafted the code of practice on energy efficiency and use of renewable energy for non-residential buildings to act as a guide for designers as an impetus for energy efficient construction (MS1525, 2007). Efforts have been taken to include MS1525 into Uniform Building By-Laws (UBBL) as part of the statute to ensure that all new non-residential buildings are mandatory to comply with the code of practice.

2.1.2 Energy Efficient in Construction

Energy efficient building can be defined as the ability to consume less energy to produce the same amount of lighting, transportation, heating and other energy services (Loo, 2006). The guiding principle of energy efficient buildings is about integrating best energy efficient measures in both passive and active manners, optimised towards achieving the best overall cost-effective solutions without sacrificing the occupants' comfort and productivity.

According to Loo (2006), there are many ways to improve energy efficiency in buildings as well as construction sectors. In 9th Malaysia Plan, the government has focused on the design and installation of energy efficient features in government buildings. In this regard, new guidelines for energy efficient designs for government buildings such as clinics and schools were formulated.

From the financial point of view, the base building costs for LEO building was RM50 million and the investment to incorporate energy efficiency design features was RM5 million. However, the net savings on energy consumption is RM0.6 million per year and it only requires 8 to 9 years of payback period simply based on energy savings and the current electricity tariff. Therefore, it is economically feasible to incorporate energy efficiency design features in building construction (Rahim, 2006)

The efficiency in thermal insulation is essential as it reduces the amount of energy consumed by cutting down or even eliminating the use of air-conditioner. The decline in of energy consumption will subsequently reduce the emission of greenhouse gases and pollutants as a result of lesser consumption of fossil fuels. Researchers such as Mahlia et al. (2007) and Davis et al. (2008) have concluded that wall and roof insulation can be used as an effective passive design of energy efficient building. Therefore building envelope plays an important role to impede the transmission of heat into the building. Research findings obtained so far has clearly shown the positive role of aerated lightweight concrete (ALC) in temperature insulation of buildings (Gleen et al., 1999; Kilic et al., 2003). Therefore, the potential of ALC should be exploited to the fullest in energy efficient building construction.

2.2 Lightweight Concrete

Lightweight concrete can be classified into three categories namely no-fines concrete, lightweight aggregate concrete and aerated concrete as shown in Figure 2.1. Basically, lightness is obtained due to the existence of tiny air bubbles in concrete. According to Suryavanshi and Swamy (2002), there are three possible locations of air voids in a hardened concrete: in the aggregate particles, the resulting aggregates being known as lightweight aggregates; in the hardened cement paste, the resulting concrete being known as cellular, air-entrained or foamed concrete; and between the normal coarse aggregate particles (fine aggregate being omitted), the resulting concrete is known as no-fines concrete.

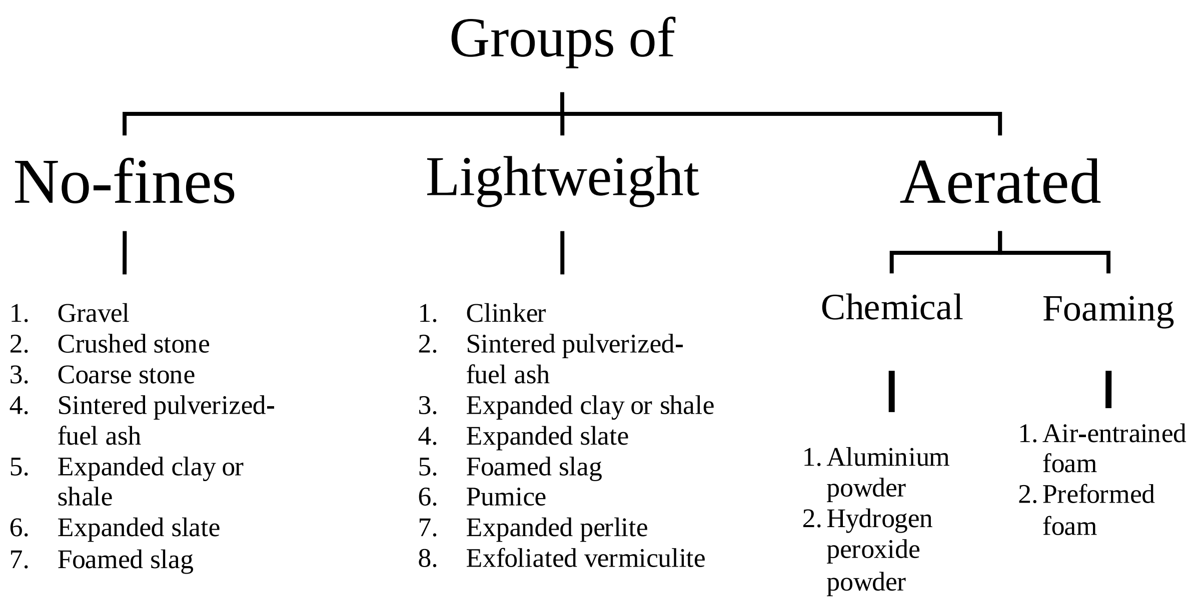


Figure 2.1: Groups of Lightweight Concrete (Short and Kinniburgh, 1978)

2.2.1 No-fines Concrete

No-fines concrete refers to concrete which contains a single-size (10 to 20 mm) of aggregate. The aggregates can be either dense aggregate or lightweight aggregate which are cement bound but leaving voids between them due to their single-size. Its unit weight is about two third to three quarters of the unit weight of conventional concrete (Everett, 1994).

2.2.2 Lightweight Aggregate Concrete

Lightweight aggregate concrete is similar to conventional concrete but lightweight aggregate is used in place of conventional aggregate. Lightweight aggregates are normally manufactured or are by-products of industrial processes such as furnace clinker, foamed slag, expanded clay or shale, sintered pulverized-fly ash, expended perlite and plastic particles of polystyrene. They are also natural lightweight aggregates which are usually of volcanic origin such as pumice, scoria and diatomite are light yet strong.

2.2.3 Aerated Lightweight Concrete (ALC)

ALC is also known as foamed, cellular, air-entraining or pore concrete. The unit weight of ALC can be lowered by partially replacing the solid content of the mix with air voids.

Concrete of this type has the lowest unit weight, thermal conductivity and strength. According to Chatterji (2003), air entrained concrete improves the performance of concrete from deterioration in freeze-thaw environment. Raina (1989) asserted that the benefits of air entrainment in concrete mixtures have made its use very common in colder climates. It improves resistance to freezing and thawing damage, improves workability and reduces permeability and bleeding. Somayaji (2001) claimed that the use of air entrainment is able to improve the workability and prevent segregation of lightweight concrete. Lo et.al. (2006) concurred with the reason that air entraining agent is used to control the floatation of lightweight aggregate therefore reducing the segregation and lowering the unit weight of the concrete.

Large amount of researches were carried out to define the characteristics of entrained air bubble system for an acceptable concrete life span. The requirements are about 5-7% air by the volume of concrete and a minimum specific surface of 25 mm^2/mm^3 of air.

Methods of aeration are done by mixing stabilised foam or by whipping air in with the aid of an air-entraining agent. Air-cured ALC is used where little strength is required and full strength of development depends upon the reaction of lime with the siliceous aggregate. For equal unit weight, the strength of high pressure steam-cured concrete is about twice that of air-cured concrete.

2.2.3.1 Autoclaved Lightweight Concrete

ALC can be non-autoclaved or autoclaved based on the method of curing. Autoclaved ALC also known as autoclaved cellular concrete, is a lightweight, porous concrete (Ropelewski and Neufeld, 1999). It is a mixture of sand, lime and cement together with a gas forming agent. These combinations of raw materials are then poured into moulds, cut and cured under pressure in an autoclave (CSR, 2001). The compressive strength, drying shrinkage and absorption properties depend directly on the method and duration of curing (Narayanan and Ramamurthy, 2000).

Autoclaved lightweight concrete is unique among the construction materials simply because it combines the excellent thermal resistance and thermal inertia properties. According to Tada (1986), thermal conductivity of autoclaved ALC depends on its unit weight. An equation has been developed correlating the relationship between the two variables.

$$k = (2.43 \text{ x } 10^{-4)}\rho + (4.62 \text{ x } 10^{-3}) \qquad (2.1)$$

Where,

k = thermal conductivity of autoclaved ALC

ρ = density of autoclaved ALC (kg/m^3)

2.2.4 Advantages of Lightweight Concrete

Glenn et al. (1999) and Kılıç et al. (2003) reported that lightweight concrete is famous for its obvious advantages of higher strength to weight ratio, lower coefficient of thermal expansion, enhanced tensile strain capacity and better heat and sound insulation characteristics due to air voids.

In concrete construction, self weight or dead load represents a very large proportion of total load on the structure. Therefore, there are clearly considerable advantages in reducing the unit weight of concrete in order to reduce the total load. The reduction in the self weight by the use of lightweight concrete could result in the decrease of cross section of columns, beams and ultimately foundations (Gao et al., 1997). This indirectly reduces the total construction cost and promotes efficient use of building materials. Suryavanshi and Swamy (2002) echoed by stating that with the reduction of load bearing elements and the size of foundations, lightweight concrete can be used for the construction on soils with lower bearing capacity.

Apart from reducing the self weight, lightweight concrete is also used to reduce the risk of earthquake damages to a structure simply because the earthquake forces that will impose on the civil engineering structures and buildings are proportional to their mass (Yasar et al., 2003).

2.2.5 Application of Lightweight Concrete

The applications of lightweight concrete cover a wide spectrum in the construction industry. Generally, it can be classified to load bearing and non-load bearing applications, both of which are rely closely on the unit weight of the lightweight concrete. The applications of lightweight concrete based on its unit weights are summarised in Table 2.1 as follows.

Table 2.1: Applications of lightweight concrete according to unit weights

Unit Weight (kN/m^3)	Application
Less then 3.0	Insulation boards that are similar to mineral-based and other man made insulation boards like polystyrene, polyurethane used in low hazard area.
3.5 – 5.5	Thermal insulation for fire protection, block filling, roof decking and void filling materials.
6.0 – 8.0	Void filling such as landscaping (above/underground), behind archways and refurbishing damaged sewage system, as well as producing masonry units.
8.0 – 10.0	Produce of block and others non-load bearing building element such as balcony railings, partitions, parapets and others.
11.0 – 14.0	Prefabricates and cast in place walls, either load bearing or non-load bearing. It can be successfully used as floor screens.
15.0 – 18.0	Recommended for slab, foundation and other load-bearing elements where high strength is obligated.

According to Glenn et al. (1999) and Kilic et al. (2003), lightweight concrete has been recognised for its superior performance in thermal insulation and sound insulation characteristics due to its porous structure. This is an important aspect of lightweight concrete to insulate the building. Hence reduce the energy demand to air-condition the building space.

2.3 Introduction to Aerated Lightweight Concrete (Foam Concrete)

ALC is either a cement paste or mortar in which air voids are entrained in by suitable foaming agent. It possesses low self weight, high flowability, controlled low strength, minimal consumption of aggregate and superior thermal insulation properties. Although the material was first patented in year 1923, its construction applications as lightweight non structural and semi structural components only increased in the fifties which were a few decades after it had been patented (Ramamurthy et al., 2009). According to Lyons (2007), ALC contains 30-80% of air content for fire and frost resistant purposes. It has high workability, can be easily placed without the need of compaction.

2.4 Constituent Materials

2.4.1 Constituents of Base Mix

The constituent of base mix of foam ALC consists of are fine aggregate, cement, water and foam. Normally, Ordinary Portland Cement is used unless special required specification need to be achieved such as sulfate resisting, higher early strength and low hydration heat. Kearsley and Wainwright (2001) and Rose and Morris (1999) have carried out research to replace Ordinary Portland Cement with rapid hardening Portland cement, while Ramamurthy et al. (2009) used high alumina and calcium sulfoaluminate cement to improve the early strength of ALC. Apart from that, fly ash and ground granulated blast furnace slag have been used by Jones and McCarthy (2005a), Papayianni and Milud (2005) as partial cement replacement to reduce cost, enhance consistency of mix, reduce heat hydration and increase long term strength.

Some other materials such as incinerator bottom ash, recycled glass, foundry sand and quarry finer have also been used as alternate fine aggregates in the production of ALC Ramamurthy et al. (2009). Lee and Hung (2005) used expanded polystyrene and Lytag fines to further reduce the unit weight of ALC.

It can be concluded that the technology of ALC production is quite matured. It is similar to conventional concrete production where different types of cement are used for certain particular requirement. ALC can be a green material since it may be produced with the inclusion of waste or industrial by-products such as fly ash, incinerator bottom ash, expanded polystyrene and others as fine aggregate or as part of the cement substitution.

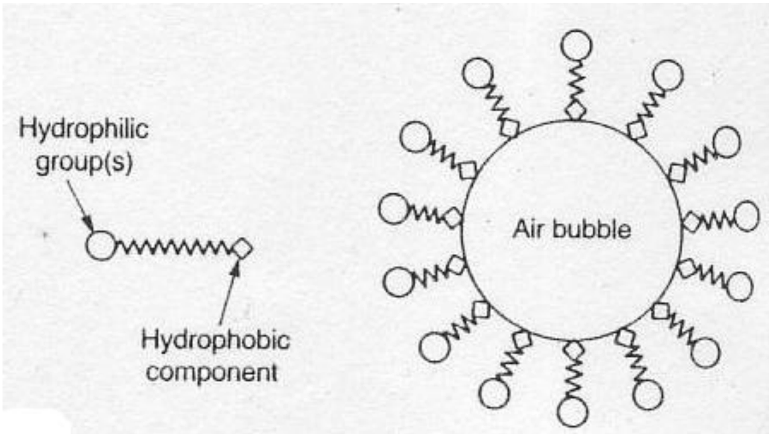
2.4.2 Water Requirement

Water within the pH level of 6-8 is suitable to be used in producing ALC. The water requirement for a mix depends upon the composition and the use of admixtures. More often than not, the water requirement is also governed by the consistency and stability of the mix as suggested by Karl and Worner (1993).

Normally, the water cement ratio ranges from 0.40 to 1.25 (Kearsley, 1996). Nambiar and Ramamurthy (2006a) mentioned that at lower water content, the mix is too stiff which will cause the bubbles to break. On the other hand, if the water content is too high, the mix will be too thin and unable to hold the bubbles leading to separation of bubbles from the mix and thus cause segregation. Though super plasticisers are also sometimes used but this caused instability in the foam as stated by Jones and McCarthy (2006).

2.4.3 Air Entraining Agent or Foaming Agent

Air entraining agents are organic materials which when added into a concrete mixture will entrain a controlled quantity of air in the form of microscopic bubbles in the cement paste component of the concrete. The bubble diameters are generally in the range of 0.02 mm to 0.10 mm with an average spacing of about 0.25 mm (Illston and Domone, 2001). Air entraining agents are powerful surfactants which act at air-water interface within the cement paste. Their molecules have a hydrocarbon chain or backbone terminated by a hydrophilic polar group typically from carboxylic or sulfonic acid. This becomes orientated into the aqueous phase, with the hydrocarbon backbone pointing inwards towards the air bubble. Thus forming a stable mixture which the negatively-charged bubbles become uniformly dispersed as shown in Figure 2.2.



(a) (b)

Figure 2.2: Schematic of air entrainer surface-active molecules (a) surface-active molecules (b) stabilized air bubbles (Illston and Domone, 2001)

Primarily, the major reason for entraining air is to provide freeze-thaw resistance to the concrete. Uniformly dispersed air voids provide spaces for the water to expand into when it freezes and thus reducing the disruptive stress of freezing. The secondary effect of entrained air is to improve the workability of the mix. Air entrainment also increases the porosity of the concrete which leading to the drop in strength properties (Illston and Demone, 2001)

According to Marotta (2005) and Mamlouk and Zaniewski (2006), air entraining admixtures can be composed of a variety of materials such as salts of wood resins (vinsol resin), synthetic detergents, salts of sulfonated lignin which is the by-product of paper production, salts of petroleum acids, salts of proteinaceous material, fatty and resinous acids, alkylbenzene sulfonates and lastly salts of sulfonated hydrocarbons.

There are two methods of producing foam ALC, that is by pre-foaming method or mixed foaming method. Pre-foaming method comprises of producing base mix and stable pre-formed or stable aqueous foam separately and then thoroughly blending the foam into the base mix. In mixed foaming, the surface active agent is mixed along with base mix ingredients during the process of mixing. At the same time, foam is produced resulting in cellular structure in concrete (Byun et al., 1998). The pre-formed foam must be stiff, firm and stable so that it resists the pressure of the mortar until cement takes its initial set and form a strong skeleton of concrete around the void filled with air (Ramamurthy et al., 2009).

According to Byun et al. (1998), pre-formed foaming is preferred to mix-forming technique due to the following advantages:

(i) lower foaming agent required;
(ii) a close relationship between amount of foaming agent used and air content of the mix.

The pre-formed foam can be either wet or dry foam. The former is produced by spraying a solution of foaming agent over a fine mesh to produce 2-5 mm bubble size and is relatively less stable. On the other hand, dry foam is produced by forcing the foaming agent solution through a series of high unit weight restrictions as well as forcing compressed air simultaneously into the mixing chamber.

Nehdi et al. (2001) reported that trial and error process is adopted to achieve ALC with desired properties. This could be due to too many variables to be taken care of in producing ALC such as filler binder ratio, water binder ratio and unit weight.

2.5 Properties of Aerated Lightweight Concrete (ALC)

Generally, properties of ALC can be classified into two categories namely fresh state and hardened state properties. Fresh state properties include consistency and stability. The hardened state properties are classified into physical, mechanical, durability and functional properties. Table 2.2 summarises the fresh and hardened properties studied by various researchers.

Table 2.2: Tabulation showing properties of aerated lightweight concrete investigated (Ramamurthy et al., 2009)

Author (Year)	Ingredients	Fresh State Properties	Physical and mechanical Properties					Durability	Functional Properties
			Shrinkage	Sorption	Porosity	Unit Weight	Strength		
Valore (1954a, 1954b)	C/L/CM		√	√	√	√	√		Thermal, fire and acoustic properties
McCormick (1967)	CM					√	√		
Hoff (1972)	C				√		√		
Richard et al. (1975)	C					√	√		Thermal properties, Cryogenic applications
Richard (1977)									
Tada and Nakano (1983)	CM			√	√				
Tada (1986)	C					√	√		Optimum acoustical performance design

Author (Year)	Ingredients	Fresh State Properties	Physical and mechanical Properties					Durability	Functional Properties
			Shrinkage	Sorption	Porosity	Unit Weight	Strength		
Tam et al. (1987)	CM					√			
Regan and Arasteh (1990)	LWA		√		√	√			
Karl and Worner (1993)	-	√							
Kearsley (1996, 1999)	CM		√				√		
Kearsley and Mostert (1997)	C/CF					√	√		Thermal properties
Durack and Weiqing (1998)	CM/CFM				√		√	√	
Kearsley and Visagie (1999)	C/CF				√ (AV)	√	√		
De Ross and Moris (1999)	C/CF/L		√				√		Thermal conductivity

Author (Year)	Ingredients	Fresh State Properties	Physical and mechanical Properties					Durability	Functional Properties
			Shrinkage	Sorption	Porosity	Unit Weight	Strength		
Nehdi et al. (2001)	-					√	√		
Jones (2001)	CM		√				√		
Turner (2001)	CM	√							
Kyle (2001)	CM						√		
Kearsley and Wainwright (2001, 2001a, 2002, 2002a)	C/CF			√	√	√	√		
Jones and Giannakou (2002)	-								Energy efficient foundation – thermal analysis
Giannakou and Jones (2002)									
Madjoudj et al. (2002)	-			√					
Jones et al. (2003)	CM	√	√				√		

Author (Year)	Ingredients	Fresh State Properties	Physical and mechanical Properties					Durability	Functional Properties
			Shrinkage	Sorption	Porosity	Unit Weight	Strength		
Tikalsky et al. (2004)	CM							√	
Kearsley and Mostert (2005)	CM/CFM								Fire resistance, use in refractory
Proshin et al. (2005)									Thermal protective foam concrete and energy
Jones and McCarthy (2005)	CM	√	√				√		Comparison of thermal conductivity
Jones and McCarthy (2005a)	CM		√				√	√	
Wee et al. (2006)	CG				√ (AV)		√		

Author (Year)	Ingredients	Fresh State Properties	Physical and mechanical Properties					Durability	Functional Properties
			Shrinkage	Sorption	Porosity	Unit Weight	Strength		
Laukaitis and Fiks (2006)	CM				√				Comparison of acoustical properties
Nambiar and Ramamurthy (2006a, 2006b, 2007, 2007a, 2008)	CM/CFM	√	√	√	√ (AV)	√	√		

Notes:
CM – Cement mortar, C – Neat cement, L – Lime, CFM – Cement fly ash mortar, CF – Cement with fly ash replacement
AC – Autoclaving, LWA – Lightweight aggregate, CG – Cement with GGBS replacement, AV – air-void characterisation

2.5.1 Fresh State Properties

Unlike conventional concrete, compaction or vibration is not required by ALC. It should have flowability and self compactability whereby these two properties are evaluated in terms of consistency and stability of ALC. The consistency and stability of ALC are affected by the water content in the base mix as well as the amount of foam added together with other solid ingredients in the mix (Nambiar and Ramamurthy, 2008)

2.5.2 Hardened State Properties

Hardened state properties are broadly classified into physical, mechanical, durability and functional characteristics (Ramamurthy et al., 2009). Physical properties include drying shrinkage, unit weight, sorption, porosity and air-void system. For mechanical properties, it includes compressive, tensile and flexural strengths as well as modulus of elasticity. Thermal conductivity, acoustic properties and fire resistance are categorised under functional properties. The focus of this literature review is only on the compressive and flexural strengths and thermal properties of ALC.

2.5.2.1 Unit Weight

The unit weight of ALC can be determined either during the fresh or hardened state. Fresh unit weight is required for mix design and casting control purposes. However, most of the physical properties of ALC related to or depend upon its unit weight in hardened state (Ramamurthy et al., 2009).

Durack and Weiqing (1998) have conducted a study comparing cement-sand based ALC with cement-fly ash based ALC. They concluded that replacement of fly ash helps in reducing the unit weight with an increased strength. Nambiar and Ramamurthy (2006b) concurred with the fact that to achieve a particular unit weight of ALC, use of fly ash resulted in a reduction in foam volume requirement due to its lower specific gravity.

A theoretical equation for finding fresh unit weight may not be applicable as there can be scatter in the results caused by a number of factors including continued expansion of the foam after its discharge and loss of foam during mixing (Regen and Arasteh, 1990).

2.5.2.2 Compressive Strength

Table 2.3 presents an overview of compressive strength of ALC for various mixture compositions and unit weights conducted by various researchers. According to Kearsley (1996), the compressive strength reduces exponentially with a reduction in the unit weight of ALC. These are the common factors affecting the compressive strength of concrete products. According to Ramamurthy et al. (2009), specimen size and shape, the method of pore formation, direction of loading, age, water content, characteristics of ingredients used and the method of curing are accounted to influence the strength of ALC in total. Aldridge (2005) and Hamidah et al. (2005) topped up the list on the factors affecting the compressive strength of ALC by suggesting that cement-sand ratio, type and particle size distribution of sand and type of foaming agent used will also affect the compressive strength of ALC.

From the study conducted by Visagie and Kearsley (2002), they concluded that the compressive strength of ALC decreases with the increase in void diameter for dry unit weight between 5 to 10 kN/m^3. For unit weights higher than 10 kN/m^3, as the air-voids are further apart to have an influence on the compressive strength, the composition of the paste determines the compressive strength.

A study was carried out to look into the effect of replacing large volumes of cement up to 67% by weight with both classified and unclassified fly ash into ALC. The results showed no significant reduction in strength according to Kearsley and Wainwright (2001). The researchers have suggested that the compressive strength of ALC is primarily a function of dry unit weight. They also highlighted that ALC mixes with high fly ash content needed a longer time to reach their maximum strength which was observed to be higher than that achieved by using only cement. The compressive strength of ALC using fly ash as partial or complete replacement for filler has resulted in higher strength to unit weight ratio (Jones and McCarthy, 2005a; Jones and McCarthy 2005b; Durack and Weiqing, 1998; Nambiar and Ramamurthy, 2006a). The explanation offered by Papayianni and Milud (2005) regarding the better performance of fly ash as binder in ALC is due to the combined effect of high water retentivity and pozzolanic activity of fly ash.

The enhancement of strength with fly ash as filler is not pronounced at lower unit weight range especially at early ages. The reason is that at lower unit weight range, it is the ALC unit weight that controls the strength rather than the material properties as reported by Nambiar and Ramamurthy (2006b).

For a given unit weight, the mix with fine sand resulted in higher strength than the mix with coarse sand and the variation is even greater at higher unit weight. This higher strength to unit weight ratio is attributed to the comparatively uniform distribution of pore in ALC with fine sand, while the pores were larger and irregular for mixes with coarse sand. Similar trend was observed when sand was replaced with fine fly ash (Nambiar and Ramamurthy, 2006a).

As highlighted earlier, curing regime affects the compressive strength of ALC. Autoclaving increases the compressive strength and is normally used for precast structural elements. In general, compressive strength of water-cured ALC is reported to be higher than that cured in air (Hamidah et al., 2005). However, Kearsley and Booyens (1998) reported a contradicting finding, they reported that higher strength is achievable for humid air curing at temperature around 40 ^{0}C compared to normal water-cured specimens.

Mixes containing expanded shale aggregate produced higher strength value than those containing sand as aggregate for the same wet unit weight. The use of lime, demolition fines, recycled glass as fine aggregate has little effect or no effect on the compressive strength of ALC. Nevertheless, the use of crumb rubber, used foundry sand, China clay sand and quarry fines has caused the reduction in strength of ALC (Rose and Morris, 1999; Ramamurthy et al., 2009).

From the findings and conclusions drawn by various researchers, the compressive strength of ALC is influenced by the water and cement content, curing regime, age, type of filler and admixtures. These are the common factors affecting the strength of either conventional or lightweight concrete products. However, they are some other explicit factors affecting the compressive strength of ALC. These explicit factors are the unit weight and types of foaming agent used.

Table 2.3: Compressive strength studies conducted by various researchers (Ramamurthy et al., 2009)

Author (Year)	Proportion of cement kg/m^3 or composition	Ratios			Unit Weight Range (kN/m^3)	Compressive Strength 28-day (MPa)
		S/C	W/C	F/C		
McCormick (1967)	335-446	0.79-2.8	0.35-0.57		8.0-18.0	1.8-17.6
Tam et al. (1987)	390	1.58-1.73	0.6-0.8		13.0-19.0	1.81-16.72
Regan and Arasteh (1990)		0.6 (LAC/C)	0.45-0.6		8.0-12.0	4-16
Van Deijk (1991)	Cement-sand/fly ash				2.8-12.0	0.6-10 (91 days)
ACI 523.1R (1992)	Neat cement paste Cement-sand mix				2.4-6.4 (DD) 4.0-5.6 (DD)	0.48-3.1 0.9-1.72
Hunaiti (1997)		3			16.7	12.11
Kearsley and Booyens (1998)	Cement-fly ash replacement				10.0-15.0	2.8-19.9
Durack and Weiqing (1998)	270-398 137-380	1.23-2.50	0.61-0.82 0.48-0.7	 1.48-2.50	9.8-11.9 (DD) 5.4-10.0 (DD)	1-6 3-15 (77 days)
Aldridge (2000)	Cement-sand mix				4.0-16.0	0.5-10

Author (Year)	Proportion of cement kg/m^3 or composition	Ratios			Unit Weight Range (kN/m^3)	Compressive Strength 28-day (MPa)
		S/C	W/C	F/C		
Kearsley and Wainwright (2001)	Cement-fly ash replacement 193-577			0.60-1.17	10.0-15.0	2-18
Tikalsky et al. (2004)	Neat cement 149-420			0.40-0.45	4.9-6.6	0.71-2.07
	Cement-sand/fly ash 57-149			0.50-0.57	13.2-15.0	0.23-1.1
Jones and McCarthy (2005a)	500	1.5-2.3	0.3		14.0-18.0	10-26
	500		0.65-0.83	1.15-1.77	14.0-18.0	20-43
Jones and McCarthy (2005b)	300	1.83-3.17	0.5		10.0-14.0	1-2
			1.11-1.56	1.22-2.11	10.0-14.0	3.9-7.3
Nambiar and Ramamurthy (2006b)	Cement-sand mix (coarse)	With filler-cement ratio varied form 1 to 3 and fly ash replacement for sand varied form 0% to 100%	800-1350 (DUW)	1.00-7.00		

Note:
S/C = Sand-cement ratio, F/C = Fly ash-cement ratio, W/C = Water-cement ratio, LAC = Lightweight aggregate content, DUW = Dry Unit Weight

2.5.2.3 Flexural and Tensile Strengths

The relationship between the flexural strength to compressive strength of ALC is in the range of 0.25-0.35 (Ramamurthy et. al., 2009). The splitting tensile strength of ALC is lower than those of equivalent normal weight and lightweight aggregate concrete. Cement-sand based ALC recorded a higher tensile strength than those that contain fly ash. The higher strength is attributed to the improved shear capacity between sand particles and the paste phase (Jones and McCarthy, 2005a).

The role of fibres cannot be ignored in improving the flexural and tensile strength of concrete materials. Kearsley and Mostert (1997) have studied and concluded the positive effects of polypropylene fibres in enhancing the flexural and tensile strength of ALC.

2.5.2.4 Thermal Conductivity

Although much work has been done and records of such work are well documented on the mechanical properties of concrete, relatively fewer studies have been conducted and inclined to investigate the thermal conductivity of ALC (Demirboga and Gul, 2003). Thermal conductivity values of concrete have been compiled and formed as a Standard in some advanced countries such as France and Germany a long time ago. In France, it is referred to as Rules Th-K77 while in Germany it is known as Deutsche Normen Din 4108.

Table 2.4 summarised the thermal conductivity values for lightweight concrete from both standards.

Table 2.4: Thermal conductivity values based on Standard French and Germany (Loudon, 1979)

Standards	Material	Dry Unit Weight (kN/m^3)	Thermal Conductivity (W/mK)
Th-K77	Dense concrete with siliceous or calcareous aggregate	22.0-24.0	1.75
	Lightweight concrete with siliceous or calcareous aggregate	16.5-21.0	1.15-1.40
	Pozzolana or foamed slag aggregate concrete	10.0-16.0	0.35-0.52
	Natural pumice concrete	9.50-11.5	0.46
	Expanded clay or expanded shale aggregate concrete	6.0-18.0	0.25-1.05
	Perlite or vermiculite concrete	4.0-8.0	0.24-0.31
	Autoclaved aerated concrete	3.8-8.3	0.16-0.33
DIN 4108	Crushed brick concrete	16.0-20.0	0.76-1.05
	No fines concrete with dense aggregate	15.0-19.0	0.64-1.11
	Pumice concrete and foamed or granulated blast furnace slag concrete	8.0-12.0	0.29-0.47
	Autoclaved aerated and foamed concrete	4.0-10.0	0.14-0.35

Many researchers such as Loudon (1979), Adam and Jones (1996); Blanco et al. (2000); Demirboga and Gul, (2003); have concluded that reduction in thermal conductivity is due to the decrease of concrete unit weight. Apart from that, thermal conductivity of concrete increases with increasing moisture content since water has a conductivity of about 25 times that of air (Demirboga and Gul, 2003). Steigner and Hurd (1978) reported that when unit weight of concrete increased 1% due to water absorption, the thermal conductivity of these specimens increases 5%. Bouguerra et al. (1998) claimed that thermal conductivity of lightweight concrete changes considerably with its porosity. Researchers also found that thermal conductivity of concrete increases with increasing cement content.

ALC possesses excellent thermal insulation property due to its cellular microstructure by controlling its unit weight. The thermal conductivity of ALC of unit weight 10.0 kN/m^3 is reported to be one-sixth the value of typical cement-sand mortar (Ramamurthy et al., 2009). The thermal conductivity value ranges from 0.1-0.7 W/mK for corresponding dry unit weights ranging from 6.0-16.0 kN/m^3 (Jones and McCarthy, 2005a). From the findings by Ramamurthy et al. (2009), they noticed that the thermal conductivity reduces by 0.04 W/mK as a result of a decrease in dry unit weight by 1.0 kN/m^3. According to Jones and McCarthy (2006), ALC exhibited typical thermal conductivity between 0.23-0.42 W/mK at dry unit weight of 10.0 to 12.0 kN/m^3.

From the observation by Giannakou and Jones (2002), the inclusion of pulverized fuel ash (PFA) reduces thermal conductivity by 12-38% as compared to mixes which used only Portland cement as binder. This is attributed to the lower unit weight and cenospheric particle morphology of fly ash particles which decrease the heat flow path.

Fu and Chung (1997) have conducted research on the effect of silica fume on the thermal conductivity and specific heat capacity of cement paste. They concluded that silica fume decreases the thermal conductivity but increases the specific heat capacity of the cement paste.

The use of lightweight aggregate with low particle unit weight in combination with artificially introduced air-voids in the mortar matrix has been observed to be advantageous in reducing thermal conductivity (Ramamurthy et al., 2009). The inclusion of polystyrene granules, a lightweight aggregate, into foam of unit weight range 2.0-6.5 kN/m^3 ALC, the corresponding thermal conductivity ranges from 0.06-0.16 W/mK as reported by Prohsin et al. (2005).

The thermal conductivity property of lightweight concrete is summarised in Table 2.5.

Table 2.5: Thermal conductivity of lightweight concrete

Authors (Year)	Ingredients	Unit Weight (kN/m^3)	Thermal Conductivity (W/mK)
Adam and Jones (1996)	Lime-soil mix	15.4-18.6	0.26-0.41
	Cement-soil mix	18.2-19.2	0.46-0.55
Khedari et al. (2001)	Cement-soil-sand with coconut coir fibre	86.4-15.6	0.19-0.93
	Cement-soil-sand with durian fibre	9.5-18.3	0.19-0.80
Demirboga and Gul (2003)	Perlite-silica fume	4.9-5.1	0.16-0.17
	Perlite-fly ash	4.8-5.1	0.15-0.17
Khedari et al. (2005)	Cement-soil-coconut fibre	15.9-17.6	0.65-0.97
Uysal et al. (2004)	Pumice-Normal Aggregate	13.3-19.9	0.78-1.35
Bederina et al. (2007)	Cement-sand-wood shavings	14.0-19.0	0.55-1.10
Gul et al. (2007)	Perlite lightweight concrete with polypropylene fibre	17.7-19.7	0.82-0.92

From the literature review, reducing the unit weight is the most effective way to reduce the thermal conductivity of ALC as concluded by all researchers. It is because unit weight has a direct relationship with the amount of air void in the ALC. The challenge is to produce low unit weight ALC to achieve low thermal conductivity but still possess sufficient strength.

Therefore, it is crucial to find an optimum mix between thermal conductivity and strength properties of ALC. It has also been observed that pulverized fly ash and silica fume not only improve the mechanical properties of ALC, they also help in reducing the thermal conductivity.

CHAPTER 3

LITERATURE REVIEW - HEAT TRANSFER

3.1 Introduction

Heat transfer is thermal energy in transit due to a spatial temperature difference. Ropelewski and Neufeld (1999) defined heat transfer as the rate of thermal energy transfer across a given area. There are three ways of heat transfer: conduction, convection and radiation. Nevertheless, Ropelewski and Neufeld (1999) ascertained that there are only two basic heat transfer mechanisms involved in heat flow through buildings which are conduction and radiation.

3.2 Mechanisms of Heat Transfer

3.2.1 Conduction

Conduction refers to heat transfers that occur across the medium as defined by Incropera et al. (2007). Conduction can be explained at which the activity at molecular level generating a flow of heat through any kind of material such as solid, liquid, vapour or gas (Wakelin and Reynolds, 1995). Yunus (2003) described conduction as the transfer of energy from the more energetic particles to the adjacent less energetic ones as a result of interactions between the particles of a substance.

3.2.2 Convection

Convection is another heat transfer mechanism that occurs between a surface and a moving fluid when they are at different temperatures. Wakelin and Reynolds (1995) explained that bulk motion of a fluid carries energy from one place to another, either through natural processes such as wind and buoyancy-induced free convection or force convection through purposeful activity for instance by fans and pumps of heating systems. Yunus (2003) defined convection as the mode of energy transfer between a solid surface and the adjacent liquid or gas that is in motion. A faster fluid motion creates a greater convection heat transfer.

3.2.3 Radiation

Radiation is about the energy released by matter in the form of electromagnetic waves or in a form of discrete photon resulted from the changes in the electronic configurations of the atoms or molecules (Yunus, 2003). Wakelin and Reynolds (1995) pointed out that all surfaces of finite temperature produce energy in the form of electromagnetic waves as radiation. Radiation heat transfer does not require the presence of an intervening medium as required in conduction and convection. Therefore, radiation heat transfer is fastest and it suffers no attenuation in a vacuum. The most important and widely known form of radiation is the solar radiation.

3.3 Heat Transfer in Building

Heat of a building is subjected to its internal and external effects of heat transfer. Figure 3.1 shows the internal heat inputs of a building which include lighting system, human occupants and from other electrical appliances.

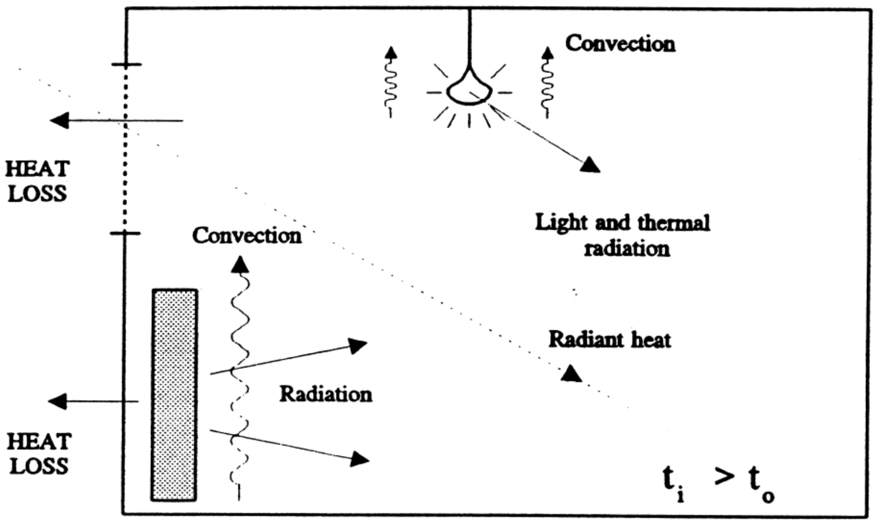


Figure 3.1: Internal heat input of a building
(Wakelin and Reynolds, 1995)

Figure 3.2 shows the external heat transfers into the inner building. It represents conditions that are typical when outdoor temperature is greater than that of the indoor temperature. It also shows convection and radiation heat transfer to the outer wall of a building; some of this energy will subsequently be conducted to the inner surface of the wall by conduction and will then pass to the interior by a combination of convection and radiation. Apart from that, heat also transfers direct radiant input through window into a building. The solar energy is absorbed by the floor and subsequently gives rise to both convection and re-radiation from the floor. However, some of the radiant energy is absorbed in the glass, rather than passing directly through as radiation. A fraction of the absorbed energy is subsequently passed to the air within by the mechanisms of conduction and convection.

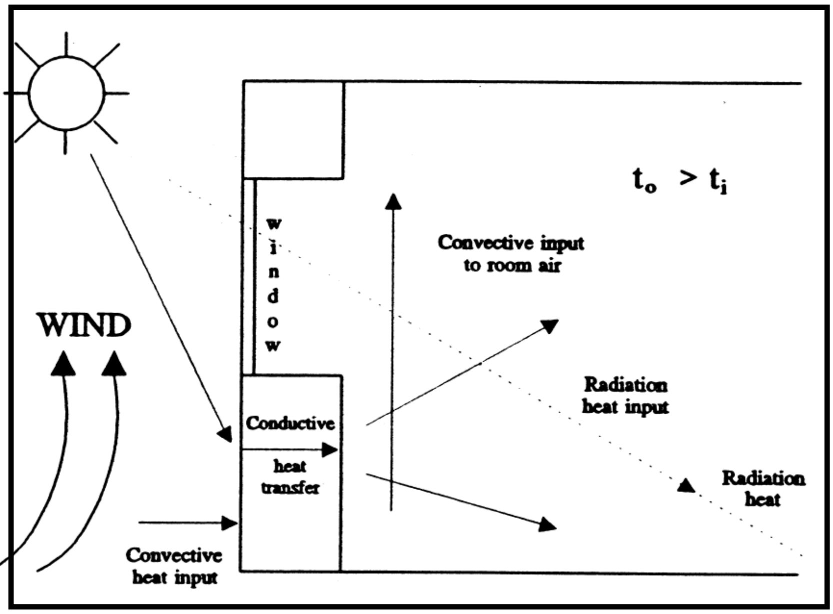


Figure 3.2: External heat transfers into the inner of a building (Wakelin and Reynolds, 1995)

This study only focuses on conduction as it is the main mechanism involved in wall panel heat transfer.

3.4 Conduction

Conduction is the first heat transfer mechanism. The transfer of heat is by molecular motion taking place within two parts of the same body or between bodies that are in physical contact with each other (Ropelewski and

Neufeld, 1999). Conductive heat transfer is described by Fourier's Law and Figure 3.3 shows the schematic form of conductive heat transfer.

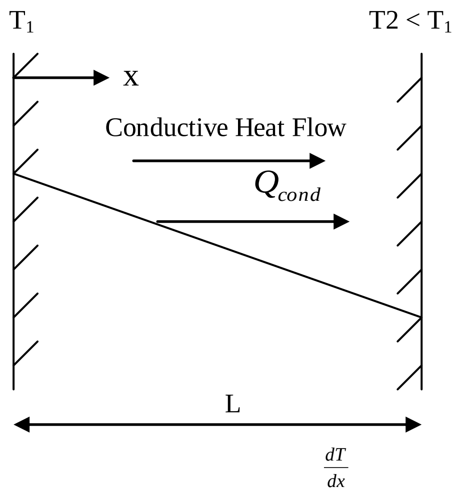


Figure 3.3: Conductive heat transfer

Fourier's Law suggests that

$$Q_{cond} = -kA\frac{dT}{dx} \tag{3.1}$$

or

$$q_x = -k\frac{dT}{dx} \tag{3.2}$$

Where,

Q_{cond} = heat flow by conduction in the x-direction (W)

q_x = heat flux (W/m^2) is the heat transfer rate in the x direction per unit area perpendicular to the direction of transfer and it is proportional to the temperature gradient, $\frac{dT}{dx}$

$\frac{dT}{dx}$ = temperature gradient, different in temperature over distance,

$$\frac{\Delta T}{L} \text{ or } \frac{T_1 - T_2}{L}$$

k = transport property known as thermal conductivity (W/mK) and it is a characteristic of the wall material

Equations (3.1) and (3.2) are in negative sign which indicate the flow of heat from high temperature to low temperature.

3.4.1 Thermal Conductivity, *k*

Thermal conductivity, *k* value, is referred to the property of the particular heat-conducting material and it depends on the state of the material. Normally, the thermal conductivity value of a material is usually being specified together with the temperature and pressure (Wakelin and Reynolds, 1995).

Thermal conductivity generally increases with the increase of the temperature as a consequence of greater molecular activity (Wakelin and Reynolds, 1995). Table 3.1 gives some values indicating the effect of marked departures from the usual atmospheric range of temperatures.

Table 3.1: Dependence of thermal conductivity on temperature (Wakelin and Reynolds, 1995)

Materials	Temperature (^{0}C)	Thermal Conductivity (W/mK)
Fire Brick	500	1.000
	1000	1.300
Silica Brick	500	1.300
	1000	1.400
Water	0	0.570
	20	0.600
	40	0.630
	80	0.670
Mineral Wool	-35	0.280
	35	0.430
Air	-45	0.021
	0	0.024
	45	0.029
Ice	-45	2.740
	-20	2.450
	-1	2.240

Air and other gases are poor conductors, their conductivities increase to some extent with rising pressure. This is because more molecules are tightly packed in. Apart from temperature, moisture content of the material also affects the thermal conductivity since water is about twenty to thirty times better at conducting heat than air. Therefore, the absorption of water will increase the thermal conductivity of a porous material.

In construction industry, the use of thermal insulator mortar and plaster or low thermal conductivity bricks is regarded as one of the most effective means of energy conservation in buildings. This is to prevent heat from being transferred into the building or vice versa. Recent efforts have shown that porous concrete possesses thermal conductivity values that are low enough to meet future building envelope standards (Khedari et al., 2005; Franco, 2007).

3.4.2 Thermal Resistance, *R*

Thermal resistance, *R* value, is a measurement of the ability of a material to resist the transfer of thermal energy in the building and construction industry. The greater the *R* value, the better the material insulates. *R* value is the reciprocal of *U* value.

The *R* value of the single layer can be expressed as:

$$R = \frac{1}{C} = \frac{l_t}{k} \tag{3.3}$$

Where,

C = layer conductance (W/m^2K)

k = thermal conductivity (W/mK)

l_t = thickness of layer (m)

3.4.3 Thermal Transmittance, *U*

Thermal transmittance is usually referred to as *U* factor in the North America and *U* value in Western Europe (Blanusa et al., 2007). It is also called the overall heat transfer coefficient which describes the ability of a building element in conducting heat. It determines the rate of heat transfer through a building element over an area. Lower thermal transmittance value means the greater the material's resistance to heat flow. Thermal transmittance is the inverse of thermal resistance, *R* value.

The thermal transmittance of a material consisting of several layers can be expressed as:

$$U = \frac{1}{\sum R} \tag{3.4}$$

Where,

R = *R* value, the resistance to heat flow in each layer (m^2K/W)

3.4.4 Thermal Diffusivity, α

In heat transfer analysis, thermal diffusivity is a measure of rapidity of the heat propagation through a material in transient or non-steady state of heat conduction (Santos, 2003).

$$\alpha = \frac{k}{\rho \mathrm{c}} \tag{3.5}$$

Where,

α = thermal diffusivity (m^2/s)

k = thermal conductivity (W/mK)

ρ = density (kg/m^3)

c = specific heat capacity (J/kgK)

Substances with high thermal diffusivity rapidly change their temperature to that of their surroundings. It is because they conduct heat quickly in comparison to their volumetric heat capacity or thermal bulk.

3.5 Transient Heat Transfer

Steady state conduction is referred the type of conduction that happens when the temperature difference is constant and the spatial distribution of temperatures in an object is constant or does not change. For instance, a bar may be cold at one end and hot at the other end, but the temperature gradient along the bar does not change with time. There are situations where the temperature rise or drop occurs more significantly, such as when a hot steel bar is dropped into liquid at a low temperature. If the spatial change of temperature of the object over the time were to be analysed. The type of heat conduction can be referred to as unsteady mode of conduction or transient conduction. The analysis is more complex for this system and requires the application of approximation theories (Yunus, 2003).

In transient heat conduction, the temperatures change with time as well as position. Thus, the finite difference solution needs discretisation in time in addition to discretisation in space as shown in Figure 3.4. Discretisation is conducted by selecting an appropriate time step, then solving for the unknown nodal temperatures repeatedly for each time step until the solution at the desired time is achieved.

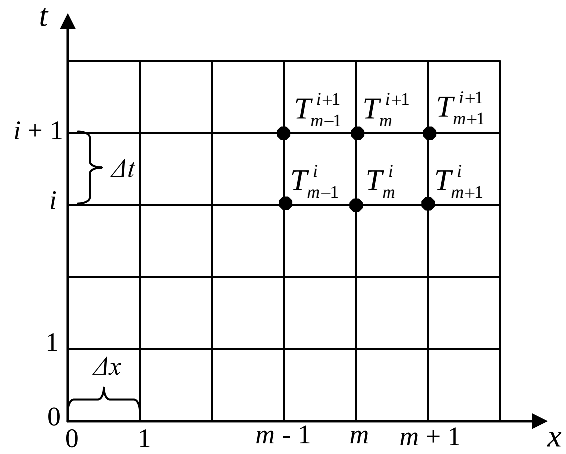


Figure 3.4: Discretisation of nodal temperature

The superscript i is used as the index or counter of time steps with $i = 0$ corresponding to the specified initial condition. The notation T_m^i is used to represent the temperature at the node m at time step i.

The formulation of transient heat conduction problems varies from steady state ones as the former involves an additional term to represent the change in the energy content of the medium with time. This additional term appears as a first derivative of temperature with respect to time in the differential equation and also as a change in the internal energy content during a time step in the energy balance formulation. During a time interval (*Δt*), the energy balance on a volume element can be expressed as:

Heat transferred into the volume element from all of its surfaces during Δt	+	Heat generated within the volume element during Δt	=	The change in the energy content of the volume element during Δt

or

$$\Delta t \text{ x } \sum Q + \Delta t \text{ x } G_{\text{element}} = \Delta E_{\text{element}} \tag{3.6}$$

In general, the rate of heat transfer Q consists of conduction terms for interior nodes but it may involve convection, heat flux and radiation for boundary nodes. Note that:

$$\Delta E_{\text{element}} = mC\,\Delta\text{t} = \rho V_{\text{element}} C\,\Delta t \tag{3.7}$$

Where,

ρ = density of the element

C = specific heat of the element

By dividing (3.7) by Δt gives:

$$\sum_{AllSides} Q + G_{element} = \rho V_{element} C \frac{\Delta T}{\Delta t} \tag{3.8}$$

or

$$\sum_{AllSides} Q + G_{element} = \rho V_{element} C \frac{T_m^{i+1} - T_m^{i}}{\Delta t} \tag{3.9}$$

T_m^{i+1} and T_m^i are the temperatures of node m at times $t_i = i$ Δt and T_m^{i+1} = (i+1) Δt respectively. T_m^{i+1} - T_m^i represents the temperature change of the node during the time interval, Δt between the time steps *i* and *i+1*.

The nodal temperatures usually change during each time step. Thus, they are two possible temperatures to be adopted for the left side of the equation. It could be either previous time step *i* or the new time step *i+1*. Therefore, there are two finite difference approaches. The first case is called explicit method while the latter is called implicit method. Both methods are expressed in the general forms as follows:

Explicit method: $$\sum_{AllSides} \dot{Q}^{i} + G^{i}_{eleemnt} = \rho V_{element} C \frac{T_m^{i+1} - T_m^{i}}{\Delta t} \qquad (3.10)$$

For explicit method, the time step is forward form, the instant for which spatial gradients are calculated. Explicit method is easier to use compared to implicit method. However, the former is not completely stable and the largest allowable value of time step is governed by the stability criterion. If the time step is not sufficiently small, the solutions obtained from the explicit method may oscillate wildly and diverge from the actual solutions. Therefore, the time step chosen must maintain below a certain upper limit as established by stability criterion. It can be proved mathematically or by physical argument based on the second law of thermodynamics. If the coefficient of all T_m^i in the T_m^{i+1} are greater than or equal to zero for all nodes *m*, then the stability criterion is satisfied.

Implicit method: $\sum_{AllSides} \dot{Q}^{i+1} + \dot{G}^{i+1}_{eleemnt} = \rho V_{element} C \frac{T_m^{i+1} - T_m^{i}}{\Delta t}$ (3.11)

Implicit method considers a time step backward form, the point in time for which the spatial gradients are derived. It means that the time derivative is expressed in forward difference form in the explicit case and backward difference form in the implicit case.

3.5.1 Transient Heat Conduction in a Plane Wall

Transient one-dimensional heat conduction in a plane wall of thickness L with heat generation g(x,t) that may vary with time and position.

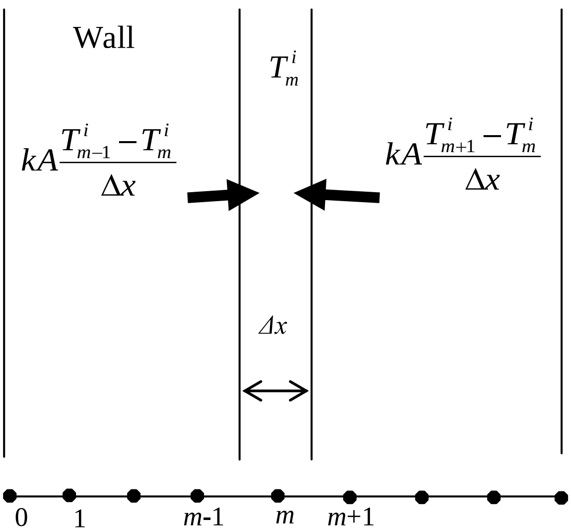


Figure 3.5: Transient one-dimensional heat conduction in a plane wall

From Figure 3.5, it is observed that the volume element of a general interior node m involves heat conduction from two sides and the volume of the element is $V_{\text{element}} = A\Delta x$, the transient finite difference formulation for an interior node can be written on the basis of (3.12) as:

$$kA\frac{T_{m-1}-T_m}{\Delta x}+kA\frac{T_{m+1}-T_m}{\Delta x}+\dot{g}_m\ A\Delta x=\rho A\Delta xC\,\frac{T_m^{i+1}-T_m^i}{\Delta x} \tag{3.12}$$

Equation (3.13) can be simplified by rescinding the surface area, *A* and multiplying by $\frac{\Delta x}{k}$ to become:

$$T_{m-1}-2T_m+T_{m+1}+\frac{\dot{g}\,\Delta x^2}{k}=\frac{\Delta x^2}{\alpha\Delta t}(T_m^{i+1}-T\,\frac{i}{m}) \tag{3.13}$$

Where, $\alpha = \frac{k}{\rho C}$ which is also termed as thermal diffusivity of the wall material.

The dimensionless mesh Fourier number is

$$\tau=\frac{\alpha\Delta t}{\Delta x^2} \tag{3.14}$$

Then (3.13) is further reduced to:

$$T_{m-1}-2T_m+T_{m+1}+\frac{\dot{g}\,\Delta x^2}{k}=\frac{(T_m^{i+1}-T_m^i)}{\tau} \tag{3.15}$$

The application of the formulation to each of the *m*-1 interior nodes gives *m*-1 equations. The outstanding two equations are obtained by using the same method to the two boundary nodes.

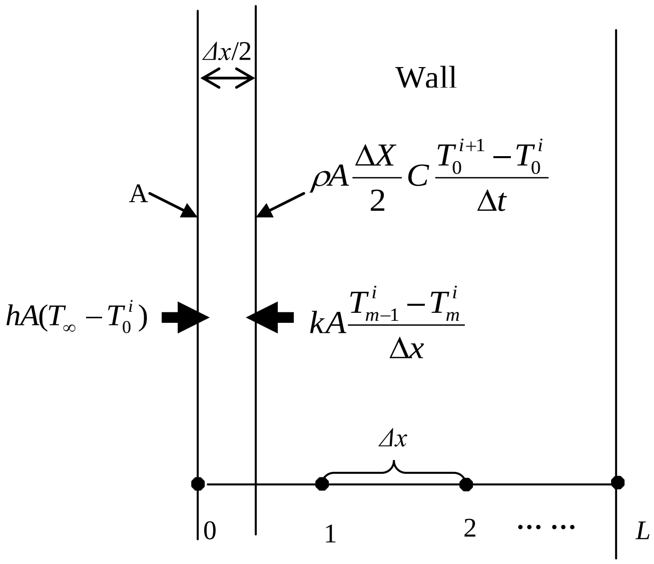


Figure 3.6: Schematic for the explicit finite difference formulation of the convection condition at the left boundary of a plane wall

From the above figure, the formulation of the convection boundary condition at the left boundary (node 0) for the explicit case can be in the form of:

$$hA(T_\infty - T_0^i) + kA\frac{T_1^i - T_0^i}{\Delta x} + \dot{g}_0^i A\frac{\Delta x}{2} = \rho A\frac{\Delta x}{2}C\frac{T_0^{i+1} - T_0^i}{\Delta t} \quad (3.16)$$

Equation (3.16) can further simplify to:

$$T_0^{i+1} = (1 - 2\tau - 2\tau\frac{h\Delta x}{k})T_0^i + 2\tau T_1^i + 2\tau\frac{h\Delta x}{k}T_\infty + \tau\frac{\dot{g}_0^i \Delta x^2}{k} \quad (3.17)$$

In the case of no heat generation and τ =0.5, the explicit finite difference formulation for a general interior node can be simplified to T_m^{i+1} =

$\frac{T_m^{i+1} + T_{m-1}^{i}}{2}$, which means that the temperature of an interior node at the new time step is the average of the temperatures of its neighbouring nodes at the previous time step.

3.6 Thermal Inertia

Thermal inertia is a term commonly used in modeling heat transfers. It is the bulk material property that related to thermal conductivity and volumetric heat capacity. In building envelope's heat transfer aspect, thermal inertia refers to as the degree of slowness with which the temperature of a body approaches its surroundings. A building is heated during the day by a combination of solar radiation and warmer air. The interior temperature of the wall begins to rise, but not at the same rate as its outer wall surface. In most cases, before the inner wall surface temperature reaches equilibrium with its outer surface temperature, the outer surface has cooled down. Hence, an equilibrium is never reached nor the steady state conditions.

According to Ropelewski and Neufeld (1999), thermal inertia heat flow approach is superior compared to thermal resistance approach to determine the heat flow of building envelope. Thermal inertia heat flow approach does not require steady-state conditions to operate since actual sol-air temperatures change continuously throughout the day. Furthermore, the heat flow through the building envelope which is a solid material is not instantaneous as a time lag develops before a temperature change on one side of a wall affects the temperature of the other side of the wall. The time lag parameter accounts for this delayed effects. On the other hand, thermal resistance method depends on steady state condition which means the heat flow is assumed to be instantaneous. It also indicates that the effect of any particular sol-air temperature is felt on the other side of the wall immediately.

The second advantage to the thermal inertia method is that it recognises the heat storage capability or capacity of the building materials of the building envelope. The simple fact is that not all of the thermal energy is passed through a material; some of it is stored within the structure of the material itself. With these two factors, the thermal inertia approach provides better and more accurate prediction on the heat flow through a building's envelope. This will enable a more legitimate capacity sizing for heating and cooling equipment.

Thermal inertia depends on two parameters namely time lag and decrement factor. These parameters in turn depend upon a complex interaction between a material's unit weight, specific heat capacity and thermal conductivity. Time lag refers to the time difference between the peaks of the interior wall surface temperature and the exterior surface temperature. On the other hand, decrement factor means the relative decrease in the variation of the interior surface temperature with time. It is calculated by dividing the interior surface temperature amplitude and the exterior surface temperature.

Time lag and decrement factor are very important characteristics on the heat storage capacities of any materials. These two factors are influenced by the material's thermophysical properties, thickness and the position of the wall as claimed by Asan (1990). High time lags and small decrement factors give comfortable inside temperatures to the occupants even if the outside is very hot (Asan, 1998). In this instance, low temperature variation indicates high thermal inertia and vice versa (RILEM, 1993). Thus, high thermal inertia provides more comfortable environment and buildings with low energy consumption as suggested by Donerlles and Roriz (2004). Figure 3.7 shows how these parameters can be determined from time-temperature measurements.

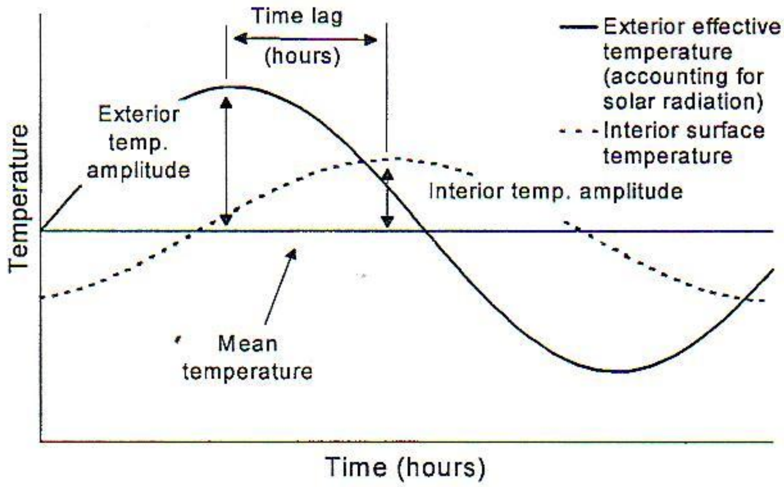


Figure 3.7: Decrement factor and time lag (Aroni et al., 1993)

From Figure 3.7, the time lag is computed in a straight forward manner as indicated. The decrement is calculated with the following equation (Aroni, 1990; Aroni et al., 1993).

$$\text{Decrement, } \lambda = \frac{A_i}{A_e} = \frac{(T_{i(\max)} - T_{i(ave)})}{(T_{e(\max)} - T_{e(ave)})} \tag{3.18}$$

Where,

A_i = interior surface temperature amplitude in ^0C

A_e = exterior surface (sol-air) temperature amplitude in ^0C

$T_{i(max)}$ = maximum (peak) interior surface temperature ^0C

$T_{i(ave)}$ = average interior surface temperature ^0C

$T_{e(max)}$ = maximum (peak) exterior surface temperature ^0C

$T_{e(ave)}$ = average exterior surface temperature ^0C

By referring to a cross-section of the outer wall of a building as shown in Figure 3.8, there are different temperatures profiles during any instant of a day due to the changes of outside temperature. During the transient process, a heat wave flows through the wall from the outside to the inside. The amplitude of these waves shows the temperature magnitudes while the wavelength shows the time. Asan (2006) stated that the amplitude of the heat wave on the outer surface of the wall is based on solar radiation and convection between the outer surface of the wall and the ambient air.

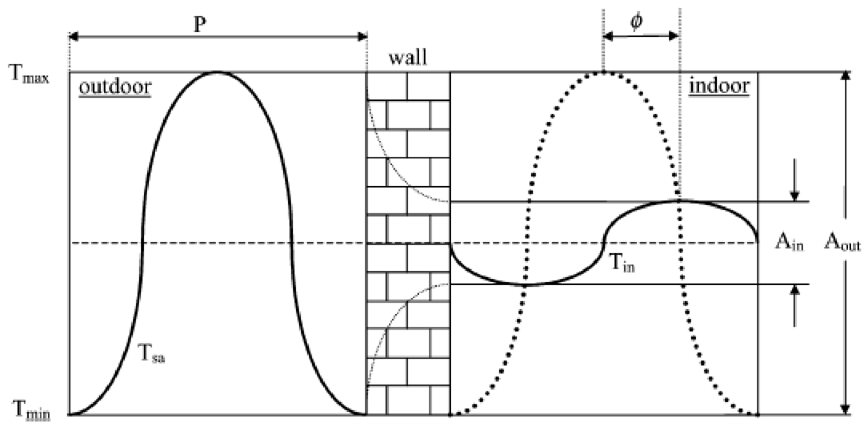


Figure 3.8: Heat wave transferred through wall (Ulgen, 2002)

From Figure 3.8, during the propagation of heat wave through the wall, its amplitude will reduce depending on the material and thickness of the wall. The amplitude will be considerably smaller in the inner surface of the wall than the value at the outer surface.

3.6.1 Thermal Inertia Studies

There were numerous studies conducted in this area and they have ascertained that energy savings of a building was due to thermal inertia (Ropelewski and Neufeld, 1999). The first study was conducted in Sweden on insulated metal roof and autoclaved aerated concrete roof. Both insulated and AAC roofs have approximately the same thermal transmittance but different thermal inertias. The results showed that the metal roof with lower thermal inertia required an additional cost of 25% per unit floor area for indoor air conditioning.

The second study was conducted on two schools located at Coruna and Ferrol, Spain by Orosa and Carpente (2009). They concluded that energy saving was observed due to high thermal inertia effects.

3.7 Newton's Law of Cooling

According to Lienhard IV and Lienhard V (2008), Sir Isaac Newton considered the convective process and suggested that the cooling would be:

$$\frac{dT_{body}}{dt} \propto T_{body} - T_{\infty} \tag{3.19}$$

Where,

T_{∞} = temperature of the on coming fluid

If the energy of the body is consistently replenished, the body temperature need not change. Then (3.19) can be simplified to:

$$Q \propto T_{body} - T_{\infty} \text{ or } q = h(T_{body} - T_{\infty}) \tag{3.20}$$

Where,

q = convective heat flux (W/m^2)

h = convective heat transfer coefficient

This is a steady state form of Newton's law of cooling with the constant *h*. From (3.20), the conductive heat flux is proportional to the difference between the surface and fluid's temperature. The convection heat flux is considered to be positive if the heat is transferred from the surface and it is considered negative if the heat is transferred to the surface (Incropera et al., 2007).

3.8 Overall Thermal Transfer Value (OTTV)

Overall thermal transfer value is an indicator for comparing the thermal performance of buildings. It is a measure of the average heat gain into a building through the building envelope. Higher OTTV means greater heat gain and vice versa (Hui and Lam, 1991). OTTV consists of three major components:

(a) conduction through opaque walls,

(b) conduction through window glass, and

(c) solar radiation through window glass.

Hui and Lam, (1991) mentioned that the OTTV requirement specified in building envelope section of energy conservation standards only applies to air-conditioned or mechanically cooled buildings. It is aimed at achieving the design of an adequately insulated building envelope in order to cut down external heat gain and thus reduce the cooling load of the air-conditioning system of a building.

Usually, they are two sets of OTTV, one for the exterior walls and the other for the roof. The common form of OTTV equation for an external wall is as follows:

$$OTTV_i = \frac{Q_{wc} + Q_{gc} + Q_{sol}}{A_i}$$

$$= \frac{(A_w \times U_w \times TD_{eq}) + (A_f \times U_f \times DT) + (A_f \times SC \times SF)}{A_i}$$

$$= (1 - WWR) \times U_w \times TD_{eq} + WWR \times U_f \times DT + WWR \times SC \times SF$$

(3.19)

Where,

$OTTV_i$ = overall thermal transfer value of the external wall (W/m^2)

Q_{wc} = heat conduction through opaque walls (W)

Q_{gc} = heat conduction through window glass (W)

Q_{sol} = solar radiation through window glass (W)

A_w = area of opaque wall (m^2)

U_w = U-value of opaque wall (W/m^{2}K)

TD_{eq} = equivalent temperature difference (K)

A_f = area of fenestration (m^2)

U_f = U-value of fenestration (W/m^{2}K)

DT = temperature difference between interior and exterior (K)

SC = shading coefficient of fenestration (dimensionless) = SC_{win} x SSF

SC_{win} = shading coefficient of window glass (dimensionless)

SSF = solar shade factor of external shading devices (dimensionless)

SF = solar factor of fenestration (W/m^2)

A_i = gross area of the walls (m^2) = $A_w + A_f$

WWR = window-to-wall ratio (gross wall area) = A_f / A_i

The OTTV for the whole exterior wall is given by the weighted average of the OTTVs of individual walls at different orientations, such that:

$$OTTV_{wall} = \frac{\Sigma(OTTV_i \times A_i)}{\Sigma A} \tag{3.20}$$

Where,

$OTTV_{wall}$ = OTTV of the whole exterior wall (W/m^2)

The approach for calculating the roof OTTV is similar to that for wall. The terms in the OTTV equations may vary in different OTTV standards. Generally, it depends on how the equations and coefficients are derived (Lam et al., 1993a; Lam et al., 1993b). Compared with thermal insulation standards in cold climate countries, OTTV is more suitable for application to buildings in hot climates because it accounts for the solar heat gain at the building envelope (Yik et al., 1995).

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) was the pioneer in OTTV method (Hui, 1997). According to Hui (1997), Singapore was the first country in Aisa to develop OTTV standard based on the ASHRAE Standards 90-75 and 90-80A, but with some refinements to suit local climate and construction practices. In 1980s and early 1990s, some countries of the Association of Southeast Asian Nations (ASEAN), including Indonesia, Malaysia, Philippines and Thailand, used Singapore's OTTV standard as a reference model to develop their building energy standards (Hui, 1997). At the same time, some countries in Central America also developed their building energy standards using OTTV as part of the requirements.

3.8.1 Overall Thermal Transfer Value – Malaysian Standard

MS1525:2007 states that solar heat gain through building envelope constitutes a substantial share of cooling load in an air-conditioned building. OTTV design criterion has been firstly adopted in MS1525:2001 and it has been revised in 2007. The computation of OTTV based on MS1525:2001 and MS1525:2007 are shown in (3.21) and (3.22) respectively.

$$OTTV_i = 19.1\alpha(1-WWR)U_w + (194 \times CF \times WWR \times SC) \qquad (3.21)$$

$$OTTV_i = 15\alpha(1-WWR)U_w + 6(WWR)U_f + (194 \times CF \times WWR \times SC) \qquad (3.22)$$

Where,

$OTTV_i$ = OTTV for orientation i

WWR = window-to-gross exterior wall area ratio for the orientation under consideration

α = solar absorptivity of the opaque wall

U_w = thermal transmittance of opaque wall (W/m^{2}K)

U_f = thermal transmittance of fenestration system (W/m^{2}K)

CF = solar correction factor

SC = shading coefficient of the fenestration system

MS1525:2007 stipulates that the OTTV should not exceed 50 N/m^2 for building with total air-conditioned area exceeding 4000 m^2. The OTTV aims at achieving the design of building envelope which is able to cut down external heat gain and hence reduce the cooling load of the air-conditioning system.

From (3.21), the OTTV of a building envelope is influenced by two components namely conduction through wall and radiation through window. The revised MS1525 includes another heat transfer mechanism into the OTTV calculation which is heat conduction through window. Therefore, the revised version of OTTV of a building envelope is governed by three factors namely conduction through wall in the first portion of the equation, conduction through window in the second portion and radiation through window in the third portion. Those three factors can be presented as follows:

$$OTTV_i = \underbrace{15\alpha(1-WWR)U_w}_{\text{Conduction Through Wall}} + \underbrace{6(WWR)U_f}_{\text{Conduction Through Window}} + \underbrace{(194 \times CF \times WWR \times SC)}_{\text{Radiation Through Window}}$$

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Introduction

This chapter describes the materials used and the test methods employed in conducting various experimental investigations for this study. Thermal properties tests are the main areas of study, but there are also other significant tests being carried out such as compressive strength and flexural strength tests to determine the mechanical properties of aerated lightweight concrete (ALC).

The proportion, preparation and production of test specimens and the standards adopted in conducting the tests are presented and discussed in detail in the following sections. The methodologies adopted in this research are fully based on experimental investigation.

They were five types of specimen prepared for the whole laboratory investigation work namely:

a) Cube (100 mm x 100 mm x 100 mm)
b) Prism (40 mm width x 40 mm depth x 160 mm long)
c) Plate (300 mm width x 300 mm length x 50 mm to 100 mm thick)

d) Panel (750 mm width x 750 mm length x 40 mm to 80 mm thick)

e) Prototype Panel (1400 mm width x 1600 mm length x 100 mm thick)

4.2 Raw Materials

ALC is a mixture of cement, filler (sand or soil), water and foaming agent. It is a concrete product and the unit weight can be controlled depending on the amount of foam introduced during the casting process. The raw materials used in producing ALC concrete are discussed in the following sections.

4.2.1 Sand

Mining sand with the following particles size distribution was used in this study:

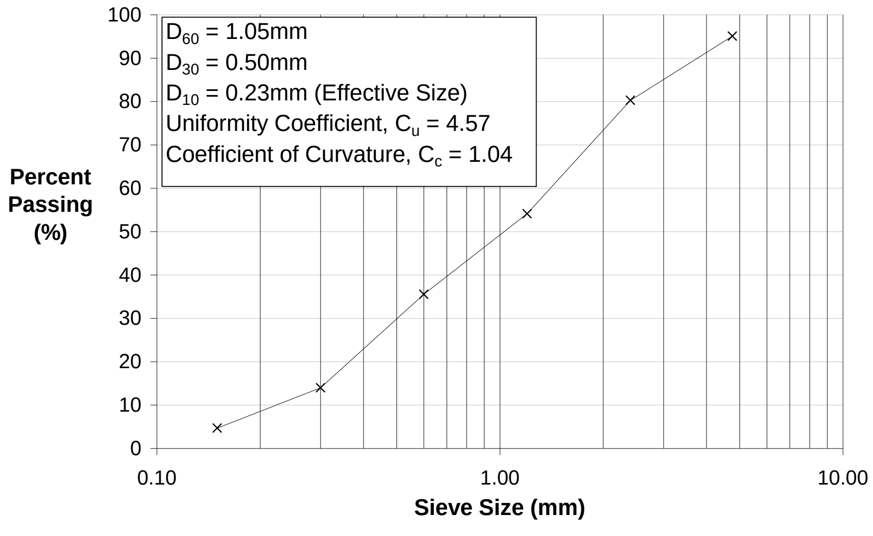


Figure 4.1: Sand distribution

From the sieve analysis, the effective size was 0.23 mm. For the mechanical properties tests, the sand was dried in an oven at a temperature of 110±5 ^{0}C for 24 hours to remove its moisture in order to control the free water content during the mixing process. On the other hand, for plates, panels and prototype panels' production, the moisture content was determined as accordance to BS 1377:1990, Part 2 and the water cement ratio was adjusted accordingly. The dried sand is shown in Figure 4.2.

Figure 4.2: Dried and sieved sand

4.2.2 Soil

The coarse-grained particle size distribution of soil is shown in Figure 4.3.

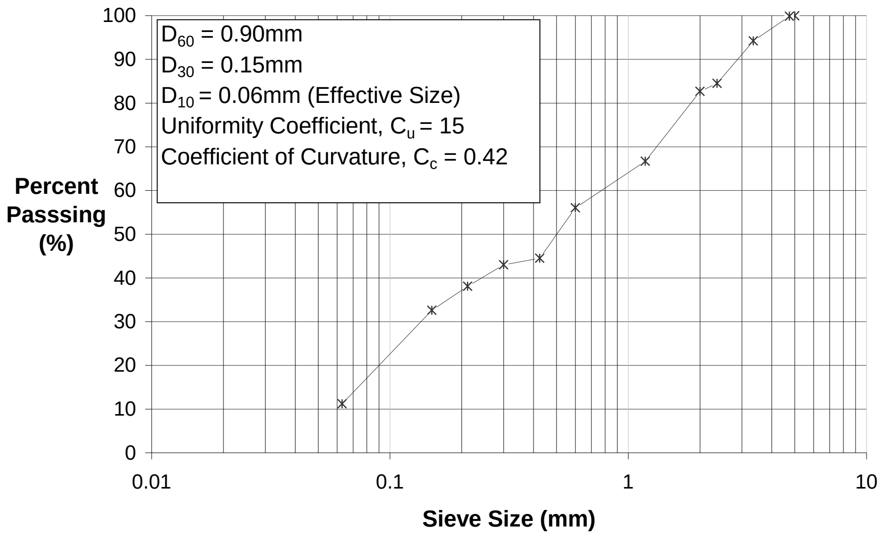


Figure 4.3: Soil distribution

Figure 4.3 indicates that the soil used was well graded. The fine-grained part of the soil gave Liquid Limit (LL) 42%, Plastic Limit (PL) 27%, and therefore is classified as a clayey soil with low plasticity. Similarly, the soil was oven dried at 110±5 ^{0}C for 24 hours to remove its moisture or the moisture content was determined as accordance to BS 1377:1990, Part 2 and the water cement ratio was adjusted accordingly. The effective size for the soil is 0.06 mm. The dried soil is shown in Figure 4.4 while the chemical compositions and physical properties of soil particles are shown in Table 4.1.

Figure 4.4: Dried and sieved soil

Table 4.1: Chemical compositions and physical properties of OPC and clayey soil

Chemical Constituents	OPC (%)	Clayey Soil (%)
Silicon dioxide/ Silica (SiO_2)	20.1	72.6
Aluminium oxide/ Alumina (Al_2O_3)	4.9	6.1
Ferric oxide (Fe_2O_3)	2.5	-
Calcium oxide (CaO)	65.0	3.0
Magnesium oxide (MgO)	3.1	7.3
Sulphur oxide (SO_3)	2.3	-
Sodium oxide (Na_2O)	0.2	9.1
Potassium oxide (K_2O)	0.4	-
Titanium dioxide (TiO_2)	0.2	-
Phosphorous oxide (P_2O_3)	<0.9	-
Manganese (Mn)	-	0.26
Physical Properties	**OPC**	**Clayey Soil**
Specific gravity	3.3	2.7
Fineness	100% (passing sieve size 93.0 µm)	10% (passing sieve size 60.0 µm)

4.2.3 Foaming Agent

Palm oil based foaming agent supplied by LCM Technology Sendirian Berhad was deployed to entrap air for the production ALC. Foam was generated from foam generator which needs to be mechanically pressured at 0.5 bars or 50 kPa. Foam was discharged when the air and foam valves were opened. Figure 4.5 shows the foaming agent in liquid form and Figure 4.6 illustrates the freshly generated foam.

Figure 4.5: Foaming agent

Figure 4.6: Generated foam

4.2.4 Cement

Ordinary Portland Cement (OPC) was used as the binder in producing ALC for this study. The OPC complied with the EN197-1: 2008 and the chemical compositions and physical properties are summarised in Table 4.1.

4.2.5 Newspaper, *Lalang* and Banana Leave

Newspaper, *lalang* or banana leave is a layer of membrane embedment sandwiched in the ALC concrete panels, plates and prototype panels. The purpose of having the encasement is to physically reduce the heat from being transferred through the panel. The newspaper used in this study was The Sun tabloid newspaper (Figure 4.7) which is easily available. The dimension is 580 mm x 395 mm. Apart form newspaper, *Lalang* (scientific name: *Imperata cylindrica*) and banana leaves (scientific name: *Musa acuminata)* are also used for embedment.

Figure 4.7: Newspaper membrane

(a) *Lalang* **(b) Banana Leave**

Figure 4.8: Plant leaves membrane

4.3 Mixing Proportions for Aerated Lightweight Concrete (ALC)

The mixing proportions of ALC were categorised into two groups. The first group was classified as sand-based specimens while the second group was soil-based specimens. All specimens were prepared in different unit weights ranging from 8.0 kN/m^3 to 18.0 kN/m^3. Further details of mixing proportions are discussed in Section 4.4.

4.4 Preparation of Test Specimens

Five types of specimens were prepared throughout this study namely cubes, prisms, plates, panels and prototype walls. Same procedures were used in the preparation and production of all specimens. These procedures are discussed in Section 4.4.2.

4.4.1 Mixing Proportions

The mixing proportions in this study were divided into three parts; cube specimens and prism specimens were used for mechanical properties tests while plates, panels and prototype panels were prepared for thermal properties tests.

4.4.1.1 Cube Specimen

In preliminary study, 100 mm cube specimens were produced for compressive strength study. The cube specimens were produced at targeted unit weights of 11.0 kN/m^3, 15.0 kN/m^3 and 18.0 kN/m^3. The cement:filler ratios were varied from 1:1, 1:0.5 and 1:0.33 for both sand-based and soil-based specimens. All the specimens were cured in water and tested at the age of 3, 7, 28 and 60-day.

4.4.1.2 Prism Specimen

Secondary study covered wider scopes which include the compressive strength and flexural strength of ALC. The prism specimens each measures 40 mm x 40 mm x 160 mm were produced at targeted unit weights of 11.0 kN/m^3, 15.0 kN/m^3 and 18.0 kN/m^3. The specimens were subjected to air curing condition and tested at the age of 3, 7, 28, 60 and 120-day. The details of the mixing proportions are as follows:

Table 4.2: Details of mixing proportion for mechanical properties test

Description	Cube Specimen (Preliminary Study)	Prism Specimen (Secondary Study)
Cement : Water : Sand	1:0.5:1, 1:0.5:0.5, 1:0.5:0.33	1:0.45:1, 1:0.45:0.67, 1:0.5:0.5
Cement : Water : Soil	1:0.675:1, 1:0.675:0.5, 1:0.675:0.33	1:0.8:1, 1:0.67:0.67, 1:0.6:0.5
Unit Weights (kN/m^3)	11.0, 15.0, 18.0	11.0, 15.0, 18.0
Age of Test	3, 7, 28, 60	3, 7, 28, 60, 120
Types of Test	Compressive Strength	Compressive Strength and Flexural Strength
Curing Regime	Water	Air

4.4.1.3 Plate, Panel and Prototype Panel Specimens

Plate, panel and prototype panel specimens were used for thermal properties tests. The mixing proportion was based on the mixing proportion used in producing cube and prism specimens. Table 4.3 summarised the mixing proportions for plate, panel and prototype panel specimens.

Table 4.3: Details of mixing proportion for thermal properties test

Description	Plate	Panel		Prototype Panel
Cement : Water : Sand	1:0.45:0.67	-	1:0.5:0.5	1:0.45:0.67
Cement : Water : Soil	1:0.67:0.67	1:0.67:0.67	1:0.675:0.5	1:0.67:0.67
Unit Weights (kN/m^3)	11.0 to18.0	13.0	8.0 to 18.0	13.0 to18.0
Type of Embedment	Newspaper membrane	Newspaper membrane	*Lalang*, Banana Leaves	Newspaper membrane
Types of Test	Thermal Conductivity, Specific Heat Capacity	Temperature Gradient		Thermal Behaviour
Curing Regime	Air	Air		Air

4.4.2 Mixing Procedure

First, the filler, either sand or soil and cement were weighed and introduced into a drum mixer. The drum mixer was turned on to dry mix the dry sand and cement for about 30 seconds. A pre-determined amount of water was then added into the mixer and mixed well for another one minute. Foam was added into the concrete mixture to achieve the targeted unit weight. Before casting, oil was applied to the mould to ease the demoulding work later. Readily mixed ALC as in Figure 4.9 was poured into the mould. The cast-specimens were subjected to open air condition in the laboratory, which has an average temperature of 30 ^{0}C and 65% relative humidity. After 24 hours, the specimens were demoulded and cured accordingly until its testing age.

Figure 4.9: Mixing of aerated lightweight concrete

4.4.3 Curing Condition

Curing condition is very important in gaining the strength of all cement based products. Two different curing exposures were adopted in this study. Details of the exposure conditions are as follows:

i) Air curing in the laboratory with average temperature ranging from 27 ^{0}C to 30 ^{0}C, 65 ± 5% relative humidity (Figure 4.10)

ii) Continuous water immersion at about 26 ^{0}C (Figure 4.11).

Cube specimens were subjected to water curing while prism specimens were subjected to air curing. This is to assess the mechanical properties of the specimens under more severe environment and to emulate the mass production of ALC blocks in factory. All specimens used for thermal properties test were subjected to air curing.

Figure 4.10: Air curing of specimens

Figure 4.11: Water curing of specimens

4.4.4 Types of Specimens Prepared

As mentioned earlier in Section 4.1, five types of specimen were prepared for various types of tests. The details and descriptions of the test specimens are discussed in the following sections.

4.4.4.1 Cube

The dimension of cube specimen is 100 mm (Figure 4.12) and it is in accordance to standard BSEN 12390-3:2002. The cube samples were used to investigate hardened unit weight and compressive strength. The use of 100 mm cube specimen in compressive strength test has been adopted by many researchers, some of these researchers are Okafor et al. (1996), Kearsley and Wainwright (2002), Wu et al. (2005) and Osman et al. (2007) Three different cement contents namely sand cement ratio 1:1, 1:2 and 1:3 were investigated.

The targeted unit weights were 11.0 kN/m^3, 15.0 kN/m^3 and 18.0 kN/m^3 respectively.

Figure 4.12: 100 mm cube specimens

4.4.4.2 Prism

Prism with the dimension of 40 mm x 40 mm x 160 mm (Figure 4.13) which is in accordance to standard BSEN 196-1:2005 was used to determine the flexural strength and compressive strength of ALC. This method of testing was adopted by other researchers namely Bignozzi et al. (2000), Nóvoa et al. (2004) and Santos et al. (2005). Apart from compressive strength and flexural strength, prism samples were also used to determine the hardened dry unit weight. The filler binder ratios were fixed at 1:1, 1:1.5 and 1:2 for all mixes. The details of the mix proportion used in producing prism specimens were shown in Table 4.1 earlier.

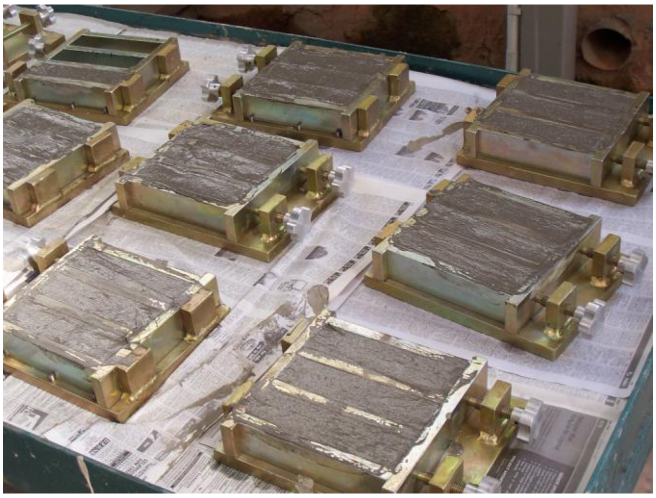


Figure 4.13: Prism specimens

4.4.4.3 Plate

Plate specimens were used to determine the thermal conductivity and specific heat capacity of ALC. The dimension of the plate was 300 mm x 300 mm x 50 mm as shown in Figure 4.14. This sample size is significant in thermal conductivity test and was adopted by other researchers in their thermal conductivity test such as Budaiwi et al. (2002) and Sukontasukkul (2008). Apart from plain ALC, newspaper membrane embedded plates were also cast and tested for its thermal conductivity and specific heat capacity.

Figure 4.14: Plate specimen

Table 4.4: Plate samples produced for thermal conductivity test

Group	Panel Description	Unit Weight (kN/m^3)	Embedment/Sandwiched
1	Sand	18.0	-
		14.0	-
		11.0	-
2	Soil	18.0	-
		15.0	-
		11.0	-
3	Sand	18.0	Newspaper membrane - 0.05 g/cm^2
		14.0	
		11.0	
5	Sand	18.0	Newspaper membrane – 0.15 g/cm^2
		14.0	
		11.0	
6	Soil	18.0	Newspaper membrane - 0.05 g/cm^2
		15.0	
		11.0	
7	Soil	18.0	Newspaper membrane – 0.10 g/cm^2
		15.0	
		11.0	
8	Soil	18.0	Newspaper membrane – 0.15 g/cm^2
		15.0	
		11.0	

4.4.4.4 Panel

Panel specimen each measures 750 mm x 750 mm x 100 mm (Figure 4.15) was used to determine the temperature gradient. Various types of ALC panels were produced and the details are as follows:

Table 4.5: Panel samples produced for temperature gradient test

Group	Panel Description	Unit Weight (kN/m^3)	Embedment/Sandwiched
1	Sand	18.0 15.0 11.0	- - -
2	Soil	18.0 15.0 11.0	- - -
3	Soil	15.0 12.0 8.0	- - -
4	Soil	15.0 12.0 8.0	*Lalang* – 0.05 g/cm^2
5	Soil	15.0 12.0 8.0	*Lalang* – 0.10 g/cm^2
6	Soil	15.0 12.0 8.0	Banana Leaves – 0.10 g/cm^2
7	Soil	13.0	Newspaper membrane - 0.05 g/cm^2, 0.10 g/cm^2, 0.15 g/cm^2, 0.20 g/cm^2

(a) Lalang (Imperata cylidrica), a weed commonly found in Malaysia

(b) Banana Leaves

(c) Newspaper membrane

(d) Completed panel

Figure 4.15: Panel casting

4.4.4.5 Prototype Panel

The prototype panels each measured 1400 mm x 1600 mm x 100 mm thick were fixed on the prototype house. The prototype panels were used to observe the thermal behaviour of ALC panels subjected to natural environment condition. It was the final stage of thermal properties study for this research which involved transient heat transfer. The layout and cross sections of the Prototype House are shown in Figure 4.16 and Figure 4.17. The prototype house was made of structural concrete frame.

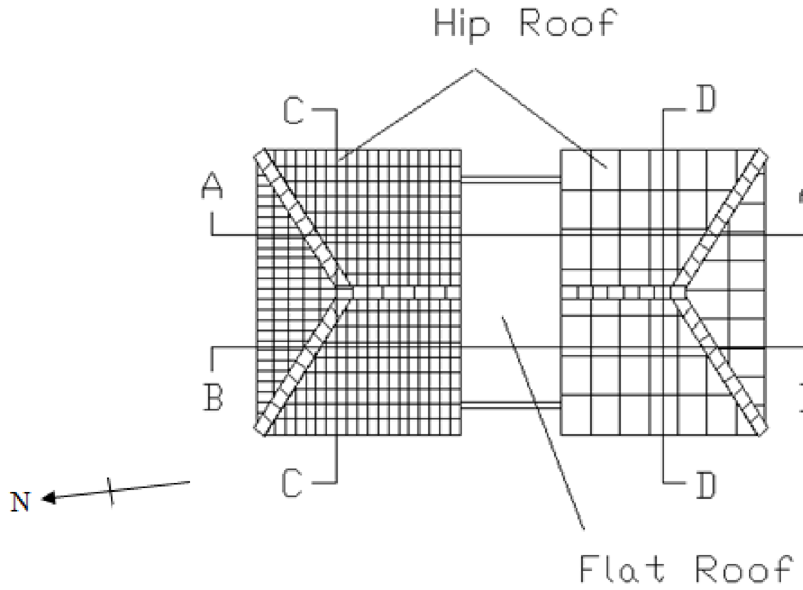


Figure 4.16: Plan view of the Prototype House

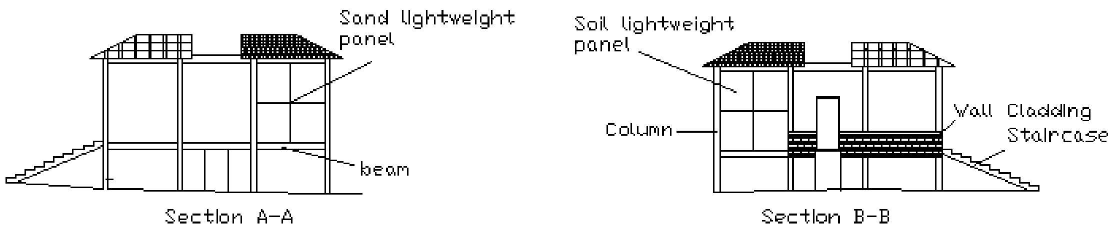


Figure 4.17: Front elevation of the Prototype House

Figures 4.18 and 4.19 show the casting and hardened prototype panel respectively. A total of eight prototype panels were produced and the details of the prototype panels are summarised in Table 4.6.

Table 4.6: Details of prototype panels produced

Group	Panel Description	Panel Code	Unit Weight (kN/m^3)	Embedment/ Sandwiched	Indication
1	Sand	P1	18.0	-	P1
		P2	13.0	-	P2
		P3	13.0	Newspaper membrane – 0.05 g/cm^2	P3
		P4	13.0	Newspaper membrane – 0.15 g/cm^2	P4
2	Soil	P5	18.0	-	P5
		P6	13.0	-	P6
		P7	13.0	Newspaper membrane – 0.05 g/cm^2	P7
		P8	13.0	Newspaper membrane – 0.15 g/cm^2	P8

Figure 4.18: Prototype panel casting

Figure 4.19: Hardened prototype panel

The average mass of the prototype panels was about 3.0 kN each. Therefore, the prototype panels were lifted to its position using chain block as shown in Figure 4.20.

Figure 4.20: Lifting of prototype panel prepared for fixing

Each bay of wall at the prototype house consists of four prototype panels. Two adjacent sides of the prototype panels were connected to the beam and column while the other two adjacent sides were connected to other prototype panels. The schematic diagramme shown in Figure 4.21 illustrates the connection of prototype panel. Figure 4.22 shows the welding process in connecting two prototype panels and Figure 4.23 shows the connection of the prototype panel to the existing column.

The reason to fix four different types of prototype panels on one bay of wall was to enable fair comparison on the thermal performance of each panel. By fixing the prototype panels side by side, they were subjected to similar testing condition so that the performance of the prototype panels can be ranked and compared at a glance. This set up was similar to the research done by Nicolajsen (2005) on thermal transmittance of cellulose loose-fill insulation material in Horsholm, Denmark. Nicolajsen set up a prototype house and compared the thermal transmittance of cellulose loose-fill insulation material with stone wool batts insulation material which were installed side by side on a prototype house.

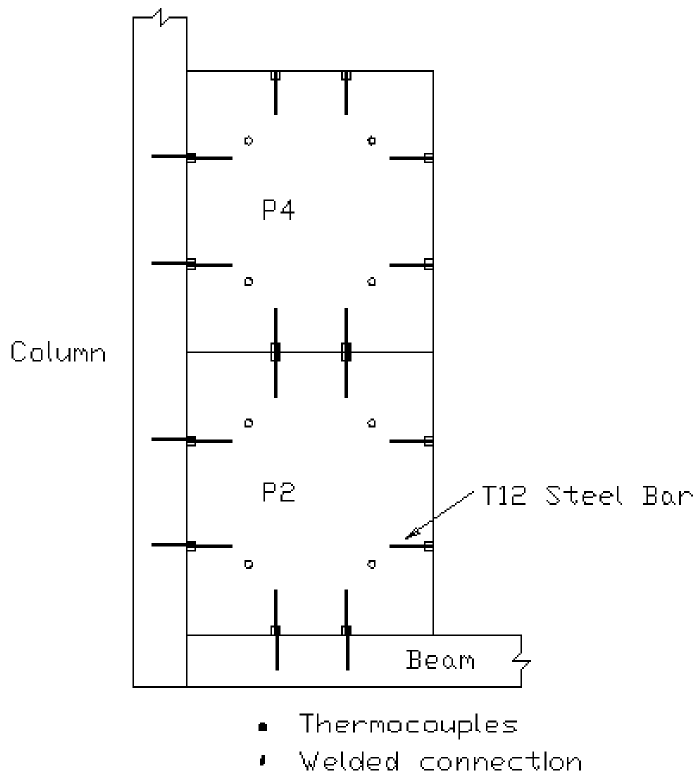


Figure 4.21: Schematic diagramme showing the connection between panels and column

Figure 4.22: Welding work in progress connecting the prototype panels

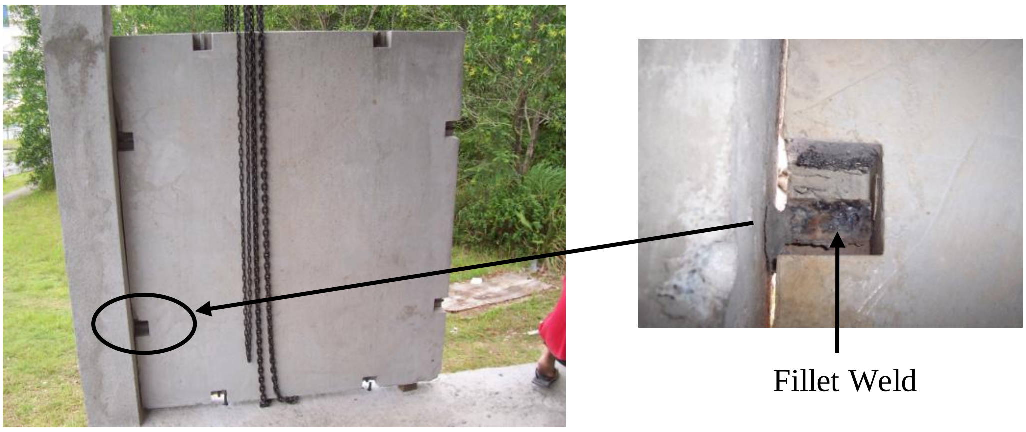


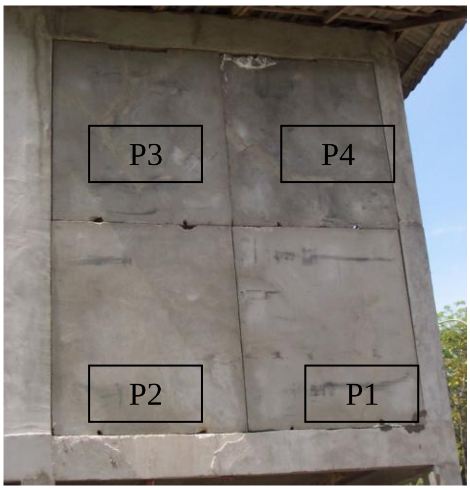
Figure 4.23: Connection of prototype panel

The prototype panels were first fixed on the bottom half of the wall before being fixed to the upper half of the wall. Figure 4.24 shows the in-progress fixing of prototype panels while Figure 4.25 shows the completely fixed prototype panels of the prototype house.

(a) Fixing of sand-based panels

(b) Fixing of soil-based panels

Figure 4.24: Fixing of prototype panels



(a) Sand-based prototype panels

(b) Soil-based prototype panels
Figure 4.25: Completely-fixed prototype panels

4.5 Test Procedures

Two broad categories of tests were conducted, one of them focusing on the mechanical properties of ALC and the other category focused on thermal properties of ALC.

4.5.1 Mechanical Properties

Two mechanical property tests were conducted namely compression test and flexural test. Before the specimens were tested, the unit weight of specimen was determined in accordance to BSEN 678 (1994), Method A. The unit weight of a regular-shaped specimen was determined by measurement of its dimensions and dividing the mass of the specimen by the calculated volume. The unit weight of the specimens was recorded before they were subjected to destructive test.

4.5.1.1 Compression Test

Two types of specimens were prepared to determine the compressive strength of ALC. 100 mm cube with compliance to standard BSEN 12390-3:2002 was used to determine the compressive strength of the specimens in the preliminary stage.

40 mm x 40 mm x 160 mm prism is accordance to standard BSEN 196-1:2005 was used to determine the compressive strength of the specimens in the second stage of mechanical properties test. The compression test was carried out after the specimen has been tested for flexural test. The hardened unit weight of the specimens was determined before it was subjected to destructive test.

The test started by weighing the mass of the samples to determine the unit weight of the sample at the time of testing. All the specimens were thoroughly checked for their quality to ensure that there was no crack or damage before the test. Next, the platens of the testing machine were cleaned and the sample was carefully placed between the platens (Figures 4.26 and 4.27). The specimen was then loaded gradually, without shock, with a constant load until failure was achieved. The maximum stress or load was recorded and the strength was calculated using (4.1) if the latter was recorded.

$$f_c = \frac{F}{A} \tag{4.1}$$

Where,

f_c = compressive strength, MPa

F = maximum load, in Newton

A = cross-sectional area which the load is applied, mm^2

Figure 4.26: Testing of 100 mm cube specimen

Figure 4.27: Compression test on prism specimen

4.5.1.2 Flexural Test

Flexural test was conducted according to standard BSEN 196-1:2005 which is based on a standard centre point load as shown in Figure 4.28. The specimen was placed where the load acted exactly at the centre of the sample. Then the load was applied at the loading point gradually without shock, at a constant rate. The maximum stress or load was recorded where the fracture occurs on the tension surface within the middle third of the span length. The flexural strength was calculated using (4.2).

$$MOR = \frac{3PL_l}{2BD^2} \tag{4.2}$$

Where:

MOR = modulus of rupture/ flexural strength, MPa

P = maximum applied load indicated by the testing machine, N

L_l = span length, mm

B = average width of specimen, mm

D = average depth of specimen, mm

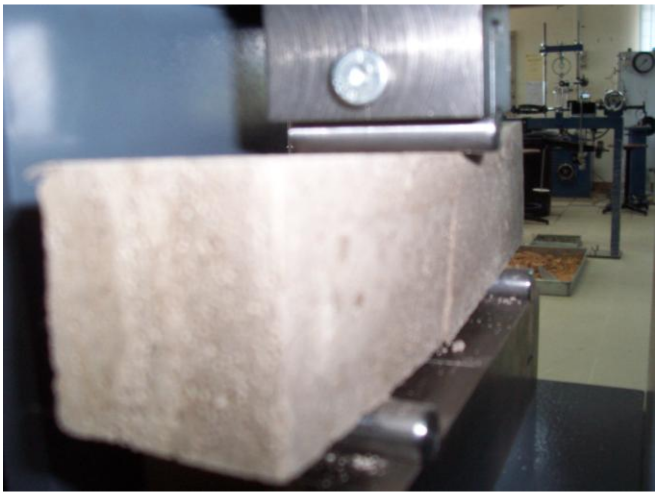


Figure 4.28: Flexural strength test

4.5.2 Thermal Properties

Thermal properties tests were divided into two categories namely laboratory-based tests and prototype tests. Laboratory-based tests included temperature gradient, thermal conductivity and specific heat capacity tests. For prototype test, the thermal behaviour of ALC panels subjected to Malaysia natural climate condition was observed.

4.5.2.1 Temperature Gradient

Temperature gradient tests of the ALC panels were carried out in the Thermal Laboratory. The set up of the Thermal Laboratory is similar to the standard ISO8990 (Thermal insulation - Determination of steady-state thermal transmission properties - Calibrated and guarded hot box) but without chiller. The average thickness of all panels were measured and used in temperature gradient computation. Temperature gradient was calculated based on the following equation:

$$TemperatureGradient = \frac{T_1 - T_2}{L} \tag{4.3}$$

Where,

T_1 = hot panel surface temperature in ^{0}C or K

T_2 = cool panel surface temperature in ^{0}C or K

L = thickness of panel in cm

The Thermal Laboratory consists of two rooms. These rooms are divided by a partition wall into two symmetrical chambers with the floor area of 2.0 m x 2.0 m each. One of the chambers is labeled as “Hot” room, equipped with Nikkon S3000 spot light fixed with 1000W halide lamp to generate heat and the other chamber is referred to as “Cool” room. The panel specimens were mounted at the opening provided at the partition as shown in Figure 4.29. Three locations were identified on each surface of the panel to enable the fixing of PT100 thermocouples (Figure 4.30). However, prior to fixing at only three locations, the distribution of temperature on 13 surface locations of the panel following an asterisk (*) pattern was first determined. It was found that the temperatures on all 15 locations showed little variation, hence a decision was made to measure temperatures at only three locations for the subsequent tests that followed. Then, it was from these three temperature readings (Figure 4.30) that the average surface temperatures of the panel were determined. As in the ‘Hot’ chamber, the same arrangement was made on the surface of the panel in the ‘Cool’ chamber. Figure 4.31 shows the on-going test in both Hot and Cool room.

Figure 4.29: Partition between the Hot room and Cool room

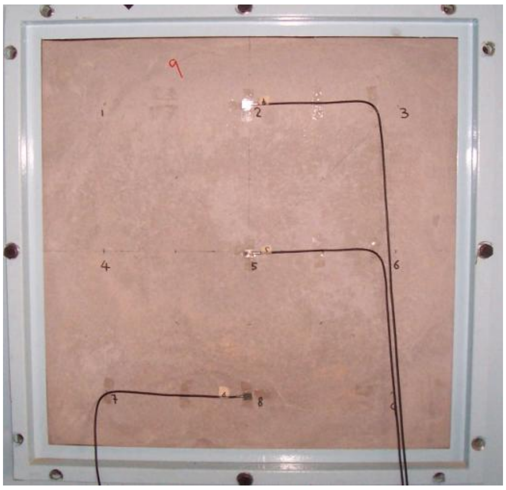
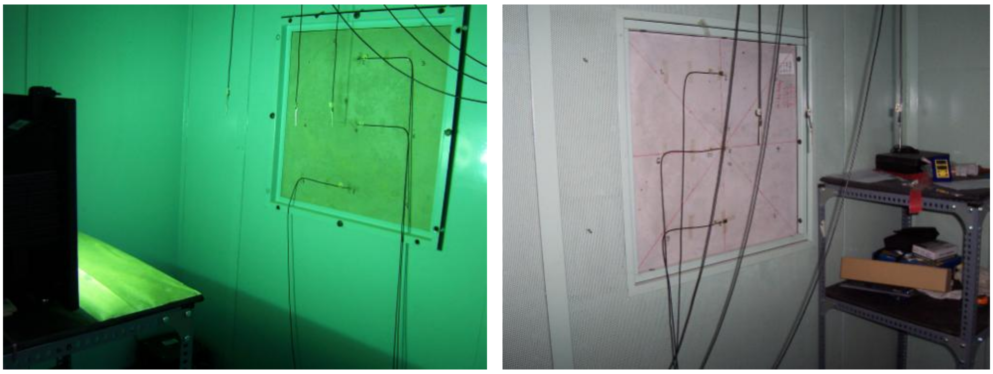


Figure 4.30: Instrumentation of thermocouples during the test



(a) Hot room **(b) Cool room**

Figure 4.31: Test in progress

Apart from the temperatures on panel surfaces, the air temperature in both the ‘Hot’ and ‘Cool’ chambers were also monitored. As shown in Figure 4.32, whether in the ‘Hot’ chamber or ‘Cool’ chamber this was accomplished by suspending three thermocouples at 0.1 m, 0.3 m and 0.6 m, respectively, in front and away from the centre point of panel. Figure 4.32 indicates that in any test a total of 12 temperature points were monitored; 6 (3 on panel surface and 3 in the air) from the ‘Hot’ chamber and the remaining 6 (again 3 on panel surface and 3 in the air) from the ‘Cool’ chamber. For practical reason, all temperatures produced during a test were continuously monitored and captured via a Fuji Paperless Recorder (Figure 4.33) where data captured were stored paperlessly in a memory card readable and printable by an ordinary computer later. The duration of the test was set at 20 hours when it has reached a steady state.

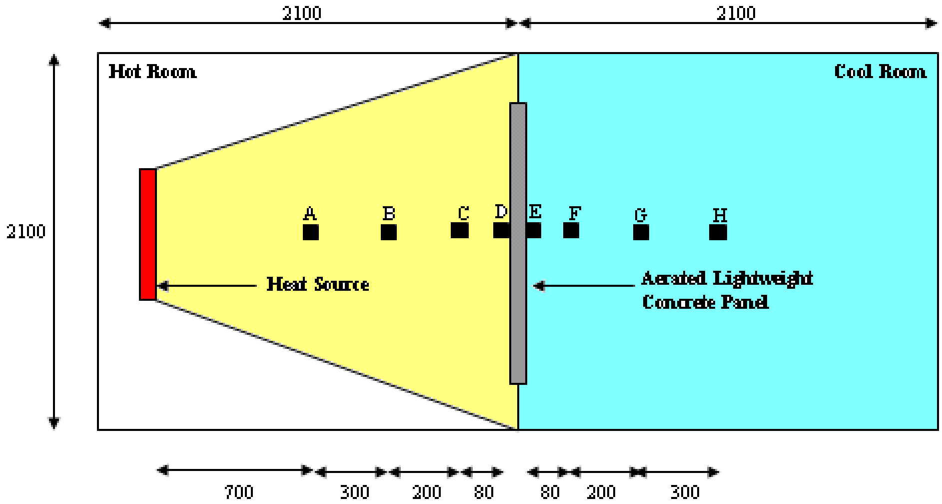


Figure 4.32: Layout plan of Hot and Cool Room where temperature readings were taken

Figure 4.33: Datalogger – Fuji Paperless Recorder

4.5.2.2 Thermal Conductivity, *k*

Thermal conductivity of the ALC plates was determined by means of guarded hot plate methods in accordance to BSEN 12664:2001. The equipment is shown in Figure 4.34. The equipment consists of four components namely the electrical control box, chiller, data logger and specimen compartment.

Figure 4.34: Guarded hot box

There were two plates namely hot plate and cold plate located in the specimen compartment. The test specimen was placed or sandwiched in between the two plates. During the test, these plates were compressed to ensure a close contact between the surface of the plates and the specimen. Rock wool was used to insulate the four sides of the plates to prevent heat lost.

The size of the specimens was fixed at 300 mm x 300 mm x 50 mm as shown in Figure 4.35.

Figure 4.35: Plate specimen

Firstly, the hot plate was heated up to a stipulated temperature of 40 ^{0}C while the cold plate temperature was fixed at 25 ^{0}C. The heat generated from the hot plate was transferred to the cold plate through the specimen. Twelve 108-L Temperature Sensors from Campbell Scientific Limited were attached on both surfaces of the specimen. The thermal conductivity test was set for 20 hours. The electrical power, W, required to maintain the temperature at 40 ^{0}C was measured using CS15-L CR Magnetics Current Transformer supplied by Campbell Scientific Limited (Figure 4.36) and connected to AM25T Solid State Multiplexer then connected to CR 800 Datalogger (Figure 4.37) from Campbell Scientific Limited. The thermal conductivity, *k* was calculated based on the following equation:

$$k = \Phi \frac{d}{A}(T_1 - T_2) \tag{4.4}$$

Where,

Φ = average power supplied to the metering section of the heating unit.

d = average specimen thickness

A = metering area

T_1 = average specimen hot side temperature

T_2 = average specimen cold side temperature

Figure 4.36: CR magnetic current transformer

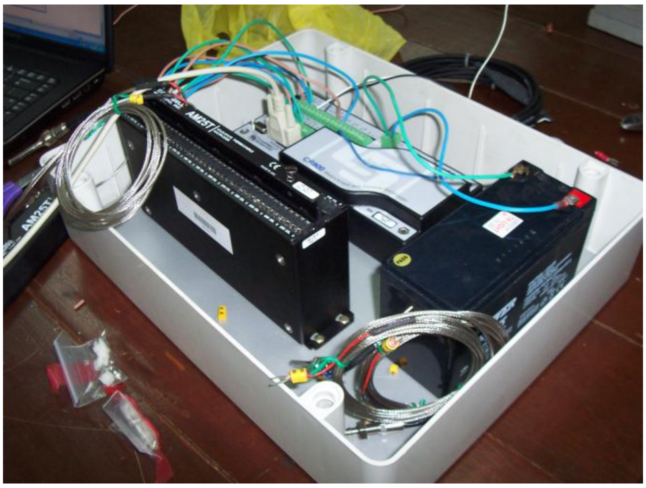


Figure 4.37: Datalogger and multiplexer

4.5.2.3 Specific Heat Capacity, *c*

Specific heat capacity, c was determined by using the relationship of $Q = mc\Delta T$, it was assumed that the heat released by the panel after being taken out from the boiling water was all absorbed by the water in the insulated box without significant heat loss. The relationships can be represented in (4.5).

$$[mc(T_{\max} - T_{initial})]_{water} = [mc(T_{boiling} - T_{\max \cdot water})]_{panel} \tag{4.5}$$

Heat gained by water = Heat loss by panel

Specific heat capacity of the panel can be obtained since the mass for both the panel and the water in the insulated box were measured and their temperature change were monitored by using Type T Thermocouples with Teflon casing supplied by ValuTemp Private Limited. The heat capacity of water was assumed to be 4.184 kJ/kgK (Incropera et al., 2007).

A boiler (Figure 4.38) was used to boil the test plate in the water. The boiled panel was then transferred to an insulated box (Figure 4.39) which was partially filled with and water was used to keep the boiled panel.

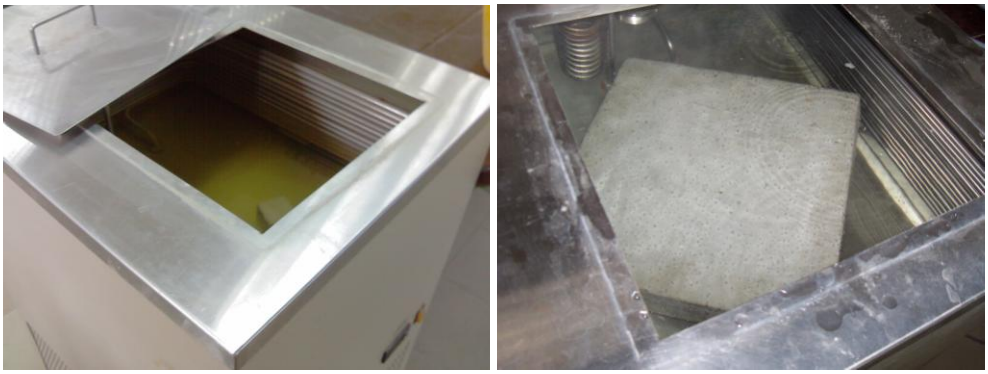


Figure 4.38: Boiler for plate boiling

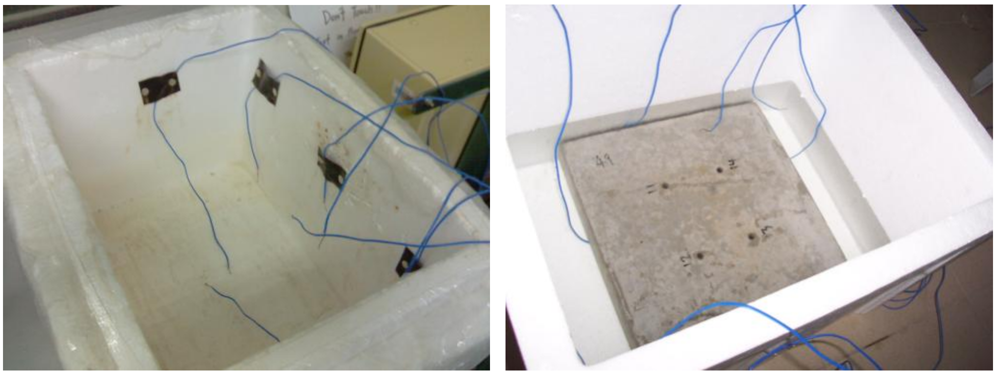


Figure 4.39: Insulated box with thermocouples

4.5.2.4 Temperature Observation on Prototype Panels

The thermal behaviour of the prototype panels was observed under natural weather condition. Type T Thermocouples with Teflon casing supplied by ValuTemp Private Limited were fixed at a designated location on the sand-based and soil-based prototype panels as shown in Figures 4.40 and 4.41 respectively. The method of instrumentation was similar to Buratti and Moretti (2005) observation on masonry wall.

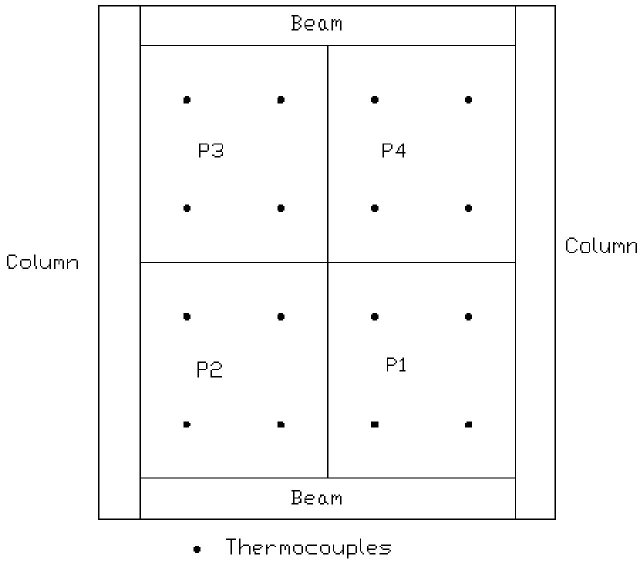


Figure 4.40: Designated locations of thermocouples for sand-based panels

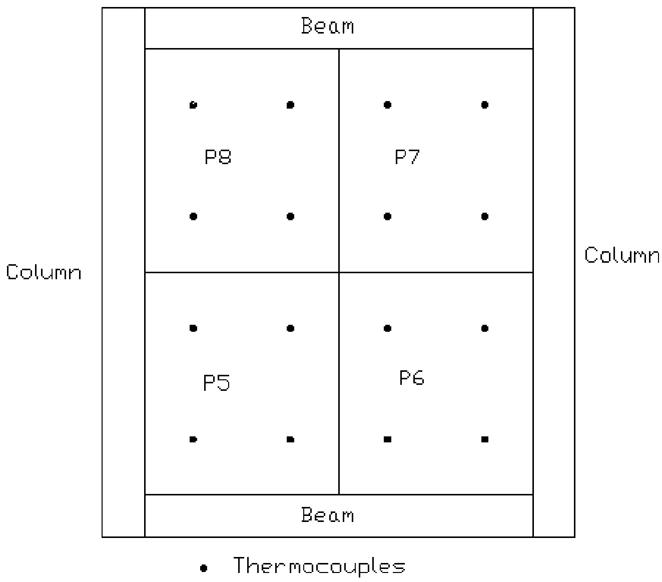


Figure 4.41: Designated locations of thermocouples for soil-based panels

Figure 4.42 and 4.43 show the fixed thermocouples on the actual prototype panels.

(a) Outer surface **(b) Inner surface**

Figure 4.42: Thermocouples fixed on sand-based panels

(a) Outer surface **(b) Inner surface**

Figure 4.43: Thermocouples fixed on soil-based panels

The thermocouples were connected to AM25T Solid State Multiplexer and then to CR800 Datalogger from Campbell Scientific Limited. Initially, the temperatures were recorded at every 30 minutes and subsequently at every 3 minutes interval for a period of 14 months. The multiplexer and datalogger used for this purpose is shown in Figure 4.44.

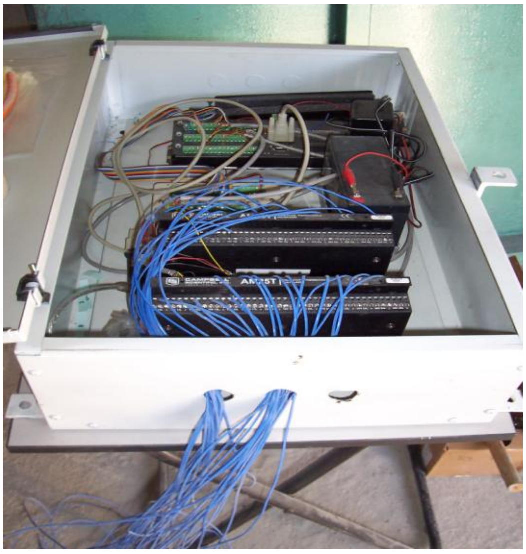


Figure 4.44: Thermocouples connected to multiplexer and datalogger

Apart from detecting surface temperatures, there were thermocouples placed to detect the air temperatures at the inside and outside of the room. Figure 4.45 shows the thermocouple detecting the indoor air temperatures while Figure 4.46 shows the thermocouple detecting the outdoor air temperatures. The outdoor air temperature acted as an indicator on the selection of a particular day for data analysis in up-coming chapters.

Figure 4.45: Thermocouple detecting indoor air temperature

Figure 4.46: Outdoor temperature indicator

4.6 Multiple Regression Analysis

Multiple regression analysis was used as a statistical technique to analyse the relationship between single dependent variable and several independent variables in this study. More specifically, regression analysis helps to understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed.

Regression analysis has been adopted by Kim et al. (2003) in engineering studies to predict the thermal conductivity of concrete from various factors. In this study, multiple regression analysis was used to model the compressive strength, flexural strength, thermal conductivity and inner surface temperature of prototype panels based on the collected test data. Statistical Package for Social Science software was used as a tool to correlate between the dependent and independent variables throughout this study.

CHAPTER 5

MECHANICAL PROPERTIES OF AERATED LIGHTWEIGHT CONCRETE*

5.1 Introduction

This chapter discusses the mechanical properties of aerated lightweight concrete (ALC) tested under compressive and flexural loads. Compressive strength is an important indicator for building materials particularly cement-based product. Generally, the compressive strength of ALC is influenced by various factors namely the unit weight, mix proportion, age, curing regime, additives and water:cement ratio as discussed in the literature review.

The investigation on the strength property of ALC is essential for the succeeding study of this research. It is a well known fact that air entraining that renders ALC its lightness has enabled it to be a superb thermal insulation material which is ideal as an energy efficient material for building construction. In the face of current oil shortage and global warming, the advantageous use of ALC in energy efficient construction is even more meaningful than ever. Nevertheless, before this benefit can be fully exploited, it is a fact that being lightweight usually led to low strength and this has often prevented the successful use of ALC in this application.

*Parts of this chapter were published in:

1. Ng, S.C., Low, K.S. and Tioh, N.H. "Potential use of clayey soil in aerated lightweight concrete". Korean Society of Civil Engineers: Journal of Civil Engineering. Accepted (Listed in ISI Citation Index, Impact Factor: 0.45)

Thus, accordingly an investigation on the strength properties of ALC in particular is warranted and must precede the investigation into the thermal insulation aspect of ALC. In this study, the strength properties of ALC were observed in two categories using two different types of specimens namely cube and prism as explained in Section 4.4.

5.2 Compressive Strength of Cube Specimens

The compressive strength study of cube specimens was conducted in the early stage of this research with the highest cement content at the cement:filler ratio of 1:0.33. The cube specimens were tested on 3, 7, 28 and 60-day and on each test, three specimens were tested. Before the test, the unit weight of the specimen was determined and the detail results are attached in Appendix A1. The average compressive strength of all tested specimens are summarised in Table 5.1

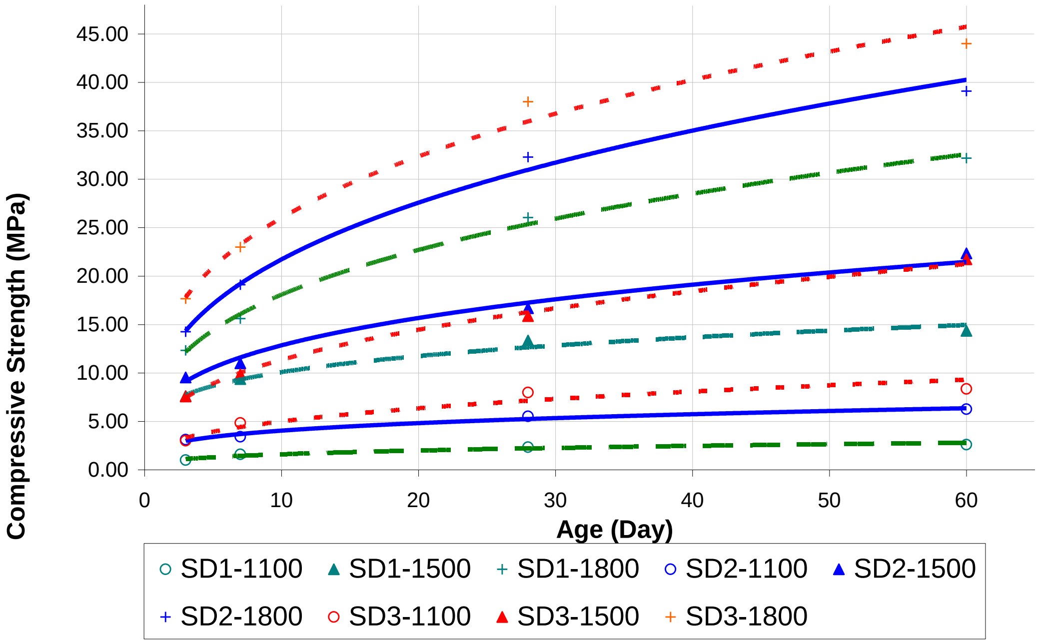
Table 5.1: Compressive strength of 100mm-cube aerated lightweight concrete

Unit Weight (kN/m^3)	Cement : Filler	Age (Day)	Compressive Strength (MPa)	
			Sand-based	Soil-based
11.0	1:1	3	1.00	0.62
		7	1.60	0.94
		28	2.33	1.32
		60	2.60	1.60
	1:0.5	3	3.11	0.64
		7	3.41	0.72
		28	5.52	1.59
		60	6.25	1.82
	1:0.33	3	2.99	2.77
		7	4.83	3.02
		28	7.97	4.83
		60	8.34	6.23
15.0	1:1	3	7.60	2.51
		7	9.36	2.96
		28	13.35	4.52
		60	14.34	5.27
	1:0.5	3	9.54	5.10
		7	11.00	5.99
		28	16.68	8.57
		60	22.35	11.18
	1:0.33	3	7.57	4.27
		7	9.85	5.76
		28	15.86	9.51
		60	21.74	13.68

Unit Weight (kN/m^3)	Cement : Filler	Age (Day)	Compressive Strength (MPa)	
			Sand-based	Soil-based
18.0	1:1	3	12.33	5.75
		7	15.61	6.32
		28	26.04	8.15
		60	32.18	9.73
	1:0.5	3	14.25	12.35
		7	19.10	15.79
		28	32.29	25.24
		60	39.09	27.36
	1:0.33	3	17.66	17.67
		7	23.00	19.33
		28	38.01	26.23
		60	44.00	28.29

5.2.1 Effect of Age on Compressive Strength

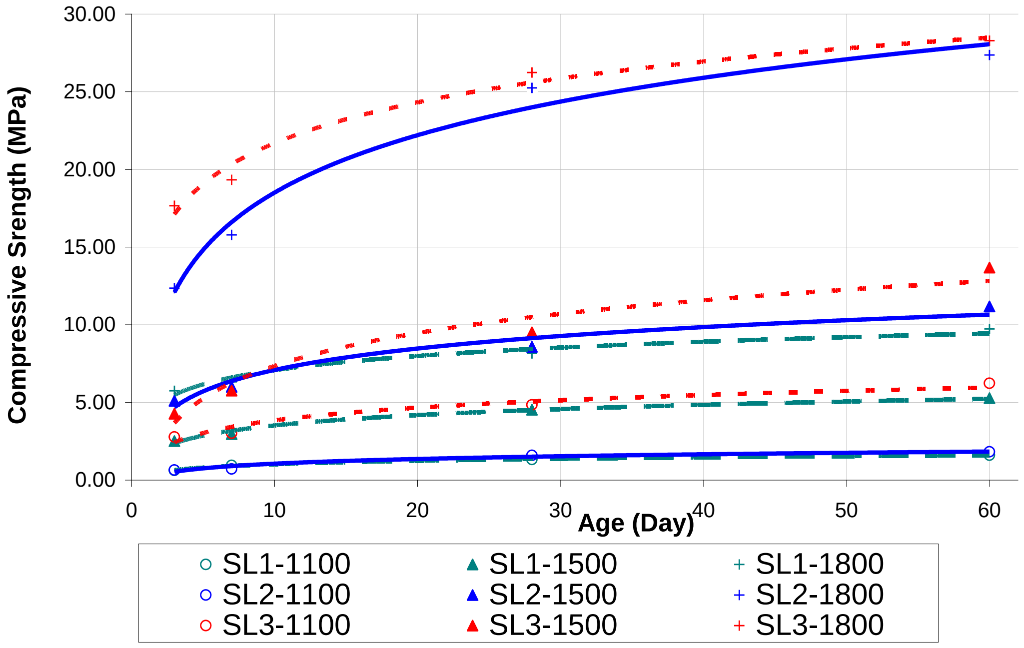
By referring to Figure 5.1 and 5.2, it is apparent that the compressive strength of both soil-based and sand-based ALC increased with time or 'age' in a curvilinear manner, a behaviour rather similar to that of conventional concrete. This can be readily explained from the fact that the degree of cement hydration and, therefore, the amount of cement gel formed in the cement paste increases with age or time. Figure 5.1 and 5.2 show that although with different cement:sand ratios, they shared a common trend of strength development pattern. The results agreed reasonably well with those reported by Jones and McCarthy (2005b), Nambiar and Ramamurthy (2006a) in terms of compressive strength development pattern for ALC.



Note:

SD1-1100 – Cement : Sand = 1:1; Unit weight 11.0 kN/m^3
SD1-1500 – Cement : Sand = 1:1; Unit weight 15.0 kN/m^3
SD1-1800 – Cement : Sand = 1:1; Unit weight 18.0 kN/m^3
SD2-1100 – Cement : Sand = 1:0.5; Unit weight 11.0 kN/m^3
SD2-1500 – Cement : Sand = 1:0.5; Unit weight 15.0 kN/m^3
SD2-1800 – Cement : Sand = 1:0.5 Unit weight 18.0 kN/m^3
SD3-1100 – Cement : Sand = 1:0.33; Unit weight 11.0 kN/m^3
SD3-1500 – Cement : Sand = 1:0.33; Unit weight 15.0 kN/m^3
SD3-1800 – Cement : Sand = 1:0.33; Unit weight 18.0 kN/m^3

Figure 5.1: Compressive strength development over the time for sand-based specimens



Note:
SL1-1100 – Cement : Soil = 1:1; Unit weight 11.0 kN/m^3
SL1-1500 – Cement : Soil = 1:1; Unit weight 15.0 kN/m^3
SL1-1800 – Cement : Soil = 1:1; Unit weight 18.0 kN/m^3
SL2-1100 – Cement : Soil = 1:0.5; Unit weight 11.0 kN/m^3
SL2-1500 – Cement : Soil = 1:0.5; Unit weight 15.0 kN/m^3
SL2-1800 – Cement : Soil = 1:0.5; Unit weight 18.0 kN/m^3
SL3-1100 – Cement : Soil = 1:0.33; Unit weight 11.0 kN/m^3
SL3-1500 – Cement : Soil = 1:0.33; Unit weight 15.0 kN/m^3
SL3-1800 – Cement : Soil = 1:0.33; Unit weight 18.0 kN/m^3

Figure 5.2: Compressive strength development over the time for soil-based specimens

5.2.2 Effect of Cement Content on Compressive Strength

With reference to Figure 5.3, it is obvious that samples with higher cement content possessed higher compressive strength for the same unit weight. For instance, for test samples on Day 60 sharing the same unit weight of 18.0 kN/m^3, by varying the cement:sand ratio from 1:0.33 to 1:0.5 and then 1:1 the corresponding compressive strength reduced from 44.00 MPa to 39.09 MPa and 32.18 MPa, respectively. Similar trend of reduction in compressive strength can be observed for soil-based specimens. For example, by referring to the same unit weight and age as discussed above, for samples of cement:soil ratio 1:0.33, 1:0.5 and 1:1, the matching compressive strength reduced from 28.29 MPa to 27.36 MPa and 9.73 MPa accordingly. This indicates that higher cement content creates stronger bonding between the particles of ALC which subsequently increases its compressive strength.

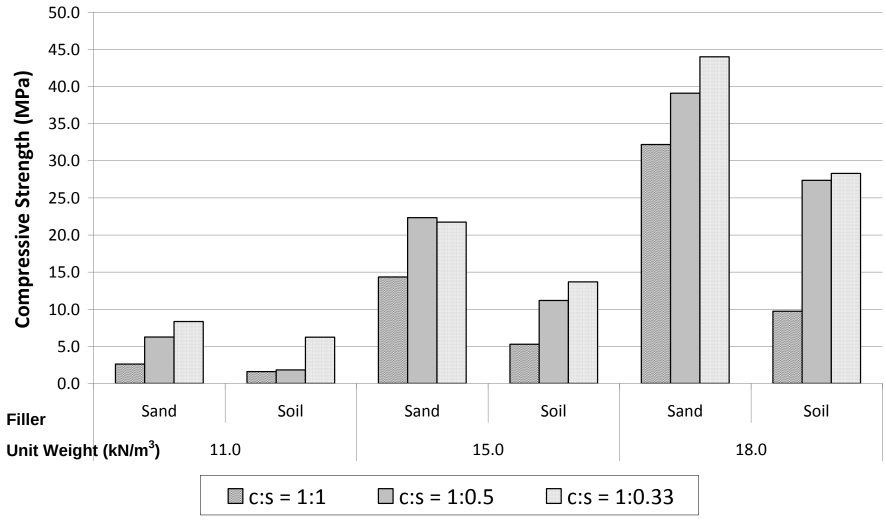


Figure 5.3: Effect of cement on compressive strength

5.2.3 Effect of Unit Weight on Compressive Strength

By referring to Figure 5.4, it is found that the compressive strength was positively proportional to the unit weight for both sand-based and soil-based ALC. This means that the higher the unit weight, the greater the compressive strength. For instance, the compressive strength for sand-based ALC with cement:sand ratio of 1:0.33 increased from 8.34 MPa to 21.74 MPa and further to 44.00 MPa for corresponding unit weight of 11.0 kN/m^3, 15.0 kN/m^3

and 18.0 kN/m^3 respectively. Similarly for soil-based ALC, taking the same category as discussed above on sand-based ALC, the compressive strength increased from 6.23 MPa to 13.68 MPa and 28.29 MPa. The results of the present study agreed reasonably well with those reported by Nambiar and Ramamurthy (2006a) in terms of compressive strength and unit weight relationships.

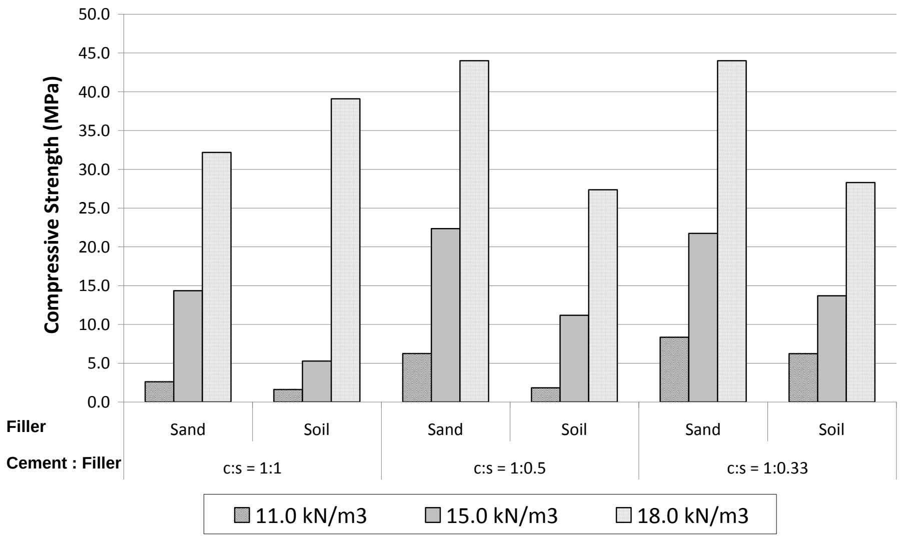


Figure 5.4: Effect of unit weight on compressive strength

5.2.4 Effect of Filler on Compressive Strength

Figure 5.5 shows the comparison on compressive strength between sand-based and soil-based ALC. A closer observation on the results obtained in Figure 5.5, it can be concluded that sand-based ALC exhibited higher compressive strength compared to soil-based ALC of similar unit weight. For instance, the compressive strength of sand-based ALC with unit weight 15.0 kN/m^3 was 14.34 MPa, 22.35 MPa and 21.74 MPa for cement:sand ratio of

1:1, 1:0.5 and 1:0.33. On the other hand, the compressive strength of soil-based ALC of identical category was 5.27 MPa, 11.18 MPa and 13.68 MPa respectively. The results show that the compressive strength of sand-based ALC was 172.1%, 100.2% and 58.9% greater than soil-based ALC for unit weight 15.0 kN/m^3 category for the three ratios used in the experiments.

Lower compressive strength of soil-based ALC could be due its higher water:cement ratio compared to sand-based ALC. Soil-based ALC required higher water:cement ratio in order to increase its workability during the mixing process. As a result of higher water:cement ratio, soil-based ALC was relatively more porous causing it to have lower compressive strength (Neville, 1995). The compressive strength of concrete products is highly dependent on the bonding of filler by the binder. Soil which contained clay and silt was finer and thus have greater surface area when compared to sand. Therefore, with the same amount of cement, the bonding of soil particles and cement paste was weaker compared to that of sand particles. Moreover, soil particles have round structures which decreased the bonding within the particles compared to sand particles which have irregular shapes that enhanced the interlocking and thus increased the strength of concrete.

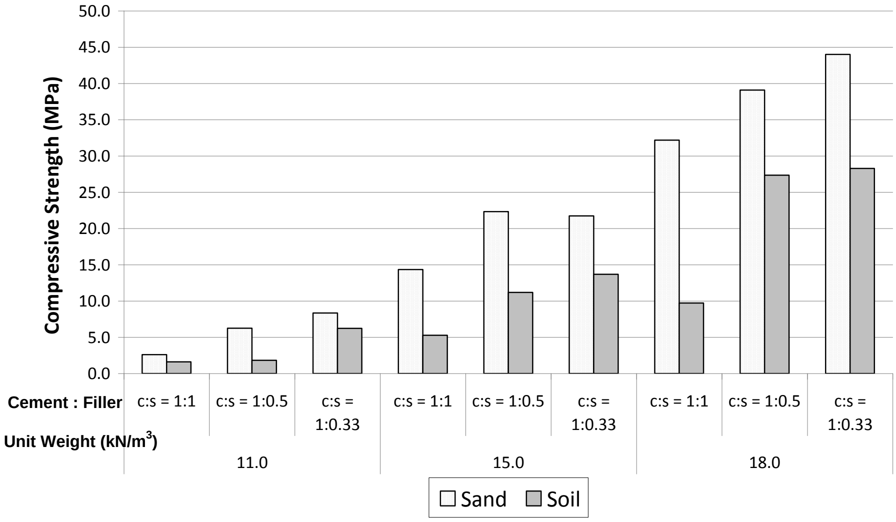


Figure 5.5: Effect of filler on compressive strength

5.2.5 Failure Mode of Cube Specimen

The failure mode of cube specimens are categorised as satisfactory as accordance to BSEN 12390:3:2002. The typical failure mode is shown in Figure 5.6.

Figure 5.6: Failure mode of aerated lightweight concrete

5.3 Compressive and Flexural Strength of Prism Specimens

In the second stage of study on the mechanical properties of ALC, the binder content was reduced to the maximum value of cement:filler = 1:0.5. This was due to the fact that the compressive strength of cement:filler = 1:0.67 ratio was far beyond the necessary strength of 3.45 MPa as required for non-load bearing wall according to ASTM C129 – 1985. Furthermore, prism specimen was adopted in the second stage of study so that additional property such as flexural strength of ALC can be obtained from the same specimen used in the compressive strength study.

In this study, all prism specimens were cured in room temperature to emulate the actual condition when the ALC is mass produced in factory. Test was conducted on three specimens at the age of 3, 7, 28, 60 and 120-day. The detail results are attached in Appendix A2 for sand-based specimens and Appendix A3 for soil-based specimens. The average result of compressive and flexural strengths conducted using prism specimens are summarised in Table 5.2

Table 5.2: Compressive and flexural strength for ALC

Unit Weight (kN/m^3)	Cement : Filler	Age (Day)	Compressive Strength (MPa)		Flexural Strength (MPa)	
			Sand-based	Soil-based	Sand-based	Soil-based
11.0	1:1	3	2.10	1.09	0.61	0.61
		7	2.31	1.56	0.99	0.63
		28	2.78	2.21	1.37	1.01
		60	3.18	2.23	1.45	1.04
		120	3.21	2.27	1.48	1.05
	1:0.67	3	2.66	1.56	0.61	0.55
		7	3.33	1.97	1.09	0.84
		28	3.38	3.01	1.36	1.42
		60	3.45	3.01	1.47	1.48
		120	3.50	3.07	1.58	1.51
	1:0.50	3	3.30	2.01	0.55	0.88
		7	3.54	2.96	1.08	1.24
		28	3.78	3.62	1.40	1.34
		60	3.82	3.81	1.55	1.42
		120	4.03	3.89	1.68	1.62
15.0	1:1	3	9.02	5.39	1.51	1.48
		7	9.22	7.94	2.34	2.33
		28	10.64	10.60	2.45	2.41
		60	14.21	12.00	2.67	2.45
		120	17.67	12.72	2.72	2.61

Unit Weight (kN/m^3)	Cement : Filler	Age (Day)	Compressive Strength (MPa)		Flexural Strength (MPa)	
			Sand-based	Soil-based	Sand-based	Soil-based
	1:0.67	3	9.63	5.73	2.16	1.60
		7	10.47	8.13	2.10	2.01
		28	13.00	10.85	2.38	2.21
		60	13.93	12.51	2.88	2.50
		120	18.23	12.99	3.04	2.70
	1:0.5	3	9.16	5.81	2.14	1.61
		7	9.90	7.51	2.36	2.22
		28	10.21	11.13	2.70	2.70
		60	14.20	13.32	2.83	2.87
		120	18.71	14.27	3.51	3.04
18.0	1:1	3	10.26	7.01	5.35	1.71
		7	12.20	9.04	6.32	2.21
		28	20.17	12.27	6.77	2.66
		60	24.99	13.99	6.82	2.88
		120	25.78	14.37	6.89	2.92
	1:0.67	3	13.74	8.47	4.67	2.28
		7	15.85	11.43	6.27	3.28
		28	24.41	17.40	6.46	3.50
		60	28.60	20.38	6.68	3.69
		120	30.64	21.96	7.08	3.81
	1:0.5	3	13.43	8.29	4.56	1.66
		7	22.44	10.97	4.54	3.18
		28	30.97	17.45	5.63	3.65
		60	32.30	20.29	7.49	3.90
		120	32.76	22.66	8.36	4.00

5.3.1 Effect of Age on Compressive and Flexural Strength

Based on Figures 5.7 and 5.9, it is apparent that the compressive strength of both soil-based and sand-based ALC specimens increased with time or 'age' in a curvilinear manner. It shared the trend observed in strength development of cube specimens which closely related to the degree of cement hydration. Similarly, it is observed that the flexural strength also increased with time or 'age' in a similar manner as shown in Figures 5.8 and 5.10 for sand-based and soil-based ALC respectively.

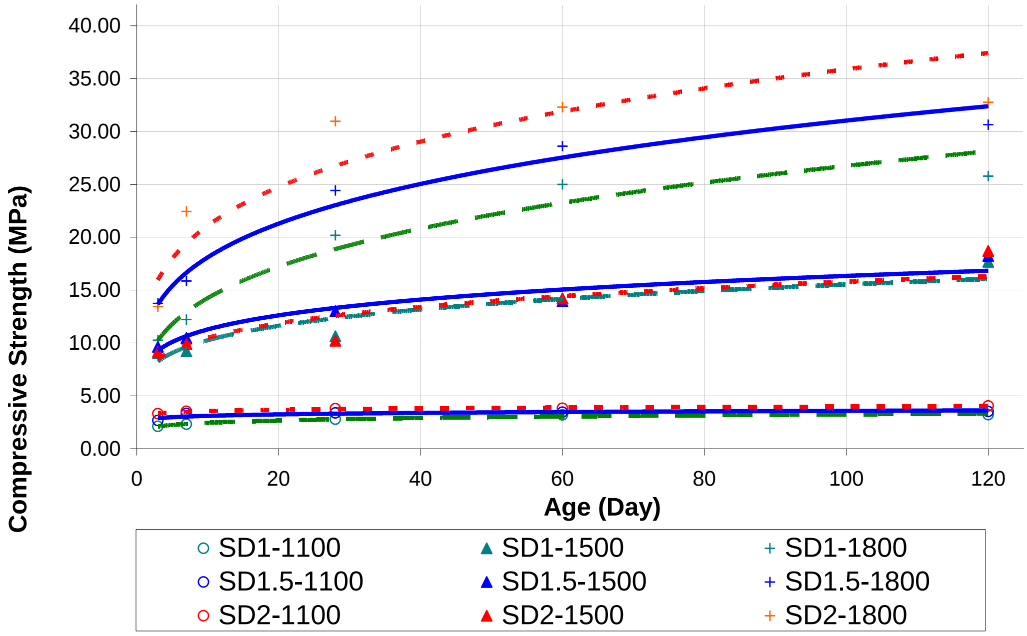


Figure 5.7: Compressive strength development over the time for sand-based specimens

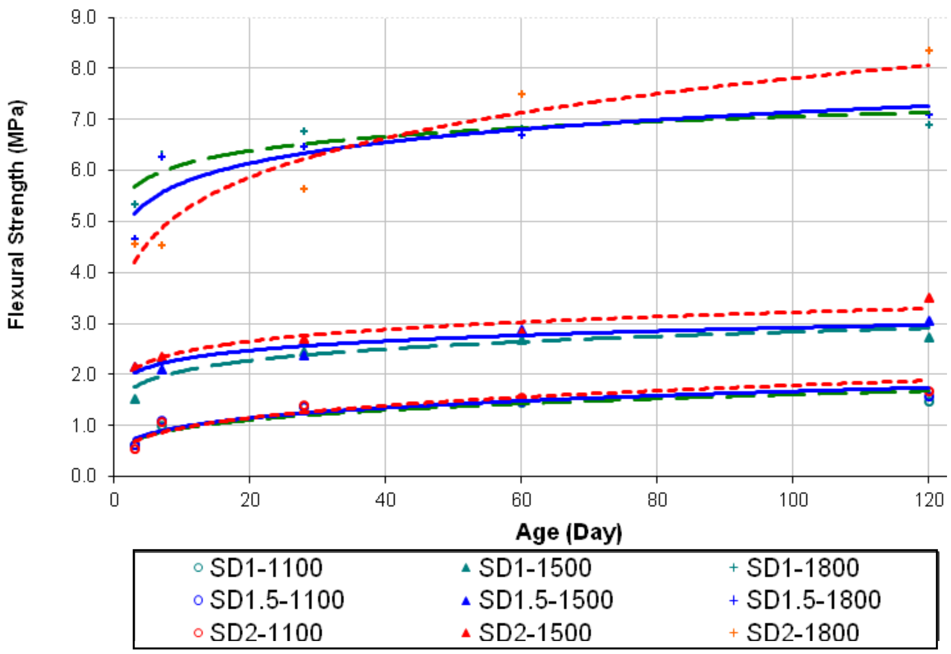


Figure 5.8: Flexural strength development over the time for sand-based specimens

Note:
SD1-1100 – Cement : Sand = 1:1; Unit weight 11.0 kN/m^3
SD1-1500 – Cement : Sand = 1:1; Unit weight 15.0 kN/m^3
SD1-1800 – Cement : Sand = 1:1; Unit weight 18.0 kN/m^3
SD1.5-1100 – Cement : Sand = 1:0.67; Unit weight 11.0 kN/m^3
SD1.5-1500 – Cement : Sand = 1:0.67; Unit weight 15.0 kN/m^3
SD1.5-1800 – Cement : Sand = 1:0.67; Unit weight 18.0 kN/m^3
SD2-1100 – Cement : Sand = 1:0.5; Unit weight 11.0 kN/m^3
SD2-1500 – Cement : Sand = 1:0.5; Unit weight 15.0 kN/m^3
SD2-1800 – Cement : Sand = 1:0.5; Unit weight 18.0 kN/m^3

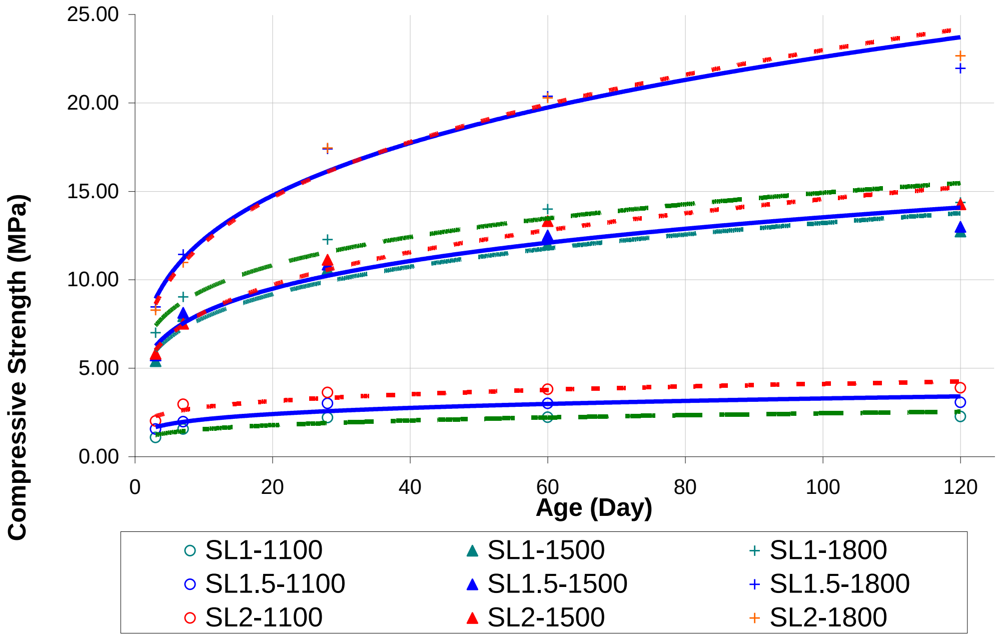


Figure 5.9: Compressive strength development over the time for soil-based specimens

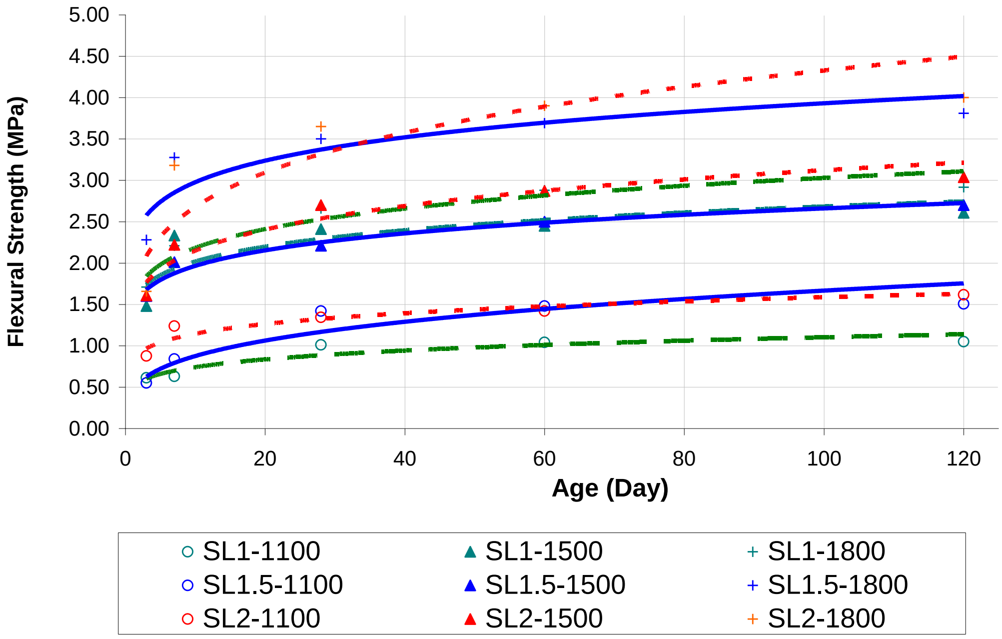


Figure 5.10: Flexural strength development over the time for soil-based specimens

Note:
SL1-1100 – Cement : Soil = 1:1; Unit weight 11.0 kN/m^3
SL1-1500 – Cement : Soil = 1:1; Unit weight 15.0 kN/m^3
SL1-1800 – Cement : Soil = 1:1; Unit weight 18.0 kN/m^3
SL1.5-1100 – Cement : Soil = 1:0.67; Unit weight 11.0 kN/m^3
SL1.5-1500 – Cement : Soil = 1:0.67; Unit weight 15.0 kN/m^3
SL1.5-1800 – Cement: Soil = 1:0.67; Unit weight 18.0 kN/m^3
SL2-1100 – Cement : Soil = 1:0.5; Unit weight 11.0 kN/m^3
SL2-1500 – Cement : Soil = 1:0.5; Unit weight 15.0 kN/m^3
SL2-1800 – Cement : Soil = 1:0.5; Unit weight 18.0 kN/m^3

5.3.2 Effect of Cement Content on Compressive and Flexural Strength

Figures 5.11 and 5.12 present the compressive and flexural strengths of ALC at the age of 120 days. Both compressive and flexural strengths observed shared a common trend where higher strength was recorded on specimen with higher cement content. This further verified the findings obtained from cube specimens discussed in Section 5.2.2 earlier.

For instance, the compressive strength of 11.0 kN/m^3 sand-based ALC increased from 3.21 MPa, 3.50 MPa to 4.03 MPa for corresponding cement:sand ratio of 1:1, 1:0.67 and 1:0.5 respectively. Soil-based ALC also experienced an increase in compressive strength with additional cement content. Based on the same category as sand-based ALC specimens discussed earlier, the compressive strength of soil-based ALC increased from 2.27 MPa to 3.07 MPa and 3.89 MPa.

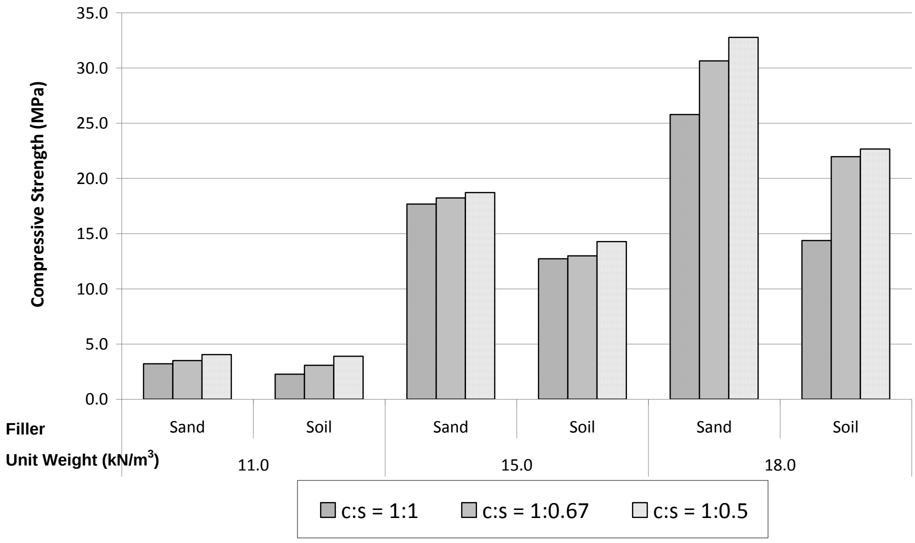


Figure 5.11: Effect of cement content on compressive strength

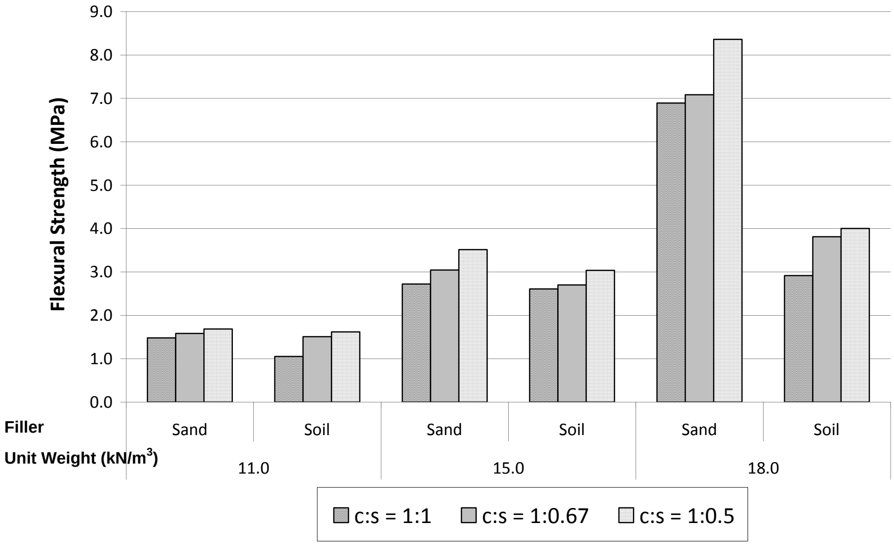


Figure 5.12: Effect of cement content on flexural strength

5.3.3 Effect of Unit Weight on Compressive and Flexural Strength

From Figures 5.13 and 5.14, it is again proven that higher unit weight translated to higher compressive and flexural strengths. This is also in-lined with the findings obtained from cube specimens in Section 5.2.3. A closer observation on the results obtained in Figure 5.14 reveals that the flexural strength for sand-based ALC with cement:sand ratio 1:0.5 was recorded at 1.68 MPa, 3.51 MPa and 8.36 MPa for corresponding unit weight of 11.0 kN/m^3, 15.0 kN/m^3 and 18.0 kN/m^3. For the same category of soil-based ALC specimen, the flexural strength increased from 1.62 MPa to 3.04 MPa and finally to 4.00 MPa.

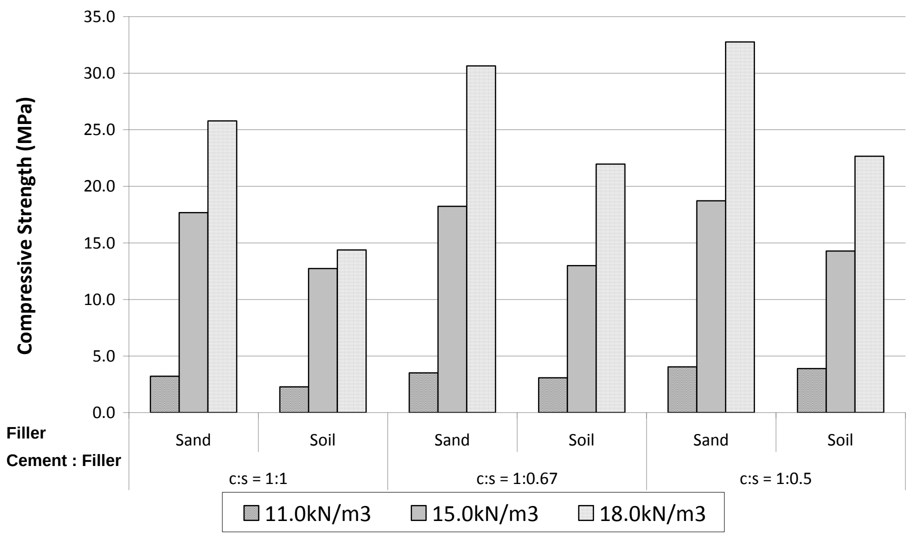


Figure 5.13: Effect of unit weight on compressive strength

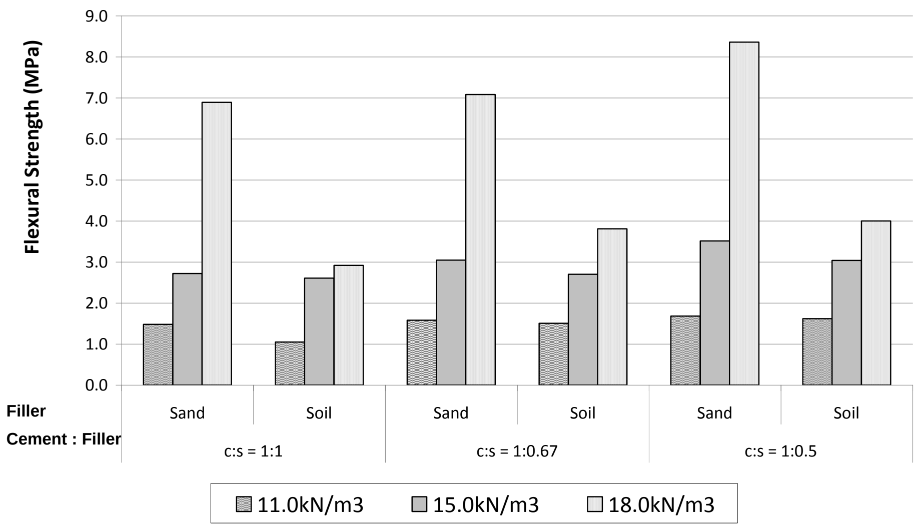


Figure 5.14: Effect of unit weight on flexural strength

5.3.4 Effect of Filler on Compressive and Flexural Strength

With reference to the results shown in Figures 5.15 and 5.16, sand-based ALC has superior compressive and flexural strengths compared to soil-based ALC. This trend complied with the findings obtained from cube specimens. Generally, the compressive and flexural strengths of sand-based specimens were higher than soil-based specimens. The higher strength was attributed to the better shear capacity between sand particles and the cement paste compared to soil particles and cement paste as mentioned by Jones and McCarthy (2005a). This could be due to the characteristic of the filler such as the shape and size. Soil being fine and round in shape decreased the bonding of cement paste and the filler. Furthermore, the crushing strength of soil was also lower compared to sand.

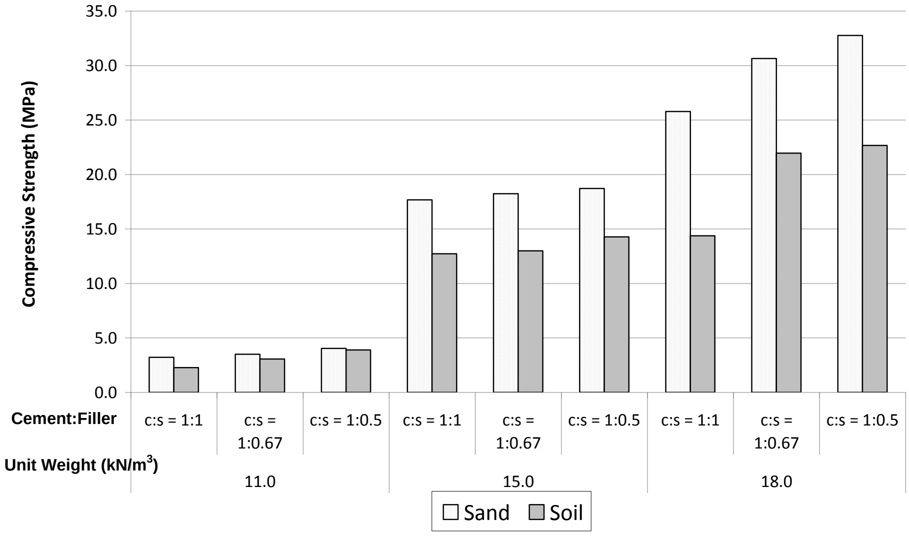


Figure 5.15: Effect of filler on compressive strength

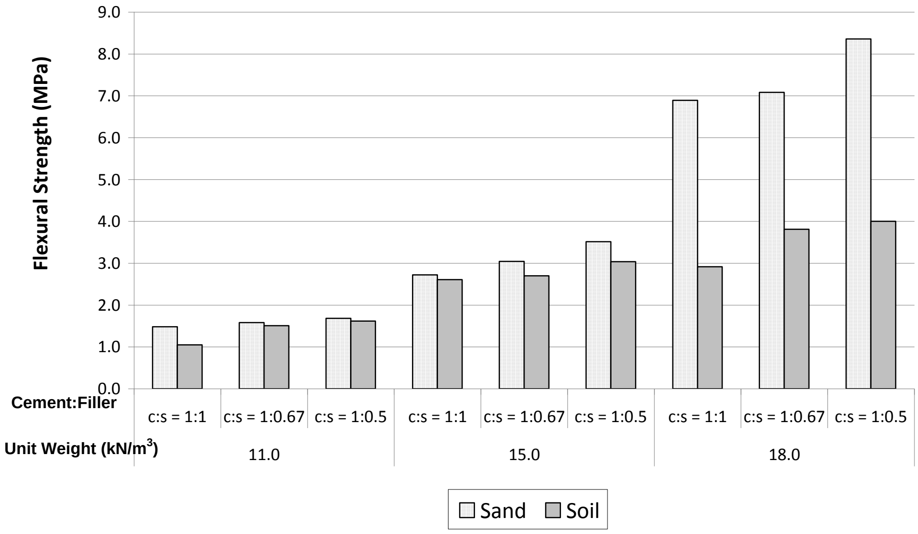


Figure 5.16: Effect of filler on flexural strength

5.3.5 Failure Mode of Prism Specimen

The failure mode of cube specimens were categorised as satisfactory in accordance to BSEN 12390:3:2002. The typical failure modes for flexural test and compressive test are shown in Figures 5.17 and 5.18 respectively.

Figure 5.17: Failure due to compression

Figure 5.18: Failure due to flexural

5.4 Conclusion

Results from the experiments on the mechanical properties show that the compressive strength obtained from 100 mm cube specimens and prism specimens shared the same trend on strength development behaviour. The strength of ALC is highly dependent on its unit weight, cement content, age and types of filler used. From the results, it can be concluded that the strength of ALC has a positive relationship with its unit weight, cement content and age. Sand-based specimens tend to have greater strength than soil-based specimens of the same category.

The mechanical properties test conducted provide a guide and reference on the suitability of ALC to be produced to proceed with thermal properties investigation. The ALC produced in the thermal properties study has to meet the minimum strength requirement of non-load bearing wall.

CHAPTER 6

THERMAL PROPERTIES OF AERATED LIGHTWEIGHT CONCRETE*

6.1 Introduction

The thermal properties namely thermal conductivity and temperature gradient of aerated lightweight concrete (ALC) were determined and discussed in this chapter. These tests were conducted on plate and panel specimens as mentioned in Section 4.4 earlier.

6.2 Thermal Conductivity

6.2.1 Introduction

Thermal conductivity is one of the most important properties required with regards to heat transfer. Thermal conductivity of soil-based and sand-based ALC plates were analysed and discussed separately in the following sections.

*Parts of this chapter were published in:

1. Ng, S.C and Low, K.S. (2010) Thermal conductivity of newspaper sandwiched aerated lightweight concrete panel. Energy and Buildings. 42(12), 2452-2456. (Listed in ISI Citation Index, Impact Factor: 2.041)
2. Ng, S.C., Low, K.S. and Tioh, N.H. (2011) Thermal insulation property of newspaper membrane encased soil-based aerated lightweight concrete panels. International Journal of Advanced Materials Research. 261-263, 783-787. (Listed in SCOPUS)
3. Ng, S.C., Low, K.S. and Lim, S.K. (2011) Thermal insulation property of aerated lightweight concrete. Proceedings of the Institution of Civil Engineers: Construction Materials. 164(4), 181-189. (Listed in SCOPUS)

6.2.2 Soil-based Plates

Thermal conductivity test was conducted on twelve soil-based ALC plates and the average results can be referred to in Table 6.1. A typical test result can be referred to in Appendix B1.

Table 6.1: Thermal conductivity values for soil-based plates

Code	Unit Weight (kN/m^3)	Aerial Intensity of Newspaper Membrane Embedment (g/cm^2)	Thermal Conductivity, k (W/mK)	Moisture Content (%)
PL	18.0	Nil (Plain)	0.580	15.39
	15.0	Nil (Plain)	0.503	3.03
	11.0	Nil (Plain)	0.466	14.82
GS05	18.0	0.05	0.466	14.54
	15.0	0.05	0.450	8.09
	11.0	0.05	0.310	8.64
GS10	18.0	0.10	0.399	9.84
	15.0	0.10	0.394	7.87
	11.0	0.10	0.277	7.55
GS15	18.0	0.15	0.382	7.96
	15.0	0.15	0.365	7.53
	11.0	0.15	0.256	5.19

Note:
PL : Without membrane embedment
GS05 : 0.05 g/cm^2 newspaper membrane embedment
GS10 : 0.10 g/cm^2 newspaper membrane embedment
GS15 : 0.15 g/cm^2 newspaper membrane embedment

Further discussions that follow are categorised according to the effect of unit weight and the effect of newspaper membrane's aerial intensity on thermal conductivity.

6.2.2.1 Effect of Unit Weight on Thermal Conductivity

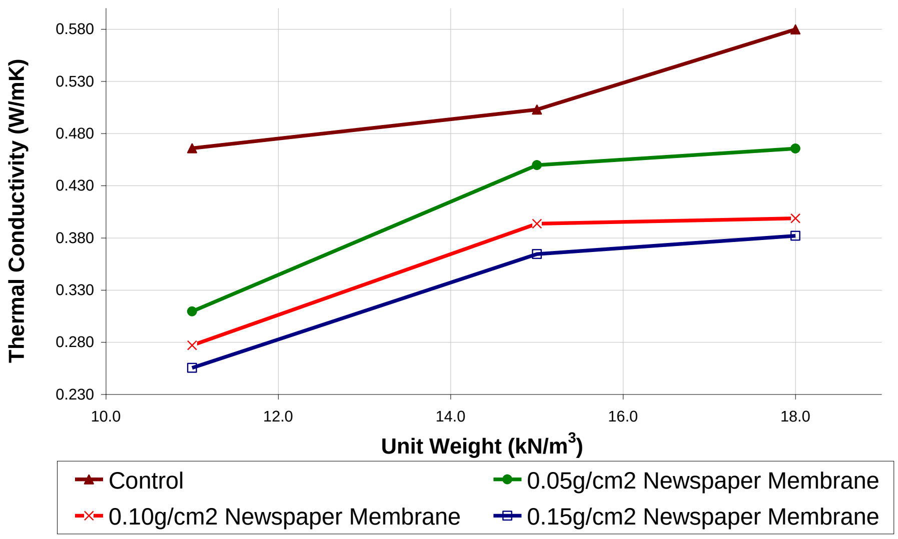


Figure 6.1: Effect of unit weight on thermal conductivity

From Figure 6.1, it is observed that the thermal conductivity values of all panels decreased proportionately to the unit weight. The thermal conductivity values for unit weight 18.0 kN/m^3, 15.0 kN/m^3 and 11.0 kN/m^3 panels were recorded at 0.580 W/mK, 0.503 W/mK and 0.466 W/mK respectively. This has translated to 13.3% and 19.7% reduction on thermal conductivity for unit weight 15.0 kN/m^3 and 11.0 kN/m^3 panels compared to control panel of unit weight 18.0 kN/m^3.

Similar trend of thermal conductivity reduction was observed for panels with newspaper membrane embedment. For instance, the thermal conductivity for GS05 panels was reduced from 0.466 W/mK to 0.450 W/mK and further to 0.310 W/mK corresponding to unit weight 18.0 kN/m^3, 15.0 kN/m^3 and 11.0 kN/m^3 panels respectively. The percent reduction on the thermal conductivity for other newspaper membrane embedded panels compared to its control unit weight 18.0 kN/m^3 panel are shown in Figure 6.2.

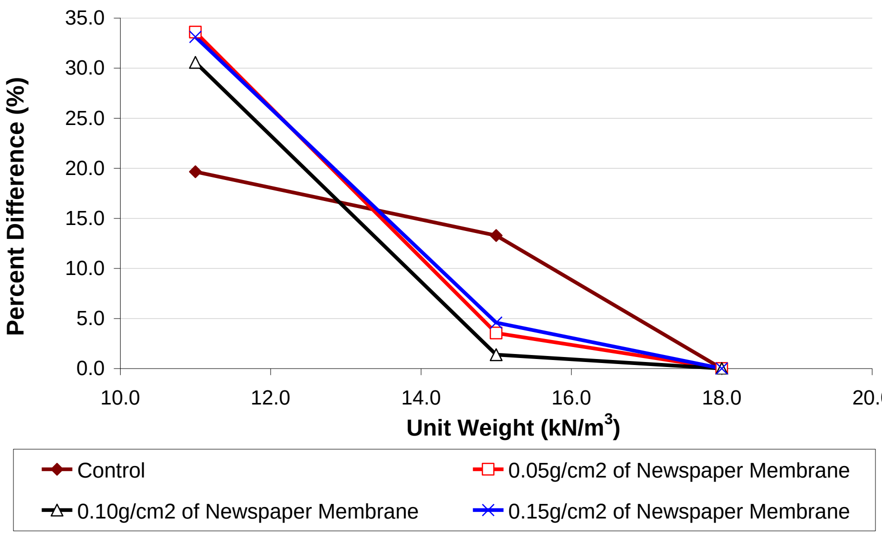


Figure 6.2: Percent reduction of thermal conductivity based on unit weight

From the results and analysis, the statement of lower unit weight resulting in lower thermal conductivity was proven true and it has also been supported by other researchers such as Adam and Jones (1995), Blanco et al. (2000), Narayanan and Ramamurthy (2000), Demirboga and Gul (2003), Demirboga (2003a), Demirboga (2003b), Khedari et al. (2005), Topcu and Uygunoglu (2006) and Elfordy et Al. (2008). The explanation is that the thermal conductivity changes considerably with its porosity. The pores are filled up with air and air being the poorest conductor compared to solid and liquid. The unit weight of ALC is governed by the porosity or amount of air content. Thus, lower unit weight of ALC indicates greater porosity or greater amount of air contained therein.

This phenomenon was not only applicable to control non-embedded samples, but was also applicable to newspaper membrane embedded panels as shown in Figure 6.1 and Figure 6.2. Generally, the highest thermal conductivity for GS05 panels was recorded on panel of unit weight 18.0 kN/m^3 followed by unit weight 15.0 kN/m^3 and unit weight 11.0 kN/m^3 panels. The same trend was shared by GS10 and GS15 panels.

6.2.2.2 Effect of Newspaper Membrane on Thermal Conductivity

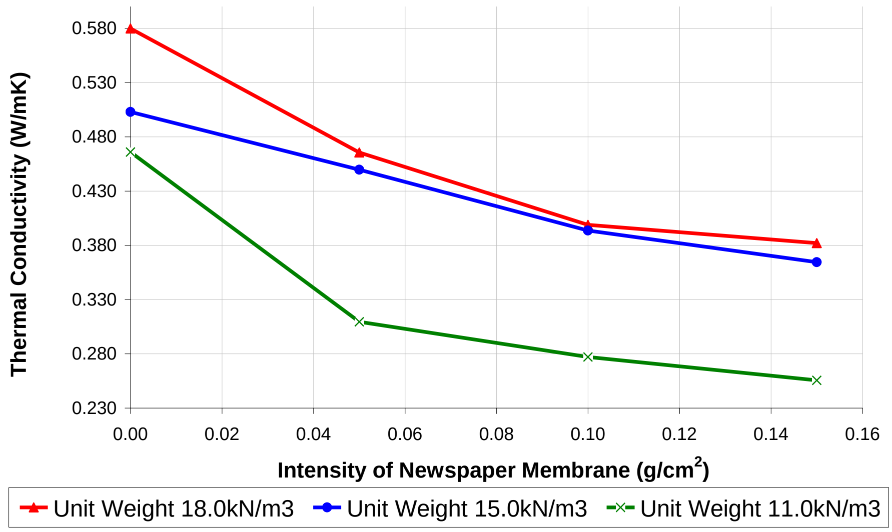


Figure 6.3: Effect of newspaper membrane on thermal conductivity

Figure 6.3 shows the effect of newspaper membrane on the thermal conductivity of soil-based aerated lightweight panels in three categories according to their densities. Generally, there is a reduction in the thermal conductivity as the aerial intensity of newspaper membrane embedded in the panel increased. Nevertheless, the rate of reduction on the thermal conductivity was not linear. The results showed that the rate of thermal conductivity reduced greatly when it was embedded with aerial intensity 0.05 g/cm^2 of newspaper membrane compared to the control panel or non-embedded panel of identical unit weight. For instance, the percent reduction on thermal conductivity between the non-embedded panels and aerial intensity 0.05 g/cm^2 newspaper membrane embedded panels was 19.7% for unit weight 18.0 kN/m^3, 10.5% for unit weight 15.0 kN/m^3 and 33.5% for unit weight 11.0 kN/m^3. This shows a significant reduction on thermal conductivity when newspaper membrane was embedded in the panel.

There is a considerable reduction in the thermal conductivity for GS10 panels compared to GS05 panels of similar unit weight. For instance, the percent reduction of thermal conductivity between GS10 with GS05 panels was 14.4% for unit weight 18.0 kN/m^3, 12.4% for unit weight 15.0 kN/m^3 and 10.6% for unit weight 11.0 kN/m^3. The trend of thermal conductivity reduction was comparable to the reduction between GS05 and non-embedded panels.

The phenomenon of thermal conductivity reduction continued when newspaper membrane of greater aerial intensity was embedded. It is evident by comparing the thermal conductivity of GS10 with GS15 panels. All GS15 panels have lower thermal conductivity values compared to GS10 panels due to higher aerial intensity of newspaper membrane embedment. However, the thermal conductivity reduced negligibly between GS10 and GS15 panels of similar unit weight. For instance, by comparing the thermal conductivity of GS10 with GS15 panels of unit weight 18.0 kN/m^3, 15.0 kN/m^3 and 11.0 kN/m^3, the corresponding difference was 0.017 W/mK or 4.3% reduction, 0.029 W/mK or 7.4% reduction and 0.021 W/mK or 7.6% reduction respectively. The percent reduction on thermal conductivity of soil-based ALC panels categorised according to the aerial intensity of newspaper membrane embedment can be referred to in Figure 6.4.

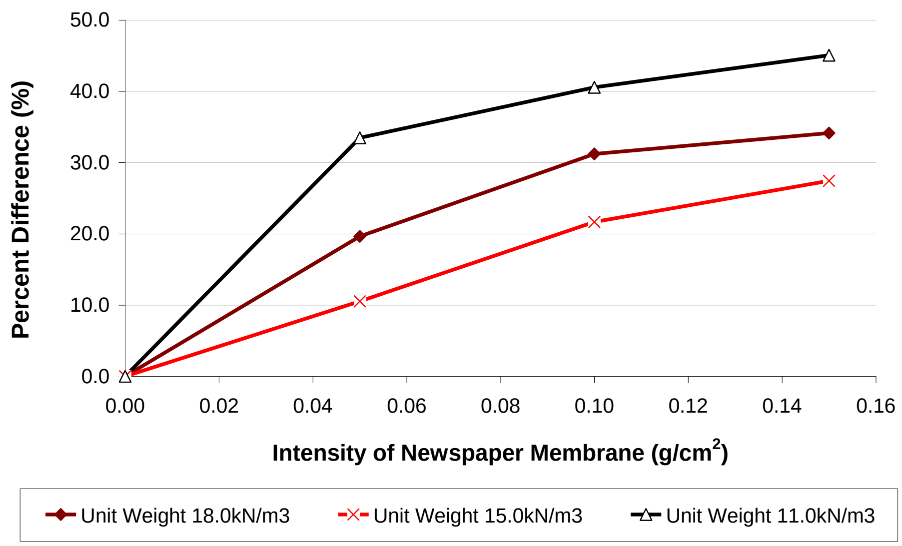


Figure 6.4: Percent reduction of thermal conductivity based on the intensity of newspaper membrane embedment

The reason for the reduction of thermal conductivity on newspaper membrane embedded plates was due to the property of the newspaper membrane itself. Newspaper membrane which originated from timber or wood pulp is well known to have low thermal conductivity of only about 0.12-0.16 W/mK (Incropera et al., 2005). Therefore, the newspaper membrane acted to impede the heat from transmitting through the panel thus lowering the thermal conductivity value. Secondly, the inclusion of newspaper membrane could lead to the existence of air void in between the plate. This has indirectly increased the overall porosity which eventually led to lower thermal conductivity.

Wood based materials have been incorporated in concrete products with the aim to reduce the thermal conductivity. For instance, Bouguerra et al. (1998) have conducted a research to investigate the thermal conductivity of wood aggregates concrete. From the study, they found that the thermal conductivity was greatly reduced when high amount of wood aggregate was incorporated. On the other hand, Khedari et al. (2001) and Khedari et al. (2005) have conducted studies which concluded positively on the effects of various types of fibre inclusion in reducing the thermal conductivity of lightweight concrete.

6.2.3 Sand-based Plates

Thermal conductivity tests for another twelve sand-based ALC plates were conducted and the average results of the thermal conductivity are shown in Table 6.2. A typical test result is attached at Appendix B2.

Table 6.2: Thermal conductivity values for sand-based plates

Code	Unit Weight (kN/m^3)	Aerial Intensity of Newspaper Membrane Embedment (g/cm^2)	Thermal Conductivity, k (W/mK)	Moisture Content (%)
PL	18.0	Nil (Plain)	0.621	2.07
	14.0	Nil (Plain)	0.504	6.75
	11.0	Nil (Plain)	0.391	2.47
GS05	18.0	0.05	0.509	5.28
	14.0	0.05	0.394	13.43
	11.0	0.05	0.310	7.04
GS10	18.0	0.10	0.491	6.87
	14.0	0.10	0.333	11.04
	11.0	0.10	0.307	5.92
GS15	18.0	0.15	0.400	6.58
	14.0	0.15	0.317	7.93
	11.0	0.15	0.303	5.11

Note:
PL : Without membrane embedment
GS05 : 0.05 g/cm^2 newspaper membrane embedment
GS10 : 0.10 g/cm^2 newspaper membrane embedment
GS15 : 0.15 g/cm^2 newspaper membrane embedment

Further discussions are categorised according to the effect of unit weight and the effect of newspaper membrane on thermal conductivity.

6.2.3.1 Effect of Unit Weight on Thermal Conductivity

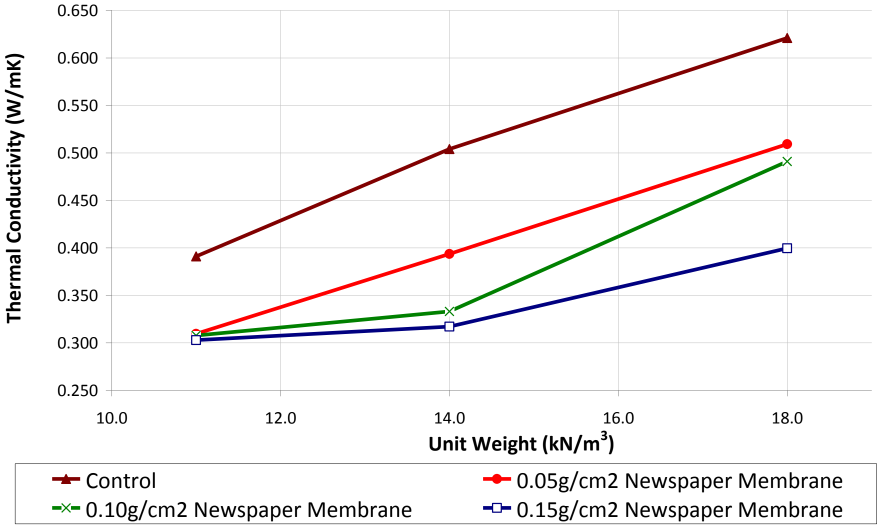


Figure 6.5: Effect of unit weight on thermal conductivity for sand-based plates

From Figure 6.5, it is observed that the thermal conductivity for all plates was proportional to its unit weight which was similar to the behaviour of soil-based ALC plates. For instance, the thermal conductivity for control plate, without newspaper membrane embedment reduced from 0.621 W/mK to 0.504 W/mK and further reduced to 0.391 W/mK for corresponding unit weight of 18.0 kN/m^3, 14.0 kN/m^3 and 11.0 kN/m^3 respectively. The percent reduction was equivalent to 18.8% and 37.0% for both unit weights 14.0 kN/m^3 and 11.0 kN/m^3 plates compared to unit weight 18.0 kN/m^3 plate.

From the results shown, it was again proven that lower unit weight equivalent to lower thermal conductivity. The results suggested that the thermal conductivity reduction trend is also applicable to newspaper membrane embedded plates.

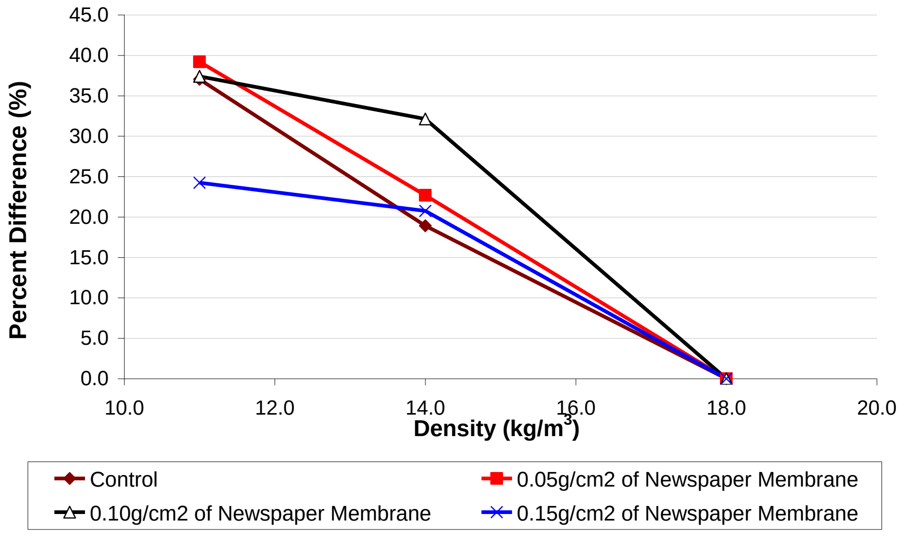


Figure 6.6: Percent reduction of thermal conductivity based on unit weight

From Figure 6.6, the reduction of thermal conductivity was linear to the reduction of unit weight for non-embedded plates. However, the reduction trend was not linear for newspaper membrane embedded plates. As a conclusion, unit weight has a great impact on the thermal conductivity of ALC plates. Generally, the thermal conductivity decreased proportionately to its unit weight irrespective of either sand-based or soil-based ALC plates.

6.2.3.2 Effect of Newspaper Membrane on Thermal Conductivity

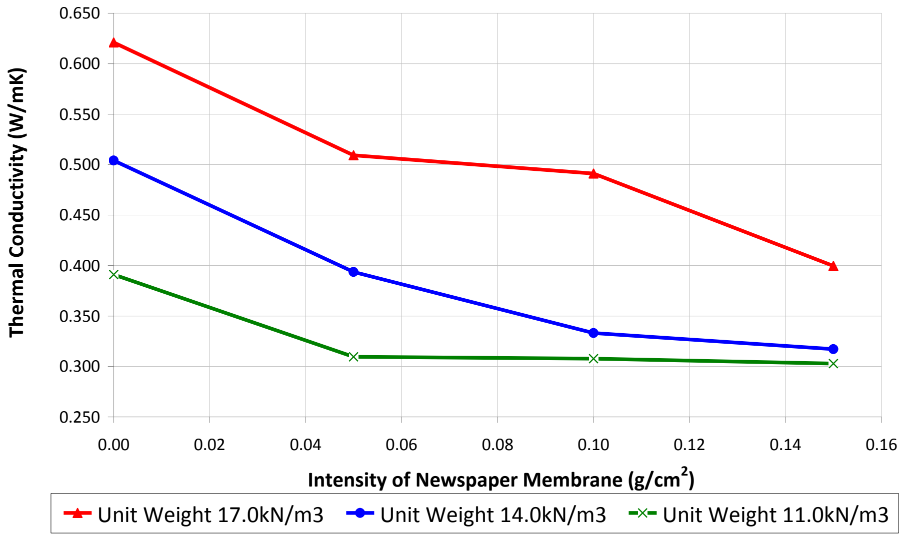


Figure 6.7: Thermal conductivity vs newspaper membrane intensity relationships for ALC

Figure 6.7 shows the thermal conductivity of ALC plates with different aerial intensities of newspaper membrane. Figure 6.7 depicts the thermal conductivity of sand-based ALC plates with different aerial intensity of newspaper membrane embedment based on their densities. The results indicated that newspaper membrane was effective in reducing the thermal conductivity of the plates. There was a behavioural similarity on the reduction of thermal conductivity between sand-based and soil-based ALC plates. It can be observed that there was a significant reduction on thermal conductivity from non-newspaper membrane embedded plates to GS05 plates. For example, thermal conductivity reduction for non-newspaper membrane embedded plates compared to GS05 plates was 0.112 W/mK or 18.0% for unit weight 18.0 kN/m^3, 0.110 W/mK or 21.8% for unit weight 14.0 kN/m^3 and 0.081 W/mK or 20.7% for unit weight 11.0 kN/m^3.

From the results obtained, the effectiveness of newspaper membrane in reducing the thermal conductivity for more than 0.10 g/cm^2 of newspaper membrane embedment seemed to be negligible except for the plate with unit weight 18.0 kN/m^3. Figure 6.8 shows the percent reduction on thermal conductivity compared to unit weight 18.0 kN/m^3 plate for newspaper membrane with different aerial intensity.

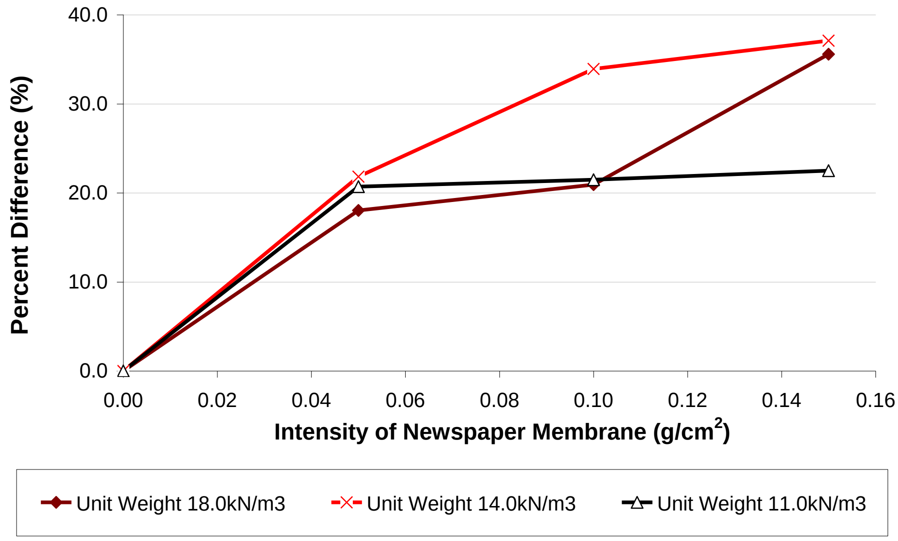


Figure 6.8: Percent reduction of thermal conductivity based on the intensity of newspaper membrane embedment

From the results, it can be concluded that newspaper membrane embedment has significantly reduced the thermal conductivity of both sand-based and soil-based ALC plates.

6.2.3.3 Effect of Filler on Thermal Conductivity

In this section, thermal conductivity of sand-based and soil-based ALC plates are compared and discussed based on the effect of raw material or filler used to produce the plates. The comparison is only conducted for unit weight 11.0 kN/m^3 and 18.0 kN/m^3 plates as shown in Figure 6.9.

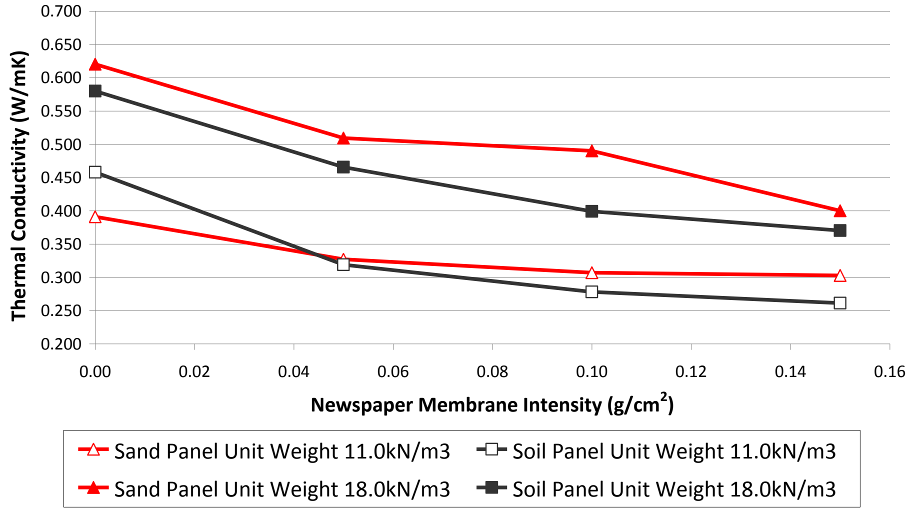


Figure 6.9: Effect of fillers on thermal conductivity

Figure 6.9 clearly shows that sand-based plates have higher thermal conductivity than soil-based plates with similar aerial intensity of newspaper membrane embedment. In other words, the results showed that soil-based plates offered better heat insulation characteristic based on its thermal conductivity property. Table 6.3 summarised the percent difference on thermal conductivity for sand-based and soil-based ALC plates.

Table 6.3: Comparison between sand-based and soil-based ALC

Unit Weight (kN/m^3)	Intensity of Newspaper Membrane Embedment (g/cm^2)	Thermal Conductivity (W/mK)		Percent of Thermal Conductivity Different (%)
		Sand	Soil	
18.0	0	0.621	0.580	6.6
	0.05	0.504	0.466	7.5
	0.10	0.491	0.399	18.7
	0.15	0.400	0.382	4.5
11.0	0	0.391	0.466	-16.1
	0.05	0.310	0.310	0
	0.10	0.307	0.277	9.8
	0.15	0.303	0.256	15.5

Generally, soil-based plates showed a lower thermal conductivity property, rendering it more favourable to be used as building material for energy efficient construction. Lower thermal conductivity of soil-based plates could be due to the thermal conductivity of the soil material itself. According to Abu-Hamdeh and Reeder (2000), thermal conductivity for soil ranged from 0.17-1.13 W/mK while Holman (1990), reported that the thermal conductivity for sand has a range of 1.73-2.29 W/mK. The filler, either soil or sand, occupied nearly 40% of the plate's volume. Thus, the thermal conductivity of the plates literally depended on the thermal property of the raw material as it accounted for a large proportion of the plate. Therefore, it is not surprising that soil-based plates have lower thermal conductivity compared to sand-based plates.

6.2.4 Model Development for Thermal Conductivity Prediction

The relationships between thermal conductivity and the controlled variables namely unit weight, aerial intensity of newspaper membrane, and types of filler were determined using the Regression tool from Statistical Package for Social Science (SPSS) software.

6.2.4.1 Regression Analysis

In statistics, regression analysis refers to techniques for modelling and analyzing several variables, when the focus is on the relationships between a dependent variable and one or more independent variables. For this case, the dependent variable was thermal conductivity, *k* value, while the independent variables were unit weight, aerial intensity of newspaper membrane, raw material and moisture content. The relationships can be represented in the following mathematical form.

$$k = f(density, membrane, filler, moisture\_content)$$

Apart from the factors shown, they are many other factors influencing the thermal conductivity such as age, water:cement ratio, cement:filler ratio, temperature difference and so on. Kim et al (2003) has concluded that age has no significant effect on thermal conductivity of concrete plate. Other factors namely water:cement ratio, cement:filler ratio and temperature difference were fixed or held constant throughout this investigation.

6.2.4.2 Equation Development

From the regression analysis, the R^2 value for the model developed was 0.88 which is considered as a very fine value. If a model has a R^2 value closer to one, it means there is greater precision to predict the outcome by using the model. The summary of the regression analysis is shown in Table 6.4 and the coefficient for each variable is shown in Table 6.5.

Table 6.4: Model summary

Mode	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.939[a]	0.881	0.870	0.0348

a. Predictors: (Constant), MoistureContent, NewspaperMembrane, Density, Filler

Table 6.5: Coefficients for every variable

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.133	0.033		4.067	0.000
Density	0.261	0.020	0.677	12.729	0.000
Newspaper Membrane	-1.134	0.090	0.664	-12.536	0.000
Filler	0.007	0.011	0.035	0.625	0.535
MoistureContent	-0.002	0.002	0.073	-1.279	0.208

From the results shown in Table 6.5, the relationships between the dependent variable and the independent variables can be expressed in an equation as follow:

$$Y = 0.261X_1 - 1.134X_2 + 0.007X_3 - 0.002X_4 + 0.133 \qquad (6.1)$$

Where,

Y = k value of the plate

X_1 = density of the plate in t/m^3

X_2 = intensity of membrane embedded inside the plate in g/cm^2, either 0, 0.05, 0.10 or 0.15

X_3 = types of filler, either 0 for soil or 1 for sand (Dummy Variable – represent subgroups)

X_4 = surface moisture content of the plate in %

From the statistical point of view, the regression analysis results suggested that some of these variables can be excluded as they have insignificant effects in predicting the thermal conductivity for this study. These variables were Filler and Moisture Content as the significant (Sig.) values shown in Table 6.5 were greater than 0.05 for 95% confidence level. Therefore, the model was being re-run according to Stepwise method to establish a new refined relationships between the dependent and independent variables. Stepwise method as described by Hair et al. (1998) is a method of regression analysis that selects the best predictor of the dependent variable.

Additional independent variables are selected in terms of the incremental explanatory power that they can add to the regression model.

The extracted tables from SPSS based on Stepwise analysis are shown in Tables 6.6, 6.7 and 6.8 respectively.

Table 6.6: Model summary

Mode	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.664[a]	0.442	0.429	0.0729
2	0.934[b]	0.873	0.867	0.0352

a. Predictors: (Constant), Density
b. Predictors: (Constant), Density, NewspaperMembrane

Table 6.7: Excluded variables for Model 1 and 2

Model	Beta In	t	Sig	Partial Correlation	Collinearity Statistic
					Tolerance
1 Newspaper Membrane	-0.657[a]	-12.346	0.000	-0.879	1.000
Filler	0.060[a]	0.537	0.594	0.080	0.995
MoistureContent	-0.013[a]	-0.112	0.911	-0.017	0.980
2 Filler	0.060[b]	1.125	0.267	0.167	0.995
MoistureContent	-0.085[b]	-1.602	0.116	-0.235	0.969

a. Predictors in the Model: (Constant), Density
b. Predictors in the Model: (Constant), Density, NewspaperMembrane

Table 6.8: Coefficients for every variable

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.043	0.061		0.697	0.489
Density	0.256	0.042	0.664	6.031	0.000
2 (Constant)	0.127	0.030		4.187	0.000
Density	0.256	0.020	0.664	12.494	0.000
Newspaper Membrane	-1.121	0.091	-0.657	-12.346	0.000

The Stepwise analysis for this study was run in two modes as shown in Tables 6.7 and 6.8, the first mode was correlating the thermal conductivity as the effect of aerial intensity of newspaper membrane while the second mode was correlating thermal conductivity as the effect of aerial intensity of newspaper membrane and unit weight. By referring to Table 6.7, it is observed that in the Sig. column in both modes of analysis, the effect of filler and moisture content towards the thermal conductivity was insignificant. Therefore, the result from the second analysis was considered as a refined model with the R^2 value of 0.87 at 1% significance level. The new equation is represented as:

$$Y = 0.256X_1 - 1.121X_2 + 0.127 \tag{6.2}$$

Where,

Y = k value of the plate

X_1 = density of the plate in t/m^3

X_2 = intensity of membrane embedded inside the plate in g/cm^2, either 0, 0.05, 0.10 or 0.15

From the analysis, it can be concluded that types of filler and moisture content have insignificant effect towards the thermal conductivity of ALC plate in this study. The elimination of moisture content as a factor affecting the thermal conductivity prediction was contradictory with the findings from other researchers such as Aroni (1990). However, the moisture content observed for this investigation was for noting purpose or for additional information. The moisture content for each plate was quite low and they did not vary much between the plates. The moisture content was recorded at the average of 7.96% with standard deviation of 3.68%.

The relative importance between the two variables namely unit weight and aerial intensity of newspaper membrane in affecting the thermal conductivity of ALC plate were subsequently ranked. Based on Table 6.8, the absolute Standardised Coefficient Beta values are 0.657 and 0.664 for newspaper membrane and unit weight respectively. It is concluded that both factors (aerial intensity of newspaper membrane and unit weight) have almost the same effect on the thermal conductivity of ALC panels, however unit weight has a slightly higher effect over aerial intensity of newspaper membrane, in this case by a mere 1.1%.

6.2.5 Conclusion

From the results, it can be concluded that unit weight and aerial intensity of newspaper membrane embedment have an immense effect on the thermal conductivity of concrete plates. With the embedment of 0.05 g/cm^2 and 0.10 g/cm^2 aerial intensity of newspaper membrane, the reduction on thermal conductivity was enormous. However, the thermal conductivity reduction was negligible for 0.15 g/cm^2 compared to 0.10 g/cm^2 aerial intensity of newspaper membrane embedded plates. In general, newspaper membrane embedment technique or concept has proved to be effective in reducing the thermal conductivity of concrete plates.

The regression analysis showed that the filler, be it sand or soil, was immaterial in affecting the thermal conductivity of the ALC plates. An equation was developed to correlate the relationships between thermal conductivity as a dependent variable with aerial intensity of newspaper membrane embedment and unit weight as independent variables. The developed equation with a high R^2 value of 0.87 indicates a strong predictive value of this model. From the statistical analysis, it was found that both the aerial intensity of newspaper membrane and unit weight played almost equally important role on influencing the thermal conductivity of ALC.

6.3 Temperature Gradient

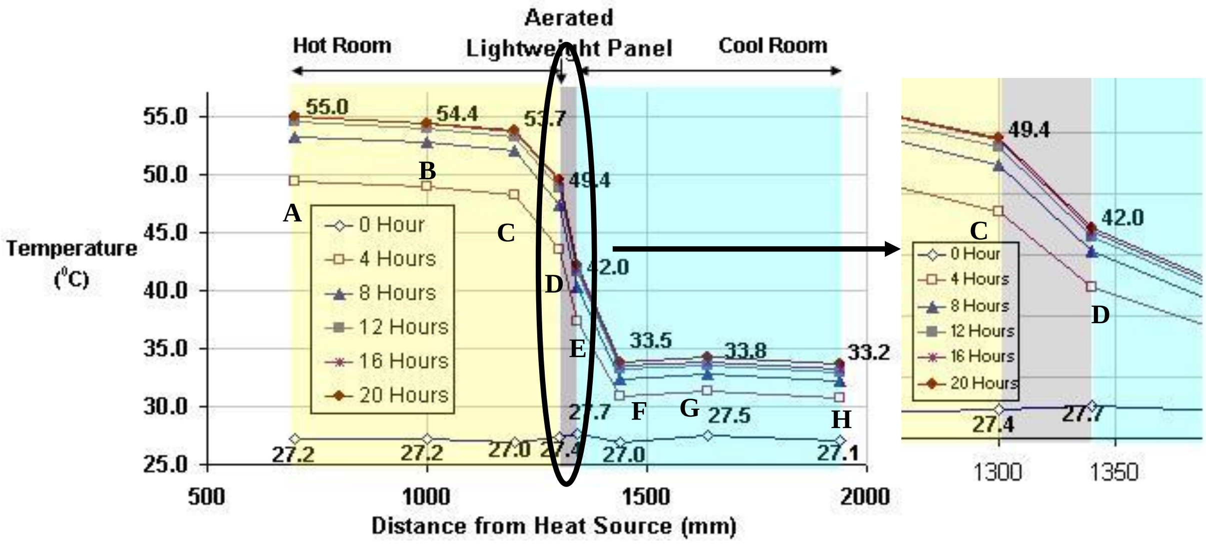
6.3.1 Introduction

Temperature gradient refers to the temperature difference between both surfaces over the thickness of a panel. Temperature gradient forms part of the Fourier Law's equation in determining thermal conductivity. The testing facility available in Thermal Laboratory is accordance to ISO 8990: 1994 – "Thermal insulation - Determination of steady-state thermal transmission properties - Calibrated and guarded hot box". However, the Thermal Laboratory available was not sophisticated enough to determine the thermal conductivity of the panel. Therefore, this test focused only on the temperature gradient which indirectly relates to the thermal conductivity of a panel.

Analysis and comparison was made between different ALC panels based on their temperature gradient values. The tests were conducted for 20 hours and the detail procedures and setup of the test were explained in Section 4.5.2.

6.3.2 Temperature Profile

Tests were conducted in the Thermal Laboratory available in the university and the temperatures at different locations were recorded. Temperature profile in the testing chamber was plotted based on the compilation of temperature at different locations and time. A typical temperature profile is shown in Figure 6.10 while the plan view of the Thermal Laboratory is shown in Figure 4.32. These two figures should be cross-referenced for better understanding on the exact location of temperatures detected.



(a) (b)

Figure 6.10: (a) Temperature profile (b) Surface temperature different

The temperature profile was plotted at the interval of four hours. The results obtained shows that the temperature increased at every location from the beginning of the test until the first twelve hours. In other words, steady state condition was achieved in twelve hours after the test started. Before the test, the room temperature was around 27.0 ^{0}C while the maximum ambient temperature after twelve hours of testing was about 55.0 ^{0}C. As mentioned earlier, this test only focused on the panel's surface temperature and the temperature difference on both surfaces of the panel as shown in Figure 6.10(b).

Tests were conducted on different types of panel and their temperature gradients were computed and compared. By comparing the temperature gradients of the panels, their relative thermal conductivity can be classified although they were not directly determined from this test. This can be explained by Fourier's Law.

The following equations exist by rearranging (3.2)

$$\frac{1}{k} = -\frac{1}{q_x}\left(\frac{dT}{dx}\right) \tag{6.3}$$

or

$$\frac{1}{k} = -\gamma\left(\frac{dT}{dx}\right) \tag{6.4}$$

Where, $\gamma = -\frac{1}{q_x}$, assumed constant for every test

Therefore,

$$\frac{1}{k} \propto \frac{dT}{dx} \tag{6.5}$$

From (6.5), it is found that there is a relationship between thermal conductivity and temperature gradient, that is, thermal conductivity is inversely proportional with the temperature gradient. Therefore, a greater temperature gradient indicates a lower thermal conductivity.

There were three purposes of conducting the test in Thermal Laboratory. Firstly, it was to further verify the thermal performance of ALC plates and the effectiveness of newspaper membrane from the aspect of temperature gradient. Secondly, it was a transition stage in turning laboratory scale ALC plate to prototype panel. Thus, the production of 750 mm x 750 mm panels was also an attempt to inspect the buildability of bigger size newspaper membrane embedded panel. Thirdly, the relationships between the maximum surface temperature and the ambient temperature in the cool room were observed and served as a guide for comparison with the prototype panels later. The following discussions are categorised according to panel without newspaper membrane, followed by panel with newspaper membrane embedment and lastly plant leaves embedded panels.

6.3.3 Temperature Gradient of ALC Panels

The temperature gradients of six non-newspaper membrane embedded panels were tested. A typical result collected from the test is given in Appendix B3 while the average results are shown in Table 6.9.

Table 6.9: Temperature gradient of ALC panels

Panel	Thickness (cm)	Unit Weight (kN/m^3)	T_1 ^0C (K)	T_2 ^0C (K)	Temperature Gradient ^0C/cm or K/cm
Sand	3.53	11.0	47.47 (320.47)	39.30 (312.30)	2.31
	3.81	15.0	49.47 (322.47)	42.15 (315.15)	1.92
	4.34	18.0	48.30 (321.30)	42.30 (315.30)	1.38
Soil	4.37	11.0	51.85 (324.85)	41.08 (314.08)	2.46
	4.31	15.0	50.00 (323.00)	41.50 (314.50)	1.97
	5.38	18.0	49.95 (322.95)	40.88 (313.88)	1.69

*Note:
T_1 : Panel's surface temperature in hot surface
T_2 : Panel's surface temperature in cold surface

6.3.3.1 Effect of Unit Weight on Temperature Gradient

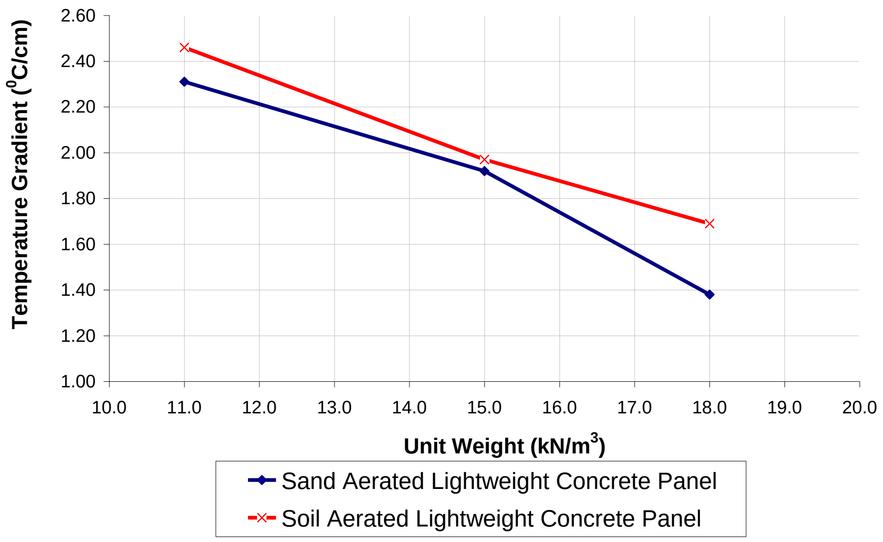


Figure 6.11: Temperature gradient vs unit weight relationships

Generally, the temperature gradient of ALC panels was influenced by the unit weight. From the results, temperature gradient increased when the unit weight decreased. The increase of temperature gradient represented lower thermal conductivity which was similar to the finding in thermal conductivity test discussed in Section 6.2.3.1 earlier. Differences in the apparent unit weight and the effective temperature gradient of the panels arose from differences in their porosity. Voids were filled up with air which contributes nothing to weight but enormous improvement in reducing thermal conductivity.

6.3.3.2 Comparison between Sand-based and Soil-based ALC Panels on Temperature Gradients

The results indicated that soil-based ALC panel has lower thermal conductivity compared to sand-based ALC panel of identical unit weight based on their temperature gradients. The temperature gradient for soil-based ALC panel of unit weight 11.0 kN/m^3 was recorded at 2.46 ^{0}C/cm while the temperature gradient of identical sand-based panel stood at 2.31 ^{0}C/cm. This showed a total of 6.5% enhancement in thermal insulation performance of soil-based panel compared to sand-based panel. For unit weight 15.0 kN/m^3 panels, the temperature gradient of soil-based panel was 2.7% higher than sand-based panel. Last but not least, for unit weight 18.0 kN/m^3 soil-based panel, it has a superior insulating characteristic compared to unit weight 18.0 kN/m^3 sand-based panel by an improvement of 22.5%.

Generally, soil-based panels exhibited greater temperature gradients compared to sand-based panels. This was due to the thermal conductivity of soil particles itself. As discussed earlier, thermal conductivity of soil ranged from 0.17-1.13 W/mK while the thermal conductivity for sand has a range of 1.73-2.29 W/mK. Apart from that, the shapes and sizes of the soil particles play an important factor in its heat insulating property. Fine and regular round shaped soil particles lead to poorer bonding between particles when compared to irregular shape of sand particles. The irregular shape of sand particles will fit in nicely with each other which resulted in less air voids available for sand-based ALC panels compared to soil-based ALC panels.

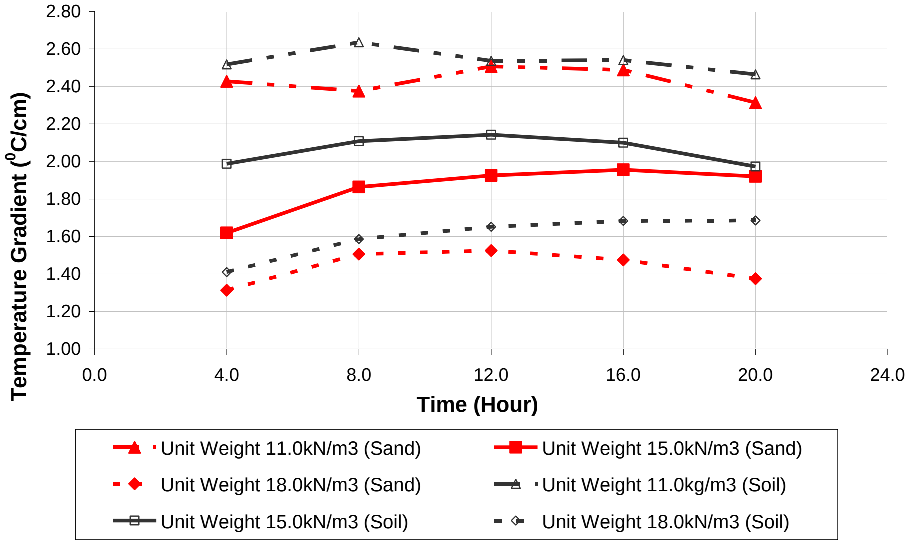


Figure 6.12: Temperature gradient vs time relationships

Figure 6.12 shows the temperature gradients computed during the test for each panel. The temperature gradients of lower unit weight panels were consistently lower than the temperature gradient of higher unit weight panels throughout the tests. This means that the greatest temperature gradient was observed on unit weight 11.0 kN/m^3 panel, followed by 15.0 kN/m^3 and finally by 18.0 kN/m^3 panels. It is evident that heat was poorly conducted through lower unit weight panels due to the air voids. This trend was observed for both sand-based and soil-based ALC panels.

6.3.4 Temperature Gradient of Newspaper Membrane Embedded Panels

Three soil-based ALC panels with newspaper membrane embedment and a control panel without newspaper membrane embedment of unit weight 13.0 kN/m^3 were produced and tested on their temperature gradients. The average results are shown in Table 6.10.

Table 6.10: Temperature gradient for newspaper membrane embedded panels

Panel Code	Thickness (cm)	Unit Weight (kN/m^3)	T_1 ^{0}C (K)	T_2 ^{0}C (K)	Temperature Gradient ^{0}C/cm or K/cm
PL	6.51	13.0	51.97 (324.97)	39.47 (312.47)	1.92
GS05	7.49	13.0	53.37 (326.37)	37.79 (310.79)	2.08
GS10	6.53	13.0	53.53 (326.53)	37.63 (310.63)	2.24
GS15	6.94	13.0	53.60 (326.60)	37.90 (310.90)	2.26

*Note:
T_1 : Panel's surface temperature in hot surface
T_2 : Panel's surface temperature in cold surface
PL : Without membrane embedment
GS05 : 0.05 g/cm^2 newspaper membrane embedment
GS10 : 0.10 g/cm^2 newspaper membrane embedment
GS15 : 0.15 g/cm^2 newspaper membrane embedment

6.3.4.1 Effect of Newspaper Membrane on Temperature Gradient

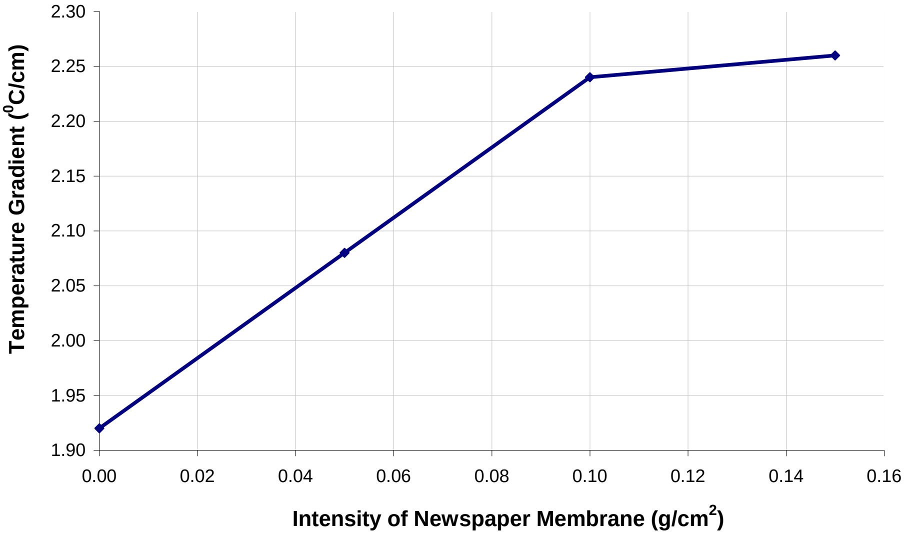


Figure 6.13: Temperature gradient vs intensity of newspaper membrane embedment relationships

A closer observation on Figure 6.13 shows that the temperature gradient of newspaper membrane embedded panels was greater than non-newspaper membrane embedded panel. From Figure 6.13, it is observed that the rate of increase in temperature gradient was linear to the aerial intensity of newspaper membrane embedment from non-membrane embedded panel to GS10 panel. The increase on temperature gradient was significant for GS05 and GS10 panels compared to non-embedded panel. The temperature gradient increased as much as 0.16 ^{0}C/cm or 8.33% with a mere increase of aerial intensity 0.05 g/cm^2 newspaper membrane embedment.

However, the results showed that the increase in temperature gradient was negligible for aerial intensity 0.15 g/cm^2 newspaper membrane embedded panels compared to 0.10 g/cm^2 panel. The difference was merely 0.02 ^{0}C/cm or 0.89%. This was similar to the findings discussed in Section 6.2.2.2 and 6.2.3.2 whereby the reduction of thermal conductivity was also insignificant for panels with 0.15 g/cm^2 newspaper membrane embedment.

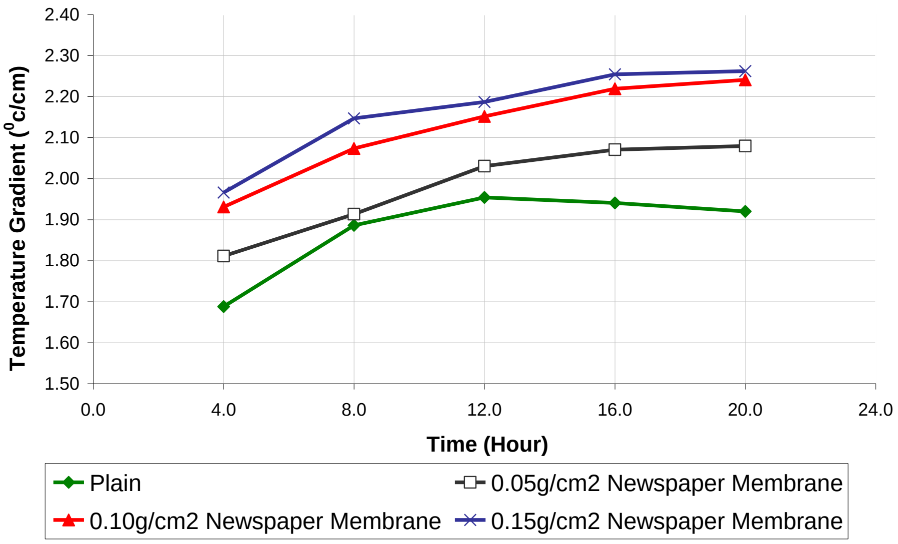


Figure 6.14: Temperature gradient vs time relationships

Figure 6.14 shows the temperature gradients recorded for the entire test period. It is noted that the trend of temperature gradient recorded on newspaper membrane embedded panels was different from non-newspaper membrane embedded (control) panel. The temperature gradient reached its peak at twelve-hour for control panel but the temperature gradients still increased after the twelve-hour period for newspaper membrane embedded panels. This showed that it took longer period of time for the heat to get through newspaper membrane embedded panels. In this context, newspaper membrane inhibited the heat from conducting through the panels.

6.3.5 Temperature Gradient of Plant Leaves Embedded Panels

The idea of embedding plant leaves in ALC panels was inspired from the concept of thatched roof. Thatched roof was an old roofing method and has been used in both tropical and temperate climates. Thatch is also a natural insulator but the shortcomings are it is a fire hazard, non-durable and unattractive for present dwellings. Therefore, a new concept of thatched house was developed in this study by embedding the plant leaves inside the ALC panel. With this arrangement, while achieving those advantages, the disadvantages are also being addressed. In this study, only banana leaves and *lalang* were embedded and tested for its temperature gradients.

Twelve plant leaves embedded panels were produced and tested for their temperature gradients. These panels were categorised into four groups with the details of the group's description and results as shown in Table 6.11.

Table 6.11: Temperature gradient of plant leaves embedded ALC panels

Embedment	Thickness (cm)	Unit Weight (kN/m^3)	T_1 ^0C (K)	T_2 ^0C (K)	Temperature Gradient ^0C/cm or K/cm
G1-Plain	6.40	8.0	54.53 (327.53)	38.67 (311.67)	2.48
G1-Plain	4.77	12.0	50.95 (323.95)	40.82 (313.82)	2.13
G1-Plain	5.32	15.0	52.20 (325.20)	42.17 (315.17)	1.89
G2-LL	5.29	8.0	52.08 (325.08)	39.20 (312.20)	2.44
G2-LL	5.40	12.0	50.28 (323.28)	38.83 (311.83)	2.12
G2-LL	5.91	15.0	49.12 (322.12)	39.73 (312.73)	1.59
G3-LH	6.59	8.0	53.92 (326.92)	37.20 (310.20)	2.54
G3-LH	6.52	12.0	53.35 (326.35)	38.52 (311.52)	2.27
G3-LH	5.83	15.0	49.52 (322.52)	39.85 (312.85)	1.66
G4-B	6.67	8.0	55.23 (328.23)	38.42 (311.42)	2.52
G4-B	6.19	12.0	53.37 (326.37)	38.68 (311.68)	2.37
G4-B	5.65	15.0	51.85 (324.85)	39.08 (312.08)	2.26

*Note:

T_1	:	Panel's surface temperature in hot surface
T_2	:	Panel's surface temperature in cold surface
G1 – Plain	:	Without embedment
G2 – LL	:	0.06 g/cm^2 *lalang* grass embedment
G3 – LH	:	0.25 g/cm^2 *lalang* grass embedment
G4 – B	:	0.10 g/cm^2 banana leaves embedment

6.3.5.1 Effect of Unit Weight on Temperature Gradient

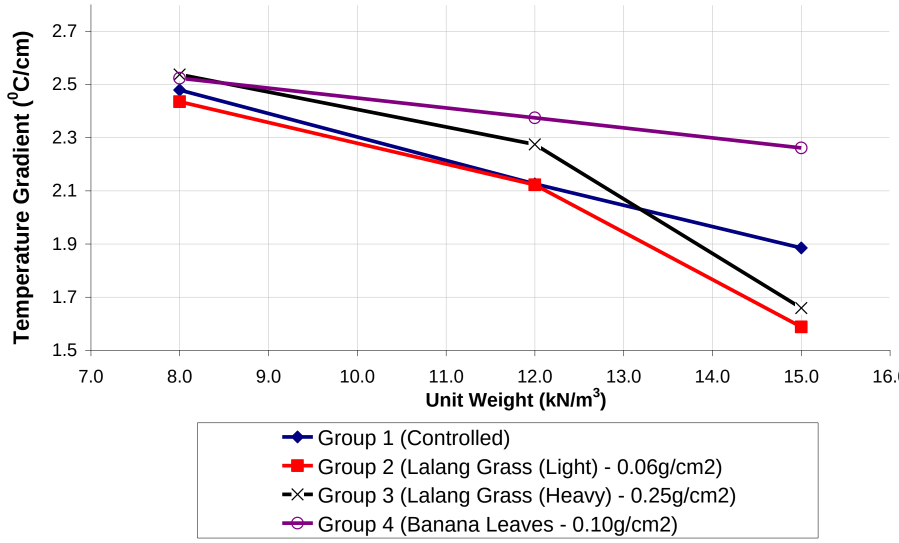


Figure 6.15: Temperature gradient vs unit weight relationships for plant leaves embedded panels

Figure 6.15 shows that the temperature gradients of all panels decreased with the increase of unit weight. For instance, the temperature gradient for control panels (plain) of unit weight 8.0 kN/m^3, 12.0 kN/m^3 and 15.0 kN/m^3, the corresponding temperature gradient decreased from 2.48 ^{0}C/cm to 2.13 ^{0}C/cm and then to 1.89 ^{0}C/cm. This phenomenon was also observed on other panels be it sand-based, soil-based or with plant leaves embedment. This can be explained by the fact that the unit weight of the panels is governed by its porosity or the amount of voids present in the control panel. Lighter panels with significant number of air voids will be comparatively more efficient in thermal insulation than its denser counterparts. The reason being air is the poorest conductor compared to solid or even water due to its molecular integration.

6.3.5.2 Effect of Sandwiched Plant Leaves on Temperature Gradient

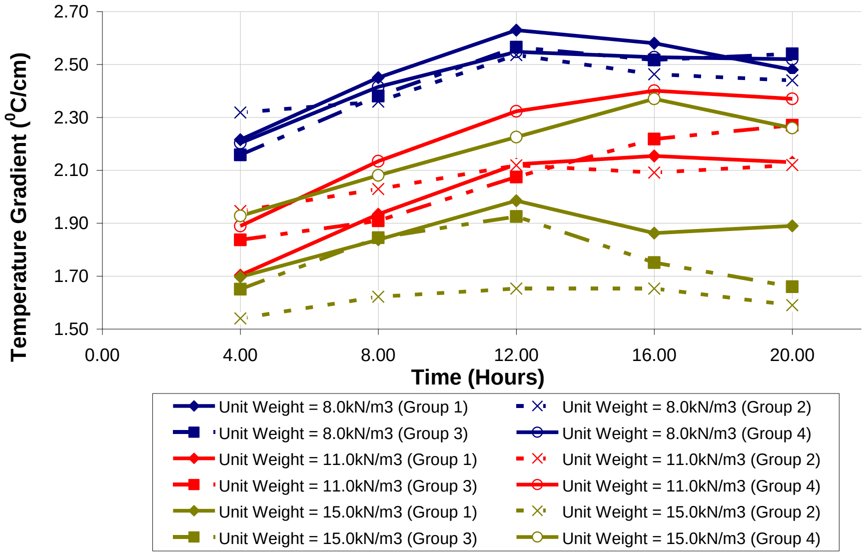


Figure 6.16: Temperature gradient vs time relationships

Based on Figure 6.16, it is found that only intensely *lalang* embedded panels showed significant reduction on temperature gradient compared to control panels of identical unit weight. For example, with unit weight of 12.0 kN/m^3 panels, the temperature gradient was 2.27 ^{0}C/cm, 2.12 ^{0}C/cm and 2.13 ^{0}C/cm which correspond to 0.25 g/cm^2, 0.06 g/cm^2 of *lalang* embedded and non-embedded panels respectively.

Of all control and *lalang* embedded panels tested, these panels shared a common trend on the changed of temperature gradient with respect to time. By analysing the graph in Figure 6.16, it is found that the temperature gradients decreased after 12 hours of test. This means that these panels required 12 hours for the heat to penetrate through the panel from its “hot” to “cool” surface. On the other hand, banana leaves embedded panels required 16 hours.

This indicated that banana leaves was more effective to act as a shield or thermal insulator. This can be readily explained from the fact that banana leaves were solid where there was no gap in between when it was encapsulated in the panels. On contrary, *lalang* embedment still contained gaps in between the leaves which eventually allowed the heat to get through.

From a practical point of view, being big pieces leaves, banana leaf embedment can be laid more readily and efficiently than *lalang* and subjectively the former offered better thermal insulation effect than the latter which after installation do have spaces in between. *Lalang* embedment is not fully shielded and the it allowed heat conduction to take place across the panel thickness. Thus, banana leaves embedment seemed to be the better choice of plant leaves embedment based on its practicality and performance.

6.3.6 Conclusion

From the results, it can be concluded that newspaper membrane or plant leaves embedment and unit weight were the main factors in heat insulation performance with respect to temperature gradient. Higher unit weight translated to lower temperature gradient or indirectly higher thermal conductivity. These findings were in compliance with the findings from other researchers.

It is found that panels with intense amount of newspaper membrane or plant leaves embedment yielded greater temperature gradient than panels with lesser or without embedment. From the buildability, uniformity and practicality perspectives, newspaper membrane took precedence from *lalang* and banana leaves embedment. This was due to its structure, that is piece by piece of uniform dimension and its easy availability.

However, it is not conclusive to wrap up that these ALC panels with low thermal conductivity are energy efficient building material when they are exposed and subjected to natural environment which involved unsteady state heat transfer. Energy efficiency of a building material does not solely depend on its thermal conductivity property but also the unit weight and specific heat capacity.

Researchers have long argued that thermal inertia approach was superior compared to thermal resistance approach for heat transfer involving building envelope. However, many researchers have concluded that low thermal conductivity or low thermal transmittance and high thermal resistance building materials are equivalent to energy efficient building materials (Khedari et al., 2001; Budaiwi et al., 2002; Al-Jabri et al., 2005; Khedari et al., 2005; Sukontasukkul, 2001; Benazzouk et al., 2008; Luai and Ahmad, 2008). Furthermore, this approach is still reflected in some national regulations about energy saving in buildings. Aste et al. (2009) suggested that thermal inertia influence should be accounted instead of only thermal resistance or thermal transmittance in those national regulations. The first step should be to specify the minimum thermal mass of building components. Feng (2004) concurred by asserting that thermal inertia is one of the most important parameters for reducing heating and cooling energy demands of buildings without compromising the thermal comfort. Thus, full scale model were constructed where the decrement factor and time lag of the panels will be observed and compared with the findings from thermal resistance aspect. Decrement factor and time lag are parameters for thermal inertia study.

CHAPTER 7

TRANSIENT THERMAL BEHAVIOUR OF PROTOTYPE PANELS*

7.1 Introduction

Prototype aerated lightweight concrete (ALC) wall panels with and without newspaper membrane embedment were produced and installed at the prototype house as shown in Figures 4.16 and 4.17. The purpose of producing the full-scale prototype wall panels was to observe the thermal behavior when the panels were subjected to hot and humid natural environment in Malaysia. The heat transfer through the wall panels under natural environmental condition is classified as transient state or unsteady condition.

This study only focused on the surface temperatures of different types of prototype panel under the same testing condition. Thus, the performance of different wall panels could be analysed and compared fairly. Secondly, the relationships between the surface temperature of prototype panels and the indoor temperature could be observed. This observation could be used to propose the suitable thermal property of the wall in order to obtain certain predetermined indoor temperature. Lastly, the construction of prototype walls also acted as a viability study and this would enable the possibility of

*Parts of this chapter were published in:

1. Ng, S.C., Low, K.S. and Tioh, N.H. (2011) Newspaper Sandwiched Aerated Lightweight Concrete Wall Panels - Thermal Inertia, Transient Thermal Behavior and Surface Temperature Prediction. Energy and Buildings. 43(7), 1636-1645. (Listed in ISI Citation Index, Impact Factor: 2.041). **Selected and listed in Renewable Energy Global Innovations Series.**
2. Ng, S.C., Low, K.S. and Tioh, N.H. (2011) Thermal inertia of newspaper sandwiched aerated lightweight concrete wall panels: Experimental study. Energy and Buildings. 43(10), 2956-2960. (Listed in ISI Citation Index, Impact Factor: 2.041)

transforming newspaper membrane embedment concept into full-scale wall panel.

7.2 Properties of the Prototype Panels

Prototype panels produced for the experiment were divided into two categories of materials, that is sand-based and soil-based. For each category, four different types of panels of different unit weight and different aerial intensity of newspaper membrane embedment were studied. The exact position of all prototype walls on the prototype house can be referred to in Section 4.5.4.5 earlier. The properties namely thermal conductivity, unit weight and specific heat capacity of the prototype panels are summarised in Table 7.1. A typical test result can be referred to in Appendix C1.

Table 7.1: Properties of Prototype Wall Panels

Prototype Panel		Intensity of Newspaper Membrane Embedded (g/cm^2)	Unit Weight (kN/m^3)	k ($W/m\cdot K$)	c ($J/kg\cdot K$)	Thermal Diffusivity (m^2/s)
Sand	P1	-	18.0	0.628	1003.70	3.44E-07
	P2	-	13.0	0.444	1035.69	3.33E-07
	P3	0.05	13.0	0.334	1149.74	2.27E-07
	P4	0.15	13.0	0.294	995.70	2.31E-07
Soil	P5	-	18.0	0.605	1100.37	3.10E-07
	P6	-	13.0	0.465	1206.51	2.94E-07
	P7	0.05	13.0	0.316	1257.60	1.93E-07
	P8	0.15	13.0	0.299	1238.55	1.87E-07

7.3 Temperature Observation on Prototype Panels

Temperature observation on prototype wall panels started on 18th of March 2009. Four thermocouples were fixed on the surface of each panel at each side. The positions of the fixed-thermocouples can be referred to in Figure 4.40 and 4.41 in Section 4.5.2.3 earlier. The temperatures were monitored and recorded 24 hours a day at 30 minutes interval with the help of data acquisition system.

7.3.1 Preliminary Temperature Observation on Sand-based Panels

The temperature behaviour of sand-based ALC panels was observed from 1st of April to 5th of April 2009. The average results of the outer surface and inner surface temperature readings observed over a period of 5 days were computed and plotted as shown in Figures 7.1 and 7.4. The typical temperature records are attached as Appendix C2.

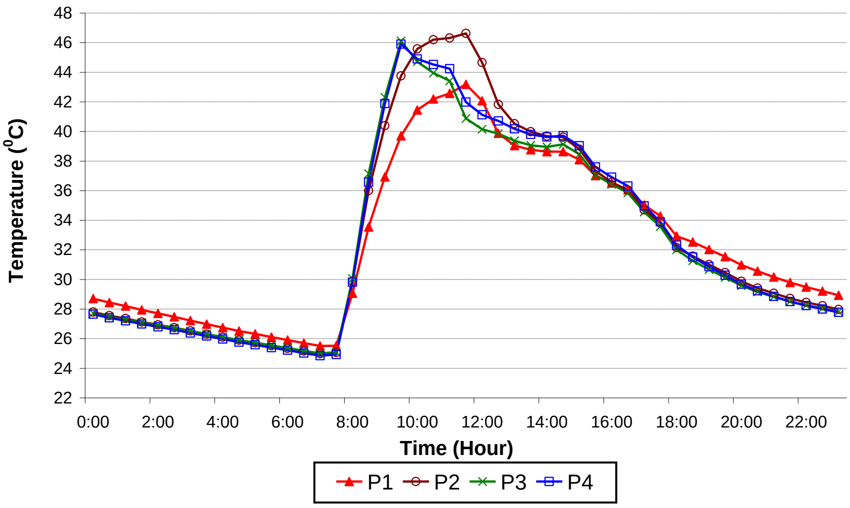


Figure 7.1: Average outer surface temperature for sand-based panels

From Figures 4.16 and 4.17, sand-based panels which were facing east were exposed to direct radiation of the morning sun. A closer observation on Figure 7.1 shows that the outer surface temperature increased significantly in the morning as a result of direct sun radiation and achieved its peak at noon time. Therefore, there was a drastic increase of outer surface temperature since 7.30am. However, there were two different time of peak average outer surface temperatures recorded among the four panels although all panels were facing the same east direction. From the results, Panel P1 and P2 achieved the maximum temperature at 11.30am while panel P3 and P4 achieved the maximum temperature at 9.30am.

This phenomenon can be readily explained by the location of the panels. Generally, panels P1 and P2 were fixed at the lower half of the wall while panel P3 and P4 were fixed on the upper part of the wall. Those panels that were fixed at the upper part of the wall were gradually protected from direct sun radiation from 9.30am onwards. As the sun rises, the roof begins to shade the upper panels and at about noon time, all panels were not exposed to direct sun radiation. Figures 7.2 and 7.3 clearly depict these phenomena.

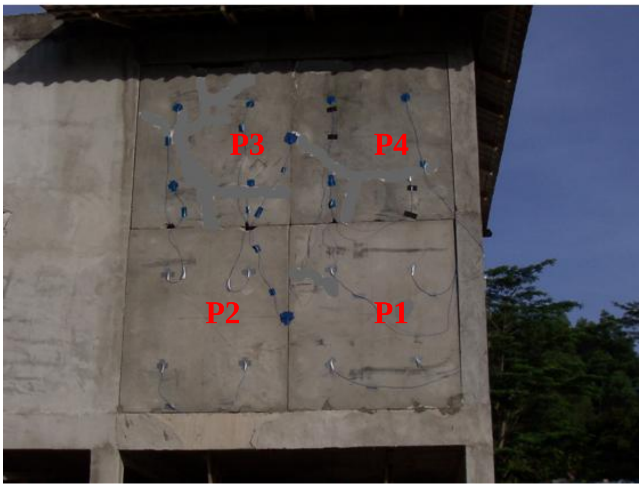


Figure 7.2: Direct sun radiation at 8.30am

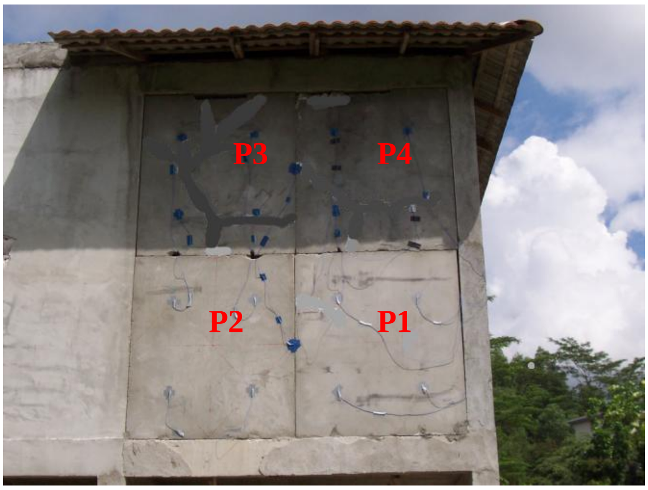


Figure 7.3: Direct sun radiation at 11.30am

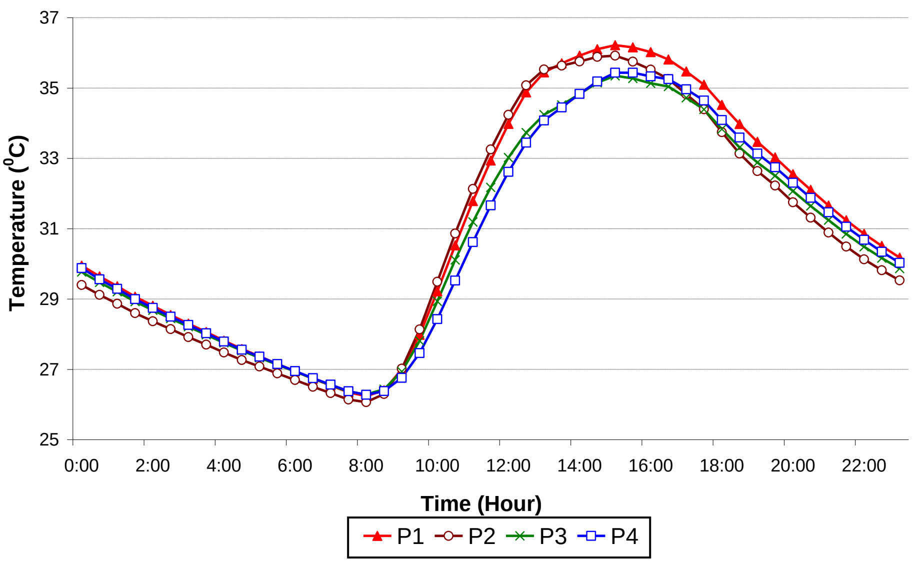


Figure 7.4: Average inner surface temperature for sand-based panels

From Figure 7.4, it is observed that the average inner surface temperature attained its maximum at 3.00pm which was roughly four hours after the outer surface temperature reached its peak. The maximum inner surface temperature values varied among the panels. It is observed that panel P1 recorded the highest inner surface temperature followed by panel P2, P4 and P3 in a descending order.

From the early stages of data collection, it was observed that the temperature readings yielded from four locations on each panel were identical. In other words, the standard deviation was small, less than 1.0 ^{0}C except at certain particular period of time. Figures 7.5, 7.6, 7.7 and 7.8 show the average and standard deviation of the results for panel P1 to P4 respectively.

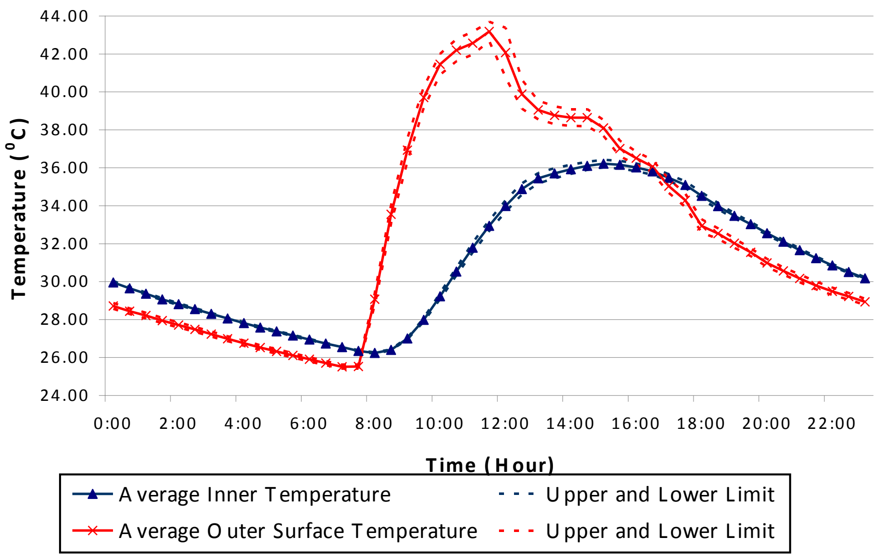


Figure 7.5: Average temperature and standard deviation for panel P1

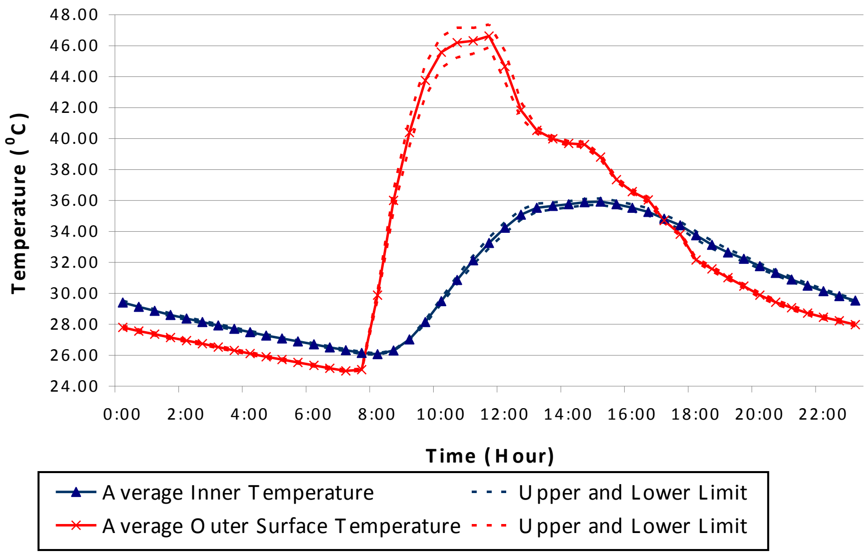


Figure 7.6: Average temperature and standard deviation for panel P2

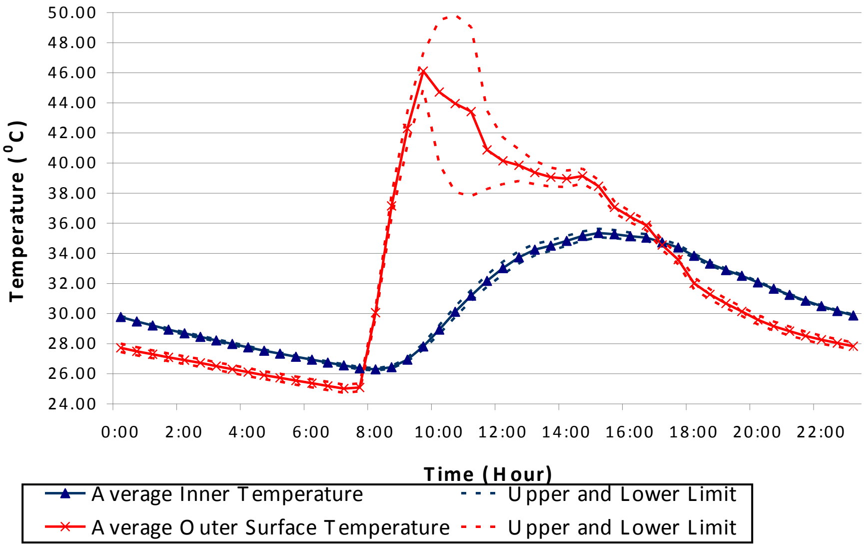


Figure 7.7: Average temperature and standard deviation for panel P3

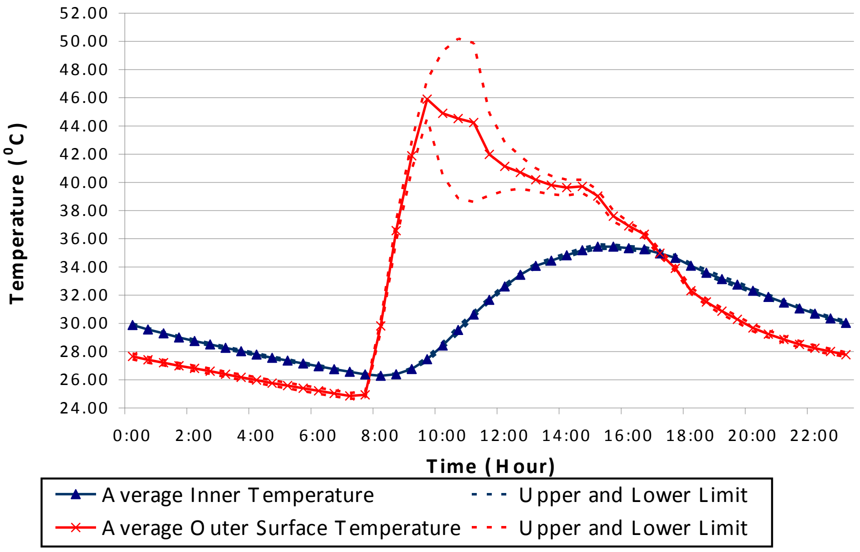


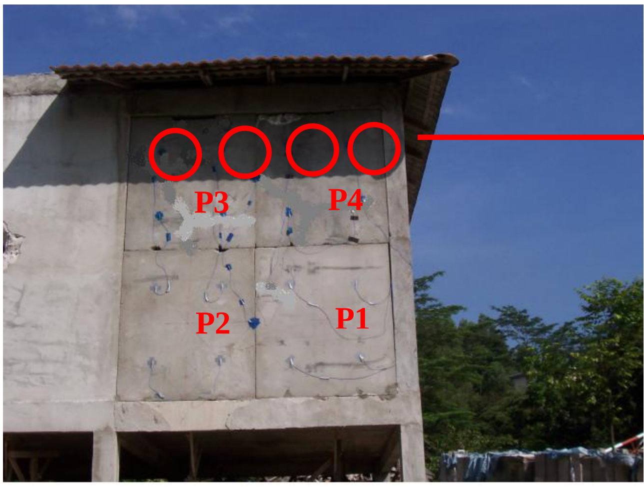
Figure 7.8: Average temperature and standard deviation for panel P4

A closer observation to Figures 7.5, 7.6, 7.7 and 7.8 revealed that there was a common trend where the standard deviations of all internal surface temperature were trifling within the range of 0.02 ^{0}C to 0.43 ^{0}C. On the contrary, the standard deviation of average outer surface temperatures showed greater difference compared to its standard deviation of average inner surface temperature. This was because the outer surface of the panels is more susceptible and the average outer surface temperatures relied mostly on the surrounding temperature and the position of the sun. The range of the standard deviations is shown in Table 7.2.

Table 7.2: Maximum and minimum standard deviation of ALC

Panel	Standard Deviation (^{0}C)	
	Maximum (Inner; Outer)	Minimum (Inner; Outer)
P1	0.30; 1.31	0.03; 0.11
P2	0.36; 1.04	0.02; 0.06
P3	0.43; 5.88	0.05; 0.24
P4	0.25; 5.67	0.05; 0.17

It is found that the standard deviation recorded the highest values of 5.88 ^{0}C and 5.67 ^{0}C which corresponded to panel P3 and P4 respectively. This was due to the location of both panels at the prototype house. Basically, both panels were fixed on the upper half of the wall. Therefore, both panels have the similar trend on their outer surface temperature. The highest standard deviations for both panels were recorded at 10.30pm. As shown in Figure 7.9, the upper part of the panels where two thermocouples were placed was blocked from direct sun radiation by the roof at 10.30pm. Naturally, the two obstructed thermocouples recorded lower temperatures compared to the other two thermocouples which were located at the lower part of the said panel. For that reason, it yielded greater standard deviation of temperatures for that particular period of time.



Shaded thermocouples detecting lower temperature

Figure 7.9: Partially blocked panels P3 and P4 from direct sunlight radiation

If the upper four thermocouples were eliminated for both panels P3 and P4, the maximum standard deviation was reduced to 0.51 (9.00am) and 0.81 (9.30am) respectively. On the other hand, the minimum standard deviation was 0.01 for both panels as shown in Figures 7.10 and 7.11. This further exemplified the earlier explanation that the great difference of standard deviation were due to the shading caused by the roof.

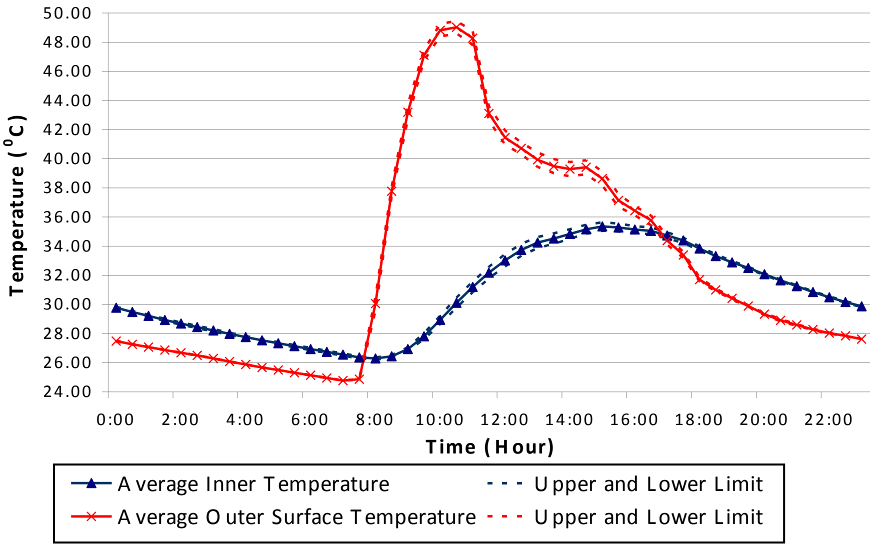


Figure 7.10: Average temperature and standard deviation for panel P3 with two thermocouples

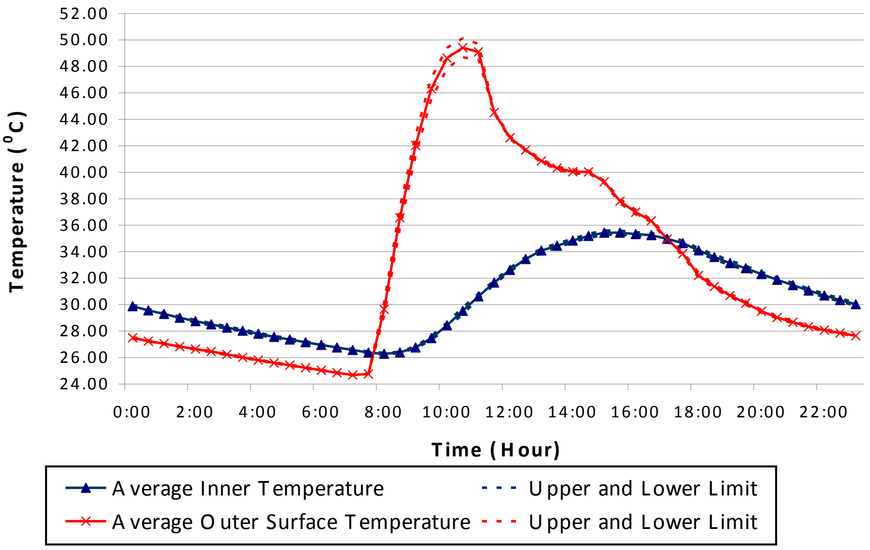


Figure 7.11: Average temperature and standard deviation for panel P4 with two thermocouples

The temperature distribution on the internal and external surfaces of the panel was shown in thermal images in Figures 7.12 and 7.13.

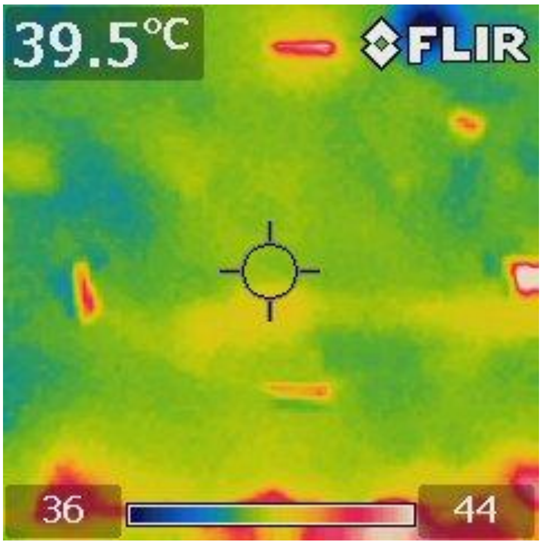


Figure 7.12: Thermal image on outer surface temperature of sand-based panel

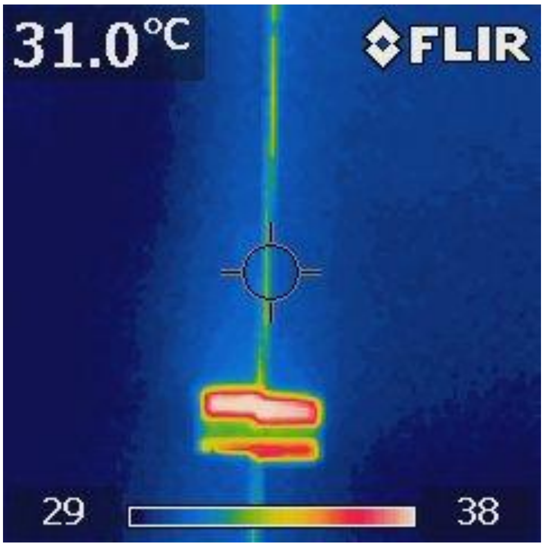


Figure 7.13: Thermal image on inner surface temperature of sand-based panel

7.3.2 Preliminary Temperature Observation on Soil-based Panels

The surface temperature of soil-based ALC panels was recorded from 18th of March to 22nd of March 2009. In a similar manner to sand-based panels, the total observation spanned over a period of 5 days. The average results are presented in Figures 7.14 and 7.17 that follow.

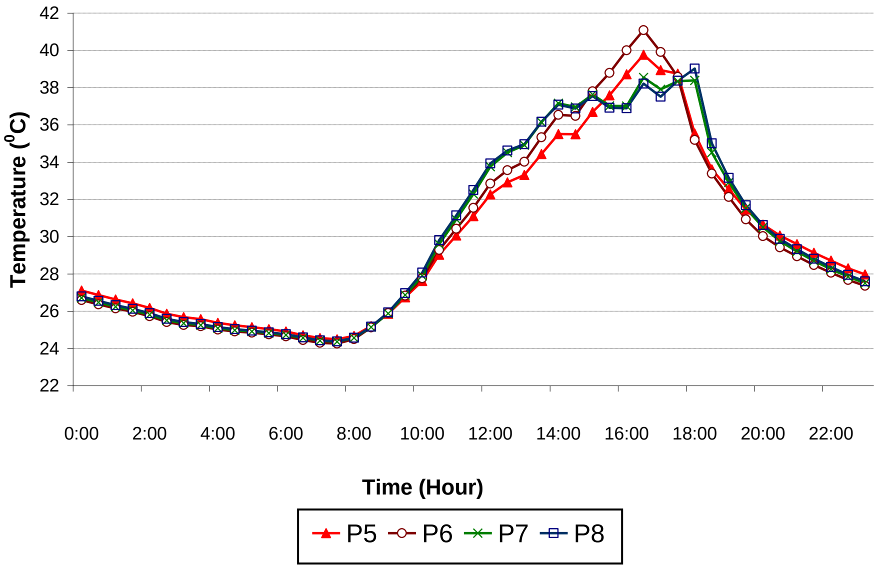


Figure 7.14: Average outer surface temperature for soil-based panels

The soil-based panels were positioned facing the west direction and therefore the maximum average outer surface temperature was obtained in the afternoon and evening. The results shown in Figure 7.14 agreed very well in this aspect. Interestingly, the highest average outer surface temperature observed from all four panels took place at two different time. A closer observation on Figure 7.14, it shows that the highest average outer surface temperature for panels P5 and P6 was recorded at 5.00pm. On the other hand, the peak average outer surface temperature for panels P7 and P8 was attained at 6.00pm.

The explanation for this phenomenon is that the exposure of the panels to direct sun radiation occurred at different time. It is worth to highlight that the outer surface temperature chiefly depended on direct sun radiation rather than diffuse radiation. Panels P5 and P6 both located at the bottom half of the wall started to get exposure from direct radiation from 3.00pm onwards while panels P7 and P8 were shaded by the roof from direct sun radiation at the same time. This observation can be seen from Figure 7.15. The two panels located at the upper half of the wall began to be exposed to direct sun light from 4.00pm onwards as shown in Figure 7.16. Therefore, the average outer surface temperatures showed an increasing trend from either 3.00pm or 4.00pm onwards depending on the location of the panels.

Figure 7.15: Direct radiation at 3.00pm

Figure 7.16: Direct radiation at 4.00pm

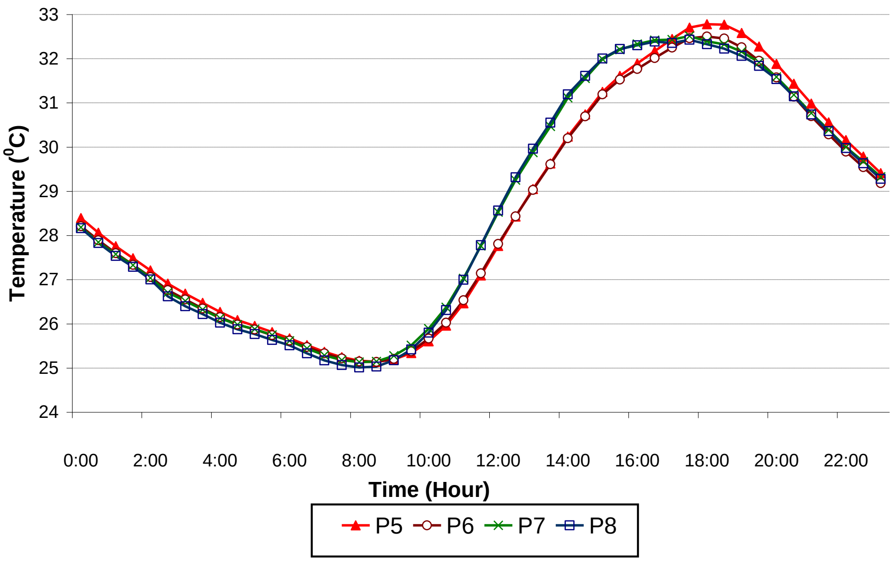


Figure 7.17: Average inner surface temperature for soil-based panels

Figure 7.17 indicates that panel P5 has the highest inner surface temperature followed by panels P6, P7 and P8. From the early stage of data collection, it is observed that the temperature readings from all four locations on each panel were identical. In other words, the standard deviation was also less than 1.0 ^{0}C. Figures 7.18, 7.19, 7.20 and 7.21 show the average and standard deviation of the results for panels P5 to P8 respectively.

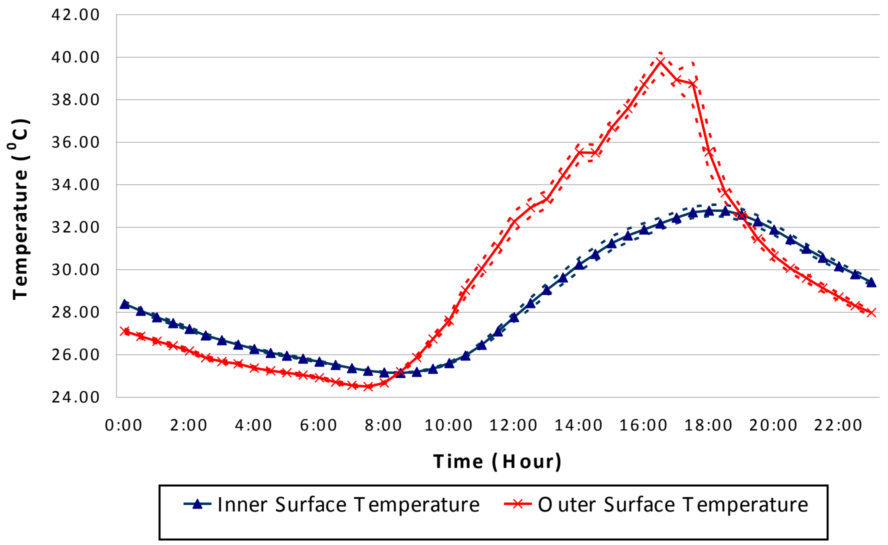


Figure 7.18: Average temperature and standard deviation for panel P5

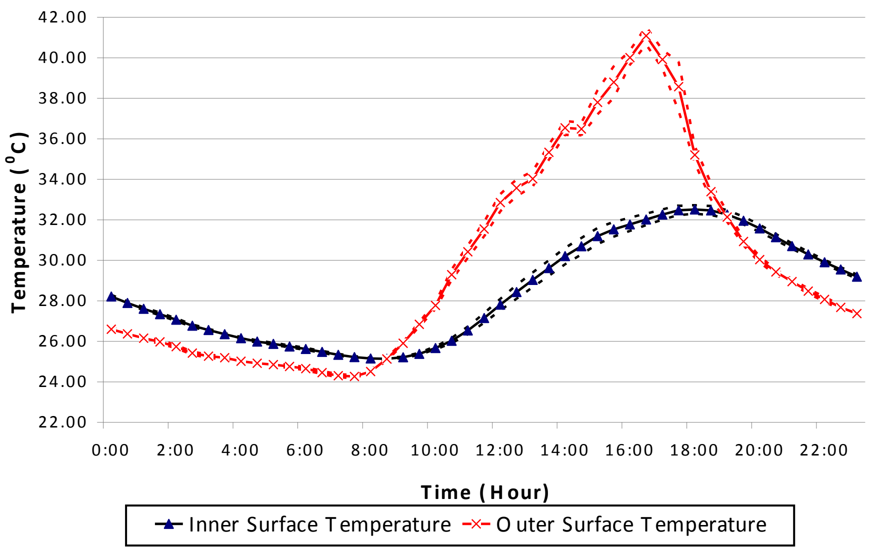


Figure 7.19: Average temperature and standard deviation for panel P6

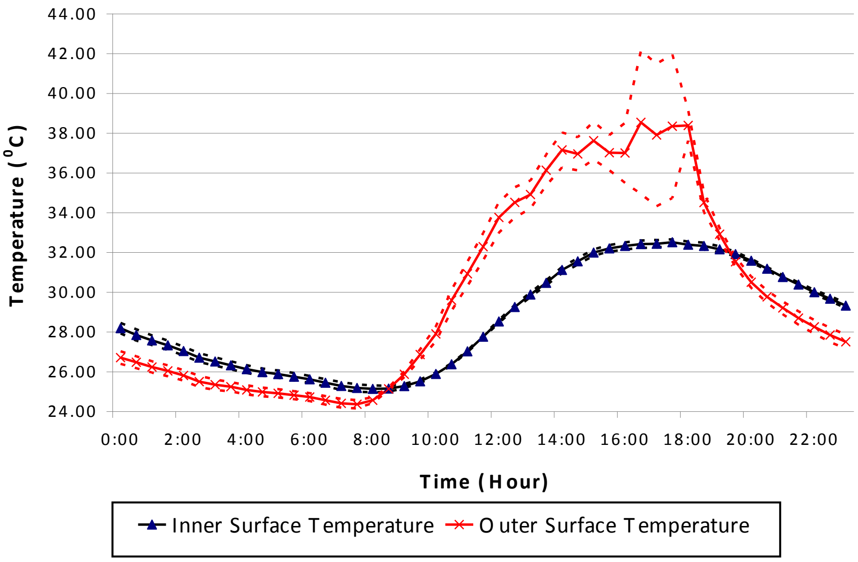


Figure 7.20: Average temperature and standard deviation for panel P7

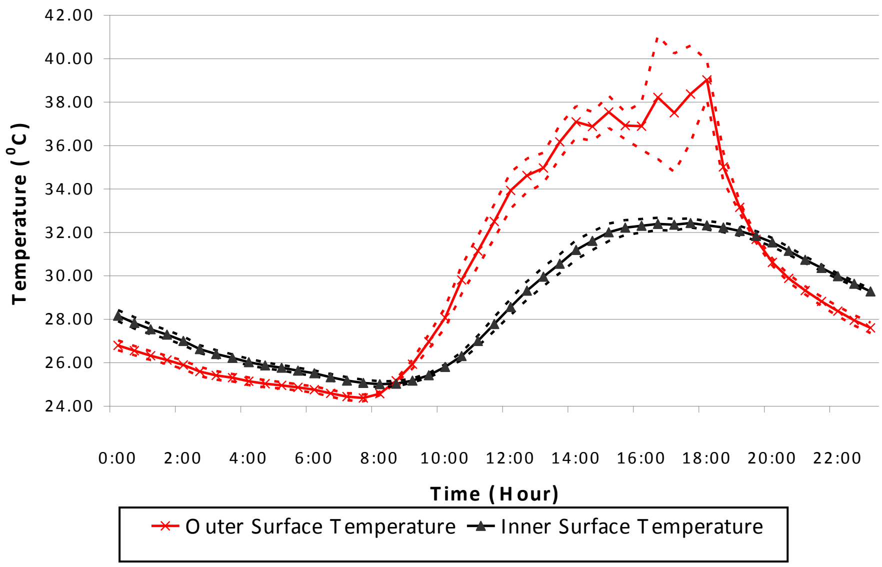


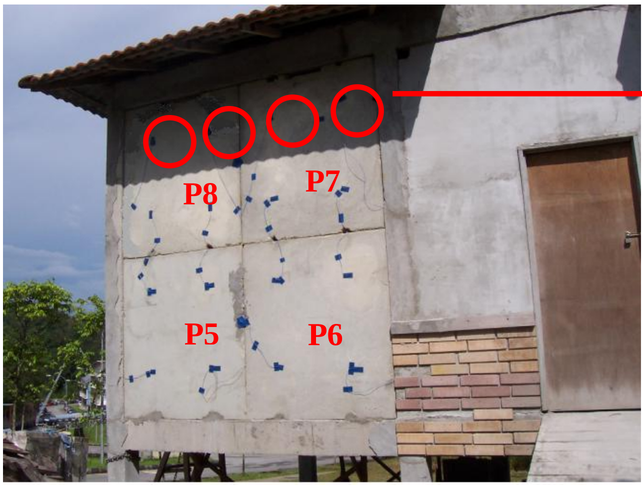
Figure 7.21: Average temperature and standard deviation for panel P8

A closer observation on Figures 7.18, 7.19, 7.20 and 7.21 reveals that there was a common trend where the standard deviations of all internal surface temperatures were within the range of 0.02 ^{0}C to 0.45 ^{0}C. However, the standard deviation of outer surface temperature showed greater difference compared to the standard deviation of inner surface temperature. This is because the outer surface of the panels was more vulnerable and the outer surface temperature was highly influenced by the surrounding temperature. The standard deviations are shown in Table 7.3.

Table 7.3: Maximum and minimum standard deviation of soil-based panels

Panel	Standard Deviation (^{0}C)	
	Maximum (Inner; Outer)	Minimum (Inner; Outer)
P5	0.32; 1.01	0.02; 0.05
P6	0.41; 1.23	0.04; 0.07
P7	0.28; 3.61	0.04; 0.07
P8	0.45; 2.84	0.10; 0.08

It is found that the standard deviation recorded the highest value of 3.61 ^{0}C and 2.84 ^{0}C correspond to panels P7 and P8 respectively. This was due to the location of both panels at the prototype house. Basically, both panels were fixed on the upper half of the wall. Therefore, they have similar trend on the outer surface temperature. The highest standard deviation for both panels was recorded at 4.30pm. At 4.30pm, the upper part of the panel where two thermocouples were placed was blocked from direct sun radiation by the roof as shown in Figure 7.22. These two obstructed thermocouples recorded lower temperatures compared to the other two thermocouples which were located at the lower part of the said panel. For that reason, it yielded greater standard deviation for that particular period of time.



Shaded thermocouples detecting lower temperature

Figure 7.22: Partially blocked panels P7 and P8 from direct sunlight

If the upper four thermocouples were eliminated in the observation for both panels P7 and P8, the maximum standard deviation was reduced to 0.41 (6.00pm) and 1.24 (12.00 noon) for panels P7 and P8 respectively. On the other hand, the minimum standard deviation was 0.03 and 0.06 for panel P7 and P8 respectively as shown in Figure 7.23 and Figure 7.24. This explained that the greater standard deviation was due to the shading caused by the roof.

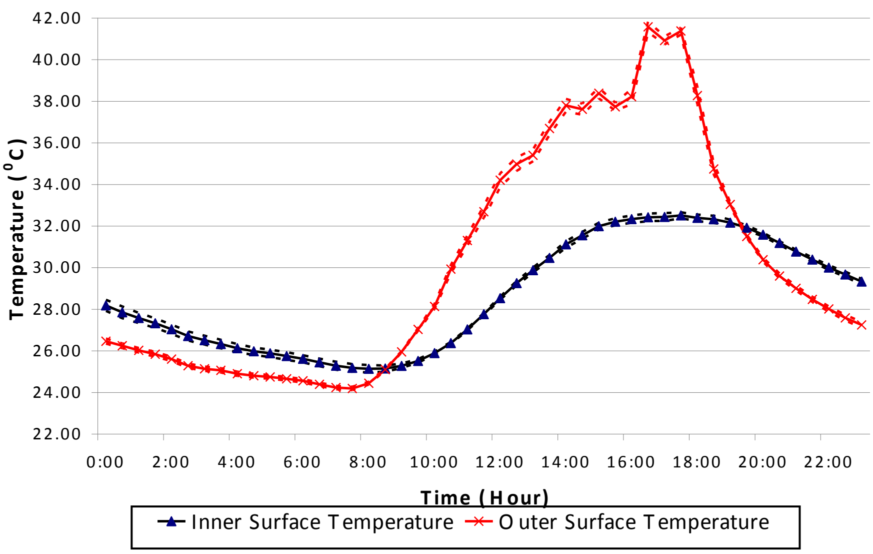


Figure 7.23: Average temperature and standard deviation for panel P7

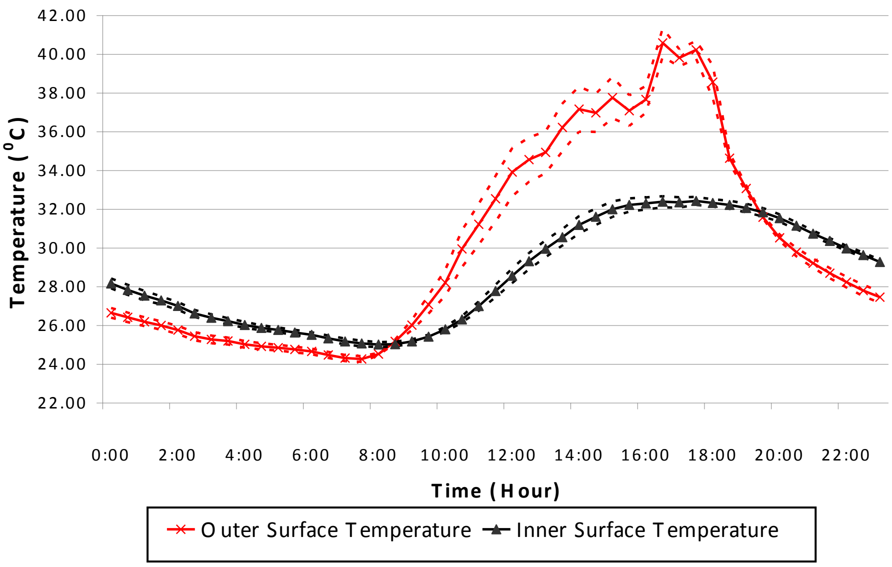


Figure 7.24: Average temperature and standard deviation for panel P8

The temperature distribution on the internal and external surfaces of the panel was also quite evenly distributed as shown in thermal images in Figures 7.25 and 7.26.

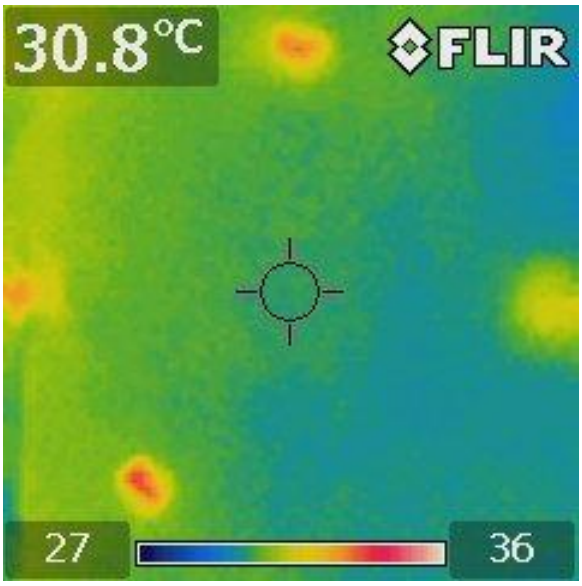


Figure 7.25: Thermal image on outer surface temperature of soil-based panels

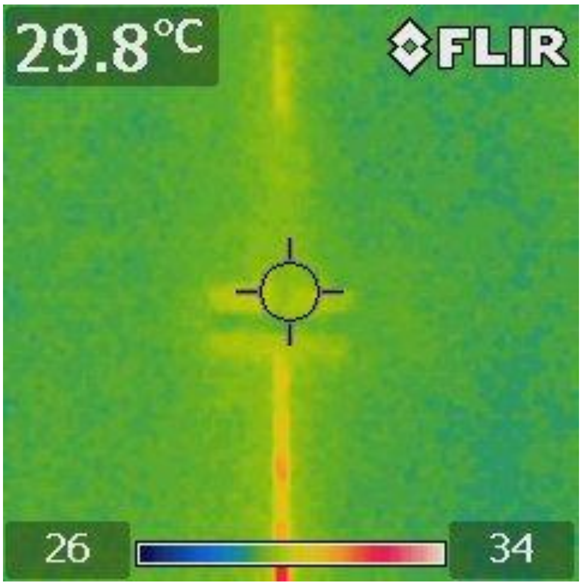


Figure 7.26: Thermal image on inner surface temperature of soil-based panels

7.4 Observation on All Panels

After the preliminary observation as discussed in Section 7.3, the observation points for each panel were reduced from four points to one point. The surface temperature of each panel was captured with one thermocouple at the centre of each panel. With the reduction on the number of observation point, the temperature for every panel was monitored at the same time. Thus, a better comparison on the thermal performance on each and every panel could be studied concurrently. The temperatures were recorded using data logger which commenced from 1st of August 2009 at the interval of 3 minutes and 24 hours a day.

7.4.1 Overview of Surface Temperature

In this section, the discussion is focused on an overview of the recorded surface temperature for the first ten days started from 1st of August 2009 to 10th of August 2009. A typical set of data collected are attached at Appendix C3.

7.4.1.1 Outer Surface Temperature

The outer surface temperature is shown in Figure 7.27 and Figure 7.28 were for sand-based and soil-based ALC panels respectively.

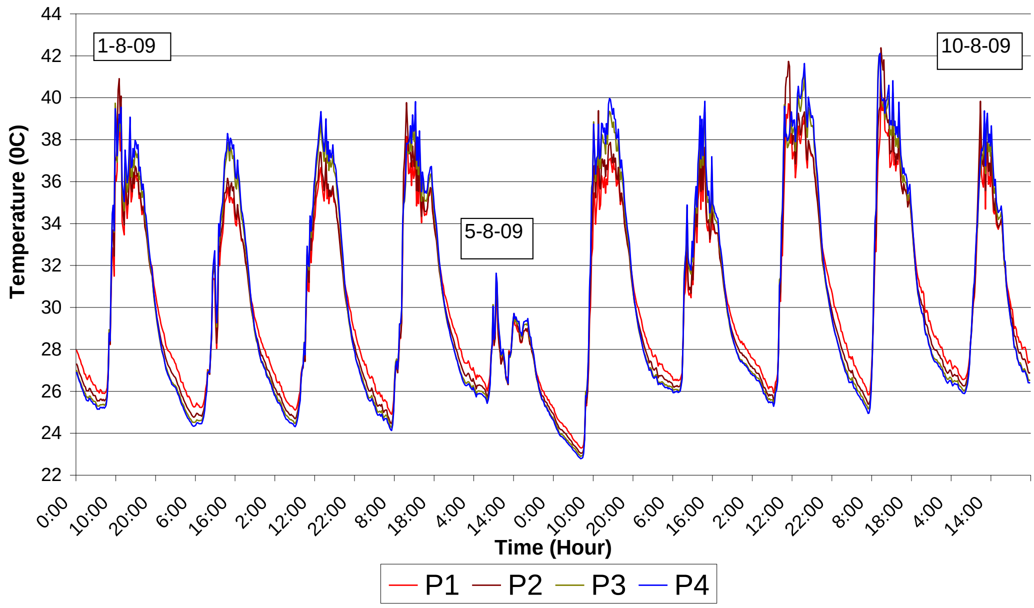


Figure 7.27: Outer surface temperature for sand-based panels from 1-8-09 to 10-8-09

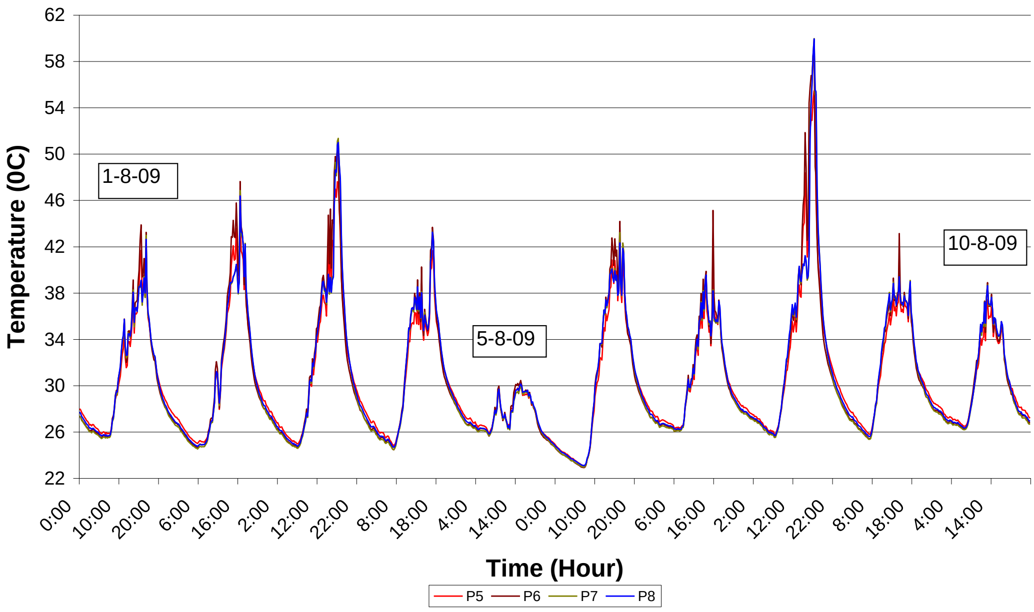


Figure 7.28: Outer surface temperature for soil-based panels from 1-8-09 to 10-8-09

From Figure 7.27 and 7.28, it is observed that the surface temperature of all sand-based panels and all soil-based panels shared a common trend of temperature behaviour within its group. This means that the surface temperature of the panels experienced an increasing and decreasing trend at about the same time. However, the magnitude of the surface temperature increase was different for each and every panel. Generally, the outer surface temperature of sand-based panels increased in the morning as they were facing the east direction while soil-based panels experienced outer surface temperature increase in the evening as they were facing the west direction.

Since all sand-based panels and all soil-based panels were located at the same place, therefore the panels were exposed to the same natural weather condition. In fact, it was designed in this manner so that the performance of all the panels could be compared and analysed at the same time. It was found that the outer surface temperature fluctuated in each day was due to the natural weather condition experienced by the house.

From Figure 7.27, it is obvious that the highest outer surface temperature for sand-based panels was recorded on 8^{th} and 9^{th} of August 2009. On the other hand, soil-based panels recorded the highest outer surface temperature on the 8^{th} of August 2009 as shown in Figure 7.28. However, the outer surface temperature recorded on the 9^{th} of August was among the lowest within the 10 days of observation for soil-based panels. This showed an inconsistency on the outer surface temperature recorded on the 9^{th} of August between sand-based and soil-based panels. This phenomenon can be explained from the aspect of Malaysia's tropical climate. Generally, the weather in Malaysia is unpredictable and uncertain; the weather could be bright and sunny at one moment but rain in the next moment.

7.4.1.2 Inner Surface Temperature

The variation of inner surface temperature for sand-based and soil-based ALC panels is shown in Figures 7.29 and 7.30 respectively.

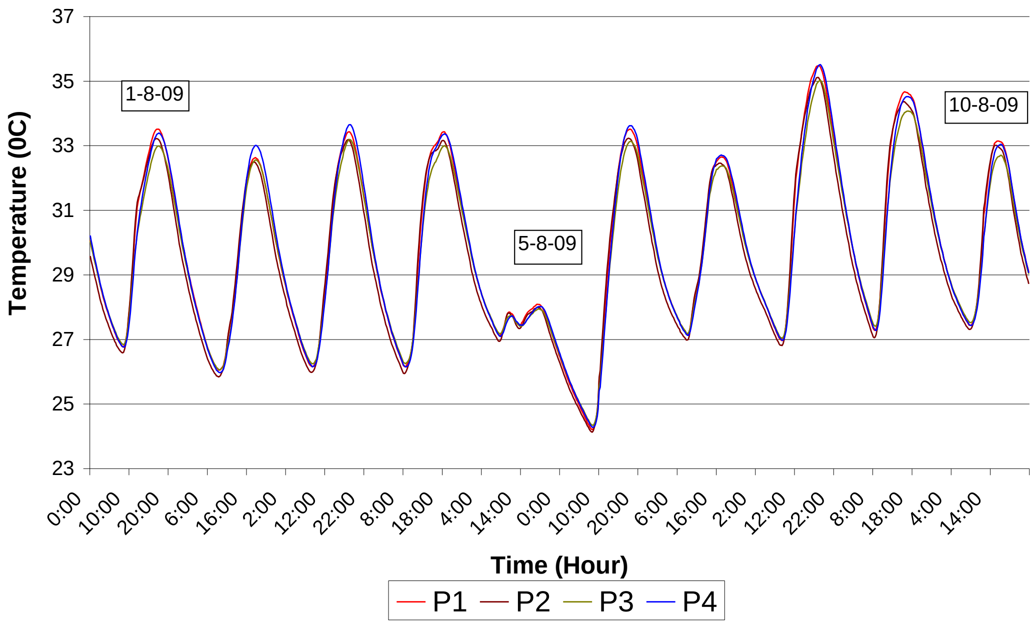


Figure 7.29: Inner surface temperature for sand-based panels from 1-8-09 to 10-8-09

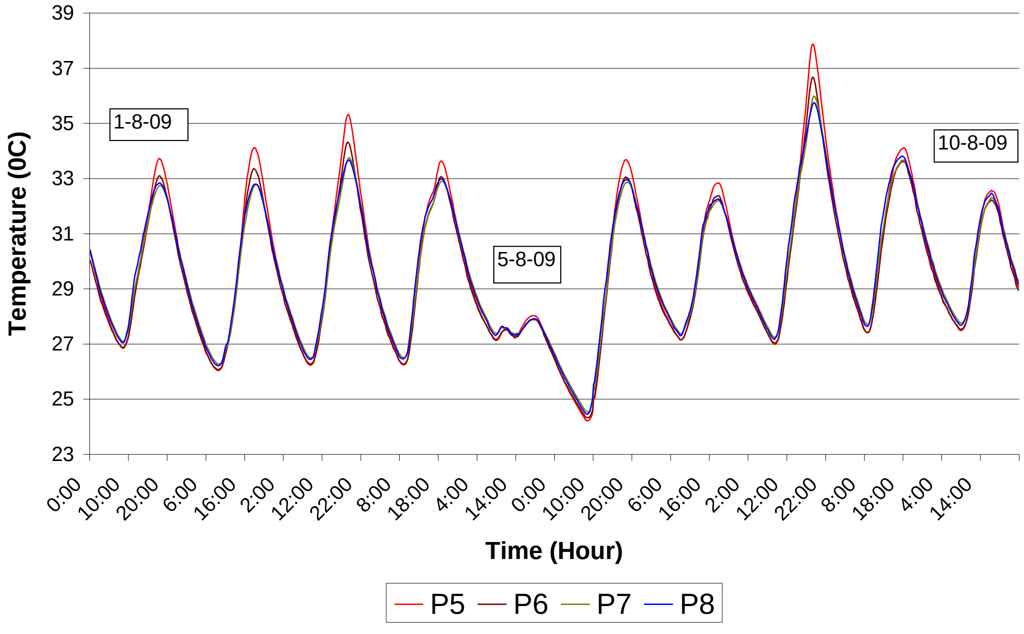


Figure 7.30: Outer surface temperature for soil-based panels from 1-8-09 to 10-8-09

Similar to the outer surface temperature, the inner surface temperature also portrayed a consistent trend and this trend is shared by the same type of panels. The highest inner surface temperature for sand-based panels was about 36 ^{0}C while for soil-based panel, it was about 38 ^{0}C as shown in Figures 7.29 and 7.30.

By comparing the outer surface temperature with the inner surface temperature for the same group of wall panels, it is noted that the inner surface temperature depended on the outer surface temperature. In other words, the inner surface temperature was influenced by the outer ambient temperature. For instance, the highest inner surface temperature was recorded on 8th of August 2009 for both sand-based and soil-based panels. This corresponded well to its outer surface temperature as the outer surface temperature also recorded the highest temperature on the same day.

7.5 Normalised Surface Temperature of the Panels

It is complicated to analyse the results obtained on an every day basis. If it were to be analysed on each and every day, some results may not be significant and representative. Therefore, the temperature data collected were normalised by averaging all the temperature records since 1st August 2009 to 31st of July 2010. Within this period of observation, 12 days' data were omitted due to incompleteness of the whole day temperature data. The normalised surface temperature of all panels is attached in Appendix C4.

7.5.1 Sand-based Panels

Figures 7.31, 7.33 and 7.35 show the normalised outer surface temperature, inner surface temperature and temperature difference between inner and outer surface of sand-based panels in 24 hours.

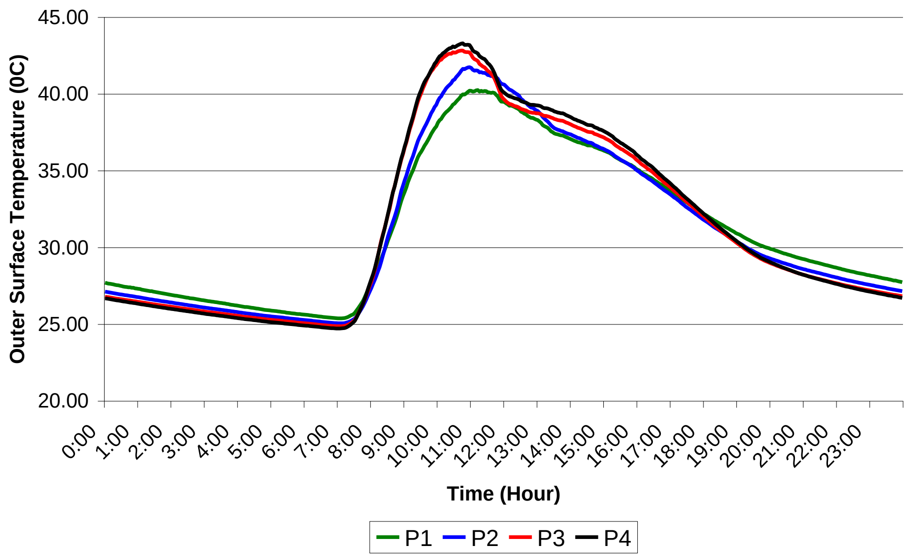


Figure 7.31: Outer surface temperature for sand-based panels

It is observed that all sand-based panels experienced a drastic increase on the outer surface temperature from 7.30am to 11.30am as shown in Figure 7.31. From the results, three notable observations need to be highlighted and further discussed. Firstly, it is noted that the peak temperature for all panels occurred at two different time namely at about 10.45am and 11.00am as shown in Figure 7.31. This was due to the position of the sun and the shading of the roof which prevented panels P3 and P4 from direct sun radiation as deliberated in Section 7.3 earlier.

Secondly, it is observed that the peak outer surface temperature of every panel varied. The lowest temperature was recorded at 40.26 ^{0}C while the highest temperature was recorded at 43.31 ^{0}C. The maximum outer surface temperature for panels P1 and P2 was different even though they were located side by side and exposed to the same condition. For instance, the maximum outer surface temperature for panels P1 and P2 was 40.26 ^{0}C and 41.75 ^{0}C respectively. On the other hand, the maximum outer surface temperature for panels P3 and P4 was 42.84 ^{0}C and 43.31 ^{0}C respectively. Interestingly, the maximum outer surface temperature for panels P3 and P4 was higher compared to panels P1 or P2 by at least 2.6% even though the former panels were shaded from direct sun radiation from 10.00am onwards. In other words, panels P3 and P4 have a shorter duration of direct sun radiation exposure compared to panels P1 and P2 yet the former have recorded a higher outer surface temperature.

Thirdly, the rate of outer surface temperature increase was also varied among the panels especially between panels P3 or P4 compared to panels P1 or P2. Generally, the rate of outer surface temperature increase slowed down at around 10.45am for panels P1 and P2 and it reached the peak at around 11.00am. However, the peak outer surface temperature for panels P3 and P4 was recorded at about 10.45am and it was reduced after that. It is worthy to mention that the rate of outer surface temperature increase for panels P3 and P4 was similar at the rate of 5.41 ^{0}C/hour and 5.57 ^{0}C/hour respectively. The rate of outer surface temperature increase for panels P3 and P4 was very much greater than the rate of outer surface temperature increase for panels P1 and P2 by at least 13.9%. The details on the rate of outer temperature increase are summarised in Table 7.4 that follows.

Table 7.4: Rates of outer temperature increase

Panel	Thermal Conductivity (W/mK)	Outer Surface Temperature and Time				Rate of Temperature Increase (^{0}C/hour)
		Time	Temperature (^{0}C)	Time	Peak Temperature (^{0}C)	
P1	0.628	7.30am	25.74	11.12am	40.26	3.92
P2	0.444	7.30am	25.37	10.57am	41.75	4.75
P3	0.334	7.30am	25.27	10.45am	42.84	5.41
P4	0.294	7.30am	25.22	10.45am	43.31	5.57

The second and third observations mentioned earlier have to be discussed from the aspect of thermal conductivity of the panel. Thermal conductivity shows the ability of a material to conduct heat from the higher temperature surface to the lower. A material with high thermal conductivity indicates faster heat transfer from the outer surface of the wall in this study.

From Table 7.1, panel P1 has the highest thermal conductivity among all the sand-based panels. Therefore, the ability of this panel to conduct heat was higher compared to other sand-based panels. Thus, the heat has been transferred into the inner part of the wall so that the outer surface temperature was greatly reduced. On the contrary, panel P2 with a lower thermal conductivity value compared to panel P1 which means the former has a lesser ability to transport heat. As a consequence, its outer surface temperature was higher than panel P1. Similarly, panel P4 with an even lower thermal conductivity compared to panel P3 thus panel P4 recorded a higher outer surface temperature compared to panel P3. The peak temperature difference between panels P3 and P4 was 0.47 ^{0}C. By comparing the thermal conductivity and the maximum outer surface temperature recorded by all sand-based panels, the results complied fairly well with their thermal conductivity values. It is observed that higher thermal conductivity value corresponded with lower peak outer surface temperature and vice versa as shown in Figure 7.32.

From the definition of thermal conductivity, higher thermal conductivity means heat is transferred into the wall panel at a higher rate.

Therefore, panel P1 with higher thermal conductivity exhibited lower rate of outer surface temperature increase compared to other panels with lower thermal conductivity value. The heat was transferred into the inner wall of panel P1 therefore the heat gain was lower on the outer surface. For the lower thermal conductivity panels, the heat was accumulated at the outer surface and therefore they have higher rate of outer surface temperature increase.

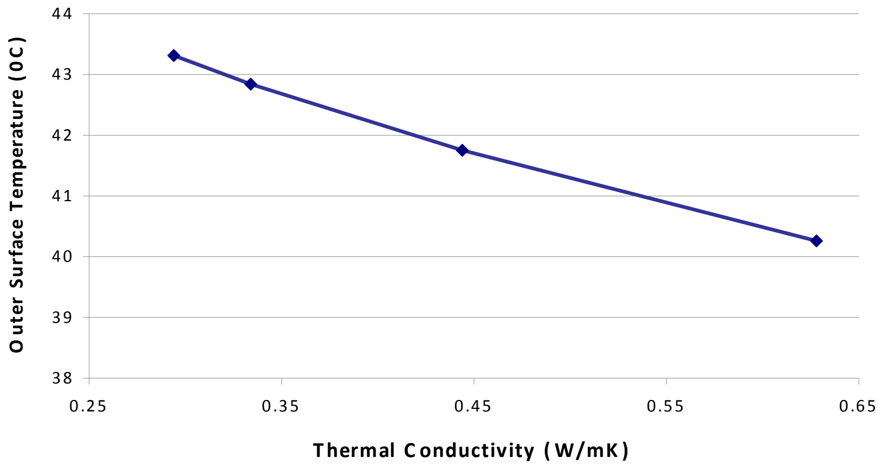


Figure 7.32: Maximum outer surface temperature increase vs thermal conductivity relationships for sand-based panels

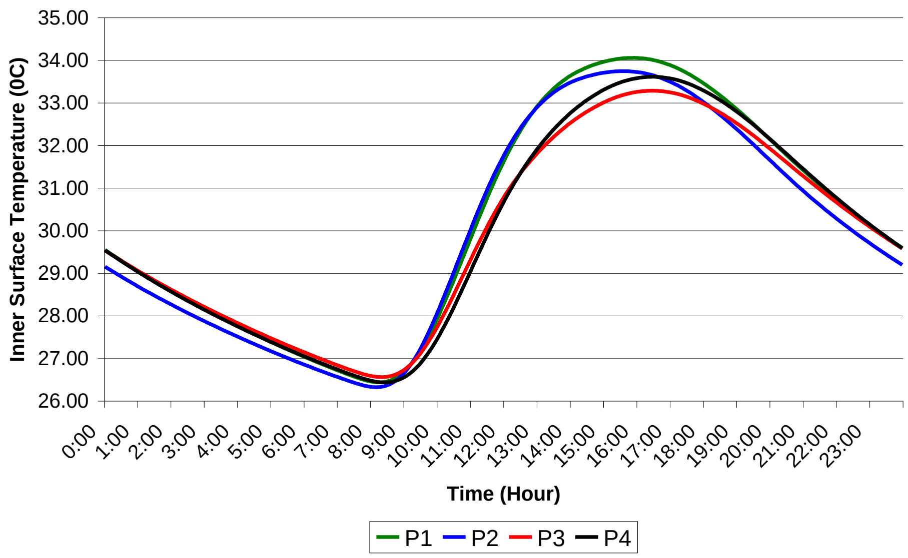


Figure 7.33: Inner surface temperature for sand-based panels

Figure 7.33 shows the inner surface temperature for all sand-based panels. The inner surface temperature of the panels started to increase after 9.00am and reached the peak at around 4.00pm. Similar to its outer surface temperature, the peak inner surface temperature were also varied among the panels. The peak temperature occurred between 3.30pm to 4.30pm with panel P1 recorded the highest inner surface temperature, followed by panel P2, P4 and P3 accordingly. The details of the peak inner surface temperature are summarised in Table 7.5.

Table 7.5: The maximum inner surface temperature

Panel	Thermal Diffusivity (m^2/s)	Time	Maximum inner Surface Temperature (^0C)
P1	3.44E-07	3.30pm	34.06
P2	3.33E-07	3.42pm	33.75
P3	2.27E-07	4.27pm	33.29
P4	2.31E-07	4.27pm	33.61

From Table 7.5, the highest inner surface temperature was recorded on panel P1 as a result of its higher thermal diffusivity value. Panel P2 has a lower thermal diffusivity value compared to panel P1 by 0.11E-7 m^2/s while the inner surface temperature difference was lower by 0.31 ^0C. Similarly, panel P4 with thermal diffusivity – 2.31E-7 m^2/s recorded an even lower maximum inner surface temperature at 33.61 ^0C. For panel P3, the maximum inner surface temperature was 33.29 ^0C with thermal diffusivity value of 2.27E-7 m^2/s. The profile of inner surface temperature was related to its thermal diffusivity property. From the trend observed, higher thermal diffusivity translated to higher inner surface temperature as shown in Figure 7.34 below. This showed that panel with lower thermal diffusivity stores the heat rather than conducts it to the inner surface.

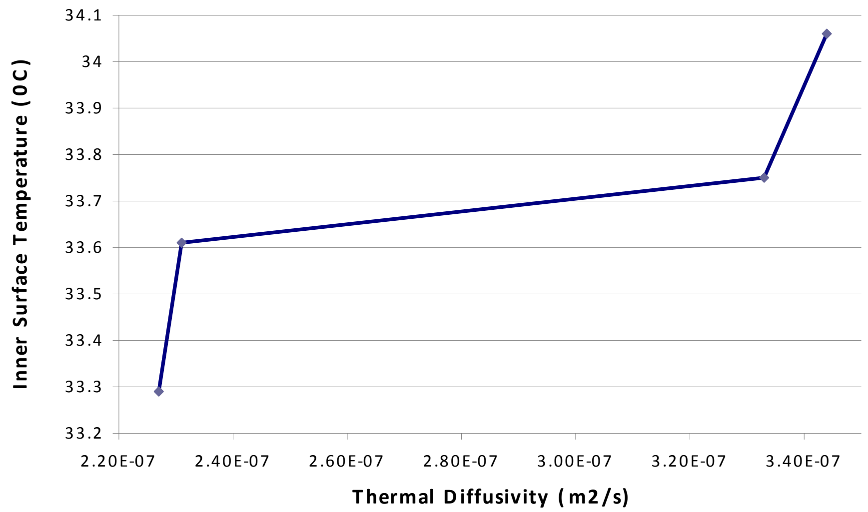


Figure 7.34: Maximum inner surface temperature for sand-based panels vs thermal diffusivity relationships

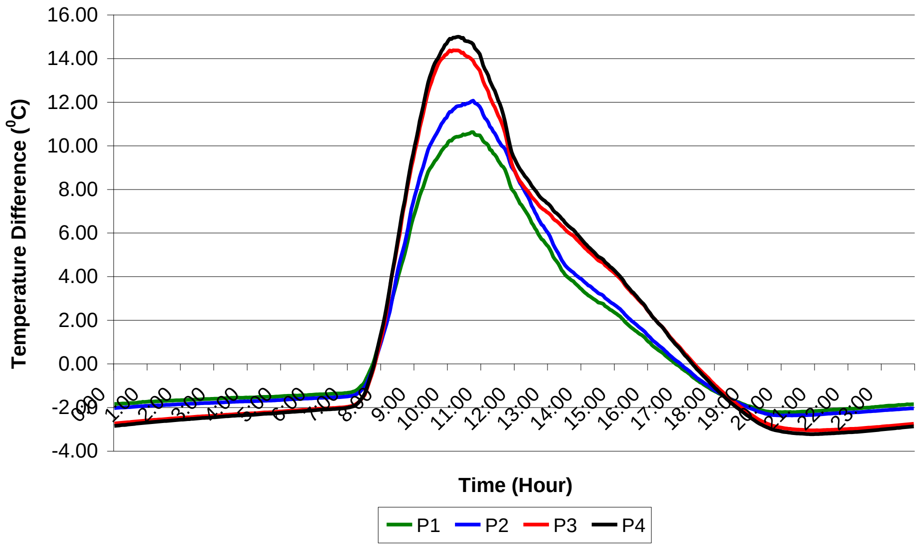


Figure 7.35: Temperature difference for sand-based panels

Figure 7.35 shows the surface temperature difference for all sand-based panels over a 24-hour period. It was calculated by determining the surface temperature difference at the same point of time. The results showed that the maximum temperature difference occurred at 10.30am. It is understood that the outer surface temperature was at its peak at about 10.30am while the inner surface temperature was still low. Generally, panel P4 has the greatest temperature difference values followed by panels P3, P2 and P1. These values were 15.00 ^{0}C, 14.38 ^{0}C, 12.07 ^{0}C and 10.63 ^{0}C respectively. When the temperature difference showed a negative value, it indicated that the inner surface temperature was higher than the outer surface temperature and this only occurred during night time or during rainy days. From Figure 7.30, it clearly indicates that the panels were under unsteady state or transient condition because the temperature difference was not consistent.

7.5.2 Soil-based Panels

Figure 7.36, 7.39 and 7.40 show the normalised outer surface temperature, inner surface temperature and temperature difference for soil-based panels.

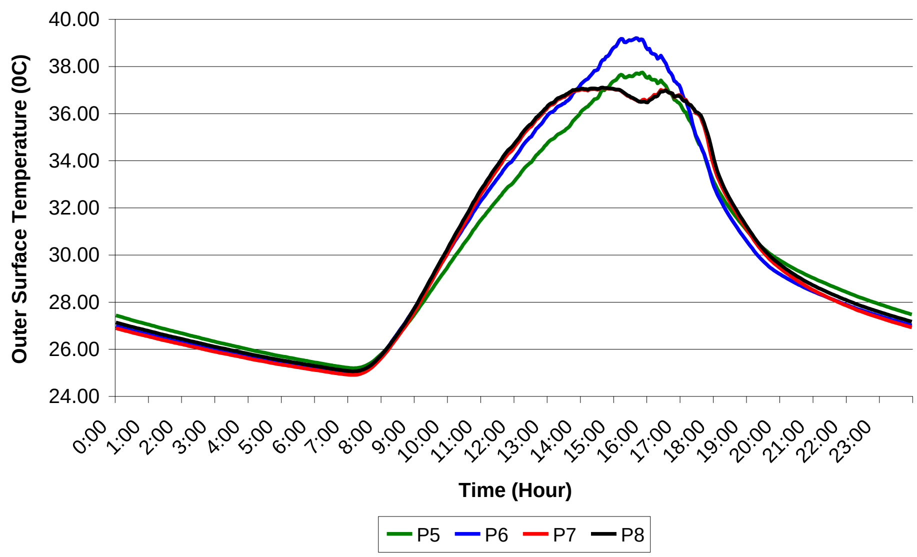


Figure 7.36: Outer surface temperature for soil-based panels

Figure 7.36 shows the outer surface temperature of soil-based panels. It is noticed that all panels experienced gradual increase on the outer surface temperature starting from 8.00am. The peak outer surface temperature occurred in the afternoon due to the location of the panels as they were facing the west direction. Similar to sand-based panels, three notable observations were worthy to be highlighted and discussed.

Firstly, peak temperature occurred at different time among the panels. Panels P7 and P8 reached their peak temperatures at about 2.00pm and outer surface temperature decreased gradually after that. However, the outer surface temperature increased again at 4.00pm and reached another peak temperature at about 5.00pm before it was again reduced. For panels P5 and P6, the outer surface temperature reached the peak at about 4.00pm and decreased gradually after that. The occurrence of this phenomenon was due to the obstruction of the panels by the roof due to the sun position at certain hours as shown in Figure 7.37.

Figure 7.37: Direct sun radiation at 4.00pm

Secondly, the rate of outer surface temperature increase also differed among the panels. Due to unequal exposure to direct sun radiation of the panels (Figure 7.38), the comparison on the rate of outer surface temperature increase for soil-based panels cannot be computed as per sand-based panels. In order to have a fairer comparison on the rate of outer surface temperature increase, the peak temperature for all panels was fixed at 12.00 noon. It is found panel P8 has the highest rate of outer surface temperature increase and this was closely followed by panels P7, P6 and panel P5 exhibited the lowest increase in outer surface temperature.

Figure 7.38: Unequal exposure of soil-based panels to direct sun radiation

Thirdly, the magnitude of the peak outer surface temperature was also varied among the soil-based panels up to 12.00 noon. The second and third phenomena can be explained from the thermal conductivity property of the panels. Generally, higher thermal conductivity translated to a lower rate of outer surface temperature increase as observed from the results of this study. This is simply because higher thermal conductivity means higher rate of heat is being transferred into the wall panel. For instance, the thermal conductivity for panels P5 and P8 was 0.605 W/mK and 0.299 W/mK and these corresponded to maximum outer surface temperatures of 33.15 ^{0}C and 34.74 ^{0}C respectively. Similarly, the rate of temperature increase for both panels was 1.84 ^{0}C/hour and 2.24 ^{0}C/hour respectively. It is noticed that the behavior observed on soil-based panels was similar to that of sand-based panels.

Table 7.6 summarised the rate of outer surface temperature increase and their peak temperature at 12.00 noon.

Table 7.6: The rate of outer temperature increase

Panel	Thermal Conductivity (W/mK)	Outer Surface Temperature and Time				Rate of Temperature Increase (^{0}C/hour)
		Time	Temperature (^{0}C)	Time	Peak Temperature (^{0}C)	
P5	0.605	8.00am	25.81	12.00 noon	33.15	1.84
P6	0.465	8.00am	25.75	12.00 noon	34.13	2.10
P7	0.316	8.00am	25.65	12.00 noon	34.60	2.24
P8	0.299	8.00am	25.77	12.00 noon	34.74	2.24

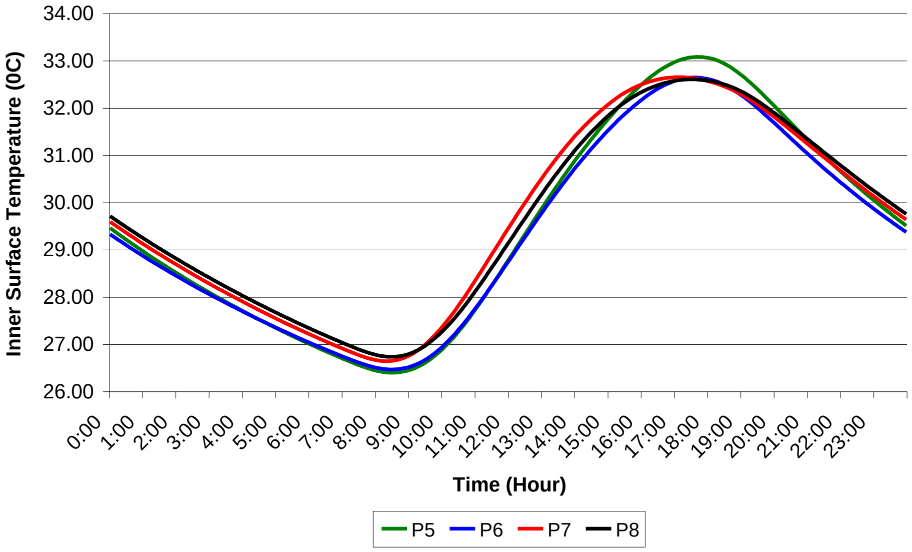


Figure 7.39: Inner surface temperature for soil-based panels

Figure 7.39 shows the inner surface temperatures for all soil-based panels. The inner surface temperature of the panels started to increase from 9.00am and reached the peak at around 5.00pm. Panels P5 and P6 recorded higher inner surface temperature compared to panels P7 and P8. This is probably due to the location of the panels as panels P5 and P6 were located at the bottom half of the wall and were exposed to longer direct sun radiation compared to panels P7 and P8. Therefore, the inner surface temperature has to be compared separately according to the latitude of the panels. In this respect, the comparison on the inner surface temperature was divided between panels P5 and P6 as one category and panels P7 and P8 in another category.

Table 7.7: The maximum inner surface temperature

Panel	Thermal Diffusivity (m^2/s)	Time	Maximum Inner Surface Temperature (^0C)
P5	3.10E-07	5.39pm	33.08
P6	2.94E-07	5.33pm	32.65
P7	1.93E-07	5.12pm	32.66
P8	1.87E-07	5.30pm	32.61

From Table 7.7, the highest inner surface temperature was recorded on panel P5. The maximum inner surface temperature is highly dependent on the property of thermal diffusivity and panel P5 has the highest thermal diffusivity value among all the soil-based panels. In contrast, Panel P8 with the lowest thermal diffusivity value witnessed the lowest inner surface temperature at 32.61 ^{0}C.

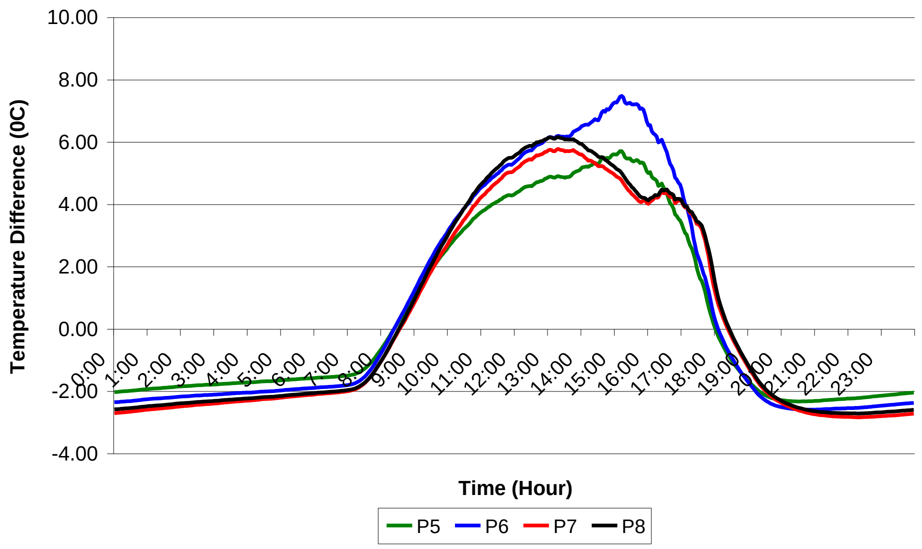


Figure 7.40: Temperature difference for soil-based panels

Figure 7.40 shows the surface temperature difference for all soil-based panels. The results showed that the maximum temperature difference occurred at 3.00pm for panels P5 and P6 and 1.30pm for panels P7 and P8 respectively. Generally, the temperature difference for panel P6 was greater than panel P5 for the lower half of the wall while panel P8 was greater than panel P7 for the upper half of the wall.

7.6 Decrement Factor or Attenuation Factor

Decrement or attenuation factor is about thermal insulation analysis based on the concept of thermal inertia of the wall panels. According to Ropelewski and Neufeld (1999), decrement factor provides a measure of the insulating ability of a wall, an effect akin to just like thermal resistance. In transient heat transfer, heat wave flows through the wall from the outside to the inside of a wall. The amplitude of the heat wave on the outer surface of the wall changes when it transfers through the wall. As mentioned by Asan (1998), during the propagation of heat wave through the wall, the amplitude of the heat wave decreases considerably when it reaches the inner surface of the wall. Furthermore, the magnitude of heat wave amplitude reduction depends on the thermophysical properties of the wall element.

Decrement factor is the ratio of the amplitude of inner surface temperature to the amplitude of outer surface temperature. It is calculated based on the following equation:

$$\text{Decrement Factor, } \lambda = \frac{A_i}{A_e} = \frac{(T_{i(\max)} - T_{i(ave)})}{(T_{e(\max)} - T_{e(ave)})} \tag{7.1}$$

Where,

A_i = interior surface temperature amplitude in ^{0}C

A_e = exterior surface (sol-air) temperature amplitude in ^{0}C

$T_{i(max)}$ = maximum (peak) interior surface temperature ^{0}C

$T_{i(ave)}$ = average interior surface temperature ^{0}C

$T_{e(max)}$ = maximum (peak) exterior surface temperature ^{0}C

$T_{e(ave)}$ = average exterior surface temperature ^{0}C

Higher decrement value indicates poorer thermal resistance ability but greater heat flow. At the same time, greater decrement factor also shows that the inner surface temperature is similar to the outer surface temperature which is vulnerable to changes in the environment.

7.6.1 Decrement Factor for Sand-based Panels

Figure 7.41 shows the decrement factors for sand-based panels based on the normalised surface temperature.

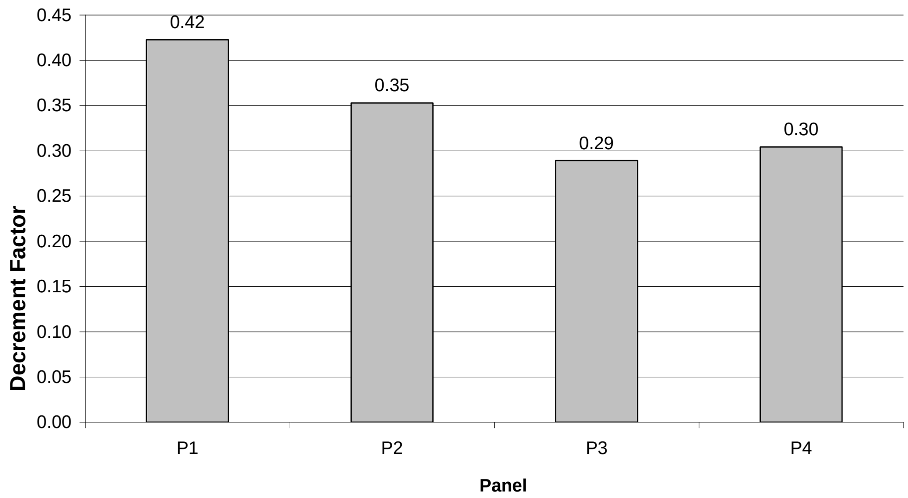


Figure 7.41: Decrement factors for sand-based panels

A closer examination of the results on Figure 7.41 reveals that panel P1 has the highest decrement factor, followed by panels P2, P4 and panel P3 exhibits the lowest decrement factor. This also indirectly indicated that panel P3 has less heat flow occurrence (Ropelewski and Neufeld, 1999). By comparing the highest decrement factor of panel P1 and lowest decrement factor of panel P3, the difference was about 31%.

From the trend of decrement factor observed in Figure 7.42, it is noticed that there was a profound relationship between decrement factor and the thermal diffusivity property of the panels. Figure 7.42 shows the relationships of decrement factor and thermal diffusivity for sand-based panels.

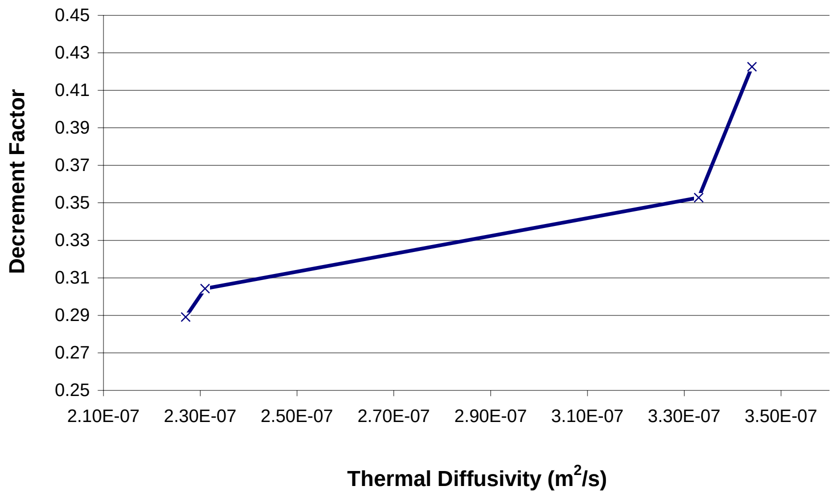


Figure 7.42: Decrement factor vs thermal diffusivity for sand-based panels

From Figure 7.42, it is observed that decrement factor increased positively with its thermal diffusivity. This also implied that lower thermal diffusivity will result in less heat flow.

7.6.2 Decrement Factor for Soil-based Panels

The comparison of decrement factors for soil-based panels was separated to two groups according to the location of the panels. Panels P5 and P6 were compared at the same time as they were located at the bottom half of the wall while panels P7 and P8 were compared simultaneously since they were located on the upper half of the wall. The difference between upper and lower half of the wall was due to the obstruction of direct evening sun radiation as shown on Figure 7.38. Separate comparisons among the panels were also needed to ensure that the performance of the panels was fairly evaluated. During the test, soil-based panels were not equally exposed to direct sun radiation due to the shading of the roof and obstruction of the surrounding trees which were unavoidable. However, the computation of decrement factor required the data for the whole day. Therefore, it was not right to consider and compute the decrement factor up to 12.00 noon as per the comparison of rate of temperature increase. Thus, the comparison for decrement factors was divided into two groups according to the location of the panels. Figure 7.43 shows the decrement factors for soil-based panels.

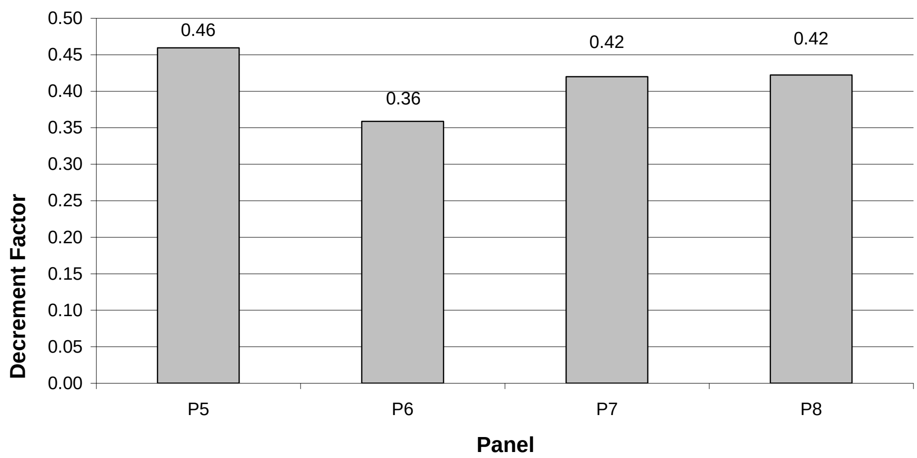


Figure 7.43: Decrement factor for soil-based panels

From Figure 7.43, the highest decrement factor was recorded on panel P5, followed by panel P6 for the lower half of the wall. For the upper half of the wall, both panels recorded similar decrement factor. Similar to sand-based panels, the difference in decrement factors between the panels was due to its thermal diffusivity property.

7.7 Time Lag

Time lag is an important factor in air-conditioner's cooling load calculation. According to Bradshaw (2006), heat gain by opaque wall does not immediately become a load on the cooling system. Instead, the heat is first absorbed and partially stored when it strikes a solid surface. It is only when the solid surfaces become appreciably warmer than the room air, then only this energy becomes part of the cooling load. In other words, time lag is the wavelength when heat flows through a wall. It is also the time required for the heat wave to propagate from the outer surface to the inner surface of the wall (Asan, 1998).

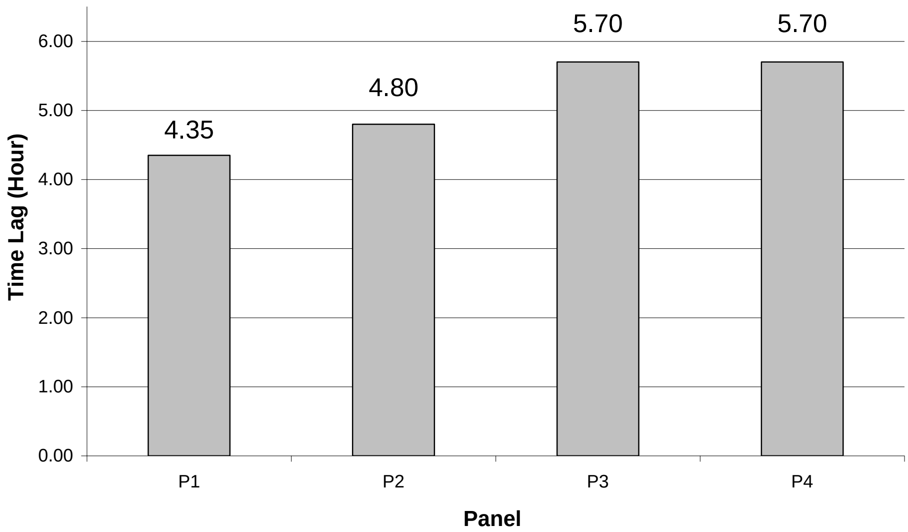


Figure 7.44: Time lag for sand-based panels

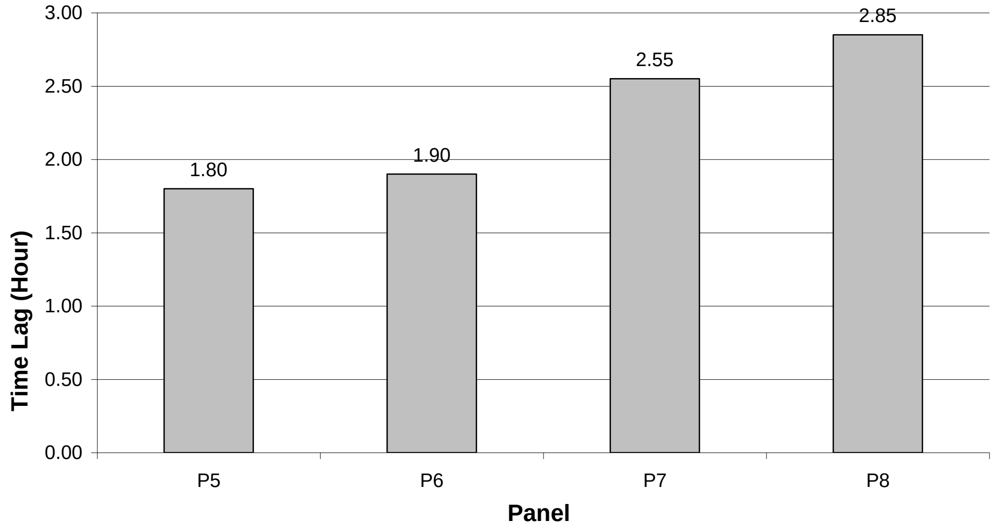


Figure 7.45: Time lag for soil-based panels

The time lags for sand-based panels ranged from 4.35 hours to 5.70 hours as shown in Figure 7.44. Figure 7.45 shows the time lags for soil-based panels which were ranged from 1.80 hours to 2.85 hours. It is strongly believed that time lag characteristic is closely related to thermal diffusivity property of the panel since the temperature profile on the inner surface of the wall depends on the capability of the heat being conducted and the capacity of the panel in storing the heat in transient condition. From the results, the time lag was inversely proportional to its thermal diffusivity. However, panels P3 and P4 did not behave in this manner. This might due to small differences on their thermal diffusivity values which was only 0.9%.

7.8 Rate of Heat Transfer

The rate of heat transfer for all wall panels was calculated using Newton's Law of Cooling. The rate of heat transfer is in the form of:

$$Q_P^i = h_i A(T_5^i - T_\infty)\Delta t \tag{7.2}$$

Where,

Q_P^i = rate of heat transfer for panel 'p' at time step 'i' (Wh)

T_5^i = inner surface temperature at time step 'i' (^{0}C or K)

T_∞ = inner air temperature (^{0}C or K)

h_i = inner convection heat transfer coefficient (W/m^{2}K), it is fixed at 3 W/m^{2}K (Incopera et al., 2007)

Δt = time step (s)

A = area of wall panel (m^2)

In this study, the heat transfer was calculated based on (7.3). The total heat transfer for the whole day was determined by adding the heat transfer amounts for each time step as:

$$Q_P = \sum_{i=1}^{i=480} h_i A(T_5^i - T_\infty)\Delta t \tag{7.3}$$

The total amount of heat transfer for all panels is summarised in Table 7.8.

Table 7.8: Total energy transferred

Panels	Energy Transfer (Wh)
P1	181.35
P2	142.71
P3	135.77
P4	142.31
P5	60.33
P6	38.50
P7	85.76
P8	84.97

From Table 7.8, the highest energy transfer was recorded on panel P1 for sand-based panels while panels P5 and P7 recorded the highest energy transfer for soil-based panels. Panels P1 and P5 shared the same attributes of having the highest thermal conductivity and lowest thermal diffusivity values among the sand-based and soil-based panels respectively. This trend agreed very well with the trend of decrement factors discussed in Section 7.6. The energy transfer observed in Table 7.8 validates the indication of decrement factor whereby the sequence of energy transfer for sand-based panels was P1>P2>P4>P3. For soil based-panels, the sequence was P5>P6 and P7>P8.

7.9 Conclusion

From the observation on the surface temperature of the prototype panels, it can be concluded that the surface temperatures distributed evenly on the whole panel with a negligible variance as discussed in Section 7.2. The collected data reflected the fact that the panels' outer surface temperature was highly dependent on the direct sun radiation and outdoor temperature. Furthermore, the inner surface temperature was highly dependent on its outer surface temperature.

Thermal conductivity appeared to be an important property on transient heat transfer as it influenced the maximum outer surface temperature and the rate of surface temperature increase while thermal diffusivity was important on decrement factor, time lag and inner surface temperature profile of the panels. There was a remarkable observation on the outer surface temperature of the panels. The maximum outer surface temperature and the rate of outer surface temperature increase of the panels varied even though the panels were exposed to the same testing environment. This was due to different thermal conductivity characteristic of the panels. It can be concluded that, lower thermal conductivity resulted in higher outer surface temperature and vice versa.

The results indicated that decrement factor, time lag and maximum inner surface temperature have a close relationship to thermal diffusivity. Higher thermal diffusivity indicated higher inner surface temperature and greater decrement factor but shorter time lag. This means that the inner surface of the wall experienced the rise of temperature in a shorter period of time after the occurrence on outer surface of the panel.

Based on computed values of the decrement factor and time lag, the trend agreed with its thermal diffusivity property. This also indicated that the amount of energy transfer followed the sequence P1>P2>P4>P3 for sand-based panels. For soil-based panels, the sequence was P5>P6 and P7>P8. The decrement factor and time lag were not only affected by thermal diffusivity of the panel, but was also influenced by the position of the panel. Therefore, the values observed from sand-based panels cannot be compared with values obtained from soil-based panels as they were subjected to different intensity of sun radiation at different time of the day. Nevertheless, there was a trend in decrement factor and time lag observed for sand-based and soil-based panels respectively based on their thermal diffusivity value.

Based on Newton's Law of Cooling, the results of the energy transfer complied well with the decrement factor computed from the observed surface temperature. This denoted that total amount of energy transfer was closely related to decrement factor which was also related to thermal diffusivity of the panel. The thermal diffusivity value provided a comprehensive idea on energy efficiency of various materials. However, it is not wrong to conclude that lower thermal conductivity represents low energy transfer or energy efficient. This only happens to comparison within similar type of material where they have the same specific heat capacity and unit weight values. Generally, lower thermal conductivity value will result in lower thermal diffusivity as shown in (3.5).

CHAPTER 8

THEORETICAL PREDICTION OF SURFACE TEMPERATURE AND THERMAL CONDUCTIVITY RECOMMENDATION FOR COMFORTABLE INDOOR TEMPERATURE*

8.1 Introduction

This chapter focuses on the theoretical prediction of surface temperature for all aerated lightweight concrete (ALC) panels. Finite difference method (FDM) was used to determine the outer surface and inner surface temperature of the panels. Average solar heat flux incident on the vertical surface of the ALC panels were determined based on the one year temperature records. The average solar heat flux incident on the vertical surface of the panels determined was used to predict the outer surface temperature and improvement was made to account for additional factors to be included in the FDM equation for outer surface temperature prediction. The FDM equation was used to predict the outer surface temperature for the month of August and September 2010 and it is used to compare with the observed outer surface temperature. It is noticed that the average temperature differences between the predicted and observed outer surface temperature were ranged from 0.51 ^{0}C to 0.81 ^{0}C or equivalent to 1.4% to 2.4% for east wall and 0.28 ^{0}C to 0.48 ^{0}C or equivalent to 0.9% to 1.5% for west wall. A

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modified version of FDM was introduced to improve the prediction on outer surface temperature. The average differences were reduced to 0.9% to 1.9% or improved up to 31.4% compared to original FDM. The original FDM does not consider factors namely the relative humidity and wind direction in the equation to determine the outer surface temperature. Thus, a blanket constant was introduced to cater for these factors to modify the outer surface temperature prediction.

The inner surface temperature of all ALC panels was predicted based on the observed outer surface temperature. The predicted inner surface temperature was close to the observed value of inner surface temperature. The determination of inner surface temperature is crucial as it indirectly affects the thermal comfort in terms of indoor temperature to the buildings' occupants and subsequently the cooling and heating cost. From the one year data collected, a trend was observed between the relationships of inner surface temperature and the inner air temperature. Based on this relationship, the selection of suitable thermal conductivity for the building envelope was proposed with the aim to enable the designer to achieve a particular inner air temperature.

8.2 Finite Difference Method (FDM)

FDM was adopted to determine the theoretical outer surface and inner surface temperature of all panels. Explicit equation of FDM was used with the assumption that the panels behaved steadily at twelve midnight. This means that for the first set of data, the temperature at node 0 and node 5 were given and assumed at steady state. Figure 8.1 shows the nodes representing the heat transfer through the wall panel.

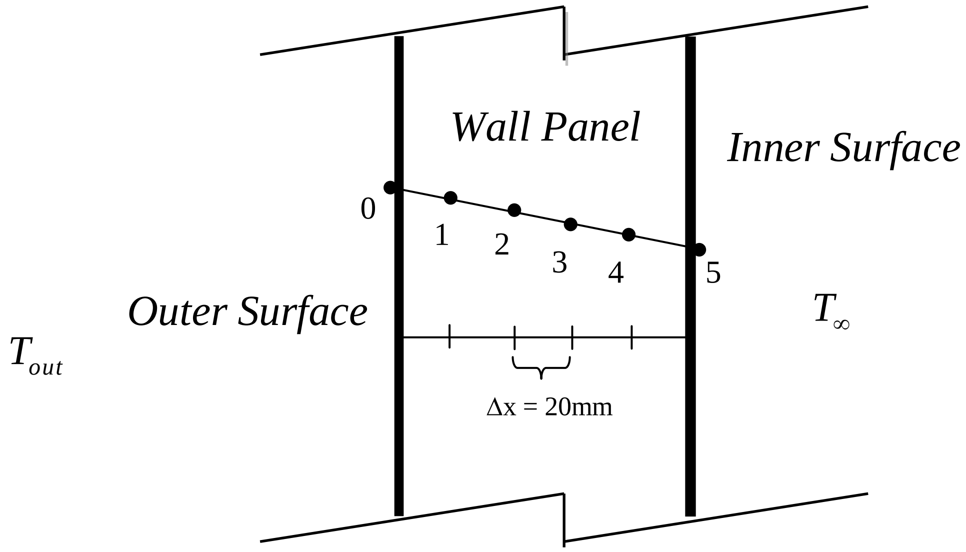


Figure 8.1: Nodes representing heat transfer through the wall panel

At Node 0,

$$T_0^{i+1} = (1 - 2\tau - 2\tau \frac{h_{out}\Delta x}{k})T_0^i + 2\tau T_1^i + 2\tau \frac{h_{out}\Delta x}{k} T_{out}^i + 2\tau \frac{\kappa q_{solar}^i \Delta x}{k} \tag{8.1}$$

At Node 1,

$$T_1^{i+1} = \tau(T_0^i + T_2^i) + (1 - 2\tau)T_1^i \tag{8.2}$$

At Node 2,

$$T_2^{i+1} = \tau(T_1^i + T_3^i) + (1-2\tau)T_2^i \tag{8.3}$$

At Node 3,

$$T_3^{i+1} = \tau(T_2^i + T_4^i) + (1-2\tau)T_3^i \tag{8.4}$$

At Node 4,

$$T_4^{i+1} = \tau(T_3^i + T_5^i) + (1-2\tau)T_4^i \tag{8.5}$$

At Node 5,

$$T_5^{i+1} = (1-2\tau-2\tau\frac{h_i\Delta x}{k})T_5^i + 2\tau T_4^i + 2\tau\frac{h_i\Delta x}{k}T_\infty \tag{8.6}$$

Where,

T_n^i = temperature of node '*n*' at time '*i*' (^{0}C or K)

T_∞ = inner air temperature (^{0}C or K)

k = thermal conductivity of the panel (W/mK)

h_i = inner convection heat transfer coefficient (W/m^{2}K), it is fixed at 3 W/m^{2}K

h_{out} = outer convection heat transfer coefficient (W/m^{2}K), it is fixed at 20 W/m^{2}K

Δx = distance between nodes, it is fixed at 20 mm

τ = mesh Fourier number, $\dfrac{\alpha \Delta t}{\Delta x^2}$

κ = absorptivity-transmissivity product, it is fixed at 0.60 for all ALC panels

q^i_{solar} = solar heat flux incident on the vertical surface of the wall (W/m^2)

8.2.1 Stability Criterion

The applicability and stability of explicit FDM is highly dependent on the stability criterion of the model. The governing factor is the time step (Δt) where it needs to be maintained below certain limit established by the stability criterion. If the time step is not sufficiently small, the solutions obtained may oscillate wildly and diverge from the actual solution.

According to the second law of thermodynamics, the stability criterion is satisfied if the coefficients of all T^i_m in the T^{i+1}_m expressions are greater than or equal to zero for all nodes m. Thus, different equations for different nodes yield different restrictions on the size of the time step and the criterion that is most restrictive should be used in the solution of the problem.

From (8.1) to (8.6), the stability criterion for this study was governed by $1-2\tau$ for interior node or $1-2\tau-2\tau\dfrac{h_i \Delta x}{k}$ or $1-2\tau-2\tau\dfrac{h_o \Delta x}{k}$ for exterior node to be greater than or equal to zero. The stability criterions for all panels are summarised in Table 8.1 and Table 8.2 for inner and outer nodes respectively.

Table 8.1: Stability criterion for inner node

Panel	Thermal Diffusivity, α (m^2/s)	Thermal Conductivity, k (W/mK)	Stability Criterion (Inner Node) $\tau = \frac{1}{2}$	$\frac{\alpha \Delta t}{\Delta x^2} \le \frac{1}{2}$ Minimum Time Step, Δt
P1	3.44E-07	0.628	0.50	581.40
P2	3.33E-07	0.444	0.50	600.60
P3	2.27E-07	0.334	0.50	881.06
P4	2.31E-07	0.294	0.50	865.80
P5	3.10E-07	0.605	0.50	645.16
P6	2.94E-07	0.465	0.50	680.27
P7	1.93E-07	0.316	0.50	1036.27
P8	1.87E-07	0.299	0.50	1069.52

Table 8.2: Stability criterions for outer nodes

Panel	Thermal Diffusivity, α (m^2/s)	Thermal Conductivity, k (W/mK)	Stability Criterion (Outer Node 0)		Stability Criterion (Outer Node 5)	
			$\tau = \frac{k}{2(k + h_o \Delta x)}$	$\frac{\alpha \Delta t}{\Delta x^2} \leq \frac{k}{2(k + h_o \Delta x)}$ Minimum Time Step, Δt	$\tau = \frac{k}{2(k + h_i \Delta x)}$	$\frac{\alpha \Delta t}{\Delta x^2} \leq \frac{k}{2(k + h_i \Delta x)}$ Minimum Time Step, Δt
P1	3.44E-07	0.628	0.305	355.17	0.456	530.69
P2	3.33E-07	0.444	0.263	315.96	0.440	529.10
P3	2.27E-07	0.334	0.228	400.92	0.424	746.89
P4	2.31E-07	0.294	0.212	366.78	0.415	719.05
P5	3.10E-07	0.605	0.301	388.38	0.455	586.95
P6	2.94E-07	0.465	0.269	365.70	0.443	602.53
P7	1.93E-07	0.316	0.221	457.35	0.420	870.91
P8	1.87E-07	0.299	0.214	457.49	0.416	890.77

From Table 8.1 and 8.2, the minimum time step required was 315.96 seconds recorded from panel P2. For this study, the time step was set at 180 seconds in order to produce highly reliable and accurate results. The revised mesh Fourier number for each panel is shown in Table 8.3. The revised mesh Fourier number was used in (8.1) to (8.6) to determine the temperatures from node 0 to node 5.

Table 8.3: Revised mesh Fourier number

Panel	Revised Mesh Fourier Number, τ
P1	0.155
P2	0.150
P3	0.102
P4	0.104
P5	0.140
P6	0.132
P7	0.087
P8	0.084

8.3 Solar Heat Flux Incident on the Wall Vertical Surface

The exact solar heat flux incident vertically on each and every wall panels was not measured. Nevertheless, the amount of solar heat flux incident was determined from the normalised one year temperature records as discussed in Section 7.5 earlier. The solar heat flux incident was determined based on the outer surface temperature observed from the sand-based (east wall) and soil-based (west wall) ALC panels respectively. The solar heat flux incident on the east wall and west wall was generated using FDM shown in (8.7).

$$q_{solar}^{i} = (T_0^{i+1} - T_0^{i} + 2\tau T_0^{i} + 2\tau \frac{h_{out}\Delta x}{k} T_0^{i} - 2\tau T_1^{i} - 2\tau \frac{h_{out}\Delta x}{k} T_{out}^{i}) \frac{k}{2\kappa\tau\Delta x} \tag{8.7}$$

Figure 8.2 shows the solar heat flux incident vertically on east wall and west wall at the prototype house located at coordinates 101.733 ^{0}E and 3.217 ^{0}N from 7.00am to 7.30pm.

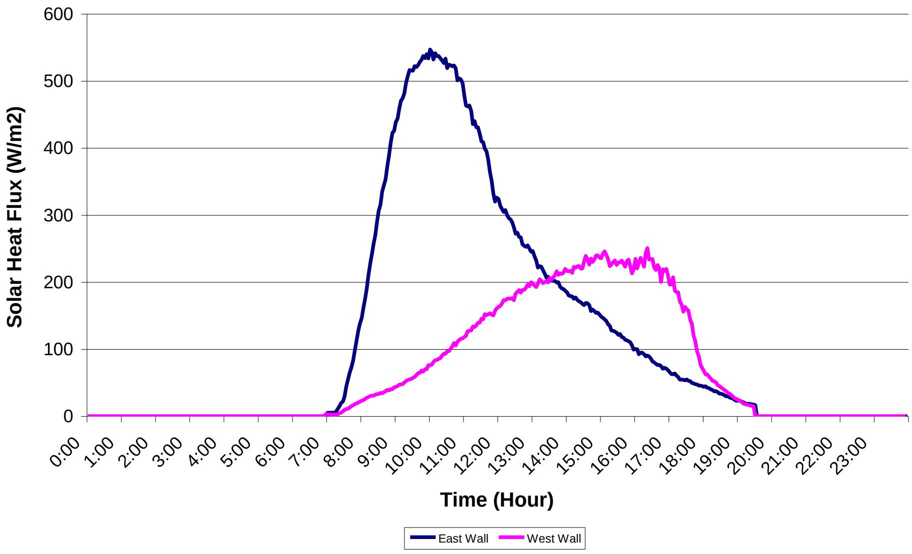


Figure 8.2: Average solar heat flux incident vertically on east wall and west wall

8.3.1 Outer Surface Temperature Prediction

The average solar heat flux determined from the one year data was used to predict the outer surface temperature of all ALC panels for the month of August and September 2010. The predicted outer surface temperature was compared to the observed outer surface temperature. A typical example of predicted outer surface temperature using FDM can be referred to in Appendix D1 and Appendix D2. The summary of the comparison is shown in Table 8.4.

Table 8.4: Difference between predicted and observed outer surface temperature

Panel	Average Temperature Difference (^{0}C)	Percent Difference (%)	Maximum Temperature Difference (^{0}C)	Maximum Percent Difference (%)
P1	0.81	2.4	2.43	6.9
P2	0.81	2.4	3.07	8.5
P3	0.51	1.5	4.10	10.9
P4	0.51	1.4	4.39	11.6
P5	0.28	0.9	1.70	4.5
P6	0.40	1.2	2.64	6.7
P7	0.36	1.1	2.24	6.0
P8	0.48	1.5	2.23	5.9

Soil-based panels showed closer predicted outer surface temperature compared to sand-based panels. The largest average difference recorded from the east wall was 0.81 ^{0}C or a 2.4% deviation from the observed value. On the other hand, the average predicted temperature difference for soil-based panels ranged from 0.28 ^{0}C to 0.48 ^{0}C or a deviation of 0.9% to 1.5%. For maximum temperature difference, sand-based panels recorded at the highest difference at 4.39 ^{0}C or a 11.6% difference while soil-based panels recorded at 2.64 ^{0}C or a 6.7% difference.

Generally, the difference between the observed and predicted surface temperature was due the limitation of the FDM equation to take into consideration of some factors which are predominant in Malaysia. For instance, wind direction and relative humidity were not taken into consideration at all in the equation. In Malaysia, the relative humidity varies within 62.75% to 93.75%. The variation in terms of relative humidity affects the moisture absorption as well as moisture level of the panels which in turn will affect the surface temperature.

8.3.2 Modified FDM Outer Surface Temperature Prediction

The earlier prediction on the outer surface prediction of FDM only involved the parameters of thermal conductivity, density, specific heat capacity, convective heat transfer coefficient, solar heat flux, absorptivity-transmissivity product of the panel and ambient temperature. The relationships between the outer surface temperature and the governing factors are summarised in (8.8) that follows.

$$T_0 = f(k, \rho, c, h_{out}, T_{out}, \kappa, q_{solar}) \tag{8.8}$$

Notwithstanding the FDM predicted fairly well on the outer surface temperature, nevertheless, this method could be further improved. From the observation, they were other factors such as wind direction (WD) and relative humidity (RH) which should be considered especially in hot and humid climate of Malaysia in determining the outer surface temperature. The proposed relationships between the outer surface temperature and the factors should be:

$$T_0 = f(k, \rho, c, h_{out}, T_{out}, \kappa, q_{solar}, RH, WD......) \tag{8.9}$$

The exact determination of wind direction and the relative humidity were not within the scope of this study. However, a constant was added into the original FDM equation (8.1) as a modified version of FDM. This blanket constant was added conditionally to improve the outer surface temperature prediction. The modified FDM is shown in (8.10).

$$T_0^{i+1} = (1 - 2\tau - 2\tau \frac{h_{out}\Delta x}{k})T_0^i + 2\tau T_1^i + 2\tau \frac{h_{out}\Delta x}{k} T_{out}^i + 2\tau \frac{\kappa q_{solar}^i \Delta x}{k} + C \tag{8.10}$$

The blanket constant, *C* changed with time according to the location of the panel. Figure 8.3 shows the value of the blanket constant according to the time and location of the panel.

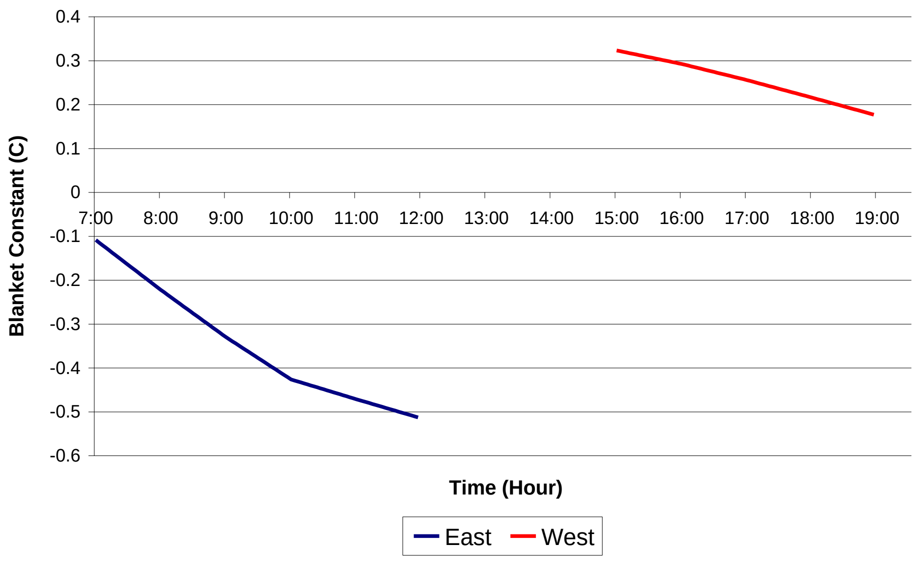


Figure 8.3: Blanket constant, *C* for the improved outer surface temperature prediction

In order to prove that the modified FDM (8.10) offers higher accuracy of outer surface prediction in this current set up, the modified FDM was used to predict the outer surface temperature of the panels. A typical example of predicted outer surface temperature using modified FDM can be referred to in Appendix D3. The comparison on the average temperature difference between the predicted and observed outer surface temperature of both FDM and modified FDM are summarised in Table 8.5. On the other hand, Table 8.6 shows the maximum difference between the predicted and observed outer surface temperature. The modified FDM also recorded an improvement in reducing the maximum difference by an average of 33.3% and 10.9% for sand-based and soil-based panels respectively.

Table 8.5: Comparison on the average temperature difference between FDM and modified FDM

Panel	Average Temperature Difference (^0C)		Percent Improved (%)
	Finite Difference Method	Modified Finite Difference Method	
P1	0.81	0.58	28.4
P2	0.81	0.62	23.5
P3	0.51	0.40	21.6
P4	0.51	0.35	31.4
P5	0.28	0.27	3.6
P6	0.40	0.40	0.0
P7	0.36	0.30	16.7
P8	0.48	0.42	12.5

Table 8.6: Comparison on the maximum temperature difference between FDM and modified FDM

Panel	Maximum Temperature Different (^{0}C)		Percent Improved (%)	Average Percent Improved (%)
	Finite Difference Method	Modified Finite Difference Method		
P1	2.43	1.66	31.7	33.3
P2	3.07	2.05	33.2	
P3	4.10	2.57	37.3	
P4	4.39	3.03	31.0	
P5	1.70	1.49	12.4	10.9
P6	2.64	1.85	29.9	
P7	2.24	2.20	1.8	
P8	2.23	2.24	-0.4	

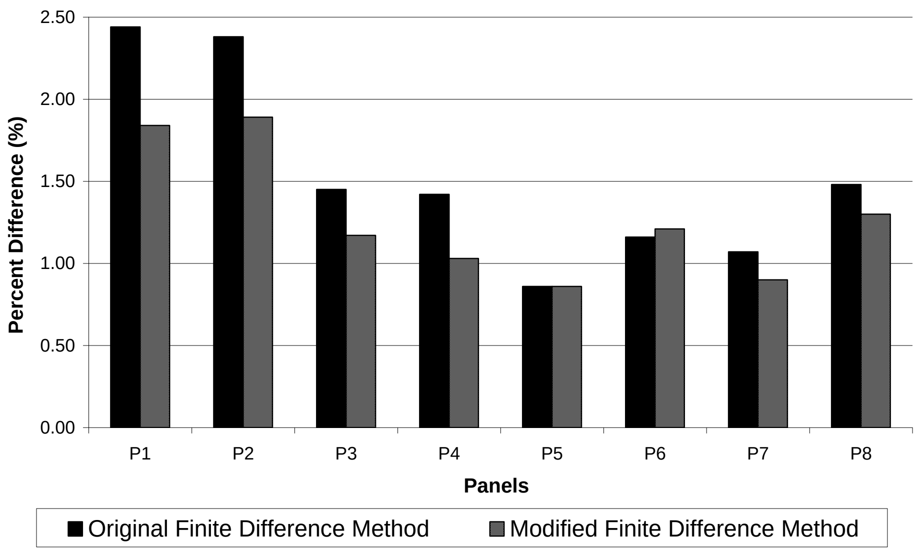
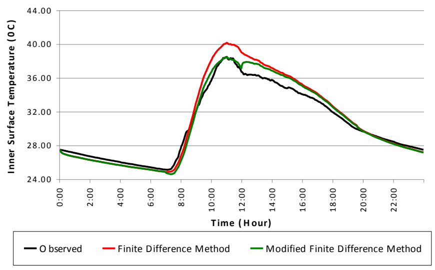
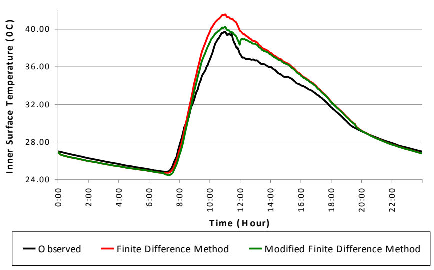


Figure 8.4: Average percent difference of predicted and observed outer surface temperature

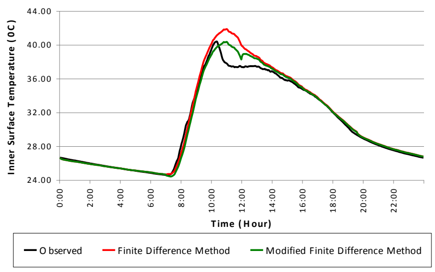
Figure 8.4 shows the average percent different between the predicted outer surface temperature using original and modified FDM compared to the observed outer surface temperature. Generally, modified FDM offered higher accuracy of outer surface temperature prediction compared to original FDM. Figure 8.5 presents the observed and predicted outer surface temperature from both modified and original FDM.



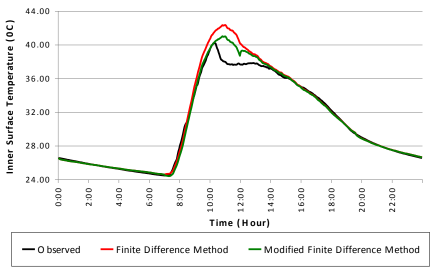
(a) Panel P1



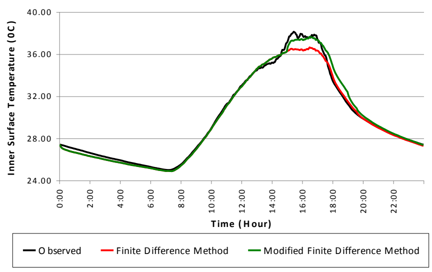
(b) Panel P2



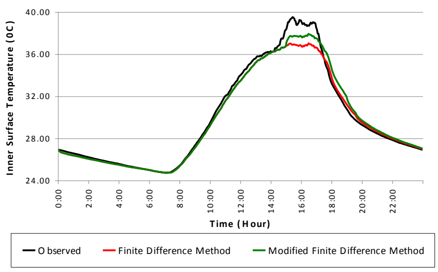
(c) Panel P3



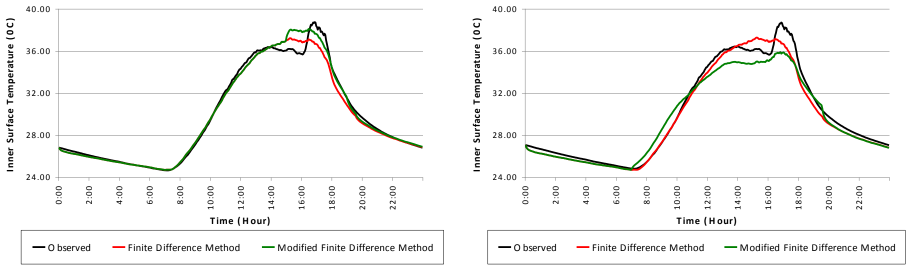
(d) Panel P4



(e) Panel P5



(f) Panel P6



(g) Panel P7 (h) Panel P8

Figure 8.5: Graphical presentation of observed and predicted outer surface temperature

8.4 Inner Surface Temperature

The inner surface temperature of the ALC panels was predicted with FDM by using (8.2) to (8.6) with the revised mesh Fourier number as shown in Table 8.2. The predicted inner surface temperature was compared with the observed normalised inner surface temperature. The first set of data at 12.00 midnight were assumed linear and were used to kick start the calculation.

Appendix D4 shows a typical finite difference computation of the theoretical inner surface temperatures. Table 8.7 shows the difference between the observed and predicted inner surface temperature using FDM for sand-based and soil-based ALC panels respectively.

Table 8.7: Average and maximum difference of theoretical and observed inner surface temperature

Panel	Average Temperature Difference (^0C)	Percent Difference (%)	Maximum Temperature Difference (^0C)	Maximum Percent Difference (%)
P1	0.41	1.3	0.96	2.8
P2	0.51	1.6	1.21	3.6
P3	0.56	1.8	1.05	3.2
P4	0.46	1.5	0.80	2.5
P5	0.45	1.5	1.14	3.5
P6	0.67	2.2	1.91	5.9
P7	0.66	2.2	1.63	5.5
P8	0.55	1.8	1.25	4.2

The FDM predicted fairly well for the inner surface temperature with average difference ranging from 0.41 ^0C to 0.67 ^0C or 1.3% to 2.2%. This little discrepancy could be due to the moisture content of the panel. ALC is prone to absorb moisture due to its porous structure. Moisture absorbed and retained in the panel affects the heat transfer process and subsequently the inner surface temperature of the panels. Water is about twenty to thirty times better at conducting heat than air. Moreover, the inner surface of the ALC panels was more protected in the indoor environment. Thus, the existing FDM has considered sufficient factors to predict the inner surface temperature.

Figure 8.6 and Figure 8.7 show the typical temperature profiles predicted with FDM for plain sand-based and soil-based panels respectively. The typical temperature profiles indicate that the temperature gradients were not linear and changed at any one time – transient heat transfer.

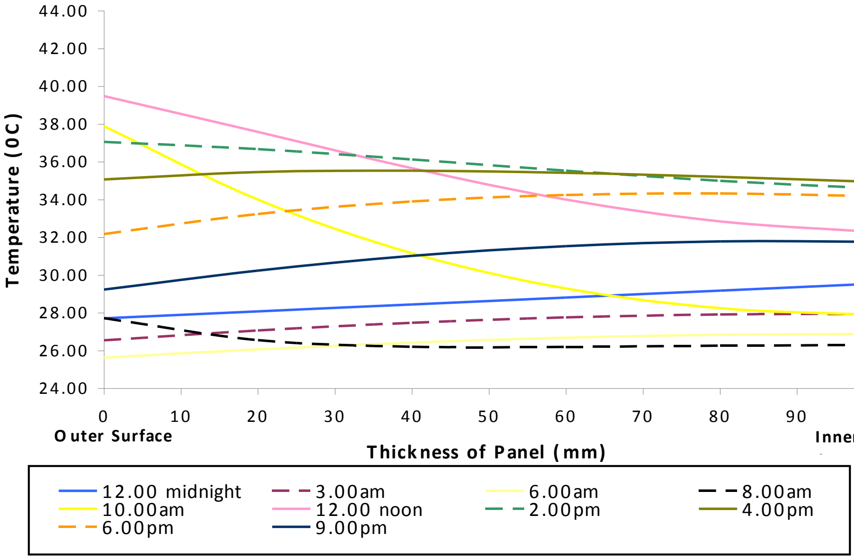


Figure 8.6: Temperature profile for panel P1

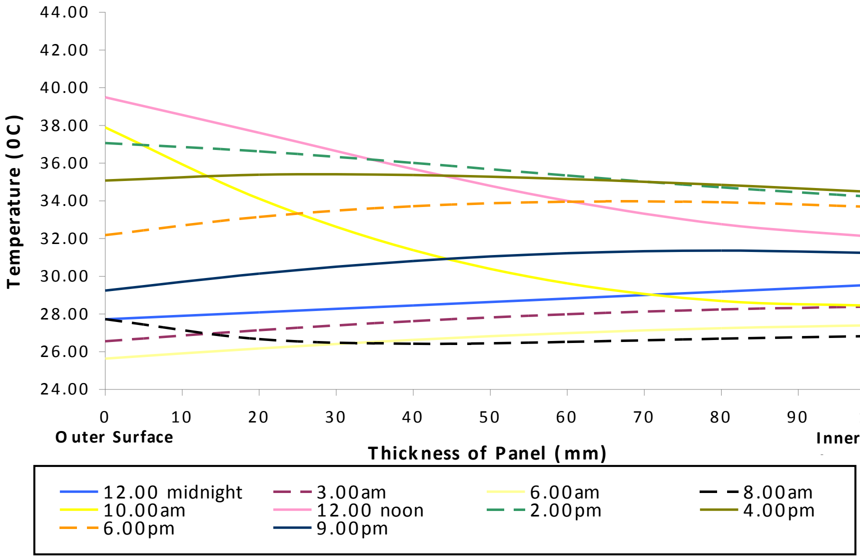


Figure 8.7: Temperature profile for panel P5

8.5 Application of Modified Finite Difference Method

The determination of outer and inner surface temperature is crucial as they subsequently affect the inner air temperature. The importance of accurately predicting the inner surface temperature is to enable the designer to select a suitable building material for energy efficient construction.

There are two approaches to assist the designers in selecting the appropriate type of building material as the building envelope for energy efficient construction. The first approach is to choose a material of suitable thermal property in order to maintain certain predetermined inner air temperature. The second approach is to determine the total energy transfer into the building if the inner air temperature and the thermal property of the wall element were fixed.

8.5.1 Minimum Thermal Conductivity Approach

The thermal laboratory tests conducted to determine the temperature gradient of the panels revealed that the inner air temperature was closely related to the inner surface temperature of the panel. The average wall temperature and inner room temperature from the Thermal Laboratory tests are shown in Figure 8.8.

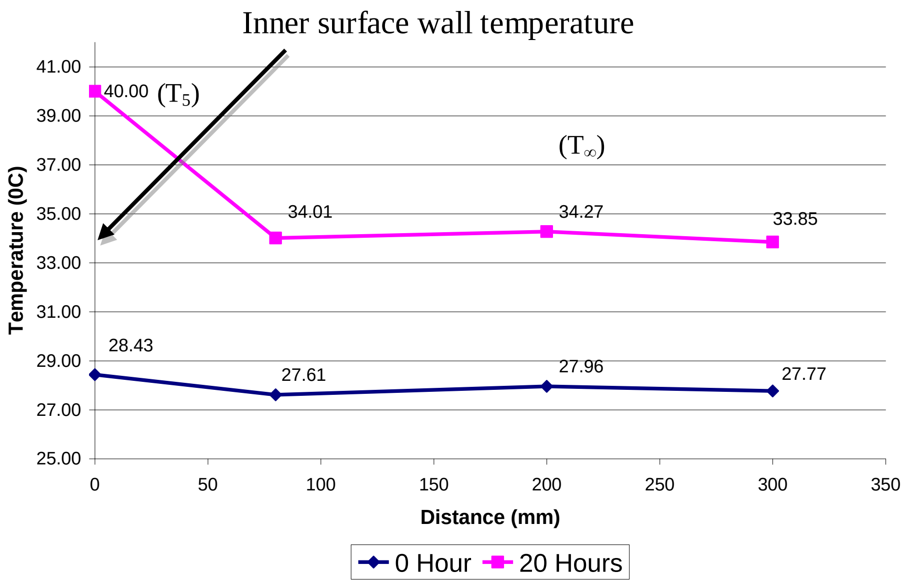


Figure 8.8: Relationships between the inner surface and inner air temperature

The indoor air temperature in the Thermal Laboratory (Figure 8.9) increased from 27.78 ^{0}C at the beginning of the test to 34.04 ^{0}C after 20 hours of testing. This has translated to an increase of 6.26 ^{0}C as a result of the increase of inner surface temperature of the wall panel.

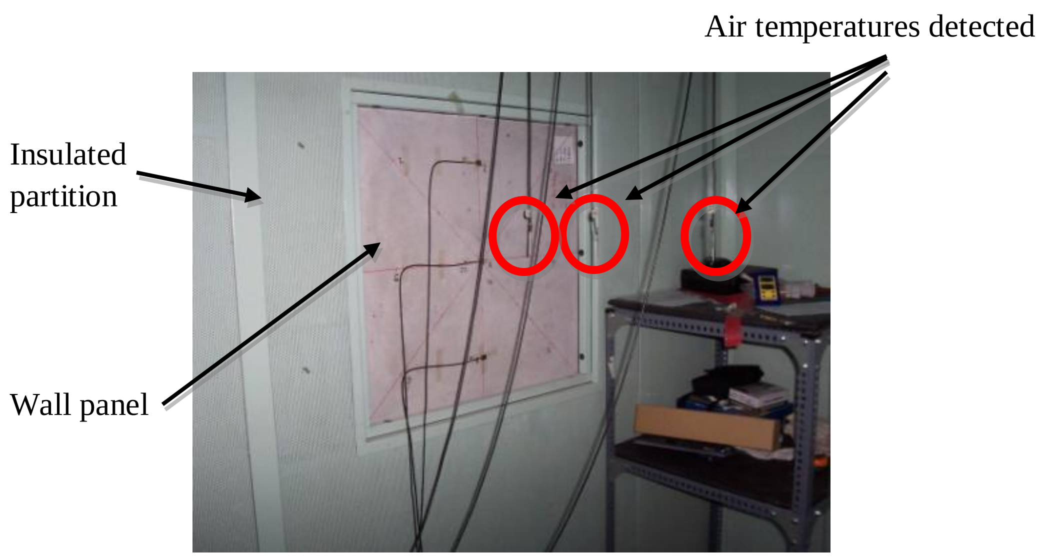


Figure 8.9: The cool room of thermal laboratory (2 m x 2 m x 2 m)

The increase of indoor air temperature in the cool room could be higher if the panel size was larger. In the current set up, the ratio of the wall panel to the partition was 0.14. Based on Newton's Law of Cooling, the inner air temperature should increase inversely to the size of the panel with the constant λ as shown in (8.11).

$$Q_P^i = h_i A(T_5^i - T_\infty)\Delta t$$

$$A = \frac{Q_P^i}{h_i \Delta t} \frac{1}{(T_5^i - T_\infty)}$$

$$A = \lambda \frac{1}{(T_5^i - T_\infty)}$$

$$A \alpha \frac{1}{(T_5^i - T_\infty)} \qquad (8.11)$$

From (8.11), the temperature difference between the wall surface temperature and inner air temperature is inversely proportional to the area of the wall. Therefore, the difference between the surface temperature and the inner air temperature was estimated to be 0.84 ^{0}C if the whole insulated partition were to be replaced by the panel. The ratio of partition area to the volume of the room was 0.50, while the east wall ratio of the prototype house (3.5 m x 3.0 m x 4.5 m) to the volume of the room was 0.22. This means the ratio reduction was 2.27 times, thus, it is predicted that the inner air temperature should be 1.91 ^{0}C (2.27 x 0.84 ^{0}C) lower than inner wall surface temperature during its peak.

From the one year data collection, the average air temperature, inner wall surface temperature from the east and west walls were computed. The relationships between the inner air temperature and inner wall surface temperature are shown in Figure 8.10.

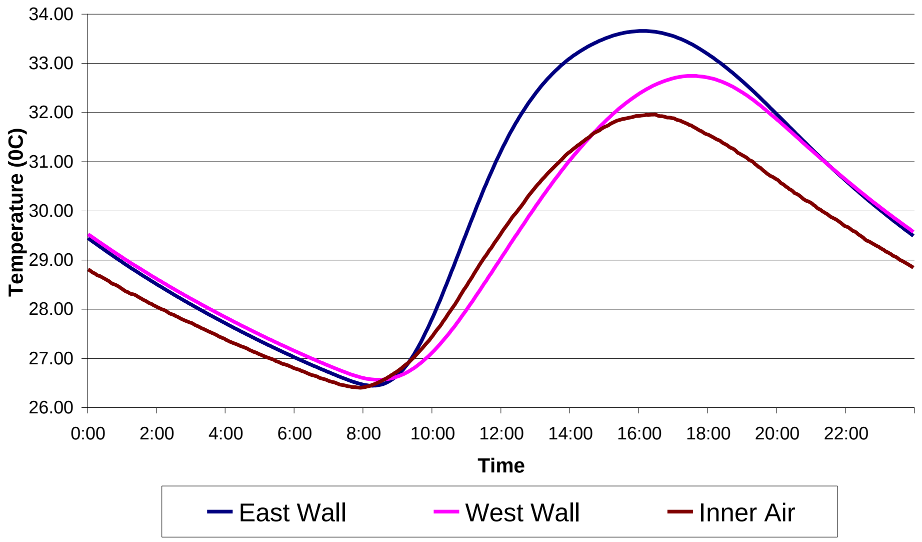


Figure 8.10: The relationships between the inner wall surface temperature and inner air temperature

From a closer observation on Figure 8.10, it is noticed that the inner air temperature behaved in a similar trend to the surface temperature of the east wall since the east wall was exposed to more direct sun radiation in the current set up. It is also noticed that the inner air temperature achieved its peak at about 4.00pm which was similar to the recorded inner surface temperature of the east wall. On the other hand, the west wall surface temperature seemed to have less impact towards the inner air temperature. The west wall reached its peak temperature at 5.30pm. Since both the east and west walls affect the inner air temperature, thus the average wall surface temperature and the air temperature was computed and shown in Figure 8.11.

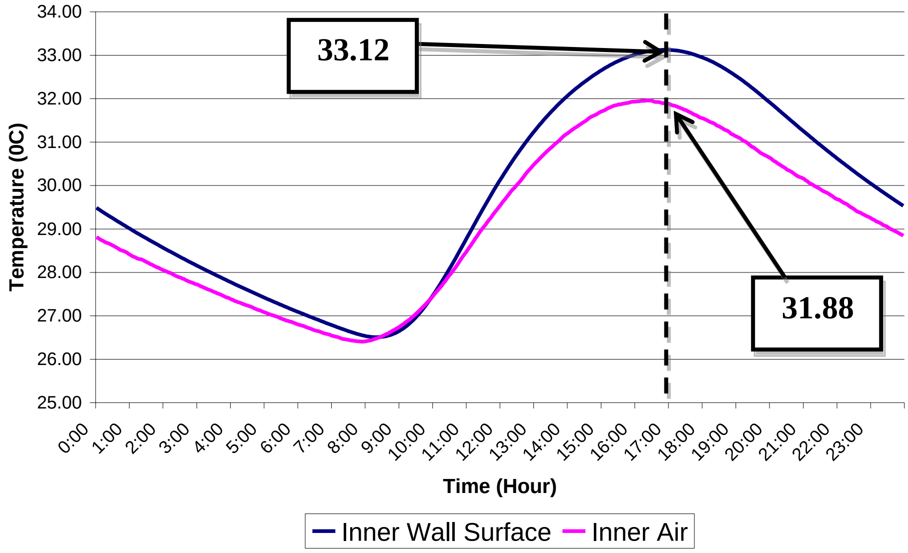


Figure 8.11: The relationships between inner air temperature and inner wall surface temperature

From Figure 8.11, the peak wall surface temperature was 33.12 ^{0}C while the corresponding inner air temperature was 31.88 ^{0}C. This shows that at the most critical time, the air temperature was 1.24 ^{0}C lower than the wall surface temperature. The difference between the surface temperature of the wall and the inner air temperature was not similar to the predicted model from the thermal laboratory. This was due to the controlled condition of thermal laboratory.

Based on the relationships between the inner wall surface temperature and inner air temperature observed from the prototype house, it is projected that if the air temperature were to be maintained at 27.00 ^{0}C, the highest wall temperature should not be greater than 28.24 ^{0}C. Based on this relationship, the thermal conductivity value required can be determined with the following equation at the time step (Δt) of 3 minutes and uniform nodal spacing (Δx) of 0.02 m.

$$k^{i+1} = \frac{T_5^{i+1} - T_5^i + \frac{54000}{\rho c} T_5^i - \frac{54000}{\rho c} T_{in}^i}{\frac{900000}{\rho c} T_4^i - \frac{900000}{\rho c} T_5^i} \tag{8.12}$$

It has to be emphasized that the main function of wall envelope is to prevent the heat from being transferred from the outer surface of the wall to the inner surface and subsequently to the indoor environment. Therefore, the desired conditions namely the indoor air temperature and inner surface temperature were fixed in order to determine the thermal conductivity value. The calculation of thermal conductivity value was conducted using Microsoft Office Excel spreadsheet as shown in Figure 8.12.

h_{out}	20	W/m^{2}K	Density, ρ	1300	kg/m^3
Thermal Conductivity, k	0.024	W/mK	Specific Heat Capacity, c	1000	J/kgK
Fourier Mesh Number, τ	0.008		Thermal Diffusivity, α	1.81E-08	
Absorptivity	0.6		Time Step, Δt	180	second
h_{in}	3	W/m^{2}K	Uniform Nodal Spacing, Δx	0.02	m
Inner Air Temperature	30	^{0}C	Overall Thickness	100	mm
Inner East Wall Temperature	31.24	^{0}C			

Figure 8.12: Spreadsheet for thermal conductivity calculation

For conservative design purpose, the most critical case or the highest wall temperature was selected to determine the thermal conductivity value. This occurred at 4.00pm, east wall, with the initial wall temperature of 33.66 ^{0}C (refer Figure 8.13). The proposed thermal conductivity values for different desired indoor air temperature are shown in Table 8.8.

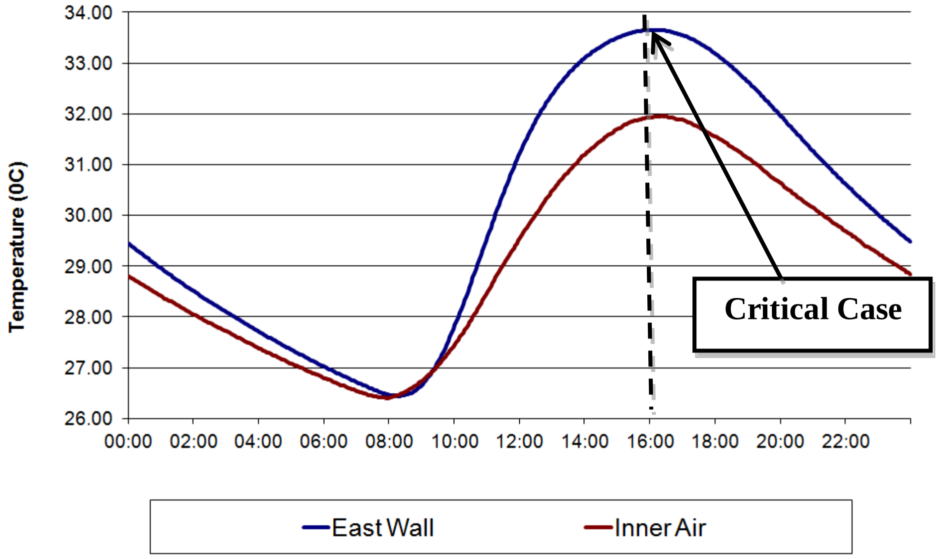


Figure 8.13: Critical case

Table 8.8: The predicted thermal conductivity value

Room Size= 3.0 m (Length) x 4.5 m (Breath) x 3.5 m (Height)			
Specific Heat Capacity, c = 1000 J/kgK			
Density, ρ = 1300 kg/m^3			
Maximum Inner Wall Temperature (^{0}C)	Desired Indoor Air Temperature (^{0}C)	Thermal Conductivity (k)	Thickness (mm)
31.24	30.00	0.024	100
28.24	27.00	0.012	100
25.24	24.00	0.008	100
28.24	27.00	0.015	120
25.24	24.00	0.009	120

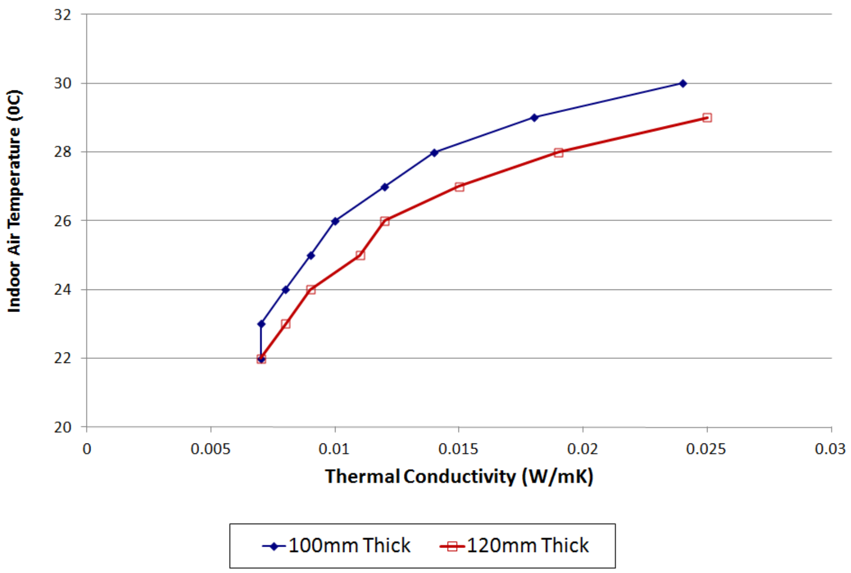


Figure 8.14: Proposed thermal conductivity values correspond to maximum indoor air temperature

Figure 8.14 shows the proposed thermal conductivity values required for the walls correspond to the maximum indoor air temperature generated from the Microsoft Office Excel spreadsheet developed (Figure 8.12). For every single maximum indoor air temperature required, two thermal conductivity values were proposed based on two different thickness of the wall. Obviously, thicker wall offers greater heat resistance than the thinner wall. Thus, for the same maximum indoor air temperature, 120 mm thick wall affords to have greater thermal conductivity value compared to the 100 mm thick wall counterpart. For instance, 100 mm thick wall needs to couple with thermal conductivity 0.014 W/mK in order to have maximum 28 ^{0}C indoor air temperature while 120 mm thick wall only requires thermal conductivity value of 0.018 W/mK for the same maximum indoor air temperature.

8.5.2 Energy Transfer Approach

The second approach for the designer to construct energy efficiently is to determine the total energy transfer from the wall into the room. Energy transfer method enables the designer to compare the total amount of energy transfer from different materials used on the wall envelope. For instance, if the inner air temperature were to be maintained at 27 ^{0}C, the total energy transfer values are summarised in Table 8.9 and Figure 8.15 shows the corresponding inner wall surface temperature. From the energy transfer results, it is noticed that the energy transfer into the room is proportional to the thermal conductivity of the wall. It is desirous to have lower thermal conductivity in order to minimise the heat energy transfer into the room thus reduce the dependency on air conditioning system.

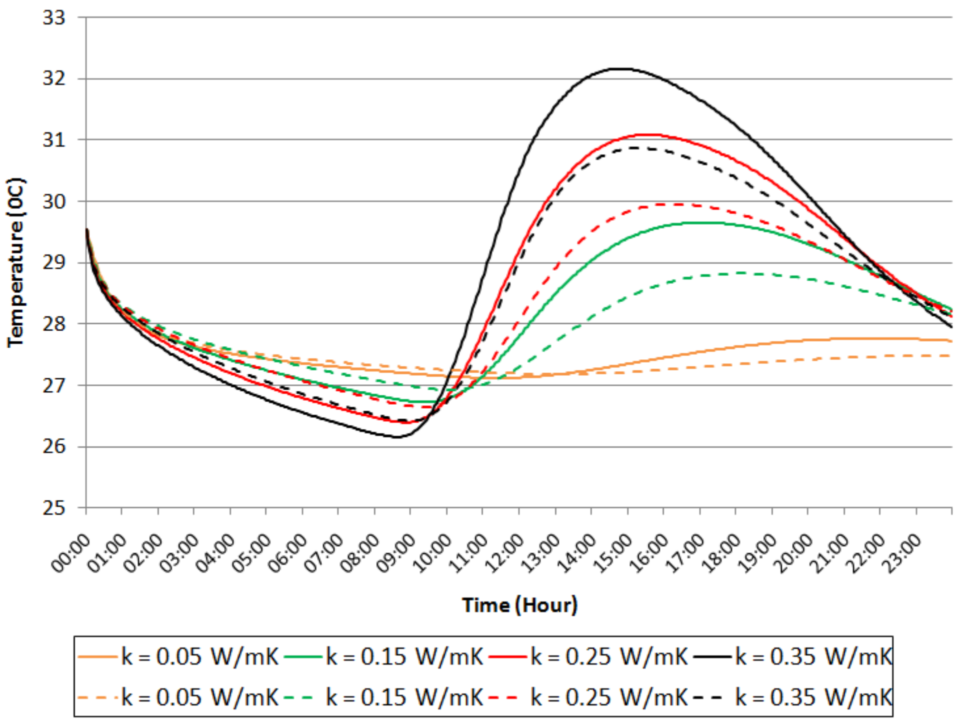
Table 8.9: Total energy transfer

Room Size= 3.0 m (Length) x 4.5 m (Breath) x 3.5 m (Height)

Specific Heat Capacity, c = 1000 J/kgK

Density, ρ = 1300 kg/m^3

Indoor Air Temperature (^{0}C)	Maximum Inner Wall Temperature (^{0}C)	Thermal Conductivity, k (W/mK)	Thickness (mm)	Energy Transfer (Wh)
27	32.52	0.35	100	1895
27	31.43	0.25	100	1567
27	29.92	0.15	100	1087
27	29.54	0.05	100	430
27	30.87	0.35	120	1539
27	29.96	0.25	120	1241
27	29.54	0.15	120	834
27	29.54	0.05	120	363



*Note:

— Thickness 100mm

- - Thickness 120mm

Figure 8.15: Predicted inner surface temperature

8.6 Conclusion

From the one year observation, solar heat flux incident vertically on the walls were developed for sand-based and soil-based panels respectively. The FDM predicted fairly well the temperatures for the outer and inner surfaces of the panels. The average differences between the observed and predicted outer wall surface temperature lied between 0.9 to 2.4% whereas for the inner wall surface, the range was 1.3 to 2.2%. Additional factors such as relative humidity and wind direction were proposed to improve the accuracy of FDM on outer surface temperature prediction. A modified FDM model was developed, the discrepancy between observed and predicted outer wall surface temperature was much improved to within 0.9 to 1.9%. Furthermore, the modified FDM also reduces the maximum different between the predicted outer surface temperature and observed surface temperature. The average improvement lied within 33.3% and 10.9% for sand-based and soil-based panels respectively.

Accurately predicting the surface temperature of the panels enables the designer to determine the suitable materials for energy efficient construction. From the predicted surface temperature, the designer may be able to propose a suitable thermal conductivity value of the building envelope for a predetermined indoor air temperature. Similarly, the predicted surface temperature also allows the designer to determine the total energy transfer into the building.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

9.1 Conclusions

The conclusions and inferences of this study are summarised according to the objectives laid in Chapter 1.

Objective 1- To determine the compressive strength and flexural strength of sand-based and soil-based aerated lightweight concrete (ALC) for unit weights range between 11.0 kN/m^3 to 18.0 kN/m^3.

Sand-based and soil-based ALC with unit weight ranged from 11.0 kN/m^3 to 18.0 kN/m^3 have been produced. The compressive and flexural strength of 120-day for both sand-based and soil-based ALC have been determined. From the results, the compressive strength of sand-based ALC varied from 3.21 MPa to 32.76 MPa and the values were affected dependent on the unit weight and cement content. For soil-based aerated lightweight concrete, the compressive strength ranged from 2.27 MPa to 22.66 MPa. In general, the compressive strength of sand-based ALC was superior compared to soil-based ALC by at least 3.6%. On the aspect of flexural strength, sand-based ALC outperformed soil-based ALC by at least 3.7%. The flexural strength for sand-based ALC ranged from 1.48 MPa to 8.36 MPa while for soil-based ALC, the flexural strength ranged from 1.05 MPa to 4.00 MPa. The relationships between the compressive and flexural strength for both sand-based and soil-based ALC were modeled in Equation 5.1 and 5.2 respectively.

Despite the poorer strength performance of soil-based ALC compared to its sand-based counterpart, soil-based ALC has the potential to be used extensively in construction. The chief reason being the experience in Malaysia and believe the same elsewhere that while sandy materials do not occur and are not found everywhere whereas soils are nearly omnipresent and therefore abundantly available. Soil is also a naturally an environmentally friendly and sustainable construction material. Furthermore, its easy availability avoided long haul and high transportation expenses and the great economy of the soil material itself have all contributed toward the cost effectiveness of the material as a whole. Environmental-wise, an avoidance of exploiting sand sources, its excavation and hauling on the roads etc. will obviously justify the non-usage of sand for the current application in comparison to soil.

Objective 2- To determine thermal conductivity, *k* value of sand-based and soil-based ALC plates with and without newspaper membrane embedment.

The thermal conductivity of sand-based and soil-based ALC with and without newspaper membrane embedment has been determined. From the results, it can be concluded that unit weight and newspaper membrane embedment played an equally important role to influence the thermal conductivity of concrete plates. Reduction in unit weight and increase in aerial intensity of newspaper membrane embedment resulted in a reduction of thermal conductivity. Newspaper membrane was found to be effective in reducing the thermal conductivity of ALC plates, for instance, the embedment of a mere 0.05 g/cm^2 aerial intensity of newspaper membrane has resulted in at least 10.5% reduction of thermal conductivity. A model has been developed (Eq. 6.2) to correlate the thermal conductivity with unit weight and newspaper membrane embedment. From a statistical point of view, types of filler (sand or soil) were immaterial in affecting the thermal conductivity of the ALC panels.

Objective 3- To compare the thermal insulation property in terms of temperature gradient of ALC

From the temperature gradient tests, the results show that newspaper membrane, *lalang* or banana leaves embedment and unit weight were the main factors in heat insulation performance. The results indicated that higher unit weight caused lower temperature gradient or indirectly higher thermal conductivity. The results on the trend of temperature gradient of the panels agreed well with the trend of its thermal conductivity values.

Objective 4- To produce full scale prototype wall panels and observe the thermal behaviour subject to natural weather in Malaysia

Full scale prototype wall panels with different unit weights, different aerial intensities of newspaper membrane embedment and fillers were produced and erected. The outer surface and inner surface temperatures were observed 24 hours a day for a period of one year. From the temperature observations, the surface temperature distributed evenly on the whole panel. The data collected also reflected that the panels' outer surface temperatures were highly depended on direct sun radiation and outdoor temperature. Furthermore, the inner surface temperatures were highly dependent on its outer surface temperatures.

Thermal conductivity appeared to be an important property on transient heat transfer as it influenced the maximum outer surface temperature and the rate of outer surface temperature increase while thermal diffusivity was important to the inner surface temperature profile of the panels. The maximum temperature and rate of temperature increase on the outer surface of the panels varied even though the panels were exposed to the same testing environment. This was due to the different property in terms of thermal conductivity of the panels. It can be concluded that lower thermal conductivity resulted in higher outer surface temperature and vice versa. The results indicated that maximum inner surface temperature has a close relationship to its thermal diffusivity. Higher thermal diffusivity signified higher inner surface temperature.

Objective 5- To compute and compare the decrement factors and time lags of the prototype panels

The decrement factors for all sand-based panels behaved in a similar trend with panel P1 having the highest decrement factor, followed by panels P2, P4 and panel P3 has the lowest decrement factor. For soil-based ALC panels, highest decrement factor was recorded on panel P5, followed by panel P6 for the lower half of the wall. For the upper half of the wall, the highest decrement factor was recorded on panel P7 followed by panel P8. Decrement factor and the thermal diffusivity property of the panels were closely related. The decrement factors were positively proportional to thermal diffusivity of the panels. This also implied that lower thermal diffusivity led to less heat flow.

Based on the decrement factors, the amount of energy transfer followed the sequence P1>P2>P4>P3 for sand-based panels. For soil-based panels, the sequences were P5>P6 and P7>P8. The decrement factor and time lag were not only dependent on the panel's thermal diffusivity value, but it was also influenced by the position of the panel. Therefore, the values observed from sand-based panels cannot be compared with values obtained from soil-based panels as they were subjected to different sun radiation intensity and their exposure was at different time. Based on thermal diffusivity value, there was a trend of decrement factors and time lags observed for sand-based and soil-based panels respectively.

From this study, the decrement factors of ALC wall facing east were ranged from 0.29 to 0.42 while for the west wall, the decrement factors ranged from 0.36 to 0.46. On the other hand, the time lags for east wall ranged from

4.35 hours to 5.70 hours and west wall ranged from 1.80 hour to 2.85 hours. This indicated that the behaviour of walls reacted according to their location. Thermal diffusivity should be emphasized rather than only thermal conductivity because the envelope of every building experienced transient heat transfer when exposed to natural environment. Therefore, the ability of the wall panel to conduct and store heat need to be considered. The relationships on the capability to conduct and capacity to store heat of a material are referred to as its thermal diffusivity.

Objective 6- To compare the performance of the prototype panels under transient state in terms of total energy transfer

The highest amount of energy transfer was recorded on panel P1 for sand-based panels while panels P5 and P7 recorded the highest amount of energy transfer for soil-based panels. On the other hand, the lowest energy transfer was recorded on P3 for sand-based panels and panel P8 for soil based panels. Panel P1 and P5 shared the same attributes of having the highest thermal conductivity and lowest thermal diffusivity values among the sand-based and soil-based panels respectively. This trend agreed very well with the trend of decrement factors. The energy transfer observed validated the indication of decrement factor where the sequence of energy transfer for sand-based panels was P1>P2>P4>P3. For soil-based panels, the sequences were P5>P6 and P7>P8. This denoted that total amount of energy transfer related to decrement factor which also depended on thermal diffusivity of the panel.

Thermal diffusivity provides a comprehensive idea on energy efficiency of various materials.

Objective 7- To determine the theoretical surface temperature based on finite difference method (FDM).

The inner surface and outer surface temperatures were predicted based on explicit FDM with certain assumptions. The solar heat flux incident on the prototype walls was developed based on the whole year temperature data recorded.

Objective 8- To compare the accuracy of predicted surface temperature with the observed temperature and improve on the prediction.

FDM predicted fairly well for the temperatures of outer and inner surfaces. The average differences between the observed and predicted outer wall surface temperature lied between 0.9 to 2.4% whereas for the inner wall surface, the range was 1.3 to 2.2%. Additional factors such as relative humidity and wind direction were proposed to improve the accuracy of FDM on outer surface temperature prediction. These two factors are crucial for Malaysia weather condition but they are neglected in the original FDM. Thus, a modified FDM model was developed with an additional constant to account for these two factors. The discrepancy between the observed and modified FDM predicted outer wall surface temperatures was improved up to 31.4% compared to original FDM's prediction. Furthermore, the modified FDM also reduces the maximum difference between the predicted outer surface temperature and observed surface temperature. The average improvement lied within 33.3% and 10.9% for sand-based and soil-based panels respectively.

Objective 9- To propose the suitable thermal property of the wall material for comfortable indoor temperature

They were two approaches to propose a suitable thermal property of the wall material to enable comfortable indoor environment. Based on the relationships between the maximum inner wall surface temperature and the indoor air temperature observed, the minimum thermal conductivity required to achieve certain predetermined indoor temperature was proposed. Secondly, the selection of the wall material can be based on the total energy transfer if certain indoor air temperature is predetermined. Generally, thermal conductivity played an important role to ensure a comfortable indoor temperature. Apart from thermal conductivity, other factors namely the thickness of the wall element, specific heat capacity and unit weight of the wall also affect the inner surface temperature and subsequently the indoor temperature.

9.2 Recommendations for Future Research

This study focused on the thermal insulation properties of sand-based and soil-based ALC panels with and without embedment. The steady and transient states on thermal behaviour of these panels have been observed and examined. However, this study experienced several drawbacks that deserve further recommendation.

1. The unit weight of the ALC should be further reduced to achieve below 10.0 kN/m^3 yet with sufficient strength. Lower unit weight will provide a better thermal insulation property and translate to saving in foundation costs.

2. Waste and recycle materials should be included in the production of ALC. This means that the life cycle analysis of the building material should also be emphasized. Therefore, waste and recycle materials should be incorporated in the ALC blocks and panels to reduce the carbon footprints starting from the production right up to the application of the building material.

3. Extra thermocouples need to be provided and embedded in between the panels. This will enable the observation on the temperature profile between the outer surface and inner surface of the panels. Furthermore, this will also provide a better understanding on the temperature behaviour of the panels under transient condition.

4. Other parameters such as humidity, wind speed and direction, sky condition, sun radiation (direct or diffuse) need to be monitored in parallel with the panels' surface temperature. This will enable the

formulation of a comprehensive model and improve the accuracy on temperature prediction.

5. The amount of energy savings should be quantified. This can be achieved by using different types of ALC panels to build several prototype houses, where each prototype house uses a particular type of ALC panel and the houses should also be air-conditioned to maintain a specific indoor temperature. This will enable the comparison on the amount of energy savings from using different types of panels as building envelope.

6. Future research should extend the scope of study to double or multi-storey building. Moreover, the moisture content of the panels should be quantified.

7. Future research should also focus on using different thickness of wall panels and to incorporate the thickness of the wall into its thermal diffusivity property. Perhaps, the thermal diffusivity should be $\frac{U}{\rho C}$ rather than the current $\frac{k}{\rho C}$.

8. Separate analyses on physical and mechanical properties of sand-based and soil-based ALC on their microstructure, water absorption, dimensional stability, mechanical strengths, modulus of elasticity etc. warrant a more thorough further investigation in future

9. More thermal conductivity tests should be conducted in the future to enable conclusive comparisons and convincing conclusions to be drawn.

10. Future research should also compare the performance of aerated lightweight concrete with the performance of normal concrete.

11. To complement the current research, the chemical, physical properties and environmental characteristics on newspaper, *lalang* and banana leaves and other materials to be used as a 'physical shield' should be carefully studied and analysed

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APPENDIX A1

Sand

Unit Weight = 11.0 kN/m^3

C:S = 1:1

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	11.6	0.99	1.00
3	11.5	0.96	
3	12.1	1.05	
7	11.5	1.58	1.60
7	11.5	1.60	
7	11.6	1.63	
28	12.1	2.29	2.33
28	11.8	2.21	
28	12.2	2.50	
60	12.6	2.73	2.66
60	12.6	2.60	
60	12.4	2.64	

Unit Weight = 15.0 kN/m^3

C:S = 1:1

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	16.1	7.48	7.60
3	16.4	7.84	
3	16.3	7.49	
7	15.9	9.16	9.36
7	16.0	9.67	
7	16.7	9.25	
28	16.5	13.02	13.56
28	16.6	13.78	
28	16.7	13.89	
60	16.3	13.56	14.34
60	16.3	13.75	
60	17.0	15.70	

Unit Weight = 18.0 kN/m^3

C:S = 1:1

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	19.1	12.75	12.33
3	18.6	11.99	
3	18.7	12.25	
7	19.1	13.53	15.61
7	19.1	17.39	
7	18.6	15.92	
28	19.1	26.89	26.04
28	18.9	24.87	
28	19.1	26.35	
60	18.9	29.29	32.18
60	19.3	34.38	
60	19.2	32.87	

Unit Weight = 11.0 kN/m^3

C:S = 1:0.5

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	12.1	3.28	3.11
3	12.0	3.01	
3	12.0	3.05	
7	11.9	3.51	3.41
7	12.0	3.48	
7	11.9	3.23	
28	12.3	5.62	5.52
28	12.4	5.65	
28	12.2	5.28	
60	12.5	6.23	6.25
60	12.5	6.11	
60	12.8	6.41	

Unit Weight = 15.0 kN/m^3

C:S = 1:0.5

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	16.7	11.05	9.54
3	15.9	8.26	
3	16.1	9.32	
7	15.8	11.25	11.00
7	14.5	11.33	
7	14.9	10.41	
28	16.6	17.97	16.68
28	16.6	15.05	
28	16.3	17.01	
60	17.3	24.05	22.35
60	16.6	22.42	
60	16.6	20.58	

Unit Weight = 18.0 kN/m^3

C:S = 1:0.5

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	18.5	15.43	14.25
3	18.2	13.22	
3	18.1	14.10	
7	18.6	19.24	19.01
7	19.1	17.68	
7	18.7	20.10	
28	18.8	32.05	32.29
28	18.7	33.65	
28	18.8	31.18	
60	18.8	39.63	39.09
60	18.9	40.69	
60	18.4	36.96	

Unit Weight = 11.0 kN/m^3
C:S = 1:0.33

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	11.9	2.99	2.99
3	11.3	2.89	
3	11.3	3.09	
7	11.7	4.97	4.83
7	11.8	4.52	
7	11.7	5.00	
28	12.2	8.09	7.97
28	12.2	8.07	
28	12.1	7.74	
60	12.5	8.67	8.34
60	12.3	7.91	
60	12.4	8.43	

Unit Weight = 15.0 kN/m^3
C:S = 1:0.33

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	15.8	7.58	7.57
3	15.5	7.40	
3	15.6	7.73	
7	15.7	10.07	9.85
7	15.6	9.16	
7	15.7	10.32	
28	15.8	16.58	15.86
28	15.9	14.80	
28	15.9	16.20	
60	16.0	21.27	21.74
60	16.1	22.03	
60	16.0	21.93	

Unit Weight = 18.0 kN/m^3

C:S = 1:0.33

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	18.6	17.47	17.66
3	18.6	17.85	
3	18.6	17.65	
7	18.6	24.20	23.00
7	18.9	23.35	
7	18.5	21.46	
28	18.9	38.60	38.01
28	18.7	37.49	
28	19.1	37.93	
60	19.1	45.01	44.00
60	18.8	42.80	
60	18.6	44.20	

APPENDIX A1

Soil

Unit Weight = 11.0kN/m^3

C:S = 1:1

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	12.8	0.61	0.62
3	12.3	0.69	
3	12.3	0.55	
7	13.0	1.12	0.94
7	14.2	0.87	
7	13.2	0.84	
28	14.3	1.39	1.32
28	13.9	1.14	
28	14.5	1.44	
60	14.2	1.65	1.60
60	13.8	1.48	
60	12.9	1.66	

Unit Weight = 15.0kN/m^3

C:S = 1:1

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	15.7	2.58	2.51
3	15.8	2.43	
3	15.8	2.52	
7	15.9	2.89	2.96
7	16.0	3.00	
7	15.9	2.99	
28	16.2	4.43	4.52
28	16.0	4.50	
28	16.2	4.64	
60	16.2	5.05	5.27
60	16.0	5.48	
60	16.0	5.28	

Unit Weight = 18.0kN/m^3

C:S = 1:1

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	17.5	5.95	5.75
3	17.3	5.44	
3	17.4	5.86	
7	17.3	5.81	6.32
7	17.3	6.66	
7	17.5	6.48	
28	17.5	8.61	8.15
28	17.4	8.16	
28	17.5	7.68	
60	17.3	9.90	9.73
60	17.4	8.80	
60	18.3	10.49	

Unit Weight = 11.0kN/m^3
C:S = 1:0.5

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	13.0	0.60	0.91
3	13.1	0.68	
3	14.8	1.45	
7	13.2	0.62	1.51
7	13.2	0.81	
7	16.0	3.10	
28	14.4	1.94	1.59
28	13.9	1.52	
28	13.7	1.32	
60	14.0	1.57	1.82
60	14.5	2.01	
60	14.0	1.88	

Unit Weight = 15.0kN/m^3
C:S = 1:0.5

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	16.2	4.97	5.10
3	16.1	4.75	
3	16.3	5.59	
7	16.3	6.05	5.99
7	16.5	5.57	
7	16.7	6.36	
28	16.5	7.94	8.57
28	16.7	8.99	
28	16.6	8.79	
60	16.9	11.48	11.18
60	16.7	11.07	
60	16.7	10.98	

Unit Weight = 18.0kN/m^3

C:S = 1:0.5

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	18.0	11.60	12.35
3	18.0	12.40	
3	18.2	13.06	
7	18.2	16.05	15.79
7	18.2	16.10	
7	18.2	15.21	
28	18.2	22.47	25.24
28	18.3	27.24	
28	18.1	26.01	
60	18.1	27.51	27.36
60	18.4	27.53	
60	18.3	27.05	

Unit Weight = 11.0kN/m^3

C:S = 1:0.33

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	13.3	2.77	2.77
3	13.6	2.65	
3	13.7	2.89	
7	13.9	3.03	3.02
7	13.8	3.05	
7	13.8	2.97	
28	14.8	5.88	4.83
28	14.8	3.31	
28	14.4	5.30	
60	14.5	6.25	6.23
60	14.6	5.96	
60	14.4	6.47	

Unit Weight = 15.0kN/m^3

C:S = 1:0.33

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	15.2	4.70	4.27
3	15.3	3.94	
3	15.3	4.17	
7	15.5	5.85	5.76
7	15.4	5.46	
7	15.3	5.97	
28	15.5	10.79	9.51
28	15.1	8.46	
28	15.4	9.28	
60	15.6	14.88	13.68
60	15.5	12.40	
60	16.0	13.76	

Unit Weight = 18.0kN/m^3

C:S = 1:0.33

Day/Age	Unit Weight (kN/m^3)	Compressive Strength (MPa)	Average Compressive Strength (MPa)
3	17.9	17.25	17.67
3	18.0	18.02	
3	17.9	17.73	
7	18.0	19.89	19.33
7	18.0	19.23	
7	17.9	18.86	
28	18.2	17.03	23.16
28	17.9	25.33	
28	18.0	27.12	
60	18.0	21.50	26.03
60	18.0	25.10	
60	18.3	31.48	

APPENDIX A2

Sand

Unit Weight = 11.0kN/m^3

C:S = 1:1

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	11.8	0.69		2.29	1.95	
	11.8	0.55	0.61	2.16	1.92	2.10
	11.7	0.58		2.33	1.96	
7	11.9	0.98		2.84	2.28	
	12.0	1.01	0.99	2.75	2.40	2.31
	11.4	0.98		1.52	2.06	
28	11.7	1.49		2.89	3.20	
	11.9	1.24	1.37	3.19	2.37	2.78
	11.5	1.37		2.71	2.30	
60	11.8	1.46		3.19	3.20	
	11.6	1.49	1.45	3.20	3.19	3.18
	11.7	1.41		3.18	3.11	
120	11.6	1.43		3.11	3.18	
	11.7	1.62	1.48	3.24	3.33	3.21
	11.5	1.38		3.19	3.21	

C:S = 1:0.67

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	10.9	0.87		3.29	2.19	
	10.5	0.69	0.61	2.21	2.81	2.66
	10.9	0.28		2.96	2.49	
7	10.5	1.11		3.33	3.58	
	10.5	0.98	1.09	3.46	3.30	3.33
	10.7	1.17		3.20	3.10	
28	10.1	1.39		4.31	2.95	
	10.4	1.26	1.36	3.43	3.45	3.38
	10.0	1.42		2.45	3.69	
60	10.2	1.42		3.43	3.48	
	10.3	1.48	1.47	3.46	3.44	3.45
	10.4	1.50		3.40	3.50	
120	10.2	1.59		3.81	3.53	
	10.4	1.52	1.58	3.31	3.42	3.50
	10.3	1.64		3.46	3.49	

C:S = 1:0.5

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	10.9	0.65	0.55	3.98	3.09	3.30
	11.2	0.49		3.05	3.07	
	11.2	0.52		3.39	3.22	
7	10.1	1.06	1.08	3.72	3.68	3.54
	10.4	1.21		3.59	3.78	
	10.6	0.97		3.00	3.48	
28	9.9	1.49	1.40	3.63	3.81	3.78
	10.3	1.38		3.63	3.78	
	9.9	1.34		3.98	3.83	
60	11.1	1.40	1.55	4.14	4.14	3.82
	10.2	1.69		3.54	3.32	
	11.1	1.57		3.94	3.83	
120	10.0	1.53	1.68	3.83	3.88	4.03
	10.5	1.82		4.29	4.32	
	10.3	1.70		3.89	3.99	

Unit Weight = 15.0kN/m^3

C:S = 1:1

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	15.2	1.51	1.51	8.94	8.80	9.02
	15.4	1.45		8.30	9.67	
	15.2	1.58		8.99	9.44	
7	15.3	2.22	2.34	9.08	8.65	9.22
	15.4	2.27		10.01	9.30	
	15.4	2.52		9.74	8.51	
28	16.1	2.53	2.45	10.51	11.15	10.64
	15.9	2.58		11.18	11.59	
	15.9	2.24		9.47	9.92	
60	15.7	2.69	2.67	13.90	12.77	14.21
	15.9	2.58		14.20	14.37	
	15.9	2.75		14.51	15.49	
120	15.1	2.89	2.72	17.42	18.34	17.67
	15.4	2.54		16.75	18.83	
	15.2	2.72		16.72	17.98	

C:S = 1:0.67

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	14.8	2.03	2.16	10.25	9.56	9.63
	14.6	2.31		10.63	8.91	
	14.8	2.13		8.96	9.48	
7	14.6	1.96	2.10	10.65	9.30	10.47
	14.6	2.02		11.51	11.07	
	14.5	2.33		10.55	9.74	
28	14.1	2.53	2.38	13.18	13.08	13.00
	14.7	2.29		13.67	13.30	
	13.9	2.32		11.89	12.89	
60	14.7	2.80	2.88	16.78	16.17	13.93
	14.8	2.96		12.69	11.13	
	14.1	2.89		13.04	13.78	
120	14.6	2.61	3.04	18.38	18.34	18.23
	14.5	3.26		18.34	18.90	
	14.6	3.26		17.42	17.98	

C:S = 1:0.5

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	14.8	1.96	2.14	8.70	8.77	9.16
	14.8	2.44		9.09	9.73	
	14.8	2.01		9.61	9.03	
7	14.4	2.53	2.36	10.29	9.14	9.90
	14.4	2.13		9.84	9.68	
	14.5	2.42		10.30	10.13	
28	14.2	2.76	2.70	9.73	9.05	10.21
	14.4	2.51		10.40	10.43	
	14.5	2.82		10.89	10.76	
60	14.8	2.88	2.83	13.89	12.14	14.20
	14.5	2.63		14.90	14.62	
	14.7	2.97		14.80	14.84	
120	14.2	3.23	3.51	18.38	18.67	18.71
	14.1	3.78		19.07	19.16	
	14.3	3.52		18.60	18.38	

Unit Weight = 18.0kN/m^3

C:S = 1:1

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	18.7	5.17	5.35	11.22	11.10	10.26
	19.1	5.40		10.29	9.74	
	19.2	5.47		8.85	10.36	
7	19.3	6.71	6.32	21.21	23.70	22.20
	18.7	5.83		21.37	23.02	
	18.7	6.43		21.07	22.83	
28	19.1	6.17	6.77	19.91	19.86	20.17
	18.7	7.52		20.81	23.27	
	18.9	6.63		18.90	18.25	
60	18.9	6.79	6.82	24.93	26.22	24.99
	18.9	6.72		23.92	25.32	
	18.2	6.96		24.52	25.01	
120	18.5	5.27	6.89	26.76	24.13	25.78
	18.4	8.55		25.59	27.23	
	18.6	6.86		25.74	25.25	

C:S = 1:0.67

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	18.7	4.42	4.67	12.33	14.71	13.74
	18.5	5.73		11.97	15.23	
	18.4	3.85		14.69	13.49	
7	18.9	6.74	6.27	17.58	17.99	15.85
	19.1	6.74		16.76	17.31	
	18.9	5.32		12.15	13.32	
28	18.5	6.43	6.46	26.24	20.52	24.41
	18.6	6.58		24.68	26.12	
	18.1	6.38		22.98	25.90	
60	18.6	6.90	6.68	29.97	23.71	28.60
	18.9	5.91		30.24	31.44	
	18.4	7.23		24.82	31.42	
120	18.6	8.39	7.08	27.21	28.63	30.64
	18.4	6.30		27.56	31.23	
	18.9	6.56		29.54	39.65	

C:S = 1:0.5

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	18.5	4.59	4.56	13.69	13.34	13.43
	18.2	4.56		12.75	14.26	
	17.6	4.52		13.06	13.47	
7	18.3	5.03	4.54	22.16	19.85	22.44
	18.0	4.19		22.54	24.54	
	18.3	4.39		24.07	21.45	
28	17.9	6.19	5.63	31.56	31.41	30.97
	18.5	4.54		32.76	31.76	
	18.0	6.17		26.16	32.18	
60	18.2	7.58	7.49	28.20	25.45	32.30
	18.4	7.25		38.10	36.34	
	18.2	7.65		32.87	32.86	
120	18.0	7.71	8.36	33.96	28.90	32.76
	17.9	7.93		32.79	33.40	
	18.2	9.44		34.43	33.10	

APPENDIX A3

Soil

Unit Weight = 11.0kN/m^3
C:S = 1:1

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	11.6	0.64	0.61	1.31	1.04	1.09
	11.4	0.6		1.27	0.46	
	11.6	0.6		1.12	1.32	
7	11.1	0.67	0.63	1.63	1.69	1.56
	10.5	0.44		1.51	1.50	
	10.7	0.78		1.50	1.51	
28	10.6	1.26	1.01	2.43	2.10	2.21
	10.4	0.8		2.02	2.14	
	10.5	0.98		2.25	2.30	
60	10.3	0.98	1.04	2.46	2.04	2.23
	10.5	1.07		2.11	2.38	
	10.5	1.06		2.13	2.27	
120	10.2	1.26	1.05	2.42	2.20	2.27
	10.2	1.06		2.53	2.08	
	10.5	0.83		2.21	2.15	

C:S = 1:0.67

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	11.3	0.46	0.55	1.39	1.65	1.56
	11.7	0.80		1.54	1.50	
	11.8	0.38		1.76	1.51	
7	11.0	0.78	0.84	2.09	1.87	1.97
	11.0	0.78		2.02	2.12	
	11.2	0.95		1.87	1.87	
28	10.6	1.32	1.42	2.68	2.81	3.01
	10.8	1.49		2.94	3.36	
	10.9	1.44		3.14	3.15	
60	10.2	1.52	1.48	2.62	2.28	3.01
	10.6	1.49		3.29	3.12	
	10.5	1.44		3.27	3.48	
120	10.4	1.70	1.51	3.06	2.84	3.07
	10.4	1.50		2.74	3.26	
	10.3	1.32		3.30	3.19	

C:S = 1:0.5

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	11.1	1.06	0.88	1.95	2.02	2.01
	11.5	0.55		2.10	2.09	
	11.1	1.02		1.87	2.04	
7	10.8	1.21	1.24	3.02	2.83	2.96
	11.0	1.15		3.10	2.94	
	10.8	1.35		2.85	3.01	
28	10.9	1.49	1.34	3.96	3.80	3.62
	11.1	1.21		3.34	3.94	
	10.7	1.33		3.36	3.34	
60	10.4	1.47	1.42	3.96	3.88	3.81
	10.4	1.35		4.01	3.94	
	10.2	1.45		3.52	3.52	
120	10.5	1.62	1.62	4.24	4.12	3.89
	10.8	1.52		3.78	3.57	
	10.4	1.71		3.85	3.78	

Unit Weight = 15.0kN/m^3

C:S = 1:1

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	15.2	2.04	1.48	5.59	5.31	5.39
	15.2	1.52		5.38	5.04	
	15.2	0.88		5.23	5.81	
7	14.8	2.46	2.33	7.88	8.06	7.94
	14.6	2.42		8.11	7.87	
	14.8	2.12		8	7.71	
28	14.0	2.42	2.41	11.04	10.88	10.60
	14.3	2.42		11.31	10.87	
	14.3	2.39		10.15	9.35	
60	13.9	2.42	2.45	11.51	12.42	12.00
	13.9	2.55		12.7	11.95	
	13.9	2.38		12.21	11.21	
120	13.8	3.36	2.61	13	12.64	12.72
	13.8	2.53		12.65	12.81	
	13.7	1.93		12.43	12.81	

C:S = 1:0.67

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	15.2	1.94	1.60	5.74	6.08	5.73
	15.3	1.80		5.68	5.56	
	14.9	1.06		5.75	5.54	
7	14.7	2.08	2.01	7.88	8.29	8.13
	14.8	2.02		8.18	8.63	
	14.6	1.94		8.16	7.64	
28	14.3	2.13	2.21	11.03	10.36	10.85
	14.2	2.12		10.76	10.70	
	14.3	2.39		11.46	10.79	
60	14.3	2.66	2.50	13.03	13.18	12.51
	14.4	2.01		13.01	12.84	
	14.1	2.84		12.02	10.99	
120	13.8	2.66	2.70	13.83	14.10	12.99
	13.5	2.60		12.93	12.63	
	13.6	2.84		11.74	12.69	

C:S = 1:0.5

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	15.0	1.70	1.61	6.09	5.91	5.81
	15.0	1.49		6.00	5.57	
	14.6	1.63		6.09	5.19	
7	14.6	2.46	2.22	7.97	7.13	7.51
	14.5	2.01		7.37	7.21	
	14.0	2.19		7.78	7.62	
28	14.0	2.63	2.70	10.78	11.25	11.13
	14.1	2.55		11.58	12.59	
	13.7	2.92		10.54	10.01	
60	13.9	2.77	2.87	14.10	14.59	13.32
	13.8	2.93		12.80	14.20	
	13.4	2.91		13.50	10.70	
120	13.8	2.99	3.04	15.55	14.76	14.27
	13.7	3.38		14.36	14.48	
	13.4	2.74		12.89	13.58	

Unit Weight = 18.0kN/m^3

C:S = 1:1

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	18.4	2.29	1.71	6.81	7.31	7.01
	18.1	1.55		6.79	6.87	
	19.0	1.29		7.45	6.85	
7	17.9	2.35	2.21	8.97	9.11	9.04
	17.6	1.96		8.94	9.03	
	17.4	2.33		9.02	9.17	
28	17.7	2.97	2.66	12.13	11.86	12.27
	17.8	2.11		13.01	12.31	
	18.0	2.89		12.65	11.67	
60	17.4	2.37	2.88	13.06	13.78	13.99
	17.6	2.73		14.62	14.27	
	17.6	3.54		14.21	14	
120	17.4	2.92	2.92	12.79	12.72	14.37
	17.3	2.92		15.24	14.38	
	17.4	2.91		15.29	15.77	

C:S = 1:0.67

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	18.6	2.19	2.28	8.42	8.30	8.47
	18.9	1.86		8.76	8.55	
	19.1	2.79		8.08	8.71	
7	18.5	3.59	3.28	10.45	12.08	11.43
	18.3	3.20		10.92	11.81	
	18.5	3.04		11.79	11.54	
28	17.9	3.46	3.50	17.19	15.95	17.40
	17.8	3.42		16.92	18.47	
	17.9	3.63		17.81	18.04	
60	17.6	3.63	3.69	20.61	20.50	20.38
	17.8	3.67		20.38	19.27	
	17.7	3.78		21.38	20.12	
120	17.6	3.91	3.81	22.64	21.94	21.96
	17.6	3.79		22.06	21.99	
	17.6	3.74		22.44	20.67	

C:S = 1:0.5

Age/Day	Unit Weight (kN/m^3)	Flexural Strength (MPa)	Average Flexural Strength (MPa)	Compressive Strength (MPa)		Average Compressive Strength (MPa)
3	18.8	1.57	1.66	7.96	8.38	8.29
	18.7	1.70		8.04	8.47	
	18.6	1.70		8.41	8.46	
7	18.5	3.56	3.18	11.19	10.93	10.97
	18.6	3.12		10.90	10.75	
	18.5	2.86		11.00	11.07	
28	17.0	3.53	3.65	17.75	17.37	17.45
	17.9	3.82		17.85	17.32	
	18.0	3.61		17.26	17.14	
60	17.7	3.88	3.90	19.03	21.31	20.29
	17.7	3.71		19.03	20.27	
	17.7	4.10		21.05	21.02	
120	17.6	3.70	4.00	22.34	22.80	22.66
	17.7	4.21		21.21	23.22	
	17.7	4.10		22.86	23.53	

APPENDIX B1

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	Cold Plate Temperature (0C)						Average Cold Plate Temperature (^{0}C)	Hot Plate Temperature (^{0}C)						Average Cold Plate Temperature (^{0}C)	Temperature Difference (^{0}C)	Current (Ampere)
Date & Time	**TC1**	**TC2**	**TC3**	**TC4**	**TC5**	**TC6**		**TC1**	**TC2**	**TC3**	**TC4**	**TC5**	**TC6**			
16/01/2009 13:12	28.2	28.16	28.14	28.19	28.12	28.08	28.15	37.56	37.48	37.61	37.33	37.51	37.49	37.50	9.35	0
16/01/2009 13:15	28.26	28.23	28.21	28.26	28.2	28.16	28.22	37.33	37.23	37.36	37.1	37.26	37.25	37.26	9.04	0
16/01/2009 13:18	28.31	28.28	28.27	28.3	28.26	28.21	28.27	37.07	36.99	37.1	36.84	37	36.99	37.00	8.73	0
16/01/2009 13:21	28.36	28.34	28.31	28.34	28.29	28.25	28.32	36.82	36.74	36.86	36.61	36.76	36.75	36.76	8.44	0
16/01/2009 13:24	28.4	28.38	28.35	28.39	28.33	28.28	28.36	36.6	36.52	36.63	36.39	36.53	36.53	36.53	8.18	0
16/01/2009 13:27	28.42	28.39	28.36	28.4	28.34	28.3	28.37	36.37	36.29	36.4	36.16	36.3	36.3	36.30	7.94	0
16/01/2009 13:30	28.44	28.42	28.4	28.41	28.37	28.32	28.39	36.16	36.07	36.19	35.95	36.09	36.08	36.09	7.70	0
16/01/2009 13:33	28.44	28.41	28.39	28.41	28.36	28.32	28.39	35.94	35.84	35.97	35.73	35.88	35.86	35.87	7.48	0
16/01/2009 13:36	28.44	28.42	28.39	28.41	28.37	28.32	28.39	35.72	35.64	35.75	35.52	35.65	35.65	35.66	7.26	0
16/01/2009 13:39	28.44	28.41	28.39	28.4	28.37	28.33	28.39	35.52	35.43	35.54	35.32	35.45	35.45	35.45	7.06	0
16/01/2009 13:42	28.44	28.4	28.38	28.4	28.36	28.32	28.38	35.32	35.24	35.35	35.13	35.26	35.26	35.26	6.88	0
16/01/2009 13:45	28.42	28.38	28.37	28.38	28.35	28.31	28.37	35.12	35.04	35.16	34.93	35.06	35.05	35.06	6.69	0
16/01/2009 13:48	28.41	28.37	28.36	28.36	28.33	28.3	28.36	34.94	34.85	34.97	34.75	34.87	34.87	34.88	6.52	0
16/01/2009 13:51	28.39	28.35	28.35	28.35	28.32	28.3	28.34	34.76	34.68	34.78	34.57	34.69	34.68	34.69	6.35	0
16/01/2009 13:54	28.38	28.35	28.34	28.34	28.31	28.29	28.34	34.59	34.51	34.62	34.41	34.53	34.52	34.53	6.20	0
16/01/2009 13:57	28.34	28.31	28.3	28.3	28.28	28.26	28.30	34.4	34.32	34.43	34.22	34.34	34.34	34.34	6.04	0
16/01/2009 14:00	28.33	28.28	28.28	28.28	28.26	28.23	28.28	34.23	34.17	34.26	34.05	34.17	34.17	34.18	5.90	0

16/01/2009 14:03	28.29	28.27	28.25	28.25	28.23	28.21	28.25	34.07	34	34.09	33.89	34	34	34.01	5.76	0
16/01/2009 14:06	28.28	28.25	28.24	28.24	28.22	28.19	28.24	33.91	33.83	33.93	33.74	33.85	33.84	33.85	5.61	0
16/01/2009 14:09	28.12	28.1	28.07	28.12	28.07	28.04	28.09	33.24	33.41	33.44	33.28	33.15	33.31	33.31	5.22	0
16/01/2009 14:12	26.08	26.04	26.04	26	25.99	26	26.03	40.33	39.75	40.42	40.17	39.98	40.59	40.21	14.18	1.207
16/01/2009 14:15	25.97	25.97	25.95	25.95	25.95	25.95	25.96	42.29	42.2	42.56	42.33	42.25	42.54	42.36	16.41	0
16/01/2009 14:18	25.99	25.99	25.98	25.98	25.97	25.97	25.98	41.2	41.18	41.29	41.11	40.97	41.25	41.17	15.19	0
16/01/2009 14:21	26.01	26.01	25.99	25.98	25.99	25.99	26.00	40.51	40.59	40.56	40.46	40.25	40.59	40.49	14.50	0.397
16/01/2009 14:24	26.05	26.06	26.04	26.04	26.03	26.03	26.04	42.27	42.17	42.38	42.19	42.1	42.36	42.25	16.20	0
16/01/2009 14:27	26.07	26.08	26.07	26.07	26.07	26.06	26.07	41.39	41.32	41.43	41.28	41.19	41.43	41.34	15.27	0
16/01/2009 14:30	25.98	25.98	25.93	25.96	25.92	25.88	25.94	40.63	40.58	40.66	40.53	40.47	40.68	40.59	14.65	0
16/01/2009 14:33	24.23	24.2	24.22	24.15	24.15	24.14	24.18	40.38	40.42	40.4	40.37	40.21	40.5	40.38	16.20	0.396
16/01/2009 14:36	24.2	24.21	24.22	24.18	24.21	24.18	24.20	42.12	42	42.23	42.07	42.05	42.25	42.12	17.92	0
16/01/2009 14:39	24.28	24.29	24.3	24.26	24.29	24.26	24.28	41.41	41.33	41.46	41.33	41.29	41.48	41.38	17.10	0
16/01/2009 14:42	24.35	24.35	24.37	24.33	24.35	24.32	24.35	40.78	40.7	40.81	40.7	40.65	40.83	40.75	16.40	0
16/01/2009 14:45	24.4	24.42	24.43	24.39	24.41	24.38	24.41	40.2	40.12	40.24	40.12	40.1	40.25	40.17	15.77	0
16/01/2009 14:48	24.49	24.5	24.52	24.48	24.5	24.47	24.49	42.74	42.36	42.81	42.6	42.67	42.91	42.68	18.19	0.407
16/01/2009 14:51	24.56	24.56	24.57	24.53	24.57	24.53	24.55	41.95	41.84	42.03	41.89	41.88	42.06	41.94	17.39	0
16/01/2009 14:54	24.62	24.63	24.64	24.6	24.63	24.6	24.62	41.33	41.25	41.38	41.25	41.24	41.4	41.31	16.69	0
16/01/2009 14:57	24.7	24.71	24.72	24.68	24.72	24.69	24.70	40.79	40.71	40.83	40.71	40.7	40.85	40.77	16.06	0
16/01/2009 15:00	24.77	24.77	24.8	24.75	24.78	24.75	24.77	40.29	40.21	40.32	40.21	40.21	40.34	40.26	15.49	0
16/01/2009 15:03	24.85	24.85	24.86	24.82	24.86	24.82	24.84	40.79	40.79	40.81	40.8	40.66	40.94	40.80	15.96	0.407
16/01/2009 15:06	24.91	24.92	24.94	24.89	24.92	24.89	24.91	42.12	42	42.24	42.09	42.12	42.27	42.14	17.23	0
16/01/2009	24.98	24.99	25	24.95	24.99	24.96	24.98	41.54	41.46	41.6	41.47	41.47	41.62	41.53	16.55	0

15:09																
16/01/2009 15:12	25.06	25.06	25.09	25.04	25.08	25.04	25.06	41.02	40.94	41.07	40.95	40.94	41.08	41.00	15.94	0
16/01/2009 15:15	25.13	25.13	25.15	25.1	25.15	25.1	25.13	40.54	40.46	40.58	40.46	40.46	40.59	40.52	15.39	0
16/01/2009 15:18	25.21	25.21	25.23	25.18	25.22	25.19	25.21	40.11	40.03	40.16	40.04	40.05	40.16	40.09	14.89	0
16/01/2009 15:21	25.27	25.27	25.29	25.25	25.29	25.25	25.27	42.66	42.28	42.73	42.53	42.63	42.82	42.61	17.34	0.406
16/01/2009 15:24	25.34	25.34	25.37	25.31	25.36	25.32	25.34	41.97	41.87	42.07	41.92	41.94	42.08	41.98	16.64	0
16/01/2009 15:27	25.42	25.42	25.44	25.39	25.44	25.39	25.42	41.44	41.36	41.49	41.37	41.37	41.5	41.42	16.01	0
16/01/2009 15:30	25.48	25.48	25.51	25.46	25.5	25.47	25.48	40.95	40.87	40.98	40.87	40.88	40.99	40.92	15.44	0
16/01/2009 15:33	25.56	25.56	25.58	25.53	25.57	25.54	25.56	40.51	40.43	40.56	40.44	40.44	40.56	40.49	14.93	0
16/01/2009 15:36	25.64	25.64	25.66	25.61	25.66	25.61	25.64	40.11	40.03	40.15	40.04	40.06	40.16	40.09	14.46	0
16/01/2009 15:39	25.7	25.7	25.73	25.67	25.72	25.68	25.70	42.74	42.27	42.78	42.54	42.64	42.86	42.64	16.94	0
16/01/2009 15:42	25.78	25.78	25.79	25.74	25.79	25.75	25.77	42.05	41.94	42.15	42	42.03	42.15	42.05	16.28	0
16/01/2009 15:45	25.85	25.85	25.87	25.82	25.87	25.83	25.85	41.53	41.45	41.58	41.45	41.47	41.58	41.51	15.66	0
16/01/2009 15:48	25.91	25.91	25.93	25.88	25.93	25.9	25.91	41.06	40.97	41.1	40.97	40.99	41.1	41.03	15.12	0
16/01/2009 15:51	26	25.99	26.01	25.96	26.01	25.97	25.99	40.64	40.56	40.68	40.56	40.58	40.68	40.62	14.63	0
16/01/2009 15:54	26.05	26.05	26.07	26.03	26.07	26.03	26.05	40.24	40.16	40.28	40.16	40.18	40.28	40.22	14.17	0
16/01/2009 15:57	26.13	26.13	26.16	26.11	26.15	26.12	26.13	39.89	39.81	39.92	39.81	39.84	39.92	39.87	13.73	0
16/01/2009 16:00	26.2	26.2	26.22	26.18	26.22	26.19	26.20	42.32	42.16	42.47	42.29	42.36	42.48	42.35	16.15	0.405
16/01/2009 16:03	26.27	26.27	26.29	26.24	26.29	26.26	26.27	41.8	41.71	41.87	41.73	41.75	41.87	41.79	15.52	0
16/01/2009 16:06	24.9	24.82	24.83	24.76	24.75	24.69	24.79	41.32	41.24	41.37	41.24	41.26	41.37	41.30	16.51	0
16/01/2009 16:09	24.37	24.37	24.42	24.34	24.41	24.36	24.38	40.88	40.81	40.92	40.81	40.81	40.93	40.86	16.48	0
16/01/2009 16:12	24.51	24.51	24.54	24.47	24.53	24.48	24.51	40.5	40.43	40.54	40.43	40.44	40.54	40.48	15.97	0
16/01/2009 16:15	24.6	24.59	24.63	24.56	24.62	24.58	24.60	40.14	40.06	40.18	40.06	40.08	40.18	40.12	15.52	0

16/01/2009 16:18	24.69	24.68	24.72	24.65	24.72	24.66	24.69	40.44	40.47	40.47	40.46	40.37	40.58	40.47	15.78	0.405
16/01/2009 16:21	24.78	24.76	24.8	24.74	24.79	24.75	24.77	42.25	42.12	42.37	42.21	42.26	42.37	42.26	17.49	0
16/01/2009 16:24	24.87	24.86	24.89	24.83	24.88	24.84	24.86	41.75	41.66	41.81	41.67	41.69	41.81	41.73	16.87	0
16/01/2009 16:27	24.95	24.95	24.97	24.92	24.97	24.92	24.95	41.28	41.2	41.33	41.2	41.22	41.33	41.26	16.31	0
16/01/2009 16:30	25.04	25.03	25.06	25	25.05	25	25.03	40.86	40.78	40.9	40.78	40.8	40.9	40.84	15.81	0
16/01/2009 16:33	25.12	25.12	25.14	25.08	25.13	25.1	25.12	40.47	40.4	40.51	40.39	40.42	40.51	40.45	15.34	0
16/01/2009 16:36	25.19	25.19	25.21	25.15	25.21	25.17	25.19	40.11	40.03	40.14	40.03	40.06	40.14	40.09	14.90	0
16/01/2009 16:39	25.28	25.27	25.3	25.25	25.3	25.26	25.28	40.46	40.49	40.49	40.48	40.38	40.61	40.49	15.21	0.409
16/01/2009 16:42	25.37	25.36	25.4	25.34	25.4	25.35	25.37	42.28	42.15	42.41	42.23	42.3	42.4	42.30	16.93	0
16/01/2009 16:45	25.44	25.44	25.47	25.42	25.46	25.43	25.44	41.76	41.68	41.83	41.68	41.71	41.82	41.75	16.30	0
16/01/2009 16:48	25.52	25.5	25.54	25.48	25.54	25.5	25.51	41.29	41.21	41.34	41.21	41.23	41.34	41.27	15.76	0
16/01/2009 16:51	25.6	25.59	25.62	25.57	25.61	25.58	25.60	40.88	40.8	40.93	40.79	40.82	40.91	40.86	15.26	0
16/01/2009 16:54	25.68	25.68	25.71	25.64	25.7	25.66	25.68	40.5	40.42	40.54	40.42	40.43	40.53	40.47	14.80	0
16/01/2009 16:57	25.76	25.75	25.78	25.72	25.78	25.73	25.75	40.14	40.06	40.17	40.05	40.09	40.17	40.11	14.36	0
16/01/2009 17:00	25.84	25.83	25.86	25.81	25.86	25.81	25.84	39.81	39.73	39.84	39.73	39.76	39.84	39.79	13.95	0.41
16/01/2009 17:03	25.93	25.92	25.94	25.89	25.94	25.9	25.92	42.24	42.1	42.36	42.18	42.26	42.37	42.25	16.33	0
16/01/2009 17:06	26	25.99	26.02	25.97	26.01	25.98	26.00	41.73	41.64	41.8	41.66	41.68	41.79	41.72	15.72	0
16/01/2009 17:09	26.06	26.06	26.08	26.03	26.08	26.04	26.06	41.27	41.19	41.32	41.18	41.2	41.31	41.25	15.19	0
16/01/2009 17:12	26.15	26.13	26.16	26.11	26.17	26.12	26.14	40.87	40.78	40.91	40.77	40.8	40.9	40.84	14.70	0
16/01/2009 17:15	26.23	26.21	26.24	26.19	26.25	26.2	26.22	40.48	40.41	40.52	40.4	40.43	40.52	40.46	14.24	0
16/01/2009 17:18	26.31	26.29	26.32	26.27	26.32	26.28	26.30	40.14	40.06	40.19	40.06	40.09	40.17	40.12	13.82	0
16/01/2009 17:21	25.4	25.33	25.33	25.26	25.26	25.2	25.30	39.8	39.74	39.85	39.74	39.77	39.85	39.79	14.50	0
16/01/2009	24.39	24.37	24.41	24.34	24.41	24.35	24.38	42.34	42.2	42.47	42.31	42.37	42.49	42.36	17.99	0

17:24																
16/01/2009 17:27	24.51	24.51	24.55	24.46	24.54	24.49	24.51	41.83	41.75	41.89	41.76	41.78	41.89	41.82	17.31	0
16/01/2009 17:30	24.63	24.63	24.66	24.59	24.65	24.6	24.63	41.39	41.32	41.44	41.3	41.32	41.43	41.37	16.74	0
16/01/2009 17:33	24.73	24.71	24.75	24.68	24.74	24.69	24.72	40.98	40.89	41.02	40.89	40.91	41.01	40.95	16.23	0
16/01/2009 17:36	24.83	24.81	24.85	24.79	24.85	24.8	24.82	40.61	40.52	40.64	40.52	40.54	40.64	40.58	15.76	0
16/01/2009 17:39	24.91	24.9	24.93	24.86	24.93	24.88	24.90	40.24	40.16	40.29	40.16	40.19	40.27	40.22	15.32	0
16/01/2009 17:42	25	24.98	25.02	24.96	25.01	24.97	24.99	39.91	39.83	39.95	39.82	39.86	39.94	39.89	14.90	0
16/01/2009 17:45	25.09	25.07	25.11	25.05	25.11	25.06	25.08	42.51	42.24	42.64	42.44	42.54	42.68	42.51	17.43	0.412
16/01/2009 17:48	25.17	25.17	25.2	25.13	25.19	25.15	25.17	41.95	41.85	42.03	41.89	41.92	42.03	41.95	16.78	0
16/01/2009 17:51	25.26	25.24	25.27	25.22	25.27	25.23	25.25	41.48	41.4	41.52	41.39	41.41	41.52	41.45	16.21	0
16/01/2009 17:54	25.35	25.33	25.36	25.3	25.36	25.31	25.34	41.04	40.96	41.09	40.95	40.97	41.07	41.01	15.68	0
16/01/2009 17:57	25.43	25.42	25.45	25.39	25.45	25.4	25.42	40.66	40.58	40.71	40.57	40.6	40.69	40.64	15.21	0
16/01/2009 18:00	25.52	25.5	25.53	25.47	25.53	25.49	25.51	40.3	40.22	40.34	40.21	40.24	40.32	40.27	14.77	0
16/01/2009 18:03	25.6	25.58	25.62	25.56	25.62	25.58	25.59	39.96	39.88	40	39.87	39.91	39.99	39.94	14.34	0
16/01/2009 18:06	25.68	25.67	25.69	25.63	25.69	25.65	25.67	42.73	42.34	42.82	42.59	42.71	42.89	42.68	17.01	0.421
16/01/2009 18:09	25.76	25.74	25.77	25.72	25.77	25.73	25.75	42.1	41.99	42.2	42.03	42.08	42.2	42.10	16.35	0
16/01/2009 18:12	25.84	25.83	25.86	25.81	25.86	25.82	25.84	41.62	41.54	41.68	41.53	41.56	41.67	41.60	15.76	0
16/01/2009 18:15	25.93	25.91	25.94	25.88	25.93	25.9	25.92	41.18	41.1	41.23	41.09	41.11	41.22	41.16	15.24	0
16/01/2009 18:18	26	25.99	26.01	25.96	26	25.97	25.99	40.78	40.7	40.82	40.69	40.71	40.81	40.75	14.76	0
16/01/2009 18:21	26.09	26.09	26.11	26.05	26.11	26.07	26.09	40.43	40.34	40.47	40.34	40.37	40.46	40.40	14.32	0
16/01/2009 18:24	26.15	26.14	26.18	26.12	26.18	26.14	26.15	40.08	40	40.12	39.99	40.02	40.1	40.05	13.90	0
16/01/2009 18:27	26.23	26.23	26.25	26.19	26.24	26.21	26.23	40.41	40.44	40.44	40.41	40.33	40.54	40.43	14.20	0.411
16/01/2009 18:30	26.33	26.31	26.33	26.28	26.33	26.29	26.31	42.24	42.11	42.36	42.19	42.26	42.35	42.25	15.94	0

16/01/2009 18:33	25.57	25.49	25.49	25.44	25.43	25.37	25.47	41.75	41.65	41.81	41.67	41.68	41.8	41.73	16.26	0
16/01/2009 18:36	24.48	24.44	24.49	24.41	24.48	24.44	24.46	41.29	41.22	41.34	41.21	41.23	41.33	41.27	16.81	0
16/01/2009 18:39	24.61	24.58	24.63	24.55	24.63	24.58	24.60	40.89	40.82	40.94	40.81	40.83	40.92	40.87	16.27	0
16/01/2009 18:42	24.71	24.69	24.73	24.67	24.72	24.68	24.70	40.53	40.45	40.57	40.44	40.47	40.55	40.50	15.80	0
16/01/2009 18:45	24.81	24.79	24.82	24.75	24.82	24.77	24.79	40.17	40.1	40.21	40.09	40.13	40.2	40.15	15.36	0
16/01/2009 18:48	24.91	24.89	24.93	24.87	24.92	24.87	24.90	39.86	39.79	39.91	39.79	39.82	39.89	39.84	14.95	0
16/01/2009 18:51	25	24.98	25.01	24.95	25.01	24.96	24.99	42.45	42.26	42.6	42.4	42.5	42.61	42.47	17.49	0.409
16/01/2009 18:54	25.08	25.07	25.09	25.04	25.09	25.05	25.07	41.92	41.83	42	41.85	41.88	41.99	41.91	16.84	0
16/01/2009 18:57	25.17	25.16	25.18	25.12	25.18	25.14	25.16	41.46	41.37	41.51	41.36	41.39	41.49	41.43	16.27	0
16/01/2009 19:00	25.27	25.25	25.28	25.21	25.28	25.24	25.26	41.04	40.96	41.09	40.95	40.99	41.07	41.02	15.76	0
16/01/2009 19:03	25.35	25.33	25.36	25.31	25.36	25.32	25.34	40.66	40.58	40.7	40.57	40.6	40.69	40.63	15.30	0
16/01/2009 19:06	25.42	25.41	25.44	25.37	25.44	25.39	25.41	40.29	40.21	40.33	40.2	40.23	40.32	40.26	14.85	0
16/01/2009 19:09	25.52	25.5	25.53	25.47	25.53	25.48	25.51	39.97	39.88	40.01	39.88	39.92	40	39.94	14.44	0
16/01/2009 19:12	25.58	25.58	25.6	25.54	25.6	25.56	25.58	42.77	42.37	42.85	42.63	42.75	42.94	42.72	17.14	0.42
16/01/2009 19:15	25.67	25.67	25.69	25.63	25.68	25.64	25.66	42.14	42.03	42.24	42.08	42.12	42.23	42.14	16.48	0
16/01/2009 19:18	25.76	25.75	25.77	25.72	25.77	25.73	25.75	41.66	41.57	41.72	41.57	41.59	41.7	41.64	15.89	0
16/01/2009 19:21	25.85	25.83	25.85	25.8	25.85	25.81	25.83	41.23	41.14	41.27	41.14	41.15	41.25	41.20	15.37	0
16/01/2009 19:24	25.92	25.9	25.93	25.88	25.93	25.88	25.91	40.82	40.73	40.86	40.73	40.76	40.85	40.79	14.89	0
16/01/2009 19:27	26	25.98	26.01	25.95	26.01	25.97	25.99	40.46	40.38	40.5	40.37	40.4	40.48	40.43	14.45	0
16/01/2009 19:30	26.07	26.05	26.08	26.03	26.09	26.04	26.06	40.11	40.03	40.15	40.02	40.05	40.13	40.08	14.02	0
16/01/2009 19:33	26.15	26.14	26.17	26.11	26.17	26.12	26.14	39.8	39.72	39.84	39.71	39.75	39.83	39.78	13.63	0
16/01/2009 19:36	26.22	26.22	26.24	26.18	26.24	26.19	26.22	42.33	42.18	42.46	42.29	42.36	42.46	42.35	16.13	0
16/01/2009	26.31	26.29	26.31	26.26	26.32	26.27	26.29	41.84	41.75	41.91	41.75	41.78	41.9	41.82	15.53	0

19:39																
16/01/2009 19:42	26.18	26.13	26.11	26.1	26.11	26.04	26.11	41.38	41.3	41.43	41.29	41.31	41.42	41.36	15.24	0
16/01/2009 19:45	24.47	24.42	24.48	24.38	24.44	24.39	24.43	40.98	40.9	41.02	40.9	40.92	41.01	40.96	16.53	0
16/01/2009 19:48	24.56	24.54	24.58	24.5	24.58	24.53	24.55	40.6	40.52	40.65	40.52	40.55	40.63	40.58	16.03	0
16/01/2009 19:51	24.68	24.65	24.69	24.62	24.68	24.64	24.66	40.25	40.19	40.3	40.18	40.21	40.3	40.24	15.58	0
16/01/2009 19:54	24.77	24.75	24.78	24.71	24.79	24.74	24.76	39.93	39.86	39.97	39.86	39.89	39.96	39.91	15.16	0
16/01/2009 19:57	24.87	24.85	24.88	24.81	24.89	24.84	24.86	42.66	42.34	42.78	42.57	42.68	42.83	42.64	17.79	0.422
16/01/2009 20:00	24.95	24.93	24.96	24.89	24.96	24.92	24.94	42.06	41.96	42.15	41.99	42.03	42.15	42.06	17.12	0
16/01/2009 20:03	25.05	25.01	25.05	24.99	25.05	25.01	25.03	41.6	41.51	41.65	41.51	41.53	41.64	41.57	16.55	0
16/01/2009 20:06	25.13	25.11	25.14	25.07	25.14	25.09	25.11	41.17	41.08	41.21	41.08	41.1	41.2	41.14	16.03	0
16/01/2009 20:09	25.22	25.19	25.23	25.17	25.22	25.18	25.20	40.77	40.68	40.81	40.68	40.72	40.81	40.75	15.54	0
16/01/2009 20:12	25.29	25.28	25.31	25.25	25.31	25.26	25.28	40.41	40.33	40.45	40.32	40.35	40.44	40.38	15.10	0
16/01/2009 20:15	25.38	25.37	25.4	25.33	25.4	25.35	25.37	40.07	39.99	40.11	39.99	40.03	40.1	40.05	14.68	0
16/01/2009 20:18	25.47	25.45	25.48	25.42	25.48	25.44	25.46	40.23	40.27	40.28	40.25	40.17	40.38	40.26	14.81	0.419
16/01/2009 20:21	25.54	25.52	25.56	25.49	25.55	25.52	25.53	42.24	42.1	42.36	42.19	42.26	42.37	42.25	16.72	0
16/01/2009 20:24	25.64	25.62	25.65	25.58	25.66	25.61	25.63	41.76	41.67	41.83	41.68	41.7	41.81	41.74	16.12	0
16/01/2009 20:27	25.71	25.69	25.72	25.66	25.72	25.68	25.70	41.31	41.22	41.36	41.21	41.23	41.34	41.28	15.58	0
16/01/2009 20:30	25.79	25.77	25.81	25.74	25.81	25.76	25.78	40.9	40.82	40.95	40.82	40.83	40.93	40.88	15.10	0
16/01/2009 20:33	25.88	25.86	25.88	25.82	25.89	25.85	25.86	40.52	40.44	40.56	40.44	40.47	40.56	40.50	14.64	0
16/01/2009 20:36	25.94	25.93	25.96	25.89	25.96	25.92	25.93	40.17	40.09	40.21	40.09	40.13	40.21	40.15	14.22	0
16/01/2009 20:39	26.04	26.02	26.05	25.98	26.05	26	26.02	39.86	39.78	39.9	39.77	39.82	39.89	39.84	13.81	0
16/01/2009 20:42	26.1	26.08	26.12	26.06	26.12	26.07	26.09	42.46	42.27	42.61	42.41	42.5	42.61	42.48	16.39	0
16/01/2009 20:45	26.19	26.17	26.21	26.15	26.21	26.16	26.18	41.95	41.86	42.03	41.88	41.9	42.02	41.94	15.76	0

16/01/2009 20:48	26.25	26.23	26.26	26.2	26.26	26.22	26.24	41.47	41.39	41.53	41.39	41.41	41.51	41.45	15.21	0
16/01/2009 20:51	26.33	26.31	26.34	26.28	26.34	26.3	26.32	41.06	40.98	41.11	40.98	40.99	41.1	41.04	14.72	0
16/01/2009 20:54	25.25	25.18	25.18	25.11	25.11	25.05	25.15	40.69	40.62	40.73	40.6	40.63	40.73	40.67	15.52	0
16/01/2009 20:57	24.46	24.44	24.48	24.4	24.47	24.41	24.44	40.33	40.24	40.37	40.24	40.28	40.36	40.30	15.86	0
16/01/2009 21:00	24.57	24.56	24.6	24.53	24.6	24.54	24.57	40	39.92	40.04	39.93	39.96	40.03	39.98	15.41	0
16/01/2009 21:03	24.69	24.67	24.71	24.63	24.7	24.66	24.68	42.82	42.36	42.87	42.63	42.74	42.94	42.73	18.05	0.42
16/01/2009 21:06	24.78	24.75	24.79	24.72	24.79	24.74	24.76	42.17	42.06	42.27	42.11	42.15	42.27	42.17	17.41	0
16/01/2009 21:09	24.87	24.85	24.89	24.82	24.88	24.83	24.86	41.69	41.61	41.75	41.61	41.64	41.75	41.68	16.82	0
16/01/2009 21:12	24.97	24.95	24.98	24.92	24.98	24.93	24.96	41.26	41.17	41.32	41.17	41.2	41.3	41.24	16.28	0
16/01/2009 21:15	25.05	25.04	25.07	25	25.06	25.02	25.04	40.86	40.77	40.9	40.77	40.79	40.89	40.83	15.79	0
16/01/2009 21:18	25.13	25.12	25.15	25.08	25.15	25.1	25.12	40.49	40.41	40.54	40.4	40.43	40.52	40.47	15.34	0
16/01/2009 21:21	25.22	25.21	25.24	25.17	25.24	25.18	25.21	40.14	40.06	40.19	40.06	40.09	40.17	40.12	14.91	0
16/01/2009 21:24	25.31	25.3	25.32	25.26	25.32	25.28	25.30	39.82	39.75	39.87	39.74	39.79	39.85	39.80	14.51	0
16/01/2009 21:27	25.4	25.38	25.41	25.34	25.41	25.36	25.38	42.42	42.24	42.56	42.37	42.45	42.57	42.44	17.05	0.417
16/01/2009 21:30	25.47	25.45	25.49	25.42	25.49	25.44	25.46	41.9	41.81	41.98	41.82	41.86	41.96	41.89	16.43	0
16/01/2009 21:33	25.56	25.55	25.58	25.51	25.58	25.52	25.55	41.45	41.36	41.5	41.36	41.38	41.49	41.42	15.87	0
16/01/2009 21:36	25.63	25.61	25.64	25.58	25.65	25.61	25.62	41.02	40.92	41.06	40.92	40.96	41.05	40.99	15.37	0
16/01/2009 21:39	25.72	25.7	25.74	25.67	25.73	25.69	25.71	40.65	40.55	40.68	40.55	40.59	40.68	40.62	14.91	0
16/01/2009 21:42	25.8	25.79	25.82	25.75	25.81	25.77	25.79	40.29	40.21	40.33	40.21	40.24	40.32	40.27	14.48	0
16/01/2009 21:45	25.88	25.86	25.9	25.83	25.88	25.85	25.87	39.95	39.87	39.99	39.87	39.91	39.99	39.93	14.06	0
16/01/2009 21:48	25.96	25.95	25.98	25.92	25.98	25.93	25.95	42.73	42.34	42.82	42.59	42.71	42.88	42.68	16.73	0.423
16/01/2009 21:51	26.03	26.02	26.04	25.99	26.04	26	26.02	42.09	41.98	42.18	42.03	42.07	42.18	42.09	16.07	0
16/01/2009	26.09	26.09	26.11	26.05	26.1	26.06	26.08	41.61	41.51	41.66	41.52	41.54	41.66	41.58	15.50	0

21:54																
16/01/2009 21:57	26.18	26.17	26.19	26.13	26.19	26.15	26.17	41.19	41.1	41.22	41.09	41.11	41.22	41.16	14.99	0
16/01/2009 22:00	26.26	26.24	26.27	26.21	26.27	26.22	26.25	40.79	40.7	40.83	40.7	40.73	40.83	40.76	14.52	0
16/01/2009 22:03	26.35	26.33	26.35	26.3	26.35	26.31	26.33	40.44	40.36	40.48	40.35	40.38	40.47	40.41	14.08	0
16/01/2009 22:06	24.97	24.88	24.91	24.81	24.83	24.76	24.86	40.09	40.02	40.14	40.01	40.04	40.12	40.07	15.21	0
16/01/2009 22:09	24.54	24.51	24.56	24.49	24.56	24.5	24.53	39.81	39.76	39.84	39.74	39.76	39.86	39.80	15.27	0.422
16/01/2009 22:12	24.66	24.64	24.67	24.6	24.67	24.62	24.64	42.32	42.2	42.46	42.29	42.36	42.46	42.35	17.71	0
16/01/2009 22:15	24.76	24.74	24.77	24.7	24.77	24.72	24.74	41.84	41.74	41.91	41.76	41.78	41.9	41.82	17.08	0
16/01/2009 22:18	24.85	24.83	24.86	24.8	24.86	24.81	24.84	41.39	41.31	41.44	41.31	41.33	41.43	41.37	16.53	0
16/01/2009 22:21	24.94	24.93	24.95	24.89	24.95	24.91	24.93	40.98	40.91	41.03	40.89	40.92	41.02	40.96	16.03	0
16/01/2009 22:24	25.03	25.02	25.05	24.98	25.05	24.99	25.02	40.62	40.54	40.65	40.53	40.55	40.64	40.59	15.57	0
16/01/2009 22:27	25.12	25.1	25.13	25.07	25.13	25.08	25.11	40.26	40.18	40.3	40.18	40.21	40.29	40.24	15.13	0
16/01/2009 22:30	25.2	25.18	25.22	25.15	25.22	25.16	25.19	39.93	39.85	39.97	39.85	39.88	39.96	39.91	14.72	0
16/01/2009 22:33	25.29	25.27	25.3	25.23	25.3	25.25	25.27	42.69	42.36	42.8	42.59	42.7	42.86	42.67	17.39	0.421
16/01/2009 22:36	25.37	25.36	25.38	25.32	25.38	25.34	25.36	42.1	41.99	42.19	42.03	42.07	42.19	42.10	16.74	0
16/01/2009 22:39	25.46	25.44	25.48	25.41	25.47	25.42	25.45	41.62	41.53	41.68	41.53	41.56	41.67	41.60	16.15	0
16/01/2009 22:42	25.54	25.52	25.54	25.49	25.55	25.5	25.52	41.19	41.1	41.23	41.1	41.11	41.23	41.16	15.64	0
16/01/2009 22:45	25.62	25.6	25.62	25.57	25.62	25.57	25.60	40.78	40.7	40.83	40.69	40.72	40.81	40.76	15.16	0
16/01/2009 22:48	25.71	25.68	25.71	25.65	25.71	25.66	25.69	40.43	40.35	40.47	40.33	40.37	40.46	40.40	14.72	0
16/01/2009 22:51	25.79	25.77	25.8	25.74	25.79	25.75	25.77	40.1	40.01	40.14	40.01	40.04	40.12	40.07	14.30	0
16/01/2009 22:54	25.86	25.84	25.87	25.8	25.87	25.83	25.85	40.42	40.45	40.46	40.43	40.34	40.56	40.44	14.60	0.421
16/01/2009 22:57	25.94	25.92	25.96	25.89	25.96	25.91	25.93	42.3	42.16	42.42	42.26	42.31	42.42	42.31	16.38	0
16/01/2009 23:00	26	25.99	26.02	25.95	26.02	25.98	25.99	41.78	41.7	41.86	41.71	41.74	41.85	41.77	15.78	0

16/01/2009 23:03	26.08	26.07	26.09	26.03	26.08	26.05	26.07	41.34	41.26	41.39	41.25	41.27	41.38	41.32	15.25	0
16/01/2009 23:06	26.16	26.15	26.17	26.11	26.17	26.13	26.15	40.94	40.86	40.98	40.85	40.88	40.98	40.92	14.77	0
16/01/2009 23:09	26.24	26.23	26.25	26.19	26.25	26.21	26.23	40.58	40.48	40.61	40.49	40.52	40.6	40.55	14.32	0
16/01/2009 23:12	26.31	26.29	26.32	26.25	26.32	26.27	26.29	40.22	40.13	40.26	40.13	40.17	40.25	40.19	13.90	0
16/01/2009 23:15	25.52	25.44	25.44	25.38	25.39	25.31	25.41	39.9	39.82	39.94	39.82	39.85	39.93	39.88	14.46	0
16/01/2009 23:18	24.45	24.42	24.46	24.38	24.45	24.4	24.43	42.59	42.34	42.72	42.52	42.62	42.75	42.59	18.16	0.421
16/01/2009 23:21	24.58	24.56	24.61	24.52	24.59	24.54	24.57	42.05	41.95	42.13	41.98	42.01	42.12	42.04	17.47	0
16/01/2009 23:24	24.66	24.65	24.69	24.61	24.68	24.63	24.65	41.57	41.49	41.62	41.49	41.51	41.62	41.55	16.90	0
16/01/2009 23:27	24.77	24.74	24.79	24.72	24.79	24.73	24.76	41.16	41.08	41.21	41.06	41.1	41.19	41.13	16.38	0
16/01/2009 23:30	24.87	24.83	24.88	24.81	24.87	24.82	24.85	40.77	40.69	40.82	40.69	40.71	40.81	40.75	15.90	0
16/01/2009 23:33	24.96	24.93	24.96	24.9	24.96	24.92	24.94	40.42	40.34	40.46	40.32	40.36	40.45	40.39	15.45	0
16/01/2009 23:36	25.05	25.02	25.06	24.99	25.06	25.01	25.03	40.08	40	40.12	40	40.03	40.11	40.06	15.03	0
16/01/2009 23:39	25.12	25.1	25.13	25.07	25.13	25.09	25.11	41.31	41.26	41.33	41.3	41.17	41.46	41.31	16.20	0
16/01/2009 23:42	25.21	25.17	25.21	25.15	25.21	25.16	25.19	42.28	42.14	42.4	42.22	42.29	42.4	42.29	17.10	0
16/01/2009 23:45	25.29	25.26	25.3	25.23	25.3	25.25	25.27	41.79	41.7	41.85	41.71	41.72	41.84	41.77	16.50	0
16/01/2009 23:48	25.38	25.36	25.39	25.32	25.39	25.34	25.36	41.34	41.26	41.39	41.26	41.27	41.38	41.32	15.95	0
16/01/2009 23:51	25.46	25.44	25.47	25.4	25.48	25.42	25.45	40.93	40.85	40.98	40.84	40.88	40.97	40.91	15.46	0
16/01/2009 23:54	25.54	25.51	25.55	25.49	25.55	25.5	25.52	40.56	40.47	40.6	40.47	40.5	40.58	40.53	15.01	0
16/01/2009 23:57	25.61	25.59	25.63	25.56	25.63	25.58	25.60	40.2	40.12	40.25	40.12	40.16	40.24	40.18	14.58	0
17/01/2009 00:00	25.69	25.68	25.71	25.64	25.71	25.66	25.68	39.88	39.79	39.92	39.8	39.83	39.91	39.86	14.17	0
17/01/2009 00:03	25.76	25.76	25.79	25.72	25.78	25.73	25.76	42.52	42.31	42.65	42.46	42.55	42.68	42.53	16.77	0.426
17/01/2009 00:06	25.84	25.82	25.86	25.8	25.85	25.81	25.83	41.98	41.87	42.06	41.89	41.93	42.05	41.96	16.13	0
17/01/2009	25.93	25.91	25.93	25.88	25.94	25.89	25.91	41.52	41.43	41.57	41.42	41.45	41.56	41.49	15.58	0

00:09															
17/01/2009 00:12	26.01	25.99	26.02	25.96	26.02	25.97	26.00	41.1	41.01	41.14	41.01	41.03	41.14	41.07	15.08	0
17/01/2009 00:15	26.07	26.05	26.09	26.02	26.09	26.04	26.06	40.7	40.62	40.74	40.6	40.64	40.73	40.67	14.61	0
17/01/2009 00:18	26.15	26.13	26.17	26.1	26.17	26.13	26.14	40.35	40.26	40.39	40.26	40.29	40.38	40.32	14.18	0
17/01/2009 00:21	26.23	26.22	26.25	26.18	26.24	26.2	26.22	40.02	39.94	40.06	39.94	39.98	40.05	40.00	13.78	0
17/01/2009 00:24	26.3	26.29	26.31	26.26	26.31	26.27	26.29	42.86	42.37	42.9	42.65	42.75	42.98	42.75	16.46	0
17/01/2009 00:27	25.78	25.72	25.7	25.66	25.66	25.59	25.69	42.19	42.08	42.31	42.15	42.19	42.31	42.21	16.52	0
17/01/2009 00:30	24.44	24.4	24.45	24.36	24.44	24.38	24.41	41.72	41.64	41.78	41.64	41.66	41.77	41.70	17.29	0
17/01/2009 00:33	24.55	24.54	24.58	24.49	24.57	24.52	24.54	41.29	41.21	41.34	41.21	41.22	41.33	41.27	16.73	0
17/01/2009 00:36	24.66	24.63	24.67	24.6	24.67	24.62	24.64	40.89	40.81	40.94	40.81	40.84	40.92	40.87	16.23	0
17/01/2009 00:39	24.76	24.72	24.76	24.69	24.76	24.71	24.73	40.52	40.44	40.57	40.44	40.47	40.55	40.50	15.77	0
17/01/2009 00:42	24.84	24.82	24.85	24.78	24.85	24.8	24.82	40.18	40.1	40.22	40.1	40.13	40.21	40.16	15.33	0
17/01/2009 00:45	24.92	24.9	24.93	24.86	24.93	24.88	24.90	39.85	39.77	39.9	39.77	39.82	39.88	39.83	14.93	0
17/01/2009 00:48	25.03	24.99	25.03	24.97	25.03	24.98	25.01	42.51	42.32	42.66	42.47	42.56	42.67	42.53	17.53	0.425
17/01/2009 00:51	25.11	25.09	25.12	25.05	25.12	25.07	25.09	41.99	41.88	42.07	41.91	41.94	42.05	41.97	16.88	0
17/01/2009 00:54	25.19	25.16	25.2	25.13	25.2	25.15	25.17	41.51	41.43	41.57	41.42	41.45	41.56	41.49	16.32	0
17/01/2009 00:57	25.27	25.24	25.28	25.21	25.27	25.22	25.25	41.08	41	41.13	40.99	41.02	41.11	41.06	15.81	0
17/01/2009 01:00	25.36	25.34	25.37	25.31	25.37	25.32	25.35	40.71	40.62	40.75	40.62	40.65	40.74	40.68	15.34	0
17/01/2009 01:03	25.44	25.41	25.45	25.38	25.45	25.4	25.42	40.34	40.26	40.39	40.26	40.29	40.37	40.32	14.90	0
17/01/2009 01:06	25.52	25.49	25.53	25.46	25.52	25.47	25.50	40.01	39.92	40.04	39.91	39.96	40.04	39.98	14.48	0
17/01/2009 01:09	25.6	25.58	25.61	25.54	25.61	25.55	25.58	42.89	42.4	42.93	42.68	42.79	43.01	42.78	17.20	0.42
17/01/2009 01:12	25.67	25.65	25.68	25.62	25.68	25.63	25.66	42.22	42.09	42.32	42.16	42.21	42.32	42.22	16.57	0
17/01/2009 01:15	25.75	25.74	25.76	25.7	25.76	25.72	25.74	41.73	41.64	41.79	41.64	41.68	41.78	41.71	15.97	0

17/01/2009 01:18	25.82	25.81	25.83	25.77	25.82	25.78	25.81	41.29	41.19	41.33	41.19	41.2	41.31	41.25	15.45	0
17/01/2009 01:21	25.9	25.89	25.91	25.85	25.91	25.87	25.89	40.88	40.79	40.91	40.79	40.82	40.91	40.85	14.96	0
17/01/2009 01:24	25.99	25.96	25.99	25.94	25.99	25.95	25.97	40.51	40.43	40.56	40.42	40.46	40.54	40.49	14.52	0
17/01/2009 01:27	26.06	26.04	26.07	26	26.06	26.02	26.04	40.16	40.08	40.21	40.08	40.11	40.2	40.14	14.10	0
17/01/2009 01:30	26.12	26.11	26.15	26.08	26.14	26.09	26.12	39.84	39.76	39.88	39.75	39.8	39.86	39.82	13.70	0
17/01/2009 01:33	26.22	26.21	26.23	26.16	26.22	26.18	26.20	42.43	42.27	42.57	42.39	42.45	42.58	42.45	16.25	0.423
17/01/2009 01:36	26.28	26.26	26.28	26.23	26.28	26.24	26.26	41.91	41.81	41.97	41.83	41.85	41.97	41.89	15.63	0
17/01/2009 01:39	26.31	26.3	26.29	26.26	26.31	26.23	26.28	41.46	41.36	41.51	41.36	41.38	41.49	41.43	15.14	0
17/01/2009 01:42	24.5	24.43	24.5	24.37	24.44	24.37	24.44	41.05	40.97	41.08	40.95	40.98	41.08	41.02	16.58	0
17/01/2009 01:45	24.51	24.47	24.52	24.44	24.51	24.46	24.49	40.66	40.58	40.7	40.57	40.6	40.7	40.64	16.15	0
17/01/2009 01:48	24.61	24.6	24.63	24.56	24.63	24.58	24.60	40.31	40.24	40.36	40.24	40.27	40.35	40.30	15.69	0
17/01/2009 01:51	24.71	24.69	24.73	24.65	24.72	24.67	24.70	39.99	39.91	40.03	39.91	39.94	40.02	39.97	15.27	0
17/01/2009 01:54	24.81	24.79	24.83	24.76	24.82	24.77	24.80	42.86	42.45	42.94	42.71	42.83	43.02	42.80	18.01	0.423
17/01/2009 01:57	24.89	24.87	24.91	24.83	24.9	24.86	24.88	42.2	42.09	42.31	42.15	42.19	42.31	42.21	17.33	0
17/01/2009 02:00	24.99	24.96	25	24.93	24.99	24.94	24.97	41.73	41.64	41.78	41.64	41.66	41.77	41.70	16.74	0
17/01/2009 02:03	25.07	25.05	25.09	25.01	25.08	25.03	25.06	41.29	41.2	41.33	41.2	41.22	41.33	41.26	16.21	0
17/01/2009 02:06	25.14	25.13	25.16	25.08	25.16	25.11	25.13	40.89	40.79	40.92	40.79	40.82	40.92	40.86	15.73	0
17/01/2009 02:09	25.24	25.23	25.26	25.18	25.26	25.2	25.23	40.52	40.44	40.56	40.43	40.46	40.56	40.50	15.27	0
17/01/2009 02:12	25.31	25.3	25.33	25.26	25.33	25.28	25.30	40.18	40.08	40.21	40.08	40.11	40.19	40.14	14.84	0
17/01/2009 02:15	25.39	25.38	25.41	25.34	25.41	25.35	25.38	39.84	39.75	39.88	39.75	39.8	39.87	39.82	14.44	0
17/01/2009 02:18	25.47	25.46	25.49	25.43	25.49	25.44	25.46	42.44	42.26	42.57	42.39	42.47	42.59	42.45	16.99	0.429
17/01/2009 02:21	25.56	25.55	25.57	25.51	25.57	25.53	25.55	41.92	41.83	41.99	41.84	41.88	41.99	41.91	16.36	0
17/01/2009	25.64	25.61	25.65	25.59	25.64	25.6	25.62	41.46	41.37	41.5	41.37	41.38	41.5	41.43	15.81	0

02:24																
17/01/2009 02:27	25.72	25.69	25.72	25.66	25.72	25.68	25.70	41.03	40.94	41.07	40.94	40.95	41.06	41.00	15.30	0
17/01/2009 02:30	25.79	25.77	25.81	25.74	25.81	25.76	25.78	40.65	40.57	40.69	40.56	40.58	40.68	40.62	14.84	0
17/01/2009 02:33	25.88	25.86	25.89	25.82	25.9	25.84	25.87	40.3	40.21	40.34	40.2	40.24	40.33	40.27	14.41	0
17/01/2009 02:36	25.95	25.94	25.96	25.89	25.97	25.92	25.94	39.96	39.88	40	39.88	39.91	39.99	39.94	14.00	0
17/01/2009 02:39	26.02	26.01	26.03	25.97	26.04	25.99	26.01	42.74	42.39	42.84	42.62	42.74	42.9	42.71	16.70	0
17/01/2009 02:42	26.1	26.09	26.12	26.05	26.11	26.07	26.09	42.13	42.01	42.22	42.06	42.11	42.22	42.13	16.04	0
17/01/2009 02:45	26.17	26.17	26.19	26.13	26.2	26.15	26.17	41.66	41.57	41.72	41.57	41.6	41.71	41.64	15.47	0
17/01/2009 02:48	26.25	26.24	26.27	26.2	26.26	26.23	26.24	41.23	41.13	41.26	41.13	41.15	41.26	41.19	14.95	0
17/01/2009 02:51	26.32	26.32	26.34	26.28	26.34	26.3	26.32	40.84	40.75	40.88	40.75	40.76	40.87	40.81	14.49	0
17/01/2009 02:54	25.1	25.03	25.04	24.96	24.98	24.9	25.00	40.45	40.37	40.49	40.37	40.41	40.49	40.43	15.43	0
17/01/2009 02:57	24.48	24.45	24.5	24.41	24.49	24.44	24.46	40.12	40.04	40.16	40.04	40.08	40.16	40.10	15.64	0
17/01/2009 03:00	24.59	24.58	24.62	24.53	24.6	24.55	24.58	39.8	39.72	39.83	39.72	39.75	39.83	39.78	15.20	0.415
17/01/2009 03:03	24.69	24.68	24.72	24.64	24.71	24.66	24.68	42.34	42.18	42.46	42.29	42.35	42.46	42.35	17.66	0
17/01/2009 03:06	24.79	24.77	24.81	24.73	24.81	24.75	24.78	41.83	41.74	41.91	41.76	41.78	41.89	41.82	17.04	0
17/01/2009 03:09	24.88	24.86	24.9	24.82	24.9	24.85	24.87	41.38	41.3	41.43	41.3	41.32	41.42	41.36	16.49	0
17/01/2009 03:12	24.96	24.94	24.98	24.9	24.97	24.93	24.95	40.96	40.88	41.01	40.87	40.9	41	40.94	15.99	0
17/01/2009 03:15	25.05	25.03	25.07	25	25.07	25.02	25.04	40.6	40.52	40.63	40.5	40.54	40.63	40.57	15.53	0
17/01/2009 03:18	25.13	25.11	25.16	25.08	25.15	25.11	25.12	40.25	40.16	40.28	40.16	40.19	40.27	40.22	15.10	0
17/01/2009 03:21	25.22	25.2	25.24	25.16	25.24	25.18	25.21	39.91	39.83	39.95	39.83	39.87	39.95	39.89	14.68	0
17/01/2009 03:24	25.29	25.28	25.31	25.24	25.31	25.26	25.28	42.57	42.34	42.71	42.5	42.61	42.74	42.58	17.30	0.422
17/01/2009 03:27	25.38	25.37	25.4	25.33	25.4	25.34	25.37	42.03	41.92	42.11	41.95	41.98	42.1	42.02	16.65	0
17/01/2009 03:30	25.46	25.45	25.47	25.41	25.48	25.43	25.45	41.54	41.46	41.61	41.45	41.48	41.59	41.52	16.07	0

17/01/2009 03:33	25.54	25.53	25.57	25.49	25.56	25.51	25.53	41.12	41.04	41.17	41.03	41.06	41.16	41.10	15.56	0
17/01/2009 03:36	25.62	25.61	25.64	25.57	25.64	25.59	25.61	40.73	40.64	40.77	40.63	40.66	40.76	40.70	15.09	0
17/01/2009 03:39	25.7	25.68	25.72	25.66	25.71	25.66	25.69	40.37	40.29	40.4	40.28	40.32	40.4	40.34	14.66	0
17/01/2009 03:42	25.77	25.75	25.79	25.73	25.79	25.74	25.76	40.03	39.94	40.07	39.94	39.98	40.06	40.00	14.24	0
17/01/2009 03:45	25.85	25.83	25.88	25.81	25.87	25.82	25.84	42.9	42.41	42.94	42.68	42.78	43.02	42.79	16.95	0
17/01/2009 03:48	25.93	25.92	25.96	25.89	25.95	25.91	25.93	42.25	42.13	42.36	42.18	42.24	42.34	42.25	16.32	0
17/01/2009 03:51	25.99	25.98	26.02	25.95	26.01	25.97	25.99	41.74	41.66	41.8	41.66	41.67	41.79	41.72	15.73	0
17/01/2009 03:54	26.08	26.06	26.1	26.04	26.09	26.05	26.07	41.31	41.22	41.36	41.21	41.24	41.34	41.28	15.21	0
17/01/2009 03:57	26.15	26.13	26.17	26.11	26.16	26.12	26.14	40.9	40.81	40.94	40.81	40.84	40.93	40.87	14.73	0
17/01/2009 04:00	26.23	26.21	26.25	26.18	26.25	26.2	26.22	40.53	40.44	40.57	40.44	40.48	40.57	40.51	14.29	0
17/01/2009 04:03	26.3	26.28	26.32	26.25	26.32	26.27	26.29	40.19	40.1	40.23	40.1	40.14	40.22	40.16	13.87	0
17/01/2009 04:06	25.56	25.5	25.49	25.43	25.45	25.37	25.47	39.87	39.79	39.9	39.78	39.82	39.9	39.84	14.38	0
17/01/2009 04:09	24.48	24.46	24.51	24.42	24.5	24.43	24.47	42.48	42.3	42.61	42.43	42.51	42.64	42.50	18.03	0
17/01/2009 04:12	24.59	24.57	24.61	24.53	24.6	24.55	24.58	41.94	41.85	42.02	41.87	41.9	42.02	41.93	17.36	0
17/01/2009 04:15	24.7	24.68	24.71	24.64	24.71	24.65	24.68	41.49	41.41	41.54	41.41	41.43	41.54	41.47	16.79	0
17/01/2009 04:18	24.79	24.77	24.81	24.74	24.81	24.74	24.78	41.07	40.99	41.12	40.99	41.02	41.11	41.05	16.27	0
17/01/2009 04:21	24.87	24.86	24.9	24.83	24.89	24.84	24.87	40.69	40.61	40.73	40.61	40.64	40.73	40.67	15.80	0
17/01/2009 04:24	24.97	24.94	24.98	24.92	24.98	24.93	24.95	40.34	40.25	40.38	40.26	40.28	40.37	40.31	15.36	0
17/01/2009 04:27	25.04	25.03	25.06	24.99	25.06	25.01	25.03	40	39.92	40.05	39.92	39.95	40.03	39.98	14.95	0
17/01/2009 04:30	25.13	25.12	25.14	25.08	25.14	25.1	25.12	42.87	42.43	42.95	42.69	42.82	43.02	42.80	17.68	0.422
17/01/2009 04:33	25.22	25.2	25.23	25.17	25.23	25.18	25.21	42.22	42.1	42.32	42.15	42.2	42.31	42.22	17.01	0
17/01/2009 04:36	25.31	25.29	25.31	25.25	25.32	25.27	25.29	41.73	41.64	41.79	41.64	41.67	41.78	41.71	16.42	0
17/01/2009	25.39	25.37	25.4	25.33	25.4	25.35	25.37	41.29	41.21	41.34	41.2	41.22	41.33	41.27	15.89	0

04:39																
17/01/2009 04:42	25.46	25.44	25.48	25.41	25.48	25.43	25.45	40.88	40.8	40.92	40.78	40.81	40.91	40.85	15.40	0
17/01/2009 04:45	25.54	25.52	25.56	25.49	25.56	25.51	25.53	40.51	40.42	40.55	40.42	40.45	40.54	40.48	14.95	0
17/01/2009 04:48	25.62	25.6	25.64	25.57	25.63	25.58	25.61	40.16	40.07	40.2	40.07	40.1	40.19	40.13	14.53	0
17/01/2009 04:51	25.69	25.69	25.71	25.65	25.71	25.66	25.69	39.83	39.75	39.87	39.75	39.79	39.87	39.81	14.13	0
17/01/2009 04:54	25.78	25.77	25.8	25.74	25.79	25.76	25.77	42.41	42.25	42.55	42.37	42.45	42.57	42.43	16.66	0.422
17/01/2009 04:57	25.85	25.84	25.86	25.81	25.86	25.82	25.84	41.9	41.8	41.98	41.82	41.84	41.97	41.89	16.05	0
17/01/2009 05:00	25.93	25.91	25.94	25.88	25.94	25.9	25.92	41.43	41.35	41.49	41.35	41.36	41.48	41.41	15.49	0
17/01/2009 05:03	25.99	25.98	26.01	25.95	26.01	25.96	25.98	41.02	40.94	41.06	40.92	40.95	41.05	40.99	15.01	0
17/01/2009 05:06	26.08	26.06	26.09	26.03	26.09	26.05	26.07	40.64	40.55	40.68	40.55	40.58	40.67	40.61	14.55	0
17/01/2009 05:09	26.15	26.14	26.17	26.11	26.17	26.12	26.14	40.29	40.19	40.32	40.2	40.23	40.32	40.26	14.12	0
17/01/2009 05:12	26.23	26.21	26.24	26.18	26.24	26.19	26.22	39.95	39.87	40	39.87	39.9	39.98	39.93	13.71	0
17/01/2009 05:15	26.29	26.27	26.31	26.24	26.31	26.27	26.28	42.74	42.42	42.85	42.64	42.75	42.92	42.72	16.44	0.423
17/01/2009 05:18	25.66	25.6	25.61	25.54	25.56	25.48	25.58	42.15	42.04	42.24	42.08	42.12	42.24	42.15	16.57	0
17/01/2009 05:21	24.41	24.39	24.44	24.34	24.41	24.36	24.39	41.68	41.59	41.73	41.6	41.6	41.72	41.65	17.26	0
17/01/2009 05:24	24.52	24.5	24.54	24.47	24.55	24.48	24.51	41.25	41.16	41.29	41.15	41.18	41.28	41.22	16.71	0
17/01/2009 05:27	24.61	24.59	24.64	24.57	24.64	24.59	24.61	40.84	40.76	40.89	40.76	40.79	40.89	40.82	16.22	0
17/01/2009 05:30	24.71	24.69	24.73	24.67	24.73	24.68	24.70	40.48	40.39	40.52	40.4	40.43	40.51	40.46	15.75	0
17/01/2009 05:33	24.81	24.79	24.82	24.75	24.82	24.77	24.79	40.14	40.05	40.18	40.05	40.09	40.17	40.11	15.32	0
17/01/2009 05:36	24.9	24.88	24.91	24.85	24.91	24.86	24.89	39.83	39.74	39.86	39.74	39.78	39.85	39.80	14.92	0
17/01/2009 05:39	24.99	24.97	25	24.93	25	24.95	24.97	42.38	42.23	42.51	42.34	42.41	42.52	42.40	17.43	0.422
17/01/2009 05:42	25.06	25.04	25.08	25.02	25.08	25.03	25.05	41.87	41.76	41.94	41.79	41.81	41.92	41.85	16.80	0
17/01/2009 05:45	25.16	25.13	25.17	25.1	25.17	25.12	25.14	41.42	41.32	41.46	41.32	41.34	41.45	41.39	16.24	0

17/01/2009 05:48	25.25	25.23	25.26	25.2	25.26	25.21	25.24	41.01	40.93	41.05	40.91	40.94	41.05	40.98	15.75	0
17/01/2009 05:51	25.31	25.3	25.33	25.26	25.33	25.28	25.30	40.62	40.53	40.66	40.52	40.54	40.64	40.59	15.28	0
17/01/2009 05:54	25.4	25.37	25.42	25.35	25.42	25.36	25.39	40.26	40.16	40.29	40.16	40.2	40.28	40.23	14.84	0
17/01/2009 05:57	25.47	25.46	25.49	25.42	25.49	25.44	25.46	39.92	39.83	39.95	39.83	39.86	39.94	39.89	14.43	0
17/01/2009 06:00	25.56	25.54	25.58	25.51	25.57	25.53	25.55	42.63	42.37	42.77	42.57	42.66	42.81	42.64	17.09	0
17/01/2009 06:03	25.62	25.62	25.64	25.58	25.65	25.6	25.62	42.06	41.95	42.14	41.99	42.02	42.14	42.05	16.43	0
17/01/2009 06:06	25.7	25.69	25.72	25.66	25.72	25.67	25.69	41.59	41.49	41.64	41.49	41.51	41.63	41.56	15.87	0
17/01/2009 06:09	25.79	25.78	25.81	25.75	25.81	25.75	25.78	41.16	41.06	41.2	41.06	41.09	41.19	41.13	15.35	0
17/01/2009 06:12	25.86	25.85	25.88	25.82	25.88	25.83	25.85	40.76	40.67	40.8	40.67	40.7	40.8	40.73	14.88	0
17/01/2009 06:15	25.95	25.92	25.96	25.9	25.96	25.91	25.93	40.4	40.32	40.44	40.31	40.34	40.43	40.37	14.44	0
17/01/2009 06:18	26	25.99	26.03	25.96	26.02	25.97	26.00	40.05	39.96	40.09	39.96	39.99	40.07	40.02	14.03	0
17/01/2009 06:21	26.08	26.08	26.11	26.04	26.1	26.05	26.08	42.53	42.15	42.53	42.37	42.32	42.63	42.42	16.35	0.414
17/01/2009 06:24	26.16	26.15	26.17	26.11	26.17	26.12	26.15	42.25	42.13	42.37	42.2	42.25	42.37	42.26	16.12	0
17/01/2009 06:27	26.24	26.22	26.25	26.2	26.25	26.2	26.23	41.77	41.68	41.84	41.69	41.71	41.82	41.75	15.53	0
17/01/2009 06:30	26.31	26.29	26.33	26.26	26.32	26.28	26.30	41.32	41.23	41.37	41.23	41.25	41.36	41.29	15.00	0
17/01/2009 06:33	25.48	25.42	25.41	25.34	25.36	25.28	25.38	40.93	40.84	40.97	40.84	40.86	40.96	40.90	15.52	0
17/01/2009 06:36	24.42	24.39	24.44	24.36	24.43	24.37	24.40	40.54	40.46	40.59	40.46	40.49	40.57	40.52	16.12	0
17/01/2009 06:39	24.54	24.52	24.56	24.48	24.56	24.5	24.53	40.21	40.13	40.24	40.12	40.15	40.23	40.18	15.65	0
17/01/2009 06:42	24.63	24.61	24.64	24.57	24.64	24.58	24.61	39.88	39.79	39.91	39.79	39.83	39.9	39.85	15.24	0
17/01/2009 06:45	24.72	24.71	24.74	24.67	24.74	24.69	24.71	42.5	42.3	42.63	42.45	42.53	42.66	42.51	17.80	0.417
17/01/2009 06:48	24.82	24.8	24.83	24.76	24.83	24.78	24.80	41.97	41.86	42.04	41.9	41.93	42.04	41.96	17.15	0
17/01/2009 06:51	24.91	24.88	24.92	24.86	24.92	24.87	24.89	41.5	41.42	41.57	41.41	41.44	41.55	41.48	16.59	0
17/01/2009	25	24.98	25	24.94	25.01	24.96	24.98	41.08	41	41.13	40.99	41.02	41.12	41.06	16.08	0

06:54															
17/01/2009 06:57	25.07	25.05	25.08	25.01	25.08	25.03	25.05	40.68	40.6	40.73	40.6	40.63	40.72	40.66	15.61	0
17/01/2009 07:00	25.15	25.13	25.17	25.1	25.17	25.12	25.14	40.33	40.23	40.36	40.23	40.27	40.36	40.30	15.16	0
17/01/2009 07:03	25.23	25.22	25.25	25.18	25.25	25.2	25.22	39.99	39.9	40.03	39.9	39.94	40.02	39.96	14.74	0
17/01/2009 07:06	25.31	25.31	25.34	25.27	25.33	25.28	25.31	42.78	42.39	42.86	42.64	42.76	42.94	42.73	17.42	0.422
17/01/2009 07:09	25.39	25.38	25.4	25.34	25.41	25.35	25.38	42.13	42.03	42.24	42.08	42.11	42.24	42.14	16.76	0
17/01/2009 07:12	25.47	25.46	25.49	25.43	25.49	25.44	25.46	41.66	41.56	41.72	41.56	41.59	41.71	41.63	16.17	0
17/01/2009 07:15	25.55	25.53	25.56	25.5	25.56	25.51	25.54	41.21	41.11	41.25	41.11	41.14	41.25	41.18	15.64	0
17/01/2009 07:18	25.62	25.62	25.64	25.58	25.64	25.6	25.62	40.81	40.72	40.86	40.71	40.75	40.84	40.78	15.17	0
17/01/2009 07:21	25.7	25.69	25.72	25.66	25.73	25.68	25.70	40.44	40.36	40.49	40.36	40.39	40.47	40.42	14.72	0
17/01/2009 07:24	25.79	25.78	25.82	25.75	25.81	25.76	25.79	40.11	40.02	40.15	40.02	40.06	40.14	40.08	14.30	0
17/01/2009 07:27	25.85	25.84	25.86	25.8	25.86	25.81	25.84	42.52	42.15	42.52	42.36	42.31	42.61	42.41	16.58	0.422
17/01/2009 07:30	25.93	25.91	25.94	25.88	25.94	25.89	25.92	42.25	42.12	42.36	42.19	42.25	42.37	42.26	16.34	0
17/01/2009 07:33	26	25.98	26.02	25.96	26.02	25.97	25.99	41.75	41.65	41.81	41.67	41.69	41.81	41.73	15.74	0
17/01/2009 07:36	26.08	26.06	26.1	26.03	26.09	26.04	26.07	41.31	41.22	41.35	41.22	41.23	41.35	41.28	15.21	0
17/01/2009 07:39	26.16	26.15	26.17	26.1	26.17	26.13	26.15	40.91	40.82	40.95	40.82	40.84	40.95	40.88	14.74	0
17/01/2009 07:42	26.22	26.21	26.23	26.18	26.23	26.19	26.21	40.53	40.45	40.57	40.44	40.47	40.56	40.50	14.29	0
17/01/2009 07:45	26.29	26.28	26.31	26.25	26.31	26.26	26.28	40.18	40.1	40.22	40.09	40.13	40.21	40.16	13.87	0
17/01/2009 07:48	25.69	25.63	25.63	25.56	25.59	25.51	25.60	39.87	39.79	39.9	39.78	39.82	39.9	39.84	14.24	0
17/01/2009 07:51	24.39	24.36	24.41	24.32	24.4	24.33	24.37	42.46	42.29	42.6	42.42	42.5	42.62	42.48	18.11	0.417
17/01/2009 07:54	24.5	24.49	24.53	24.45	24.52	24.45	24.49	41.96	41.86	42.04	41.89	41.91	42.02	41.95	17.46	0
17/01/2009 07:57	24.59	24.58	24.62	24.54	24.61	24.55	24.58	41.49	41.4	41.55	41.4	41.42	41.53	41.47	16.88	0
17/01/2009 08:00	24.68	24.67	24.71	24.63	24.71	24.65	24.68	41.08	40.99	41.12	40.98	41	41.11	41.05	16.37	0

17/01/2009 08:03	24.78	24.76	24.8	24.73	24.8	24.74	24.77	40.69	40.61	40.74	40.61	40.63	40.73	40.67	15.90	0
17/01/2009 08:06	24.86	24.84	24.88	24.8	24.88	24.82	24.85	40.33	40.24	40.37	40.24	40.27	40.37	40.30	15.46	0
17/01/2009 08:09	24.93	24.92	24.96	24.89	24.96	24.9	24.93	39.98	39.9	40.03	39.9	39.94	40.01	39.96	15.03	0
17/01/2009 08:12	25.03	25.02	25.05	24.98	25.05	25	25.02	42.69	42.31	42.78	42.55	42.66	42.84	42.64	17.62	0.421
17/01/2009 08:15	25.12	25.11	25.14	25.07	25.14	25.09	25.11	42.08	41.95	42.16	42	42.04	42.16	42.07	16.95	0
17/01/2009 08:18	25.2	25.18	25.22	25.15	25.21	25.16	25.19	41.59	41.49	41.65	41.5	41.52	41.63	41.56	16.38	0
17/01/2009 08:21	25.27	25.26	25.29	25.22	25.29	25.23	25.26	41.15	41.05	41.19	41.05	41.07	41.18	41.12	15.86	0
17/01/2009 08:24	25.36	25.35	25.37	25.31	25.37	25.32	25.35	40.75	40.66	40.79	40.66	40.68	40.77	40.72	15.37	0
17/01/2009 08:27	25.44	25.42	25.45	25.4	25.45	25.4	25.43	40.39	40.29	40.43	40.29	40.32	40.41	40.36	14.93	0
17/01/2009 08:30	25.52	25.5	25.52	25.47	25.52	25.48	25.50	40.04	39.94	40.07	39.94	39.97	40.06	40.00	14.50	0
17/01/2009 08:33	25.59	25.58	25.61	25.54	25.61	25.56	25.58	42.74	42.3	42.8	42.56	42.67	42.87	42.66	17.08	0.415
17/01/2009 08:36	25.67	25.65	25.68	25.61	25.68	25.62	25.65	42.08	41.96	42.17	42.01	42.06	42.17	42.08	16.42	0
17/01/2009 08:39	25.74	25.73	25.76	25.69	25.75	25.7	25.73	41.6	41.51	41.67	41.51	41.54	41.65	41.58	15.85	0
17/01/2009 08:42	25.83	25.81	25.85	25.79	25.84	25.79	25.82	41.18	41.09	41.22	41.08	41.1	41.21	41.15	15.33	0
17/01/2009 08:45	25.9	25.88	25.91	25.86	25.91	25.87	25.89	40.77	40.68	40.81	40.67	40.7	40.8	40.74	14.85	0
17/01/2009 08:48	25.96	25.95	25.98	25.92	25.99	25.94	25.96	40.39	40.31	40.44	40.31	40.34	40.42	40.37	14.41	0
17/01/2009 08:51	26.04	26.03	26.05	25.99	26.06	26	26.03	40.06	39.97	40.09	39.96	39.99	40.08	40.03	14.00	0
17/01/2009 08:54	26.12	26.1	26.13	26.08	26.13	26.08	26.11	42.83	42.35	42.87	42.62	42.7	42.95	42.72	16.61	0
17/01/2009 08:57	26.18	26.17	26.2	26.14	26.2	26.15	26.17	42.17	42.05	42.28	42.12	42.16	42.28	42.18	16.00	0
17/01/2009 09:00	26.25	26.25	26.27	26.21	26.27	26.22	26.25	41.7	41.6	41.74	41.61	41.63	41.74	41.67	15.43	0
17/01/2009 09:03	26.33	26.32	26.34	26.28	26.34	26.29	26.32	41.25	41.16	41.31	41.16	41.18	41.29	41.23	14.91	0
17/01/2009 09:06	24.69	24.64	24.67	24.55	24.61	24.54	24.62	40.86	40.77	40.89	40.76	40.79	40.89	40.83	16.21	0
17/01/2009	24.5	24.48	24.53	24.45	24.53	24.47	24.49	40.48	40.4	40.53	40.41	40.43	40.52	40.46	15.97	0

09:09																
17/01/2009 09:12	24.62	24.59	24.63	24.56	24.63	24.58	24.60	40.15	40.06	40.18	40.06	40.09	40.17	40.12	15.52	0
17/01/2009 09:15	24.7	24.68	24.72	24.64	24.71	24.66	24.69	39.88	39.87	39.93	39.85	39.84	39.96	39.89	15.20	0.41
17/01/2009 09:18	24.79	24.77	24.81	24.75	24.81	24.76	24.78	42.25	42.1	42.38	42.21	42.26	42.38	42.26	17.48	0
17/01/2009 09:21	24.88	24.86	24.89	24.83	24.89	24.84	24.87	41.75	41.66	41.82	41.67	41.7	41.81	41.74	16.87	0
17/01/2009 09:24	24.97	24.96	25	24.93	24.99	24.94	24.97	41.32	41.24	41.36	41.22	41.25	41.35	41.29	16.33	0
17/01/2009 09:27	25.04	25.02	25.06	25	25.05	25	25.03	40.9	40.81	40.94	40.81	40.82	40.92	40.87	15.84	0
17/01/2009 09:30	25.13	25.11	25.14	25.08	25.14	25.09	25.12	40.52	40.43	40.55	40.42	40.45	40.54	40.49	15.37	0
17/01/2009 09:33	25.2	25.19	25.23	25.16	25.22	25.17	25.20	40.16	40.07	40.2	40.07	40.11	40.19	40.13	14.94	0
17/01/2009 09:36	25.29	25.28	25.3	25.24	25.3	25.25	25.28	39.83	39.75	39.87	39.75	39.78	39.87	39.81	14.53	0
17/01/2009 09:39	25.38	25.36	25.4	25.34	25.39	25.34	25.37	42.31	42.14	42.43	42.26	42.32	42.43	42.32	16.95	0.401
17/01/2009 09:42	25.45	25.43	25.47	25.4	25.46	25.41	25.44	41.78	41.68	41.86	41.71	41.73	41.85	41.77	16.33	0
17/01/2009 09:45	25.54	25.52	25.55	25.49	25.55	25.5	25.53	41.34	41.25	41.39	41.24	41.27	41.37	41.31	15.79	0
17/01/2009 09:48	25.6	25.59	25.63	25.55	25.62	25.57	25.59	40.91	40.82	40.96	40.82	40.85	40.95	40.89	15.29	0
17/01/2009 09:51	25.68	25.67	25.69	25.64	25.69	25.64	25.67	40.54	40.45	40.58	40.44	40.47	40.57	40.51	14.84	0
17/01/2009 09:54	25.76	25.74	25.78	25.72	25.78	25.72	25.75	40.17	40.09	40.22	40.09	40.13	40.21	40.15	14.40	0
17/01/2009 09:57	25.84	25.82	25.84	25.79	25.84	25.8	25.82	39.85	39.76	39.89	39.76	39.8	39.88	39.82	14.00	0
17/01/2009 10:00	25.91	25.89	25.93	25.87	25.93	25.88	25.90	42.38	42.23	42.52	42.34	42.4	42.52	42.40	16.50	0.414
17/01/2009 10:03	25.98	25.97	25.99	25.94	25.99	25.94	25.97	41.87	41.78	41.95	41.79	41.82	41.94	41.86	15.89	0
17/01/2009 10:06	26.05	26.04	26.07	26.02	26.07	26.02	26.05	41.42	41.33	41.46	41.33	41.34	41.45	41.39	15.34	0
17/01/2009 10:09	26.14	26.12	26.14	26.09	26.14	26.09	26.12	41	40.92	41.04	40.9	40.93	41.03	40.97	14.85	0

APPENDIX B2

Panel GS05 - 1700 - 1

Date & Time	Cold Plate Temperature (0C) TC1	TC2	TC3	TC4	TC5	TC6	Average Cold Plate Temperature (^{0}C)	Hot Plate Temperature (^{0}C) TC1	TC2	TC3	TC4	TC5	TC6	Average Cold Plate Temperature (^{0}C)	Temperature Difference (^{0}C)	Current (Ampere)
02/04/2009 12:21	25.39	25.36	25.36	25.33	25.38	25.37	25.37	41.57	41.51	41.64	42.26	42.17	42.08	41.87	16.51	0
02/04/2009 12:24	25.43	25.4	25.39	25.37	25.41	25.4	25.40	40.95	40.83	40.97	41.32	41.22	41.19	41.08	15.68	0
02/04/2009 12:27	25.47	25.44	25.45	25.42	25.47	25.45	25.45	41.45	41.25	41.4	41.64	41.63	41.63	41.50	16.05	0.811
02/04/2009 12:30	25.51	25.48	25.48	25.45	25.51	25.5	25.49	42.24	42.08	42.27	42.53	42.55	42.48	42.36	16.87	0
02/04/2009 12:33	25.55	25.52	25.53	25.5	25.55	25.54	25.53	41.54	41.4	41.54	41.67	41.65	41.62	41.57	16.04	0
02/04/2009 12:36	25.61	25.6	25.6	25.57	25.62	25.61	25.60	40.96	40.83	40.94	40.99	40.99	40.97	40.95	15.35	0
02/04/2009 12:39	25.68	25.66	25.67	25.64	25.69	25.68	25.67	40.46	40.33	40.43	40.44	40.44	40.43	40.42	14.75	0
02/04/2009 12:42	25.73	25.71	25.73	25.7	25.74	25.74	25.73	41.68	41.43	41.58	41.7	41.78	41.78	41.66	15.93	0
02/04/2009 12:45	25.8	25.78	25.79	25.76	25.82	25.81	25.79	42.06	41.92	42.08	42.26	42.3	42.25	42.15	16.35	0
02/04/2009 12:48	25.87	25.85	25.86	25.83	25.87	25.87	25.86	41.48	41.36	41.48	41.56	41.56	41.54	41.50	15.64	0
02/04/2009 12:51	25.94	25.92	25.93	25.9	25.95	25.94	25.93	40.99	40.87	40.98	40.99	41	40.99	40.97	15.04	0
02/04/2009 12:54	26.01	26	26.01	25.97	26.02	26.01	26.00	40.54	40.43	40.53	40.51	40.52	40.52	40.51	14.51	0
02/04/2009 12:57	26.08	26.06	26.08	26.04	26.09	26.09	26.07	40.13	40.02	40.11	40.09	40.1	40.11	40.09	14.02	0
02/04/2009 13:00	26.14	26.13	26.14	26.1	26.16	26.15	26.14	42.34	42.07	42.27	42.45	42.55	42.53	42.37	16.23	0
02/04/2009 13:03	26.22	26.2	26.22	26.19	26.24	26.23	26.22	41.82	41.7	41.85	41.98	42	41.96	41.89	15.67	0
02/04/2009 13:06	26.28	26.27	26.28	26.25	26.3	26.29	26.28	41.32	41.2	41.32	41.37	41.37	41.36	41.32	15.05	0
02/04/2009	25.92	25.89	25.87	25.85	25.9	25.86	25.88	40.88	40.78	40.88	40.88	40.89	40.88	40.87	14.98	0

13:09															
02/04/2009 13:12	24.45	24.42	24.43	24.36	24.44	24.43	24.42	40.47	40.37	40.46	40.44	40.46	40.46	40.44	16.02	0
02/04/2009 13:15	24.44	24.43	24.45	24.39	24.49	24.47	24.45	40.1	40	40.09	40.06	40.08	40.08	40.07	15.62	0
02/04/2009 13:18	24.57	24.55	24.57	24.51	24.6	24.58	24.56	41.71	41.51	41.69	41.82	41.91	41.87	41.75	17.19	0.822
02/04/2009 13:21	24.67	24.65	24.67	24.61	24.7	24.68	24.66	41.87	41.75	41.9	42.04	42.06	42.03	41.94	17.28	0
02/04/2009 13:24	24.77	24.74	24.77	24.71	24.79	24.77	24.76	41.38	41.28	41.39	41.46	41.46	41.44	41.40	16.64	0
02/04/2009 13:27	24.86	24.84	24.86	24.8	24.89	24.87	24.85	40.96	40.86	40.96	40.97	40.97	40.97	40.95	16.10	0
02/04/2009 13:30	24.95	24.93	24.95	24.9	24.98	24.96	24.95	40.57	40.47	40.57	40.55	40.56	40.56	40.55	15.60	0
02/04/2009 13:33	25.05	25.03	25.04	24.99	25.08	25.05	25.04	40.21	40.12	40.21	40.17	40.19	40.19	40.18	15.14	0
02/04/2009 13:36	25.14	25.11	25.13	25.08	25.17	25.14	25.13	40.84	40.63	40.8	40.81	40.9	40.88	40.81	15.68	0
02/04/2009 13:39	25.23	25.2	25.22	25.17	25.26	25.23	25.22	42.11	41.95	42.15	42.33	42.4	42.33	42.21	16.99	0
02/04/2009 13:42	25.32	25.3	25.31	25.26	25.34	25.32	25.31	41.58	41.48	41.6	41.71	41.7	41.68	41.63	16.32	0
02/04/2009 13:45	25.4	25.39	25.4	25.34	25.43	25.41	25.40	41.14	41.04	41.15	41.18	41.18	41.18	41.15	15.75	0
02/04/2009 13:48	25.49	25.47	25.49	25.43	25.52	25.5	25.48	40.75	40.65	40.75	40.74	40.75	40.75	40.73	15.25	0
02/04/2009 13:51	25.59	25.56	25.58	25.52	25.6	25.59	25.57	40.38	40.28	40.38	40.36	40.37	40.37	40.36	14.78	0
02/04/2009 13:54	25.67	25.65	25.66	25.61	25.69	25.68	25.66	40.04	39.94	40.04	40.01	40.02	40.02	40.01	14.35	0
02/04/2009 13:57	25.75	25.73	25.75	25.7	25.78	25.76	25.75	41.73	41.53	41.7	41.85	41.93	41.9	41.77	16.03	0.829
02/04/2009 14:00	25.83	25.81	25.83	25.78	25.86	25.84	25.83	41.83	41.72	41.87	42.02	42.03	41.99	41.91	16.09	0
02/04/2009 14:03	25.92	25.9	25.91	25.86	25.94	25.92	25.91	41.36	41.25	41.38	41.45	41.44	41.43	41.39	15.48	0
02/04/2009 14:06	26	25.99	26	25.95	26.03	26.01	26.00	40.96	40.85	40.96	40.98	40.98	40.98	40.95	14.96	0
02/04/2009 14:09	26.08	26.07	26.08	26.03	26.11	26.09	26.08	40.58	40.48	40.58	40.57	40.58	40.58	40.56	14.49	0
02/04/2009 14:12	26.17	26.15	26.16	26.12	26.19	26.18	26.16	40.23	40.14	40.23	40.21	40.22	40.22	40.21	14.05	0
02/04/2009 14:15	26.25	26.23	26.25	26.2	26.28	26.26	26.25	40.24	40.16	40.21	40.23	40.23	40.26	40.22	13.98	0.824

02/04/2009 14:18	26.34	26.32	26.32	26.28	26.36	26.34	26.33	42.19	41.99	42.22	42.4	42.5	42.42	42.29	15.96	0
02/04/2009 14:21	26.18	26.15	26.13	26.1	26.17	26.13	26.14	41.64	41.53	41.67	41.78	41.78	41.77	41.70	15.55	0
02/04/2009 14:24	24.62	24.57	24.58	24.52	24.6	24.58	24.58	41.21	41.11	41.22	41.26	41.27	41.26	41.22	16.64	0
02/04/2009 14:27	24.47	24.45	24.48	24.42	24.52	24.5	24.47	40.82	40.72	40.83	40.83	40.84	40.83	40.81	16.34	0
02/04/2009 14:30	24.61	24.59	24.61	24.55	24.65	24.63	24.61	40.47	40.37	40.47	40.45	40.46	40.47	40.45	15.84	0
02/04/2009 14:33	24.72	24.7	24.72	24.67	24.76	24.74	24.72	40.13	40.04	40.13	40.11	40.12	40.13	40.11	15.39	0
02/04/2009 14:36	24.83	24.81	24.83	24.77	24.86	24.84	24.82	40.79	40.58	40.75	40.77	40.85	40.84	40.76	15.94	0
02/04/2009 14:39	24.93	24.9	24.93	24.87	24.97	24.94	24.92	42.06	41.91	42.1	42.28	42.34	42.28	42.16	17.24	0
02/04/2009 14:42	25.03	25.01	25.02	24.97	25.07	25.04	25.02	41.55	41.45	41.57	41.68	41.67	41.66	41.60	16.57	0
02/04/2009 14:45	25.13	25.1	25.12	25.07	25.15	25.13	25.12	41.13	41.03	41.14	41.18	41.18	41.17	41.14	16.02	0
02/04/2009 14:48	25.23	25.2	25.22	25.17	25.26	25.23	25.22	40.75	40.65	40.76	40.76	40.76	40.77	40.74	15.52	0
02/04/2009 14:51	25.32	25.3	25.32	25.26	25.36	25.33	25.32	40.4	40.31	40.4	40.39	40.39	40.4	40.38	15.07	0
02/04/2009 14:54	25.42	25.39	25.41	25.36	25.45	25.42	25.41	40.06	39.98	40.07	40.05	40.06	40.07	40.05	14.64	0
02/04/2009 14:57	25.51	25.49	25.5	25.45	25.54	25.52	25.50	41.13	40.96	41.07	41.18	41.22	41.25	41.14	15.63	0.824
02/04/2009 15:00	25.6	25.58	25.59	25.54	25.63	25.61	25.59	41.96	41.83	42	42.19	42.22	42.16	42.06	16.47	0
02/04/2009 15:03	25.69	25.67	25.68	25.63	25.72	25.7	25.68	41.48	41.37	41.49	41.59	41.58	41.57	41.51	15.83	0
02/04/2009 15:06	25.78	25.76	25.77	25.73	25.81	25.79	25.77	41.07	40.96	41.07	41.11	41.1	41.1	41.07	15.30	0
02/04/2009 15:09	25.86	25.84	25.86	25.81	25.89	25.87	25.86	40.68	40.58	40.68	40.69	40.69	40.69	40.67	14.81	0
02/04/2009 15:12	25.96	25.93	25.95	25.9	25.99	25.96	25.95	40.33	40.24	40.34	40.33	40.33	40.34	40.32	14.37	0
02/04/2009 15:15	26.04	26.03	26.04	25.99	26.08	26.05	26.04	40.01	39.92	40.01	40	40	40.01	39.99	13.95	0
02/04/2009 15:18	26.13	26.11	26.13	26.08	26.16	26.14	26.13	41.52	41.29	41.51	41.61	41.71	41.67	41.55	15.43	0.819
02/04/2009 15:21	26.22	26.2	26.21	26.17	26.25	26.23	26.21	41.83	41.72	41.87	42.04	42.04	42.01	41.92	15.71	0
02/04/2009	26.31	26.28	26.3	26.25	26.33	26.31	26.30	41.38	41.27	41.39	41.47	41.45	41.45	41.40	15.11	0

15:24															
02/04/2009 15:27	26.38	26.37	26.38	26.33	26.42	26.39	26.38	40.97	40.87	40.97	41.01	41	41	40.97	14.59	0
02/04/2009 15:30	25.77	25.72	25.7	25.67	25.73	25.68	25.71	40.6	40.52	40.61	40.61	40.61	40.62	40.60	14.88	0
02/04/2009 15:33	24.52	24.49	24.51	24.44	24.54	24.52	24.50	40.27	40.18	40.27	40.26	40.27	40.27	40.25	15.75	0
02/04/2009 15:36	24.64	24.61	24.63	24.58	24.68	24.66	24.63	39.95	39.87	39.96	39.94	39.94	39.96	39.94	15.30	0
02/04/2009 15:39	24.76	24.74	24.76	24.71	24.81	24.78	24.76	41.64	41.46	41.63	41.78	41.85	41.84	41.70	16.94	0.826
02/04/2009 15:42	24.88	24.86	24.87	24.83	24.92	24.89	24.88	41.82	41.71	41.86	42.02	42.03	42	41.91	17.03	0
02/04/2009 15:45	24.99	24.96	24.98	24.93	25.03	25	24.98	41.38	41.27	41.39	41.47	41.46	41.45	41.40	16.42	0
02/04/2009 15:48	25.09	25.07	25.08	25.04	25.13	25.1	25.09	40.98	40.88	40.98	41.01	41	41	40.98	15.89	0
02/04/2009 15:51	25.2	25.17	25.19	25.14	25.24	25.21	25.19	40.62	40.52	40.62	40.62	40.62	40.62	40.60	15.41	0
02/04/2009 15:54	25.29	25.27	25.28	25.23	25.32	25.3	25.28	40.27	40.18	40.27	40.26	40.26	40.27	40.25	14.97	0
02/04/2009 15:57	25.39	25.36	25.38	25.33	25.42	25.39	25.38	39.95	39.87	39.95	39.94	39.94	39.95	39.93	14.56	0
02/04/2009 16:00	25.49	25.46	25.48	25.43	25.52	25.49	25.48	41.64	41.46	41.63	41.79	41.86	41.84	41.70	16.23	0.823
02/04/2009 16:03	25.59	25.56	25.58	25.53	25.62	25.59	25.58	41.82	41.71	41.86	42.03	42.04	42	41.91	16.33	0
02/04/2009 16:06	25.68	25.65	25.67	25.62	25.71	25.69	25.67	41.37	41.27	41.39	41.47	41.45	41.45	41.40	15.73	0
02/04/2009 16:09	25.77	25.74	25.76	25.72	25.8	25.77	25.76	40.97	40.87	40.98	41	41	41	40.97	15.21	0
02/04/2009 16:12	25.86	25.83	25.85	25.81	25.89	25.87	25.85	40.61	40.51	40.61	40.61	40.61	40.62	40.60	14.74	0
02/04/2009 16:15	25.95	25.93	25.94	25.89	25.98	25.96	25.94	40.26	40.17	40.26	40.26	40.26	40.27	40.25	14.31	0
02/04/2009 16:18	26.05	26.02	26.03	25.99	26.07	26.05	26.04	39.95	39.86	39.95	39.94	39.94	39.95	39.93	13.90	0
02/04/2009 16:21	26.13	26.1	26.12	26.07	26.16	26.13	26.12	41.52	41.3	41.5	41.63	41.71	41.68	41.56	15.44	0.83
02/04/2009 16:24	26.21	26.19	26.2	26.15	26.24	26.22	26.20	41.83	41.71	41.86	42.04	42.05	42.01	41.92	15.72	0
02/04/2009 16:27	26.3	26.28	26.29	26.24	26.32	26.31	26.29	41.38	41.27	41.39	41.47	41.46	41.45	41.40	15.11	0
02/04/2009 16:30	26.39	26.37	26.38	26.34	26.42	26.4	26.38	40.99	40.89	41	41.02	41.02	41.02	40.99	14.61	0

02/04/2009 16:33	26.04	25.99	25.98	25.95	26.01	25.97	25.99	40.62	40.53	40.63	40.63	40.63	40.63	40.61	14.62	0
02/04/2009 16:36	24.56	24.52	24.54	24.48	24.56	24.54	24.53	40.28	40.2	40.29	40.28	40.29	40.29	40.27	15.74	0
02/04/2009 16:39	24.61	24.58	24.61	24.56	24.66	24.63	24.61	39.98	39.9	39.98	39.97	39.97	39.98	39.96	15.36	0
02/04/2009 16:42	24.75	24.71	24.75	24.69	24.78	24.76	24.74	41.57	41.32	41.55	41.65	41.77	41.72	41.60	16.86	0
02/04/2009 16:45	24.86	24.83	24.86	24.8	24.89	24.87	24.85	41.91	41.79	41.95	42.13	42.15	42.11	42.01	17.16	0
02/04/2009 16:48	24.97	24.94	24.96	24.91	25	24.98	24.96	41.45	41.35	41.47	41.56	41.55	41.54	41.49	16.53	0
02/04/2009 16:51	25.07	25.04	25.06	25.01	25.1	25.07	25.06	41.05	40.94	41.05	41.08	41.07	41.08	41.05	15.99	0
02/04/2009 16:54	25.17	25.15	25.16	25.11	25.2	25.18	25.16	40.68	40.58	40.68	40.69	40.69	40.69	40.67	15.51	0
02/04/2009 16:57	25.27	25.25	25.26	25.21	25.3	25.28	25.26	40.33	40.24	40.34	40.33	40.32	40.34	40.32	15.06	0
02/04/2009 17:00	25.37	25.35	25.37	25.31	25.41	25.38	25.37	40.02	39.94	40.02	40.01	40.01	40.03	40.01	14.64	0
02/04/2009 17:03	25.47	25.44	25.46	25.41	25.5	25.47	25.46	41.24	41.06	41.19	41.31	41.36	41.38	41.26	15.80	0
02/04/2009 17:06	25.56	25.54	25.55	25.5	25.6	25.56	25.55	41.92	41.79	41.96	42.15	42.18	42.14	42.02	16.47	0
02/04/2009 17:09	25.66	25.63	25.65	25.61	25.69	25.67	25.65	41.46	41.36	41.48	41.58	41.56	41.56	41.50	15.85	0
02/04/2009 17:12	25.75	25.73	25.74	25.69	25.79	25.75	25.74	41.05	40.95	41.05	41.09	41.08	41.09	41.05	15.31	0
02/04/2009 17:15	25.85	25.82	25.84	25.79	25.88	25.85	25.84	40.68	40.59	40.69	40.69	40.69	40.7	40.67	14.84	0
02/04/2009 17:18	25.94	25.91	25.93	25.88	25.97	25.94	25.93	40.34	40.24	40.34	40.33	40.33	40.34	40.32	14.39	0
02/04/2009 17:21	26.02	26	26.01	25.96	26.05	26.02	26.01	40.01	39.92	40.01	40	40	40.01	39.99	13.98	0
02/04/2009 17:24	26.12	26.09	26.1	26.06	26.15	26.12	26.11	41.34	41.14	41.27	41.4	41.45	41.47	41.35	15.24	0
02/04/2009 17:27	26.21	26.19	26.2	26.16	26.24	26.21	26.20	41.9	41.77	41.94	42.13	42.16	42.11	42.00	15.80	0
02/04/2009 17:30	26.29	26.26	26.27	26.23	26.32	26.29	26.28	41.43	41.33	41.44	41.54	41.53	41.52	41.47	15.19	0
02/04/2009 17:33	26.38	26.36	26.36	26.32	26.4	26.38	26.37	41.03	40.93	41.04	41.07	41.06	41.06	41.03	14.67	0
02/04/2009 17:36	26.36	26.33	26.33	26.3	26.37	26.33	26.34	40.66	40.56	40.66	40.67	40.67	40.67	40.65	14.31	0
02/04/2009	24.9	24.84	24.84	24.79	24.86	24.82	24.84	40.32	40.23	40.32	40.32	40.32	40.34	40.31	15.47	0

17:39																
02/04/2009 17:42	24.59	24.56	24.59	24.53	24.63	24.61	24.59	40.01	39.93	40.01	40	40.01	40.01	40.00	15.41	0
02/04/2009 17:45	24.74	24.71	24.73	24.67	24.78	24.75	24.73	41.52	41.27	41.46	41.57	41.66	41.65	41.52	16.79	0
02/04/2009 17:48	24.84	24.81	24.83	24.78	24.88	24.85	24.83	41.91	41.79	41.96	42.14	42.16	42.12	42.01	17.18	0
02/04/2009 17:51	24.96	24.93	24.95	24.9	24.99	24.96	24.95	41.46	41.35	41.48	41.57	41.55	41.55	41.49	16.55	0
02/04/2009 17:54	25.06	25.03	25.05	25	25.09	25.06	25.05	41.05	40.95	41.06	41.09	41.08	41.09	41.05	16.01	0
02/04/2009 17:57	25.17	25.14	25.15	25.1	25.19	25.16	25.15	40.69	40.59	40.69	40.69	40.69	40.7	40.68	15.52	0
02/04/2009 18:00	25.27	25.24	25.25	25.21	25.3	25.27	25.26	40.35	40.25	40.34	40.34	40.34	40.35	40.33	15.07	0
02/04/2009 18:03	25.37	25.34	25.35	25.31	25.4	25.37	25.36	40.03	39.94	40.03	40.02	40.02	40.03	40.01	14.66	0
02/04/2009 18:06	25.47	25.44	25.46	25.4	25.49	25.47	25.46	41.04	40.88	40.99	41.11	41.14	41.16	41.05	15.60	0.833
02/04/2009 18:09	25.56	25.52	25.54	25.49	25.58	25.55	25.54	41.91	41.78	41.96	42.14	42.17	42.12	42.01	16.47	0
02/04/2009 18:12	25.66	25.63	25.64	25.59	25.68	25.65	25.64	41.44	41.34	41.46	41.57	41.55	41.54	41.48	15.84	0
02/04/2009 18:15	25.74	25.72	25.73	25.68	25.77	25.74	25.73	41.03	40.94	41.04	41.09	41.07	41.07	41.04	15.31	0
02/04/2009 18:18	25.84	25.81	25.82	25.77	25.86	25.84	25.82	40.67	40.57	40.67	40.68	40.68	40.68	40.66	14.84	0
02/04/2009 18:21	25.93	25.9	25.91	25.87	25.95	25.93	25.92	40.33	40.23	40.32	40.32	40.32	40.33	40.31	14.39	0
02/04/2009 18:24	26.02	25.99	26	25.95	26.04	26.01	26.00	40.01	39.92	40	39.99	39.99	40	39.99	13.98	0
02/04/2009 18:27	26.1	26.08	26.09	26.05	26.13	26.1	26.09	41.55	41.3	41.51	41.61	41.71	41.69	41.56	15.47	0
02/04/2009 18:30	26.2	26.17	26.18	26.14	26.22	26.19	26.18	41.92	41.8	41.96	42.14	42.16	42.12	42.02	15.83	0
02/04/2009 18:33	26.26	26.24	26.26	26.21	26.29	26.27	26.26	41.44	41.34	41.46	41.55	41.54	41.53	41.48	15.22	0
02/04/2009 18:36	26.36	26.33	26.34	26.3	26.39	26.36	26.35	41.04	40.95	41.05	41.08	41.08	41.08	41.05	14.70	0
02/04/2009 18:39	26.44	26.41	26.41	26.38	26.45	26.43	26.42	40.69	40.58	40.69	40.69	40.69	40.69	40.67	14.25	0
02/04/2009 18:42	25.12	25.05	25.04	24.99	25.06	25.02	25.05	40.34	40.26	40.35	40.34	40.35	40.35	40.33	15.29	0
02/04/2009 18:45	24.54	24.51	24.53	24.47	24.58	24.55	24.53	40.03	39.95	40.03	40.03	40.03	40.04	40.02	15.49	0

02/04/2009 18:48	24.68	24.65	24.67	24.62	24.72	24.69	24.67	41.27	41.1	41.21	41.33	41.39	41.41	41.29	16.61	0
02/04/2009 18:51	24.81	24.77	24.79	24.74	24.84	24.8	24.79	41.97	41.84	42.01	42.2	42.23	42.18	42.07	17.28	0
02/04/2009 18:54	24.91	24.88	24.9	24.85	24.94	24.91	24.90	41.49	41.39	41.52	41.62	41.6	41.59	41.54	16.64	0
02/04/2009 18:57	25.02	24.99	25.01	24.96	25.05	25.02	25.01	41.09	41	41.11	41.14	41.13	41.13	41.10	16.09	0
02/04/2009 19:00	25.12	25.09	25.11	25.06	25.15	25.12	25.11	40.72	40.63	40.73	40.73	40.73	40.73	40.71	15.60	0
02/04/2009 19:03	25.22	25.19	25.21	25.16	25.25	25.22	25.21	40.38	40.29	40.38	40.37	40.37	40.38	40.36	15.15	0
02/04/2009 19:06	25.32	25.28	25.3	25.26	25.34	25.31	25.30	40.05	39.97	40.06	40.05	40.04	40.06	40.04	14.74	0
02/04/2009 19:09	25.42	25.39	25.41	25.35	25.44	25.41	25.40	40.75	40.58	40.72	40.77	40.83	40.83	40.75	15.34	0.816
02/04/2009 19:12	25.52	25.49	25.5	25.45	25.54	25.51	25.50	42.03	41.89	42.07	42.27	42.31	42.25	42.14	16.64	0
02/04/2009 19:15	25.6	25.57	25.59	25.54	25.63	25.6	25.59	41.53	41.43	41.55	41.67	41.65	41.64	41.58	15.99	0
02/04/2009 19:18	25.7	25.67	25.68	25.64	25.72	25.69	25.68	41.12	41.02	41.13	41.17	41.17	41.17	41.13	15.45	0
02/04/2009 19:21	25.79	25.76	25.77	25.72	25.81	25.78	25.77	40.75	40.64	40.75	40.76	40.75	40.76	40.74	14.96	0
02/04/2009 19:24	25.87	25.84	25.86	25.81	25.89	25.87	25.86	40.39	40.3	40.39	40.39	40.39	40.39	40.38	14.52	0
02/04/2009 19:27	25.96	25.93	25.95	25.9	25.98	25.96	25.95	40.07	39.98	40.07	40.06	40.06	40.07	40.05	14.11	0
02/04/2009 19:30	26.05	26.02	26.04	25.99	26.07	26.04	26.04	40.71	40.53	40.69	40.73	40.79	40.79	40.71	14.67	0.823
02/04/2009 19:33	26.15	26.11	26.13	26.08	26.16	26.14	26.13	41.97	41.83	42.02	42.21	42.25	42.2	42.08	15.95	0
02/04/2009 19:36	26.23	26.2	26.21	26.17	26.25	26.23	26.22	41.5	41.39	41.51	41.62	41.61	41.59	41.54	15.32	0
02/04/2009 19:39	26.31	26.28	26.3	26.25	26.33	26.31	26.30	41.08	40.98	41.09	41.13	41.12	41.12	41.09	14.79	0
02/04/2009 19:42	26.4	26.37	26.38	26.34	26.42	26.4	26.39	40.72	40.62	40.72	40.72	40.72	40.73	40.71	14.32	0
02/04/2009 19:45	25.92	25.87	25.85	25.82	25.88	25.83	25.86	40.37	40.28	40.37	40.37	40.37	40.38	40.36	14.50	0
02/04/2009 19:48	24.53	24.48	24.5	24.43	24.53	24.5	24.50	40.06	39.98	40.06	40.05	40.06	40.07	40.05	15.55	0
02/04/2009 19:51	24.59	24.56	24.58	24.53	24.63	24.6	24.58	40.77	40.61	40.74	40.81	40.86	40.87	40.78	16.20	0.831
02/04/2009	24.72	24.69	24.71	24.65	24.75	24.72	24.71	42.02	41.88	42.06	42.26	42.3	42.25	42.13	17.42	0

19:54															
02/04/2009 19:57	24.83	24.79	24.81	24.76	24.85	24.83	24.81	41.53	41.43	41.55	41.66	41.65	41.63	41.58	16.76	0
02/04/2009 20:00	24.94	24.91	24.93	24.88	24.97	24.94	24.93	41.13	41.03	41.14	41.18	41.17	41.17	41.14	16.21	0
02/04/2009 20:03	25.04	25.01	25.02	24.97	25.06	25.03	25.02	40.75	40.66	40.76	40.76	40.76	40.77	40.74	15.72	0
02/04/2009 20:06	25.14	25.11	25.13	25.07	25.16	25.13	25.12	40.41	40.32	40.41	40.4	40.41	40.41	40.39	15.27	0
02/04/2009 20:09	25.25	25.21	25.23	25.18	25.26	25.24	25.23	40.09	40.01	40.09	40.08	40.08	40.09	40.07	14.85	0
02/04/2009 20:12	25.34	25.3	25.32	25.27	25.36	25.33	25.32	40.75	40.53	40.69	40.73	40.78	40.79	40.71	15.39	0
02/04/2009 20:15	25.44	25.41	25.42	25.38	25.46	25.43	25.42	42.09	41.94	42.13	42.33	42.39	42.34	42.20	16.78	0
02/04/2009 20:18	25.53	25.5	25.51	25.46	25.55	25.52	25.51	41.58	41.47	41.6	41.72	41.71	41.69	41.63	16.12	0
02/04/2009 20:21	25.62	25.59	25.6	25.55	25.64	25.61	25.60	41.16	41.06	41.17	41.22	41.2	41.2	41.17	15.57	0
02/04/2009 20:24	25.72	25.69	25.7	25.65	25.74	25.71	25.70	40.79	40.69	40.79	40.8	40.79	40.8	40.78	15.08	0
02/04/2009 20:27	25.81	25.78	25.79	25.74	25.83	25.79	25.79	40.43	40.34	40.43	40.43	40.43	40.44	40.42	14.63	0
02/04/2009 20:30	25.89	25.86	25.87	25.82	25.91	25.88	25.87	40.1	40.01	40.1	40.09	40.09	40.1	40.08	14.21	0
02/04/2009 20:33	25.99	25.95	25.97	25.91	26	25.97	25.97	40.72	40.51	40.66	40.7	40.74	40.76	40.68	14.72	0
02/04/2009 20:36	26.06	26.03	26.04	25.99	26.08	26.05	26.04	42.09	41.92	42.13	42.32	42.39	42.33	42.20	16.16	0
02/04/2009 20:39	26.15	26.13	26.14	26.09	26.17	26.14	26.14	41.58	41.47	41.6	41.72	41.71	41.69	41.63	15.49	0
02/04/2009 20:42	26.24	26.22	26.22	26.17	26.26	26.23	26.22	41.16	41.06	41.17	41.22	41.21	41.21	41.17	14.95	0
02/04/2009 20:45	26.33	26.31	26.31	26.27	26.35	26.32	26.32	40.79	40.69	40.79	40.81	40.8	40.81	40.78	14.47	0
02/04/2009 20:48	26.4	26.38	26.39	26.34	26.42	26.39	26.39	40.43	40.34	40.43	40.43	40.43	40.44	40.42	14.03	0
02/04/2009 20:51	25.81	25.76	25.74	25.71	25.77	25.72	25.75	40.12	40.04	40.12	40.11	40.12	40.13	40.11	14.36	0
02/04/2009 20:54	24.57	24.52	24.55	24.48	24.57	24.55	24.54	40.75	40.55	40.7	40.74	40.79	40.8	40.72	16.18	0
02/04/2009 20:57	24.67	24.64	24.66	24.61	24.7	24.68	24.66	42.12	41.96	42.16	42.36	42.43	42.37	42.23	17.57	0
02/04/2009 21:00	24.79	24.76	24.78	24.73	24.82	24.79	24.78	41.61	41.51	41.64	41.76	41.75	41.73	41.67	16.89	0

02/04/2009 21:03	24.91	24.87	24.89	24.84	24.93	24.9	24.89	41.2	41.1	41.21	41.26	41.25	41.25	41.21	16.32	0
02/04/2009 21:06	25.01	24.98	25	24.94	25.04	25.01	25.00	40.82	40.73	40.82	40.84	40.84	40.84	40.82	15.82	0
02/04/2009 21:09	25.11	25.08	25.09	25.04	25.14	25.1	25.09	40.47	40.38	40.47	40.47	40.47	40.48	40.46	15.36	0
02/04/2009 21:12	25.21	25.18	25.2	25.14	25.23	25.2	25.19	40.15	40.06	40.15	40.14	40.14	40.15	40.13	14.94	0
02/04/2009 21:15	25.3	25.27	25.29	25.24	25.32	25.3	25.29	40.04	39.97	40.01	40.04	40.02	40.07	40.03	14.74	0.844
02/04/2009 21:18	25.4	25.37	25.38	25.33	25.42	25.39	25.38	42.23	42.02	42.25	42.44	42.54	42.48	42.33	16.95	0
02/04/2009 21:21	25.51	25.47	25.49	25.44	25.53	25.5	25.49	41.68	41.57	41.7	41.84	41.83	41.82	41.74	16.25	0
02/04/2009 21:24	25.59	25.56	25.58	25.52	25.61	25.58	25.57	41.25	41.14	41.25	41.31	41.3	41.3	41.26	15.69	0
02/04/2009 21:27	25.69	25.66	25.67	25.62	25.7	25.68	25.67	40.86	40.77	40.86	40.88	40.88	40.88	40.86	15.19	0
02/04/2009 21:30	25.78	25.75	25.76	25.71	25.8	25.77	25.76	40.51	40.41	40.51	40.51	40.51	40.52	40.50	14.73	0
02/04/2009 21:33	25.87	25.84	25.85	25.8	25.88	25.86	25.85	40.17	40.09	40.18	40.17	40.17	40.18	40.16	14.31	0
02/04/2009 21:36	25.96	25.93	25.94	25.89	25.97	25.95	25.94	40.01	39.95	39.99	40.02	40	40.04	40.00	14.06	0.832
02/04/2009 21:39	26.04	26.02	26.03	25.97	26.06	26.03	26.03	42.21	41.99	42.23	42.41	42.51	42.45	42.30	16.28	0
02/04/2009 21:42	26.13	26.1	26.11	26.06	26.14	26.12	26.11	41.65	41.54	41.68	41.81	41.8	41.79	41.71	15.60	0
02/04/2009 21:45	26.22	26.19	26.19	26.15	26.23	26.2	26.20	41.23	41.12	41.23	41.29	41.28	41.28	41.24	15.04	0
02/04/2009 21:48	26.29	26.26	26.28	26.23	26.31	26.29	26.28	40.84	40.74	40.84	40.86	40.85	40.86	40.83	14.56	0
02/04/2009 21:51	26.37	26.36	26.37	26.31	26.39	26.37	26.36	40.49	40.4	40.49	40.49	40.49	40.5	40.48	14.12	0
02/04/2009 21:54	26.24	26.2	26.18	26.15	26.22	26.18	26.20	40.17	40.08	40.17	40.16	40.16	40.17	40.15	13.96	0
02/04/2009 21:57	24.69	24.64	24.65	24.58	24.66	24.63	24.64	39.95	39.9	39.95	39.96	39.95	39.98	39.95	15.31	0.84
02/04/2009 22:00	24.56	24.52	24.55	24.49	24.59	24.57	24.55	42.29	42.06	42.31	42.5	42.6	42.55	42.39	17.84	0
02/04/2009 22:03	24.69	24.65	24.68	24.62	24.71	24.68	24.67	41.72	41.61	41.75	41.89	41.88	41.86	41.79	17.11	0
02/04/2009 22:06	24.8	24.77	24.79	24.73	24.82	24.8	24.79	41.29	41.19	41.31	41.37	41.35	41.35	41.31	16.53	0
02/04/2009	24.91	24.87	24.89	24.84	24.93	24.9	24.89	40.91	40.81	40.91	40.93	40.93	40.93	40.90	16.01	0

22:09																
02/04/2009 22:12	25.03	24.99	25.01	24.95	25.04	25.01	25.01	40.57	40.47	40.56	40.56	40.57	40.57	40.55	15.55	0
02/04/2009 22:15	25.12	25.09	25.1	25.05	25.14	25.11	25.10	40.23	40.15	40.23	40.22	40.22	40.23	40.21	15.11	0
02/04/2009 22:18	25.21	25.18	25.2	25.15	25.23	25.2	25.20	39.92	39.84	39.92	39.9	39.91	39.92	39.90	14.71	0
02/04/2009 22:21	25.31	25.28	25.29	25.23	25.32	25.29	25.29	42.21	41.97	42.16	42.35	42.44	42.44	42.26	16.98	0
02/04/2009 22:24	25.4	25.37	25.39	25.34	25.42	25.4	25.39	41.77	41.65	41.79	41.95	41.95	41.93	41.84	16.45	0
02/04/2009 22:27	25.51	25.47	25.48	25.43	25.52	25.49	25.48	41.33	41.23	41.34	41.41	41.4	41.4	41.35	15.87	0
02/04/2009 22:30	25.6	25.57	25.58	25.52	25.61	25.59	25.58	40.93	40.84	40.94	40.97	40.96	40.96	40.93	15.36	0
02/04/2009 22:33	25.68	25.65	25.67	25.62	25.7	25.67	25.67	40.58	40.48	40.57	40.57	40.57	40.58	40.56	14.89	0
02/04/2009 22:36	25.78	25.75	25.76	25.7	25.78	25.76	25.76	40.24	40.14	40.24	40.23	40.22	40.24	40.22	14.46	0
02/04/2009 22:39	25.87	25.84	25.85	25.79	25.87	25.85	25.85	39.92	39.84	39.92	39.91	39.91	39.92	39.90	14.06	0
02/04/2009 22:42	25.95	25.92	25.93	25.88	25.96	25.94	25.93	42.28	42.01	42.24	42.43	42.53	42.5	42.33	16.40	0
02/04/2009 22:45	26.03	26.01	26.02	25.97	26.05	26.02	26.02	41.76	41.65	41.79	41.95	41.94	41.92	41.84	15.82	0
02/04/2009 22:48	26.11	26.09	26.1	26.05	26.13	26.1	26.10	41.32	41.21	41.33	41.4	41.39	41.39	41.34	15.24	0
02/04/2009 22:51	26.21	26.18	26.19	26.14	26.22	26.2	26.19	40.93	40.84	40.94	40.96	40.95	40.96	40.93	14.74	0
02/04/2009 22:54	26.29	26.26	26.27	26.23	26.3	26.28	26.27	40.58	40.48	40.57	40.57	40.58	40.58	40.56	14.29	0
02/04/2009 22:57	26.38	26.35	26.36	26.32	26.39	26.37	26.36	40.25	40.16	40.24	40.24	40.24	40.25	40.23	13.87	0
02/04/2009 23:00	26.24	26.2	26.19	26.15	26.22	26.18	26.20	39.94	39.85	39.94	39.92	39.93	39.93	39.92	13.72	0
02/04/2009 23:03	24.7	24.64	24.65	24.59	24.66	24.64	24.65	42.19	41.97	42.16	42.35	42.44	42.44	42.26	17.61	0
02/04/2009 23:06	24.58	24.55	24.57	24.51	24.61	24.59	24.57	41.8	41.68	41.83	41.99	41.99	41.96	41.88	17.31	0
02/04/2009 23:09	24.7	24.67	24.7	24.63	24.73	24.7	24.69	41.36	41.25	41.37	41.44	41.43	41.43	41.38	16.69	0
02/04/2009 23:12	24.82	24.78	24.8	24.75	24.83	24.81	24.80	40.97	40.87	40.97	41	40.99	41	40.97	16.17	0
02/04/2009 23:15	24.93	24.9	24.91	24.86	24.94	24.92	24.91	40.62	40.52	40.61	40.61	40.61	40.62	40.60	15.69	0

02/04/2009 23:18	25.03	25	25.02	24.96	25.04	25.02	25.01	40.28	40.2	40.28	40.27	40.27	40.28	40.26	15.25	0
02/04/2009 23:21	25.13	25.1	25.12	25.06	25.15	25.12	25.11	39.97	39.89	39.97	39.95	39.95	39.97	39.95	14.84	0
02/04/2009 23:24	25.23	25.2	25.22	25.16	25.24	25.22	25.21	41.78	41.6	41.75	41.92	41.99	41.99	41.84	16.63	0.828
02/04/2009 23:27	25.32	25.3	25.31	25.26	25.34	25.31	25.31	41.86	41.75	41.89	42.06	42.07	42.04	41.95	16.64	0
02/04/2009 23:30	25.41	25.38	25.4	25.35	25.42	25.4	25.39	41.41	41.3	41.41	41.5	41.48	41.48	41.43	16.04	0
02/04/2009 23:33	25.51	25.48	25.5	25.45	25.52	25.5	25.49	41.01	40.91	41.01	41.04	41.04	41.04	41.01	15.52	0
02/04/2009 23:36	25.6	25.58	25.59	25.54	25.62	25.6	25.59	40.64	40.55	40.64	40.64	40.64	40.66	40.63	15.04	0
02/04/2009 23:39	25.69	25.66	25.68	25.63	25.7	25.68	25.67	40.3	40.21	40.3	40.29	40.29	40.31	40.28	14.61	0
02/04/2009 23:42	25.78	25.75	25.77	25.71	25.79	25.77	25.76	39.99	39.9	39.99	39.97	39.97	39.99	39.97	14.21	0
02/04/2009 23:45	25.87	25.84	25.85	25.81	25.88	25.86	25.85	41.5	41.27	41.48	41.59	41.69	41.65	41.53	15.68	0.833
02/04/2009 23:48	25.96	25.92	25.94	25.89	25.97	25.94	25.94	41.81	41.69	41.85	42.02	42.03	42	41.90	15.96	0
02/04/2009 23:51	26.04	26.01	26.02	25.97	26.05	26.03	26.02	41.36	41.26	41.37	41.46	41.44	41.44	41.39	15.37	0
02/04/2009 23:54	26.12	26.1	26.11	26.06	26.13	26.12	26.11	40.96	40.86	40.97	40.99	40.99	40.99	40.96	14.85	0
02/04/2009 23:57	26.22	26.19	26.2	26.15	26.23	26.21	26.20	40.61	40.51	40.61	40.61	40.62	40.62	40.60	14.40	0
03/04/2009 00:00	26.3	26.27	26.28	26.23	26.3	26.29	26.28	40.27	40.18	40.27	40.26	40.27	40.27	40.25	13.98	0
03/04/2009 00:03	26.38	26.36	26.37	26.32	26.39	26.37	26.37	39.96	39.87	39.96	39.94	39.94	39.96	39.94	13.57	0
03/04/2009 00:06	26.09	26.04	26.02	25.99	26.05	26.01	26.03	42.13	41.92	42.09	42.28	42.36	42.36	42.19	16.16	0
03/04/2009 00:09	24.6	24.55	24.56	24.49	24.57	24.55	24.55	41.79	41.68	41.82	41.98	41.99	41.96	41.87	17.32	0
03/04/2009 00:12	24.59	24.56	24.58	24.52	24.61	24.59	24.58	41.35	41.25	41.37	41.44	41.43	41.43	41.38	16.80	0
03/04/2009 00:15	24.71	24.67	24.69	24.64	24.73	24.71	24.69	40.95	40.86	40.96	40.98	40.98	40.99	40.95	16.26	0
03/04/2009 00:18	24.82	24.79	24.81	24.75	24.84	24.81	24.80	40.6	40.51	40.6	40.6	40.61	40.62	40.59	15.79	0
03/04/2009 00:21	24.93	24.9	24.91	24.86	24.94	24.92	24.91	40.27	40.19	40.27	40.26	40.27	40.28	40.26	15.35	0
03/04/2009	25.03	24.99	25.01	24.95	25.04	25.01	25.01	39.96	39.87	39.96	39.94	39.95	39.96	39.94	14.94	0

00:24																
03/04/2009 00:27	25.12	25.09	25.1	25.05	25.14	25.12	25.10	41.81	41.63	41.78	41.95	42.02	42.02	41.87	16.77	0.829
03/04/2009 00:30	25.23	25.19	25.21	25.16	25.24	25.22	25.21	41.8	41.68	41.83	41.99	41.99	41.97	41.88	16.67	0
03/04/2009 00:33	25.32	25.28	25.3	25.25	25.33	25.3	25.30	41.34	41.24	41.35	41.43	41.42	41.41	41.37	16.07	0
03/04/2009 00:36	25.42	25.39	25.4	25.35	25.43	25.41	25.40	40.96	40.86	40.96	40.99	40.98	40.98	40.96	15.56	0
03/04/2009 00:39	25.5	25.47	25.49	25.44	25.52	25.5	25.49	40.58	40.49	40.59	40.59	40.58	40.59	40.57	15.08	0
03/04/2009 00:42	25.6	25.56	25.58	25.52	25.6	25.58	25.57	40.25	40.15	40.24	40.24	40.24	40.25	40.23	14.66	0
03/04/2009 00:45	25.68	25.65	25.67	25.61	25.69	25.67	25.66	39.94	39.85	39.93	39.92	39.92	39.94	39.92	14.26	0
03/04/2009 00:48	25.77	25.74	25.75	25.7	25.78	25.76	25.75	42.3	42.03	42.27	42.45	42.56	42.52	42.36	16.61	0
03/04/2009 00:51	25.85	25.82	25.84	25.78	25.86	25.84	25.83	41.71	41.6	41.74	41.89	41.88	41.86	41.78	15.95	0
03/04/2009 00:54	25.95	25.92	25.93	25.88	25.96	25.94	25.93	41.29	41.18	41.3	41.35	41.35	41.34	41.30	15.37	0
03/04/2009 00:57	26.04	26.01	26.02	25.97	26.04	26.03	26.02	40.9	40.8	40.9	40.92	40.92	40.92	40.89	14.88	0
03/04/2009 01:00	26.11	26.09	26.09	26.04	26.12	26.1	26.09	40.53	40.44	40.53	40.53	40.53	40.54	40.52	14.43	0
03/04/2009 01:03	26.2	26.18	26.19	26.13	26.21	26.19	26.18	40.21	40.12	40.21	40.19	40.2	40.21	40.19	14.01	0
03/04/2009 01:06	26.29	26.26	26.27	26.21	26.29	26.27	26.27	39.9	39.81	39.9	39.88	39.89	39.89	39.88	13.61	0.827
03/04/2009 01:09	26.36	26.34	26.35	26.3	26.38	26.36	26.35	42.32	42.06	42.31	42.49	42.62	42.55	42.39	16.04	0
03/04/2009 01:12	26.21	26.18	26.16	26.13	26.18	26.15	26.17	41.73	41.62	41.76	41.89	41.9	41.87	41.80	15.63	0
03/04/2009 01:15	24.65	24.6	24.6	24.54	24.61	24.6	24.60	41.29	41.19	41.31	41.37	41.37	41.36	41.32	16.72	0
03/04/2009 01:18	24.52	24.49	24.51	24.46	24.54	24.53	24.51	40.91	40.82	40.92	40.94	40.94	40.94	40.91	16.40	0
03/04/2009 01:21	24.64	24.62	24.64	24.58	24.67	24.65	24.63	40.56	40.46	40.56	40.55	40.55	40.56	40.54	15.91	0
03/04/2009 01:24	24.75	24.72	24.74	24.69	24.77	24.75	24.74	40.23	40.13	40.23	40.21	40.22	40.23	40.21	15.47	0
03/04/2009 01:27	24.86	24.83	24.84	24.79	24.87	24.85	24.84	39.91	39.83	39.92	39.89	39.9	39.91	39.89	15.05	0
03/04/2009 01:30	24.97	24.93	24.95	24.89	24.97	24.95	24.94	42.31	42.04	42.29	42.46	42.59	42.54	42.37	17.43	0

03/04/2009 01:33	25.06	25.03	25.05	24.99	25.07	25.05	25.04	41.72	41.62	41.75	41.9	41.9	41.87	41.79	16.75	0
03/04/2009 01:36	25.16	25.13	25.14	25.09	25.17	25.15	25.14	41.29	41.19	41.3	41.37	41.36	41.36	41.31	16.17	0
03/04/2009 01:39	25.26	25.22	25.24	25.18	25.26	25.24	25.23	40.9	40.8	40.9	40.92	40.92	40.92	40.89	15.66	0
03/04/2009 01:42	25.35	25.32	25.34	25.28	25.35	25.34	25.33	40.54	40.45	40.54	40.54	40.54	40.55	40.53	15.20	0
03/04/2009 01:45	25.44	25.41	25.42	25.37	25.45	25.43	25.42	40.21	40.12	40.2	40.19	40.2	40.21	40.19	14.77	0
03/04/2009 01:48	25.54	25.51	25.52	25.47	25.54	25.53	25.52	39.9	39.81	39.9	39.89	39.89	39.9	39.88	14.36	0
03/04/2009 01:51	25.62	25.59	25.61	25.55	25.63	25.61	25.60	42.34	42.08	42.34	42.52	42.64	42.58	42.42	16.82	0
03/04/2009 01:54	25.7	25.68	25.69	25.64	25.71	25.7	25.69	41.74	41.63	41.76	41.91	41.9	41.89	41.81	16.12	0
03/04/2009 01:57	25.79	25.76	25.78	25.72	25.8	25.78	25.77	41.3	41.2	41.31	41.37	41.36	41.36	41.32	15.55	0
03/04/2009 02:00	25.88	25.85	25.87	25.82	25.89	25.87	25.86	40.92	40.82	40.92	40.94	40.93	40.94	40.91	15.05	0
03/04/2009 02:03	25.96	25.93	25.95	25.89	25.97	25.95	25.94	40.55	40.45	40.55	40.54	40.55	40.55	40.53	14.59	0
03/04/2009 02:06	26.05	26.03	26.04	25.99	26.06	26.05	26.04	40.22	40.13	40.22	40.21	40.21	40.22	40.20	14.17	0
03/04/2009 02:09	26.13	26.11	26.12	26.07	26.13	26.13	26.12	39.9	39.82	39.9	39.88	39.9	39.9	39.88	13.77	0.823
03/04/2009 02:12	26.22	26.19	26.2	26.15	26.23	26.21	26.20	42.31	42.06	42.31	42.49	42.61	42.55	42.39	16.19	0
03/04/2009 02:15	26.3	26.27	26.28	26.23	26.31	26.29	26.28	41.72	41.61	41.75	41.89	41.88	41.87	41.79	15.51	0
03/04/2009 02:18	26.38	26.36	26.37	26.32	26.39	26.37	26.37	41.29	41.18	41.3	41.36	41.35	41.35	41.31	14.94	0
03/04/2009 02:21	25.88	25.83	25.81	25.77	25.82	25.79	25.82	40.91	40.81	40.91	40.93	40.93	40.93	40.90	15.09	0
03/04/2009 02:24	24.5	24.46	24.49	24.41	24.49	24.48	24.47	40.55	40.47	40.55	40.55	40.56	40.56	40.54	16.07	0
03/04/2009 02:27	24.57	24.54	24.57	24.5	24.59	24.58	24.56	40.22	40.13	40.22	40.21	40.22	40.23	40.21	15.65	0
03/04/2009 02:30	24.7	24.67	24.7	24.63	24.72	24.7	24.69	39.92	39.84	39.92	39.91	39.91	39.93	39.91	15.22	0
03/04/2009 02:33	24.81	24.78	24.8	24.74	24.83	24.81	24.80	42.36	42.08	42.33	42.51	42.64	42.58	42.42	17.62	0
03/04/2009 02:36	24.91	24.88	24.9	24.84	24.92	24.9	24.89	41.75	41.65	41.79	41.93	41.93	41.91	41.83	16.94	0
03/04/2009	25.02	24.98	25	24.94	25.02	25	24.99	41.33	41.23	41.34	41.4	41.39	41.39	41.35	16.35	0

02:39																
03/04/2009 02:42	25.11	25.07	25.09	25.04	25.12	25.09	25.09	40.93	40.84	40.94	40.95	40.95	40.96	40.93	15.84	0
03/04/2009 02:45	25.2	25.17	25.19	25.13	25.21	25.19	25.18	40.58	40.48	40.57	40.57	40.57	40.58	40.56	15.38	0
03/04/2009 02:48	25.3	25.27	25.29	25.23	25.31	25.29	25.28	40.25	40.15	40.24	40.23	40.24	40.24	40.23	14.94	0
03/04/2009 02:51	25.38	25.35	25.37	25.31	25.39	25.38	25.36	39.92	39.83	39.92	39.91	39.91	39.92	39.90	14.54	0
03/04/2009 02:54	25.47	25.45	25.46	25.41	25.49	25.47	25.46	42.32	42.04	42.27	42.46	42.57	42.54	42.37	16.91	0
03/04/2009 02:57	25.57	25.54	25.55	25.5	25.57	25.56	25.55	41.77	41.66	41.8	41.95	41.95	41.93	41.84	16.30	0
03/04/2009 03:00	25.66	25.63	25.64	25.59	25.66	25.65	25.64	41.33	41.23	41.33	41.41	41.4	41.4	41.35	15.71	0
03/04/2009 03:03	25.74	25.72	25.73	25.68	25.75	25.74	25.73	40.93	40.84	40.93	40.96	40.95	40.96	40.93	15.20	0
03/04/2009 03:06	25.83	25.81	25.82	25.77	25.84	25.82	25.82	40.58	40.48	40.57	40.57	40.57	40.58	40.56	14.74	0
03/04/2009 03:09	25.91	25.89	25.9	25.84	25.92	25.9	25.89	40.23	40.14	40.23	40.22	40.22	40.23	40.21	14.32	0
03/04/2009 03:12	26	25.97	25.99	25.93	26	25.99	25.98	39.92	39.83	39.91	39.9	39.91	39.92	39.90	13.92	0
03/04/2009 03:15	26.08	26.05	26.07	26.01	26.09	26.07	26.06	42.35	42.09	42.34	42.52	42.65	42.59	42.42	16.36	0
03/04/2009 03:18	26.16	26.14	26.15	26.1	26.17	26.16	26.15	41.76	41.65	41.79	41.93	41.93	41.91	41.83	15.68	0
03/04/2009 03:21	26.25	26.23	26.23	26.19	26.25	26.25	26.23	41.33	41.22	41.33	41.4	41.38	41.39	41.34	15.11	0
03/04/2009 03:24	26.33	26.3	26.32	26.26	26.34	26.33	26.31	40.94	40.84	40.94	40.95	40.95	40.96	40.93	14.62	0
03/04/2009 03:27	26.41	26.38	26.39	26.34	26.41	26.39	26.39	40.57	40.48	40.58	40.57	40.58	40.58	40.56	14.17	0
03/04/2009 03:30	25.12	25.07	25.05	25	25.04	25.02	25.05	40.25	40.16	40.25	40.24	40.25	40.26	40.24	15.19	0
03/04/2009 03:33	24.42	24.39	24.41	24.35	24.44	24.43	24.41	39.93	39.85	39.93	39.92	39.93	39.94	39.92	15.51	0
03/04/2009 03:36	24.56	24.53	24.55	24.49	24.58	24.56	24.55	42.36	42.09	42.32	42.51	42.63	42.59	42.42	17.87	0
03/04/2009 03:39	24.68	24.64	24.66	24.61	24.69	24.68	24.66	41.81	41.7	41.85	42	42	41.98	41.89	17.23	0
03/04/2009 03:42	24.78	24.75	24.77	24.72	24.8	24.78	24.77	41.38	41.27	41.39	41.46	41.44	41.44	41.40	16.63	0
03/04/2009 03:45	24.88	24.86	24.87	24.82	24.9	24.88	24.87	40.98	40.89	40.99	41.01	41	41.01	40.98	16.11	0

03/04/2009 03:48	24.98	24.95	24.96	24.91	24.99	24.97	24.96	40.62	40.52	40.61	40.61	40.61	40.62	40.60	15.64	0
03/04/2009 03:51	25.08	25.05	25.06	25.01	25.09	25.07	25.06	40.29	40.19	40.28	40.27	40.27	40.28	40.26	15.20	0
03/04/2009 03:54	25.18	25.15	25.16	25.11	25.18	25.16	25.16	39.97	39.88	39.97	39.95	39.95	39.97	39.95	14.79	0
03/04/2009 03:57	25.26	25.23	25.25	25.2	25.27	25.25	25.24	41.87	41.68	41.84	42.02	42.09	42.1	41.93	16.69	0
03/04/2009 04:00	25.36	25.33	25.34	25.29	25.37	25.35	25.34	41.77	41.64	41.79	41.96	41.96	41.93	41.84	16.50	0
03/04/2009 04:03	25.45	25.42	25.43	25.38	25.46	25.44	25.43	41.32	41.21	41.33	41.4	41.39	41.39	41.34	15.91	0
03/04/2009 04:06	25.54	25.5	25.52	25.47	25.54	25.52	25.52	40.92	40.81	40.92	40.94	40.94	40.95	40.91	15.40	0
03/04/2009 04:09	25.63	25.6	25.62	25.55	25.63	25.62	25.61	40.56	40.46	40.56	40.56	40.56	40.57	40.55	14.94	0
03/04/2009 04:12	25.72	25.69	25.7	25.64	25.72	25.7	25.70	40.22	40.13	40.22	40.21	40.21	40.22	40.20	14.51	0
03/04/2009 04:15	25.8	25.77	25.78	25.72	25.8	25.78	25.78	39.96	39.89	39.95	39.96	39.95	39.98	39.95	14.17	0.824
03/04/2009 04:18	25.89	25.86	25.87	25.82	25.89	25.87	25.87	42.24	42.01	42.24	42.43	42.54	42.48	42.32	16.46	0
03/04/2009 04:21	25.97	25.94	25.95	25.9	25.97	25.96	25.95	41.66	41.55	41.69	41.82	41.82	41.8	41.72	15.78	0
03/04/2009 04:24	26.05	26.02	26.04	25.98	26.06	26.04	26.03	41.24	41.13	41.24	41.3	41.29	41.29	41.25	15.22	0
03/04/2009 04:27	26.13	26.11	26.11	26.06	26.14	26.12	26.11	40.85	40.75	40.85	40.86	40.86	40.87	40.84	14.73	0
03/04/2009 04:30	26.21	26.18	26.19	26.14	26.21	26.2	26.19	40.49	40.38	40.48	40.48	40.48	40.49	40.47	14.28	0
03/04/2009 04:33	26.29	26.26	26.28	26.22	26.3	26.29	26.27	40.16	40.07	40.16	40.14	40.15	40.16	40.14	13.87	0
03/04/2009 04:36	26.37	26.34	26.35	26.3	26.37	26.36	26.35	40.74	40.54	40.68	40.71	40.76	40.79	40.70	14.36	0
03/04/2009 04:39	25.71	25.66	25.63	25.6	25.64	25.61	25.64	42.11	41.94	42.15	42.34	42.42	42.36	42.22	16.58	0
03/04/2009 04:42	24.41	24.37	24.39	24.32	24.4	24.4	24.38	41.6	41.49	41.63	41.74	41.74	41.73	41.66	17.27	0
03/04/2009 04:45	24.5	24.47	24.49	24.43	24.52	24.5	24.49	41.18	41.08	41.19	41.23	41.24	41.24	41.19	16.71	0
03/04/2009 04:48	24.62	24.59	24.61	24.55	24.63	24.62	24.60	40.81	40.71	40.81	40.82	40.82	40.83	40.80	16.20	0
03/04/2009 04:51	24.72	24.69	24.71	24.65	24.73	24.72	24.70	40.45	40.36	40.45	40.44	40.45	40.46	40.44	15.73	0
03/04/2009	24.83	24.79	24.82	24.76	24.84	24.82	24.81	40.13	40.04	40.13	40.11	40.12	40.13	40.11	15.30	0

04:54																
03/04/2009 04:57	24.93	24.89	24.91	24.85	24.93	24.91	24.90	40.78	40.56	40.72	40.75	40.81	40.82	40.74	15.84	0
03/04/2009 05:00	25.02	24.99	25.01	24.94	25.02	25.01	25.00	42.08	41.92	42.12	42.31	42.38	42.32	42.19	17.19	0
03/04/2009 05:03	25.12	25.08	25.1	25.04	25.12	25.11	25.10	41.58	41.47	41.59	41.71	41.7	41.69	41.62	16.53	0
03/04/2009 05:06	25.21	25.18	25.2	25.14	25.22	25.2	25.19	41.16	41.06	41.16	41.21	41.2	41.21	41.17	15.98	0
03/04/2009 05:09	25.31	25.28	25.29	25.23	25.31	25.29	25.29	40.78	40.68	40.78	40.79	40.79	40.8	40.77	15.49	0
03/04/2009 05:12	25.39	25.36	25.37	25.32	25.4	25.38	25.37	40.42	40.32	40.42	40.42	40.42	40.43	40.41	15.04	0
03/04/2009 05:15	25.48	25.45	25.46	25.41	25.48	25.47	25.46	40.09	40	40.09	40.08	40.08	40.09	40.07	14.61	0
03/04/2009 05:18	25.56	25.54	25.55	25.49	25.57	25.56	25.55	40.93	40.77	40.89	40.98	41.02	41.04	40.94	15.39	0.829
03/04/2009 05:21	25.65	25.62	25.63	25.58	25.65	25.64	25.63	41.97	41.83	42.01	42.2	42.24	42.19	42.07	16.45	0
03/04/2009 05:24	25.74	25.7	25.72	25.66	25.74	25.72	25.71	41.49	41.37	41.51	41.6	41.59	41.59	41.53	15.81	0
03/04/2009 05:27	25.82	25.8	25.81	25.76	25.83	25.82	25.81	41.08	40.97	41.08	41.12	41.12	41.12	41.08	15.28	0
03/04/2009 05:30	25.9	25.88	25.89	25.84	25.91	25.9	25.89	40.7	40.59	40.7	40.7	40.71	40.71	40.69	14.80	0
03/04/2009 05:33	25.98	25.96	25.97	25.91	25.99	25.97	25.96	40.34	40.25	40.34	40.33	40.34	40.35	40.33	14.36	0
03/04/2009 05:36	26.08	26.05	26.06	26.01	26.08	26.07	26.06	40.03	39.94	40.03	40.01	40.02	40.03	40.01	13.95	0
03/04/2009 05:39	26.15	26.11	26.13	26.07	26.15	26.13	26.12	41.55	41.29	41.52	41.62	41.73	41.7	41.57	15.45	0
03/04/2009 05:42	26.22	26.2	26.21	26.16	26.23	26.22	26.21	41.85	41.73	41.9	42.06	42.08	42.05	41.95	15.74	0
03/04/2009 05:45	26.31	26.29	26.3	26.25	26.31	26.3	26.29	41.41	41.3	41.42	41.5	41.49	41.49	41.44	15.14	0
03/04/2009 05:48	26.39	26.36	26.37	26.32	26.39	26.38	26.37	41	40.9	41	41.03	41.03	41.03	41.00	14.63	0
03/04/2009 05:51	25.51	25.46	25.43	25.39	25.43	25.39	25.44	40.63	40.53	40.64	40.62	40.64	40.64	40.62	15.18	0
03/04/2009 05:54	24.41	24.38	24.4	24.33	24.41	24.4	24.39	40.29	40.19	40.29	40.28	40.3	40.3	40.28	15.89	0
03/04/2009 05:57	24.54	24.51	24.53	24.47	24.55	24.54	24.52	39.98	39.9	39.99	39.97	39.98	39.99	39.97	15.45	0
03/04/2009 06:00	24.65	24.61	24.63	24.57	24.66	24.64	24.63	41.93	41.74	41.9	42.08	42.16	42.16	42.00	17.37	0

03/04/2009 06:03	24.74	24.72	24.73	24.68	24.75	24.74	24.73	41.82	41.7	41.85	42.01	42.01	41.99	41.90	17.17	0
03/04/2009 06:06	24.86	24.83	24.84	24.79	24.86	24.85	24.84	41.38	41.27	41.39	41.46	41.45	41.45	41.40	16.56	0
03/04/2009 06:09	24.96	24.93	24.94	24.89	24.97	24.95	24.94	40.99	40.89	40.99	41.01	41.01	41.02	40.99	16.05	0
03/04/2009 06:12	25.05	25.02	25.03	24.98	25.05	25.04	25.03	40.62	40.52	40.62	40.61	40.62	40.63	40.60	15.58	0
03/04/2009 06:15	25.13	25.1	25.11	25.06	25.13	25.12	25.11	40.27	40.17	40.27	40.25	40.25	40.27	40.25	15.14	0
03/04/2009 06:18	25.23	25.2	25.21	25.16	25.23	25.22	25.21	39.95	39.86	39.95	39.94	39.94	39.95	39.93	14.72	0
03/04/2009 06:21	25.32	25.3	25.3	25.25	25.33	25.32	25.30	42.04	41.84	42.01	42.2	42.27	42.28	42.11	16.80	0
03/04/2009 06:24	25.41	25.38	25.39	25.34	25.41	25.4	25.39	41.76	41.65	41.79	41.94	41.95	41.92	41.84	16.45	0
03/04/2009 06:27	25.5	25.48	25.49	25.43	25.51	25.49	25.48	41.32	41.21	41.33	41.39	41.38	41.38	41.34	15.85	0
03/04/2009 06:30	25.59	25.55	25.57	25.51	25.59	25.57	25.56	40.91	40.81	40.91	40.94	40.93	40.94	40.91	15.34	0
03/04/2009 06:33	25.66	25.63	25.65	25.59	25.67	25.65	25.64	40.54	40.44	40.54	40.54	40.54	40.55	40.53	14.88	0
03/04/2009 06:36	25.76	25.73	25.75	25.69	25.76	25.75	25.74	40.21	40.12	40.21	40.2	40.2	40.22	40.19	14.45	0
03/04/2009 06:39	25.82	25.8	25.81	25.76	25.83	25.82	25.81	40.04	39.98	40.02	40.04	40.02	40.07	40.03	14.22	0.825
03/04/2009 06:42	25.92	25.89	25.9	25.85	25.92	25.91	25.90	42.2	41.97	42.21	42.39	42.49	42.44	42.28	16.39	0
03/04/2009 06:45	26	25.97	25.98	25.93	26	26	25.98	41.64	41.53	41.66	41.79	41.79	41.78	41.70	15.72	0
03/04/2009 06:48	26.08	26.05	26.07	26.01	26.08	26.07	26.06	41.21	41.11	41.22	41.27	41.26	41.26	41.22	15.16	0
03/04/2009 06:51	26.16	26.14	26.15	26.09	26.16	26.15	26.14	40.82	40.72	40.82	40.83	40.83	40.84	40.81	14.67	0
03/04/2009 06:54	26.24	26.22	26.23	26.18	26.25	26.24	26.23	40.48	40.38	40.47	40.47	40.47	40.48	40.46	14.23	0
03/04/2009 06:57	26.32	26.3	26.3	26.25	26.32	26.31	26.30	40.14	40.05	40.14	40.12	40.13	40.14	40.12	13.82	0
03/04/2009 07:00	26.38	26.36	26.36	26.32	26.39	26.37	26.36	40.77	40.57	40.74	40.77	40.84	40.83	40.75	14.39	0.809
03/04/2009 07:03	25.14	25.09	25.07	25.02	25.06	25.04	25.07	42.03	41.89	42.08	42.26	42.32	42.26	42.14	17.07	0
03/04/2009 07:06	24.43	24.4	24.43	24.36	24.45	24.44	24.42	41.53	41.42	41.56	41.66	41.66	41.65	41.58	17.16	0
03/04/2009	24.57	24.53	24.56	24.5	24.58	24.57	24.55	41.13	41.02	41.13	41.17	41.17	41.17	41.13	16.58	0

07:09															
03/04/2009 07:12	24.67	24.64	24.66	24.61	24.68	24.68	24.66	40.75	40.65	40.75	40.75	40.76	40.77	40.74	16.08	0
03/04/2009 07:15	24.78	24.75	24.76	24.7	24.79	24.77	24.76	40.4	40.3	40.4	40.39	40.4	40.41	40.38	15.63	0
03/04/2009 07:18	24.88	24.85	24.87	24.81	24.89	24.87	24.86	40.08	39.99	40.08	40.06	40.07	40.08	40.06	15.20	0
03/04/2009 07:21	24.98	24.94	24.96	24.9	24.98	24.97	24.96	41.35	41.16	41.29	41.41	41.47	41.5	41.36	16.41	0
03/04/2009 07:24	25.07	25.03	25.05	24.99	25.07	25.05	25.04	41.9	41.77	41.94	42.12	42.14	42.11	42.00	16.95	0
03/04/2009 07:27	25.16	25.13	25.14	25.09	25.16	25.15	25.14	41.44	41.32	41.45	41.54	41.53	41.53	41.47	16.33	0
03/04/2009 07:30	25.25	25.22	25.23	25.18	25.25	25.24	25.23	41.02	40.92	41.03	41.06	41.06	41.06	41.03	15.80	0
03/04/2009 07:33	25.34	25.31	25.33	25.27	25.35	25.33	25.32	40.65	40.55	40.65	40.66	40.66	40.66	40.64	15.32	0
03/04/2009 07:36	25.42	25.39	25.41	25.35	25.43	25.42	25.40	40.3	40.21	40.3	40.29	40.3	40.31	40.29	14.88	0
03/04/2009 07:39	25.52	25.48	25.5	25.44	25.52	25.51	25.50	39.99	39.89	39.98	39.97	39.97	39.99	39.97	14.47	0
03/04/2009 07:42	25.6	25.57	25.59	25.53	25.61	25.59	25.58	41.93	41.74	41.9	42.08	42.15	42.16	41.99	16.41	0
03/04/2009 07:45	25.68	25.65	25.67	25.61	25.69	25.67	25.66	41.79	41.67	41.82	41.97	41.97	41.96	41.86	16.20	0
03/04/2009 07:48	25.77	25.74	25.75	25.69	25.77	25.76	25.75	41.34	41.23	41.35	41.42	41.41	41.41	41.36	15.61	0
03/04/2009 07:51	25.85	25.82	25.83	25.78	25.85	25.84	25.83	40.94	40.83	40.94	40.96	40.96	40.96	40.93	15.10	0
03/04/2009 07:54	25.93	25.9	25.92	25.86	25.93	25.93	25.91	40.57	40.47	40.57	40.57	40.57	40.58	40.56	14.64	0
03/04/2009 07:57	26.01	25.98	26	25.94	26.01	26	25.99	40.23	40.14	40.23	40.21	40.22	40.23	40.21	14.22	0
03/04/2009 08:00	26.08	26.05	26.07	26.01	26.08	26.08	26.06	40.13	40.06	40.1	40.13	40.11	40.16	40.12	14.05	0.825
03/04/2009 08:03	26.17	26.14	26.15	26.1	26.17	26.16	26.15	42.15	41.94	42.17	42.34	42.44	42.39	42.24	16.09	0
03/04/2009 08:06	26.25	26.23	26.24	26.19	26.26	26.24	26.24	41.61	41.5	41.63	41.75	41.75	41.73	41.66	15.43	0
03/04/2009 08:09	26.32	26.3	26.31	26.26	26.32	26.32	26.31	41.18	41.07	41.18	41.23	41.23	41.23	41.19	14.88	0
03/04/2009 08:12	26.34	26.31	26.3	26.27	26.33	26.31	26.31	40.8	40.7	40.8	40.81	40.81	40.82	40.79	14.48	0
03/04/2009 08:15	24.91	24.86	24.85	24.79	24.83	24.82	24.84	40.44	40.35	40.44	40.43	40.45	40.46	40.43	15.59	0

03/04/2009 08:18	24.45	24.42	24.44	24.38	24.47	24.46	24.44	40.12	40.04	40.12	40.11	40.12	40.13	40.11	15.67	0
03/04/2009 08:21	24.57	24.55	24.57	24.5	24.59	24.58	24.56	40.86	40.71	40.84	40.91	40.96	40.98	40.88	16.32	0.827
03/04/2009 08:24	24.68	24.65	24.67	24.62	24.7	24.68	24.67	42.04	41.9	42.08	42.27	42.31	42.27	42.15	17.48	0
03/04/2009 08:27	24.78	24.75	24.77	24.71	24.79	24.78	24.76	41.55	41.45	41.57	41.67	41.66	41.66	41.59	16.83	0
03/04/2009 08:30	24.88	24.85	24.87	24.81	24.89	24.88	24.86	41.14	41.04	41.15	41.18	41.18	41.19	41.15	16.28	0
03/04/2009 08:33	24.98	24.95	24.97	24.91	24.99	24.97	24.96	40.77	40.67	40.76	40.77	40.77	40.78	40.75	15.79	0
03/04/2009 08:36	25.07	25.04	25.06	25	25.08	25.06	25.05	40.41	40.32	40.41	40.4	40.41	40.41	40.39	15.34	0
03/04/2009 08:39	25.16	25.14	25.15	25.09	25.16	25.15	25.14	40.09	40	40.09	40.07	40.07	40.09	40.07	14.93	0
03/04/2009 08:42	25.25	25.22	25.24	25.18	25.26	25.24	25.23	41.14	40.97	41.08	41.18	41.23	41.27	41.15	15.91	0.721
03/04/2009 08:45	25.36	25.32	25.33	25.28	25.35	25.33	25.33	41.95	41.82	41.99	42.17	42.2	42.16	42.05	16.72	0
03/04/2009 08:48	25.45	25.41	25.43	25.36	25.43	25.42	25.42	41.48	41.36	41.49	41.57	41.57	41.56	41.51	16.09	0
03/04/2009 08:51	25.54	25.5	25.51	25.45	25.52	25.51	25.51	41.07	40.97	41.08	41.1	41.1	41.1	41.07	15.57	0
03/04/2009 08:54	25.61	25.57	25.58	25.52	25.58	25.58	25.57	40.7	40.59	40.69	40.68	40.69	40.7	40.68	15.10	0
03/04/2009 08:57	25.69	25.65	25.65	25.6	25.67	25.66	25.65	40.35	40.25	40.34	40.32	40.33	40.34	40.32	14.67	0
03/04/2009 09:00	25.77	25.71	25.72	25.66	25.73	25.73	25.72	40.02	39.92	40.01	39.99	40	40.01	39.99	14.27	0
03/04/2009 09:03	25.84	25.79	25.79	25.74	25.8	25.8	25.79	42.11	41.89	42.07	42.24	42.33	42.34	42.16	16.37	0
03/04/2009 09:06	25.89	25.84	25.85	25.79	25.86	25.86	25.85	41.76	41.64	41.79	41.92	41.93	41.91	41.83	15.98	0
03/04/2009 09:09	25.97	25.92	25.93	25.87	25.93	25.93	25.93	41.33	41.21	41.33	41.38	41.38	41.38	41.34	15.41	0
03/04/2009 09:12	26.02	25.97	25.99	25.93	25.99	25.99	25.98	40.91	40.81	40.91	40.92	40.92	40.94	40.90	14.92	0
03/04/2009 09:15	26.09	26.04	26.04	25.99	26.05	26.05	26.04	40.55	40.45	40.55	40.53	40.54	40.55	40.53	14.49	0
03/04/2009 09:18	26.15	26.09	26.1	26.04	26.11	26.11	26.10	40.21	40.11	40.21	40.17	40.19	40.2	40.18	14.08	0

APPENDIX B3 (Soil)

Panel : Soil Based (15.0kN/m^3)

		Time					
	Hour	**4.00pm**	**8.00pm**	**12.00mn**	**4.00am**	**8.00am**	**12.00noon**
	Location	**0.0**	**4.0**	**8.0**	**12.0**	**16.0**	**20.0**
Hot Room	Point A	28.4	53.0	55.1	55.4	55.5	54.7
	Point B	28.4	52.3	54.4	54.8	54.8	54.1
	Point C	28.3	51.7	53.9	54.2	54.3	53.6
	Point D1	28.4	46.9	49.8	50.4	50.5	50.1
	Point D2	28.9	47.5	50.5	51.2	51.3	51.0
	Point D3	28.6	46.0	48.7	49.3	49.4	49.0
	Avg Point D	28.60	46.75	49.63	50.28	50.38	50.00
Cool Room	Point E1	28.3	38.0	40.4	40.9	41.2	41.3
	Point E2	28.7	38.2	40.7	41.2	41.5	41.7
	Point E3	29.0	38.4	40.6	41.1	41.4	41.6
	Avg Point E	28.63	38.18	40.55	41.05	41.33	41.50
	Point F	27.8	32.3	33.5	33.7	34.2	34.8
	Point G	28.2	32.6	33.7	33.9	34.4	35.0
	Point H	27.9	32.2	33.3	33.5	33.9	34.6

APPENDIX B3 (Sand)

Panel : Sand-based (11.0kN/m^3)

		Time					
	Hour	**1.00pm**	**5.00pm**	**9.00pm**	**1.00am**	**5.00am**	**9.00am**
	Location	**0.0**	**4.0**	**8.0**	**12.0**	**16.0**	**20.0**
Hot Room	Point A	26.9	48.8	52.1	53.5	53.6	51.8
	Point B	27.1	48.1	51.4	52.8	52.9	51.2
	Point C	26.3	47.0	50.2	51.6	51.7	50.0
	Point D1	27.1	43.3	46.5	48.0	48.2	47.3
	Point D2	27.1	44.1	47.5	49.1	49.4	47.6
	Point D3	27.2	43.9	47.3	48.8	49.0	47.5
	Avg Point D	27.12	43.73	47.08	48.60	48.85	47.45
Cool Room	Point E1	27.3	32.9	39.1	40.0	40.4	39.5
	Point E2	27.4	36.7	39.0	40.1	40.4	39.7
	Point E3	27.4	36.0	38.1	39.3	39.5	38.8
	Avg Point E	27.33	35.17	38.70	39.75	40.07	39.30
	Point F	26.7	30.8	31.9	32.6	32.8	32.6
	Point G	27.3	31.1	32.2	32.9	33.0	32.8
	Point H	26.8	30.6	31.7	32.4	32.5	32.3

APPENDIX C1 - Thermal Conductivity Test

Prototype Panel P3 - 1

Date & Time	Cold Plate Temperature (^{0}C)						Average Cold Plate Temperature (^{0}C)	Hot Plate Temperature (^{0}C)						Average Cold Plate Temperature (^{0}C)	Temperature Difference (^{0}C)	Current (Ampere)
	TC1	TC2	TC3	TC4	TC5	TC6		TC1	TC2	TC3	TC4	TC5	TC6			
27/04/2009 09:30	26.24	26.2	26.19	26.13	26.14	26.14	26.17	43.34	42.97	43.46	43.44	43.97	43.69	43.48	17.31	0
27/04/2009 09:33	26.16	26.17	26.16	26.12	26.14	26.13	26.15	42.81	42.69	42.91	42.96	43.28	43.08	42.96	16.81	0
27/04/2009 09:36	26.22	26.2	26.18	26.16	26.16	26.17	26.18	42.18	42.17	42.2	42.29	42.43	42.33	42.27	16.09	0
27/04/2009 09:39	26.25	26.25	26.22	26.19	26.2	26.2	26.22	41.65	41.66	41.63	41.71	41.77	41.72	41.69	15.47	0
27/04/2009 09:42	26.22	26.21	26.18	26.16	26.17	26.17	26.19	41.18	41.2	41.14	41.21	41.24	41.21	41.20	15.01	0
27/04/2009 09:45	25.59	25.57	25.56	25.51	25.53	25.55	25.55	40.77	40.79	40.72	40.77	40.79	40.77	40.77	15.22	0
27/04/2009 09:48	25.61	25.62	25.6	25.58	25.59	25.61	25.60	40.38	40.41	40.34	40.37	40.38	40.36	40.37	14.77	0
27/04/2009 09:51	25.69	25.69	25.67	25.66	25.67	25.69	25.68	41.03	40.91	40.94	40.96	41.05	41.01	40.98	15.31	0
27/04/2009 09:54	25.75	25.77	25.75	25.73	25.75	25.76	25.75	42.52	42.41	42.53	42.54	42.75	42.62	42.56	16.81	0
27/04/2009 09:57	25.82	25.82	25.81	25.8	25.81	25.82	25.81	42	42	41.99	42.04	42.13	42.05	42.04	16.22	0
27/04/2009 10:00	25.89	25.9	25.88	25.87	25.88	25.89	25.89	41.57	41.59	41.54	41.58	41.62	41.57	41.58	15.69	0
27/04/2009 10:03	25.95	25.97	25.95	25.93	25.95	25.96	25.95	41.16	41.19	41.12	41.15	41.18	41.15	41.16	15.21	0
27/04/2009 10:06	26.02	26.03	26.01	26.01	26.01	26.02	26.02	40.78	40.82	40.74	40.77	40.78	40.75	40.77	14.76	0
27/04/2009 10:09	26.08	26.1	26.08	26.07	26.08	26.08	26.08	40.43	40.46	40.39	40.41	40.41	40.4	40.42	14.34	0
27/04/2009 10:12	26.15	26.17	26.15	26.13	26.15	26.15	26.15	40.1	40.13	40.07	40.07	40.08	40.06	40.09	13.94	0
27/04/2009 10:15	26.22	26.24	26.22	26.21	26.22	26.22	26.22	41.79	41.64	41.75	41.76	41.92	41.83	41.78	15.56	0.818
27/04/2009 10:18	25.91	25.91	25.88	25.86	25.87	25.86	25.88	42.2	42.17	42.21	42.24	42.38	42.28	42.25	16.37	0

27/04/2009 10:21	25.58	25.6	25.58	25.56	25.58	25.58	25.58	41.75	41.77	41.74	41.78	41.83	41.78	41.78	16.20	0
27/04/2009 10:24	25.7	25.72	25.7	25.68	25.7	25.7	25.70	41.36	41.38	41.33	41.36	41.38	41.34	41.36	15.66	0
27/04/2009 10:27	25.79	25.8	25.79	25.77	25.79	25.79	25.79	40.99	41.02	40.95	40.98	40.98	40.96	40.98	15.19	0
27/04/2009 10:30	25.87	25.88	25.87	25.85	25.87	25.87	25.87	40.63	40.67	40.6	40.62	40.62	40.6	40.62	14.76	0
27/04/2009 10:33	25.95	25.95	25.94	25.92	25.94	25.94	25.94	40.3	40.34	40.27	40.28	40.28	40.26	40.29	14.35	0
27/04/2009 10:36	26.01	26.03	26.01	26	26.02	26.01	26.01	39.99	40.02	39.96	39.97	39.96	39.95	39.98	13.96	0
27/04/2009 10:39	26.08	26.11	26.08	26.07	26.09	26.08	26.09	42.54	42.32	42.51	42.51	42.73	42.6	42.54	16.45	0
27/04/2009 10:42	26.16	26.17	26.16	26.14	26.16	26.15	26.16	42.04	42.03	42.06	42.08	42.19	42.1	42.08	15.93	0
27/04/2009 10:45	26.23	26.25	26.23	26.22	26.24	26.23	26.23	41.62	41.64	41.6	41.64	41.68	41.63	41.64	15.40	0
27/04/2009 10:48	25.88	25.87	25.83	25.81	25.82	25.8	25.84	41.24	41.27	41.21	41.24	41.25	41.22	41.24	15.40	0
27/04/2009 10:51	25.16	25.17	25.15	25.15	25.15	25.14	25.15	40.87	40.9	40.84	40.86	40.86	40.84	40.86	15.71	0
27/04/2009 10:54	25.27	25.28	25.26	25.28	25.27	25.26	25.27	40.54	40.57	40.51	40.53	40.52	40.5	40.53	15.26	0
27/04/2009 10:57	25.37	25.37	25.35	25.38	25.36	25.35	25.36	40.22	40.25	40.19	40.2	40.19	40.18	40.21	14.84	0
27/04/2009 11:00	25.45	25.46	25.45	25.47	25.45	25.45	25.46	40.36	40.39	40.29	40.37	40.34	40.31	40.34	14.89	0
27/04/2009 11:03	25.54	25.55	25.53	25.56	25.54	25.52	25.54	42.45	42.3	42.46	42.46	42.67	42.54	42.48	16.94	0
27/04/2009 11:06	25.62	25.63	25.6	25.64	25.61	25.61	25.62	41.95	41.95	41.96	41.99	42.07	41.99	41.99	16.37	0
27/04/2009 11:09	25.7	25.71	25.69	25.72	25.7	25.69	25.70	41.54	41.56	41.52	41.56	41.58	41.54	41.55	15.85	0
27/04/2009 11:12	25.78	25.8	25.78	25.81	25.78	25.78	25.79	41.16	41.2	41.14	41.16	41.17	41.14	41.16	15.37	0
27/04/2009 11:15	25.86	25.87	25.85	25.89	25.86	25.85	25.86	40.81	40.84	40.78	40.8	40.79	40.77	40.80	14.94	0
27/04/2009 11:18	25.94	25.95	25.93	25.96	25.94	25.93	25.94	40.47	40.5	40.44	40.45	40.44	40.42	40.45	14.51	0
27/04/2009 11:21	26.01	26.03	26	26.04	26.01	26.01	26.02	40.15	40.18	40.13	40.13	40.11	40.1	40.13	14.12	0
27/04/2009 11:24	26.08	26.1	26.08	26.1	26.09	26.08	26.09	40.84	40.73	40.77	40.76	40.84	40.79	40.79	14.70	0
27/04/2009	26.17	26.18	26.16	26.2	26.18	26.17	26.18	42.34	42.24	42.37	42.37	42.55	42.42	42.38	16.21	0

11:27																
27/04/2009 11:30	26.24	26.25	26.23	26.27	26.25	26.24	26.25	41.87	41.88	41.88	41.91	41.98	41.9	41.90	15.66	0
27/04/2009 11:33	25.97	25.96	25.93	25.95	25.93	25.91	25.94	41.47	41.49	41.45	41.49	41.5	41.46	41.48	15.54	0
27/04/2009 11:36	25.55	25.56	25.54	25.57	25.55	25.54	25.55	41.1	41.14	41.08	41.1	41.1	41.07	41.10	15.55	0
27/04/2009 11:39	25.67	25.68	25.66	25.7	25.67	25.66	25.67	40.75	40.79	40.73	40.75	40.73	40.72	40.75	15.07	0
27/04/2009 11:42	25.76	25.77	25.75	25.79	25.76	25.75	25.76	40.43	40.46	40.4	40.4	40.4	40.39	40.41	14.65	0
27/04/2009 11:45	25.85	25.85	25.84	25.88	25.85	25.84	25.85	40.12	40.15	40.1	40.09	40.08	40.07	40.10	14.25	0
27/04/2009 11:48	25.93	25.94	25.92	25.97	25.94	25.93	25.94	40.84	40.74	40.79	40.78	40.86	40.81	40.80	14.87	0.809
27/04/2009 11:51	26.01	26.02	26	26.04	26.01	26	26.01	42.29	42.21	42.33	42.33	42.5	42.37	42.34	16.33	0
27/04/2009 11:54	26.09	26.09	26.07	26.12	26.08	26.08	26.09	41.83	41.85	41.85	41.87	41.93	41.86	41.87	15.78	0
27/04/2009 11:57	26.17	26.17	26.15	26.2	26.17	26.16	26.17	41.44	41.47	41.43	41.46	41.47	41.44	41.45	15.28	0
27/04/2009 12:00	26.24	26.25	26.23	26.28	26.25	26.24	26.25	41.08	41.11	41.06	41.08	41.08	41.05	41.08	14.83	0
27/04/2009 12:03	26.15	26.14	26.11	26.16	26.12	26.09	26.13	40.73	40.77	40.71	40.72	40.71	40.69	40.72	14.59	0
27/04/2009 12:06	25.67	25.68	25.66	25.69	25.66	25.66	25.67	40.41	40.44	40.39	40.38	40.37	40.36	40.39	14.72	0
27/04/2009 12:09	25.81	25.82	25.79	25.84	25.81	25.8	25.81	40.11	40.13	40.08	40.08	40.06	40.05	40.09	14.27	0
27/04/2009 12:12	25.9	25.91	25.89	25.93	25.91	25.89	25.91	40.94	40.88	40.9	40.93	40.99	40.93	40.93	15.02	0.826
27/04/2009 12:15	26	26.01	25.99	26.03	26	25.99	26.00	42.27	42.2	42.31	42.3	42.47	42.34	42.32	16.31	0
27/04/2009 12:18	26.08	26.09	26.07	26.11	26.09	26.08	26.09	41.82	41.83	41.83	41.85	41.92	41.85	41.85	15.76	0
27/04/2009 12:21	26.16	26.17	26.14	26.19	26.16	26.16	26.16	41.43	41.45	41.41	41.43	41.45	41.42	41.43	15.27	0
27/04/2009 12:24	26.24	26.25	26.22	26.27	26.25	26.23	26.24	41.06	41.09	41.05	41.05	41.05	41.03	41.06	14.81	0
27/04/2009 12:27	26.24	26.24	26.2	26.26	26.22	26.2	26.23	40.72	40.76	40.7	40.71	40.7	40.68	40.71	14.49	0
27/04/2009 12:30	25.31	25.3	25.27	25.3	25.27	25.25	25.28	40.41	40.44	40.39	40.39	40.38	40.36	40.40	15.11	0
27/04/2009 12:33	25.31	25.32	25.29	25.34	25.32	25.3	25.31	40.11	40.14	40.09	40.08	40.07	40.05	40.09	14.78	0

27/04/2009 12:36	25.42	25.43	25.4	25.46	25.43	25.41	25.43	40.84	40.74	40.79	40.77	40.86	40.81	40.80	15.38	0.821
27/04/2009 12:39	25.51	25.52	25.5	25.55	25.52	25.51	25.52	42.35	42.26	42.39	42.38	42.56	42.43	42.40	16.88	0
27/04/2009 12:42	25.61	25.61	25.59	25.65	25.61	25.6	25.61	41.89	41.9	41.9	41.92	41.99	41.92	41.92	16.31	0
27/04/2009 12:45	25.69	25.7	25.67	25.73	25.69	25.68	25.69	41.49	41.52	41.48	41.5	41.52	41.48	41.50	15.81	0
27/04/2009 12:48	25.77	25.78	25.76	25.82	25.77	25.77	25.78	41.12	41.16	41.11	41.12	41.12	41.09	41.12	15.34	0
27/04/2009 12:51	25.86	25.87	25.85	25.91	25.87	25.86	25.87	40.79	40.82	40.77	40.77	40.76	40.74	40.78	14.91	0
27/04/2009 12:54	25.95	25.96	25.93	25.99	25.95	25.94	25.95	40.47	40.5	40.44	40.44	40.42	40.41	40.45	14.49	0
27/04/2009 12:57	26.04	26.04	26.02	26.08	26.04	26.03	26.04	40.16	40.19	40.14	40.13	40.11	40.1	40.14	14.10	0
27/04/2009 13:00	26.11	26.12	26.1	26.16	26.12	26.11	26.12	40.4	40.42	40.34	40.4	40.38	40.34	40.38	14.26	0
27/04/2009 13:03	26.19	26.21	26.18	26.24	26.2	26.19	26.20	42.44	42.31	42.47	42.45	42.67	42.52	42.48	16.28	0
27/04/2009 13:06	26.27	26.27	26.25	26.31	26.27	26.27	26.27	41.96	41.95	41.97	41.99	42.08	41.99	41.99	15.72	0
27/04/2009 13:09	25.96	25.93	25.9	25.95	25.9	25.88	25.92	41.55	41.58	41.55	41.57	41.59	41.54	41.56	15.64	0
27/04/2009 13:12	25.29	25.3	25.27	25.33	25.29	25.28	25.29	41.19	41.23	41.17	41.19	41.19	41.16	41.19	15.90	0
27/04/2009 13:15	25.39	25.4	25.38	25.44	25.4	25.39	25.40	40.83	40.87	40.82	40.82	40.81	40.79	40.82	15.42	0
27/04/2009 13:18	25.5	25.51	25.48	25.55	25.51	25.49	25.51	40.52	40.55	40.5	40.49	40.48	40.47	40.50	15.00	0
27/04/2009 13:21	25.6	25.6	25.58	25.64	25.61	25.59	25.60	40.22	40.25	40.2	40.19	40.17	40.16	40.20	14.60	0
27/04/2009 13:24	25.68	25.69	25.66	25.72	25.69	25.67	25.69	39.91	39.95	39.9	39.88	39.87	39.85	39.89	14.21	0
27/04/2009 13:27	25.77	25.78	25.75	25.81	25.78	25.76	25.78	42.5	42.28	42.47	42.46	42.69	42.54	42.49	16.72	0
27/04/2009 13:30	25.85	25.86	25.84	25.89	25.86	25.85	25.86	42.01	42	42.04	42.05	42.15	42.06	42.05	16.19	0
27/04/2009 13:33	25.93	25.94	25.92	25.98	25.93	25.93	25.94	41.59	41.62	41.59	41.61	41.64	41.59	41.61	15.67	0
27/04/2009 13:36	26.02	26.02	26	26.07	26.02	26.01	26.02	41.22	41.25	41.2	41.22	41.22	41.19	41.22	15.19	0
27/04/2009 13:39	26.1	26.11	26.09	26.16	26.11	26.1	26.11	40.88	40.92	40.86	40.86	40.86	40.83	40.87	14.76	0
27/04/2009	26.18	26.19	26.17	26.24	26.19	26.18	26.19	40.55	40.59	40.53	40.53	40.51	40.49	40.53	14.34	0

13:42															
27/04/2009 13:45	26.26	26.27	26.24	26.31	26.26	26.25	26.27	40.24	40.27	40.22	40.2	40.19	40.18	40.22	13.95	0
27/04/2009 13:48	26.14	26.14	26.1	26.18	26.12	26.09	26.13	39.94	39.98	39.93	39.92	39.9	39.88	39.93	13.80	0
27/04/2009 13:51	25.31	25.31	25.28	25.35	25.29	25.28	25.30	42.23	42.09	42.19	42.25	42.41	42.26	42.24	16.94	0
27/04/2009 13:54	25.39	25.4	25.38	25.46	25.4	25.39	25.40	42.05	42.03	42.08	42.09	42.21	42.1	42.09	16.69	0
27/04/2009 13:57	25.5	25.5	25.48	25.56	25.51	25.49	25.51	41.64	41.66	41.64	41.66	41.7	41.64	41.66	16.15	0
27/04/2009 14:00	25.6	25.61	25.58	25.66	25.61	25.6	25.61	41.27	41.31	41.26	41.28	41.28	41.25	41.28	15.67	0
27/04/2009 14:03	25.69	25.7	25.67	25.75	25.7	25.68	25.70	40.92	40.95	40.9	40.91	40.9	40.88	40.91	15.21	0
27/04/2009 14:06	25.77	25.78	25.75	25.84	25.78	25.77	25.78	40.58	40.62	40.57	40.56	40.55	40.54	40.57	14.79	0
27/04/2009 14:09	25.86	25.87	25.85	25.92	25.87	25.86	25.87	40.28	40.32	40.26	40.25	40.23	40.22	40.26	14.39	0
27/04/2009 14:12	25.95	25.96	25.93	26.01	25.96	25.95	25.96	39.98	40.02	39.96	39.95	39.93	39.92	39.96	14.00	0
27/04/2009 14:15	26.04	26.04	26.02	26.09	26.04	26.03	26.04	41.62	41.46	41.6	41.57	41.73	41.63	41.60	15.56	0.804
27/04/2009 14:18	26.12	26.13	26.1	26.17	26.13	26.11	26.13	42.08	42.05	42.12	42.11	42.24	42.14	42.12	16.00	0
27/04/2009 14:21	26.21	26.21	26.18	26.26	26.2	26.2	26.21	41.66	41.68	41.67	41.68	41.72	41.67	41.68	15.47	0
27/04/2009 14:24	26.28	26.28	26.26	26.33	26.28	26.27	26.28	41.27	41.31	41.27	41.28	41.29	41.25	41.28	15.00	0
27/04/2009 14:27	26.07	26.06	26.02	26.06	26.03	26	26.04	40.93	40.97	40.92	40.92	40.91	40.89	40.92	14.88	0
27/04/2009 14:30	25.34	25.33	25.31	25.34	25.32	25.3	25.32	40.59	40.63	40.58	40.58	40.57	40.55	40.58	15.26	0
27/04/2009 14:33	25.45	25.46	25.42	25.47	25.46	25.44	25.45	40.29	40.32	40.27	40.26	40.25	40.23	40.27	14.82	0
27/04/2009 14:36	25.56	25.56	25.54	25.58	25.56	25.54	25.56	39.99	40.03	39.98	39.97	39.94	39.94	39.98	14.42	0
27/04/2009 14:39	25.65	25.66	25.63	25.67	25.65	25.64	25.65	41.63	41.44	41.58	41.56	41.72	41.61	41.59	15.94	0
27/04/2009 14:42	25.75	25.75	25.72	25.77	25.75	25.73	25.75	42.11	42.06	42.15	42.14	42.28	42.17	42.15	16.41	0
27/04/2009 14:45	25.84	25.84	25.82	25.86	25.84	25.83	25.84	41.69	41.71	41.7	41.71	41.76	41.7	41.71	15.87	0
27/04/2009 14:48	25.92	25.92	25.9	25.95	25.92	25.91	25.92	41.3	41.34	41.3	41.31	41.32	41.28	41.31	15.39	0

27/04/2009 14:51	26	26.01	25.98	26.03	26.01	25.99	26.00	40.95	40.99	40.93	40.94	40.93	40.91	40.94	14.94	0
27/04/2009 14:54	26.09	26.09	26.07	26.11	26.09	26.08	26.09	40.62	40.65	40.6	40.6	40.58	40.56	40.60	14.51	0
27/04/2009 14:57	26.17	26.17	26.15	26.19	26.17	26.16	26.17	40.31	40.34	40.28	40.27	40.26	40.24	40.28	14.12	0
27/04/2009 15:00	26.25	26.25	26.23	26.28	26.25	26.24	26.25	40.01	40.04	39.99	39.98	39.96	39.95	39.99	13.74	0
27/04/2009 15:03	26.32	26.33	26.3	26.35	26.33	26.31	26.32	41.66	41.48	41.61	41.59	41.75	41.65	41.62	15.30	0
27/04/2009 15:06	25.72	25.7	25.66	25.7	25.67	25.65	25.68	42.14	42.1	42.18	42.18	42.31	42.2	42.19	16.50	0
27/04/2009 15:09	25.75	25.75	25.72	25.78	25.76	25.74	25.75	41.72	41.74	41.73	41.74	41.79	41.73	41.74	15.99	0
27/04/2009 15:12	25.88	25.88	25.86	25.91	25.88	25.86	25.88	41.35	41.38	41.34	41.36	41.37	41.33	41.36	15.48	0
27/04/2009 15:15	25.96	25.96	25.93	25.98	25.96	25.94	25.96	40.99	41.03	40.98	40.98	40.97	40.95	40.98	15.03	0
27/04/2009 15:18	26.05	26.05	26.03	26.07	26.05	26.03	26.05	40.66	40.7	40.65	40.64	40.62	40.61	40.65	14.60	0
27/04/2009 15:21	26.13	26.14	26.11	26.15	26.13	26.11	26.13	40.34	40.38	40.33	40.32	40.3	40.29	40.33	14.20	0
27/04/2009 15:24	26.22	26.22	26.2	26.24	26.22	26.2	26.22	40.05	40.09	40.04	40.02	40	39.99	40.03	13.82	0
27/04/2009 15:27	26.3	26.3	26.28	26.32	26.3	26.28	26.30	40.91	40.86	40.87	40.9	40.96	40.89	40.90	14.60	0.815
27/04/2009 15:30	26.04	26.02	25.99	26.02	25.99	25.97	26.01	42.22	42.15	42.26	42.25	42.41	42.29	42.26	16.26	0
27/04/2009 15:33	25.77	25.77	25.75	25.79	25.78	25.76	25.77	41.78	41.8	41.8	41.81	41.87	41.8	41.81	16.04	0
27/04/2009 15:36	25.91	25.92	25.89	25.94	25.92	25.91	25.92	41.41	41.44	41.4	41.41	41.43	41.39	41.41	15.50	0
27/04/2009 15:39	26.01	26.02	25.99	26.04	26.01	26	26.01	41.05	41.09	41.03	41.04	41.03	41.01	41.04	15.03	0
27/04/2009 15:42	26.11	26.12	26.09	26.14	26.11	26.09	26.11	40.72	40.76	40.71	40.7	40.68	40.67	40.71	14.60	0
27/04/2009 15:45	26.19	26.2	26.17	26.22	26.19	26.18	26.19	40.4	40.44	40.39	40.38	40.36	40.34	40.39	14.19	0
27/04/2009 15:48	26.29	26.29	26.26	26.31	26.28	26.27	26.28	40.12	40.15	40.1	40.08	40.06	40.05	40.09	13.81	0
27/04/2009 15:51	26.23	26.23	26.19	26.25	26.2	26.17	26.21	40.74	40.66	40.67	40.68	40.72	40.66	40.69	14.48	0
27/04/2009 15:54	25.4	25.39	25.36	25.4	25.37	25.35	25.38	42.35	42.24	42.39	42.37	42.57	42.44	42.39	17.02	0
27/04/2009	25.47	25.47	25.44	25.5	25.47	25.45	25.47	41.9	41.9	41.92	41.93	42	41.93	41.93	16.46	0

15:57

27/04/2009 16:00	25.57	25.57	25.55	25.6	25.57	25.55	25.57	41.5	41.53	41.5	41.51	41.53	41.49	41.51	15.94	0
27/04/2009 16:03	25.67	25.67	25.64	25.7	25.67	25.65	25.67	41.14	41.17	41.13	41.13	41.13	41.1	41.13	15.47	0
27/04/2009 16:06	25.75	25.76	25.73	25.79	25.75	25.74	25.75	40.8	40.84	40.79	40.79	40.77	40.75	40.79	15.04	0
27/04/2009 16:09	25.84	25.84	25.82	25.88	25.84	25.82	25.84	40.49	40.52	40.47	40.46	40.44	40.42	40.47	14.63	0
27/04/2009 16:12	25.94	25.93	25.91	25.96	25.93	25.92	25.93	40.18	40.22	40.17	40.16	40.13	40.12	40.16	14.23	0
27/04/2009 16:15	26.01	26.02	25.99	26.05	26.01	26	26.01	39.89	39.93	39.88	39.86	39.84	39.82	39.87	13.86	0
27/04/2009 16:18	26.1	26.11	26.08	26.13	26.1	26.08	26.10	42.49	42.27	42.47	42.44	42.67	42.53	42.48	16.38	0
27/04/2009 16:21	26.18	26.18	26.15	26.21	26.17	26.16	26.18	41.98	41.98	42.01	42.02	42.11	42.02	42.02	15.85	0
27/04/2009 16:24	26.27	26.27	26.24	26.29	26.26	26.24	26.26	41.59	41.62	41.59	41.6	41.63	41.58	41.60	15.34	0
27/04/2009 16:27	26.35	26.35	26.32	26.37	26.34	26.32	26.34	41.23	41.27	41.21	41.22	41.22	41.19	41.22	14.88	0
27/04/2009 16:30	25.76	25.74	25.71	25.75	25.71	25.69	25.73	40.87	40.91	40.85	40.85	40.85	40.82	40.86	15.13	0
27/04/2009 16:33	25.79	25.79	25.77	25.82	25.79	25.77	25.79	40.55	40.59	40.53	40.53	40.51	40.49	40.53	14.75	0
27/04/2009 16:36	25.91	25.91	25.88	25.93	25.9	25.89	25.90	40.25	40.28	40.23	40.21	40.2	40.19	40.23	14.32	0
27/04/2009 16:39	26	26	25.98	26.02	26	25.98	26.00	39.96	39.99	39.94	39.92	39.9	39.89	39.93	13.94	0
27/04/2009 16:42	26.09	26.09	26.07	26.11	26.09	26.07	26.09	41.8	41.69	41.77	41.8	41.93	41.83	41.80	15.72	0.817
27/04/2009 16:45	26.17	26.17	26.15	26.19	26.17	26.15	26.17	42.09	42.07	42.13	42.13	42.24	42.14	42.13	15.97	0
27/04/2009 16:48	26.25	26.25	26.22	26.27	26.24	26.22	26.24	41.68	41.7	41.69	41.7	41.73	41.68	41.70	15.46	0
27/04/2009 16:51	26.33	26.33	26.3	26.36	26.32	26.3	26.32	41.3	41.34	41.29	41.31	41.3	41.28	41.30	14.98	0
27/04/2009 16:54	25.53	25.5	25.45	25.5	25.45	25.42	25.48	40.96	41	40.95	40.95	40.94	40.92	40.95	15.48	0
27/04/2009 16:57	25.34	25.34	25.3	25.37	25.33	25.31	25.33	40.63	40.67	40.62	40.61	40.6	40.58	40.62	15.29	0
27/04/2009 17:00	25.45	25.46	25.43	25.49	25.45	25.43	25.45	40.32	40.36	40.3	40.29	40.27	40.26	40.30	14.85	0
27/04/2009 17:03	25.56	25.56	25.53	25.6	25.56	25.54	25.56	40.04	40.08	40.03	40	39.98	39.97	40.02	14.46	0

27/04/2009 17:06	25.65	25.65	25.62	25.68	25.64	25.62	25.64	41.26	41.19	41.2	41.25	41.33	41.24	41.25	15.60	0
27/04/2009 17:09	25.75	25.75	25.72	25.78	25.74	25.72	25.74	42.26	42.21	42.31	42.3	42.46	42.33	42.31	16.57	0
27/04/2009 17:12	25.82	25.82	25.79	25.85	25.82	25.8	25.82	41.82	41.83	41.83	41.84	41.9	41.83	41.84	16.03	0
27/04/2009 17:15	25.9	25.91	25.88	25.93	25.9	25.89	25.90	41.43	41.46	41.43	41.43	41.44	41.4	41.43	15.53	0
27/04/2009 17:18	26	26	25.97	26.02	25.99	25.97	25.99	41.08	41.12	41.06	41.07	41.06	41.03	41.07	15.08	0
27/04/2009 17:21	26.07	26.08	26.05	26.1	26.07	26.05	26.07	40.74	40.78	40.73	40.72	40.7	40.68	40.73	14.66	0
27/04/2009 17:24	26.15	26.14	26.13	26.17	26.14	26.12	26.14	40.42	40.46	40.4	40.39	40.37	40.35	40.40	14.26	0
27/04/2009 17:27	26.24	26.24	26.22	26.26	26.23	26.22	26.24	40.13	40.17	40.11	40.09	40.08	40.06	40.11	13.87	0
27/04/2009 17:30	26.31	26.31	26.29	26.33	26.31	26.29	26.31	40.78	40.69	40.71	40.71	40.76	40.7	40.73	14.42	0
27/04/2009 17:33	25.9	25.87	25.84	25.87	25.84	25.81	25.86	42.4	42.29	42.44	42.42	42.61	42.48	42.44	16.59	0
27/04/2009 17:36	25.71	25.72	25.69	25.73	25.72	25.69	25.71	41.93	41.94	41.95	41.96	42.03	41.96	41.96	16.25	0
27/04/2009 17:39	25.85	25.84	25.83	25.86	25.84	25.83	25.84	41.55	41.58	41.54	41.55	41.57	41.53	41.55	15.71	0
27/04/2009 17:42	25.93	25.94	25.91	25.95	25.93	25.91	25.93	41.17	41.22	41.16	41.16	41.16	41.13	41.17	15.24	0
27/04/2009 17:45	26.03	26.03	26	26.04	26.02	26	26.02	40.84	40.88	40.83	40.82	40.81	40.79	40.83	14.81	0
27/04/2009 17:48	26.11	26.11	26.09	26.13	26.11	26.1	26.11	40.53	40.57	40.51	40.5	40.48	40.46	40.51	14.40	0
27/04/2009 17:51	26.19	26.19	26.16	26.2	26.18	26.16	26.18	40.21	40.25	40.19	40.17	40.15	40.15	40.19	14.01	0
27/04/2009 17:54	26.27	26.28	26.26	26.28	26.27	26.25	26.27	39.94	39.96	39.91	39.9	39.88	39.86	39.91	13.64	0
27/04/2009 17:57	26.2	26.18	26.14	26.18	26.16	26.12	26.16	42.26	42.13	42.22	42.28	42.43	42.3	42.27	16.11	0
27/04/2009 18:00	25.34	25.33	25.3	25.32	25.3	25.28	25.31	42.13	42.12	42.17	42.17	42.29	42.19	42.18	16.87	0
27/04/2009 18:03	25.41	25.41	25.38	25.42	25.41	25.38	25.40	41.72	41.75	41.73	41.74	41.78	41.73	41.74	16.34	0
27/04/2009 18:06	25.52	25.52	25.49	25.53	25.51	25.49	25.51	41.36	41.39	41.35	41.36	41.36	41.33	41.36	15.85	0
27/04/2009 18:09	25.61	25.61	25.58	25.61	25.6	25.59	25.60	41	41.04	40.99	40.99	40.98	40.96	40.99	15.39	0
27/04/2009	25.69	25.69	25.67	25.7	25.68	25.66	25.68	40.67	40.71	40.65	40.64	40.62	40.62	40.65	14.97	0

18:12																
27/04/2009 18:15	25.78	25.78	25.75	25.78	25.77	25.75	25.77	40.36	40.4	40.34	40.33	40.31	40.29	40.34	14.57	0
27/04/2009 18:18	25.86	25.86	25.83	25.86	25.85	25.83	25.85	40.06	40.09	40.05	40.02	40	39.99	40.04	14.19	0
27/04/2009 18:21	25.95	25.94	25.92	25.95	25.94	25.92	25.94	40.89	40.83	40.85	40.86	40.92	40.86	40.87	14.93	0.828
27/04/2009 18:24	26.03	26.02	26	26.03	26.02	26	26.02	42.31	42.24	42.35	42.34	42.51	42.38	42.36	16.34	0
27/04/2009 18:27	26.11	26.1	26.09	26.11	26.1	26.09	26.10	41.87	41.88	41.88	41.89	41.94	41.88	41.89	15.79	0
27/04/2009 18:30	26.19	26.18	26.16	26.19	26.18	26.16	26.18	41.48	41.51	41.47	41.48	41.49	41.45	41.48	15.30	0
27/04/2009 18:33	26.27	26.26	26.24	26.26	26.25	26.24	26.25	41.12	41.15	41.1	41.1	41.09	41.07	41.11	14.85	0
27/04/2009 18:36	26.19	26.17	26.14	26.17	26.15	26.12	26.16	40.8	40.83	40.77	40.76	40.76	40.74	40.78	14.62	0
27/04/2009 18:39	25.73	25.72	25.7	25.72	25.71	25.69	25.71	40.47	40.51	40.45	40.44	40.42	40.41	40.45	14.74	0
27/04/2009 18:42	25.86	25.87	25.84	25.87	25.86	25.85	25.86	40.17	40.2	40.15	40.13	40.11	40.1	40.14	14.29	0
27/04/2009 18:45	25.98	25.98	25.95	25.98	25.97	25.96	25.97	40.31	40.35	40.25	40.31	40.28	40.24	40.29	14.32	0.822
27/04/2009 18:48	26.06	26.06	26.03	26.06	26.06	26.04	26.05	42.47	42.33	42.5	42.47	42.69	42.55	42.50	16.45	0
27/04/2009 18:51	26.14	26.14	26.11	26.14	26.13	26.12	26.13	41.99	41.99	42.01	42.02	42.1	42.02	42.02	15.89	0
27/04/2009 18:54	26.22	26.22	26.2	26.22	26.21	26.2	26.21	41.59	41.62	41.59	41.6	41.62	41.58	41.60	15.39	0
27/04/2009 18:57	26.3	26.3	26.28	26.3	26.29	26.28	26.29	41.22	41.26	41.21	41.22	41.21	41.19	41.22	14.93	0
27/04/2009 19:00	25.75	25.73	25.68	25.7	25.68	25.65	25.70	40.9	40.94	40.88	40.88	40.87	40.84	40.89	15.19	0
27/04/2009 19:03	25.38	25.39	25.35	25.38	25.38	25.35	25.37	40.57	40.61	40.55	40.54	40.52	40.51	40.55	15.18	0
27/04/2009 19:06	25.49	25.48	25.45	25.48	25.48	25.46	25.47	40.27	40.3	40.24	40.23	40.21	40.2	40.24	14.77	0
27/04/2009 19:09	25.59	25.58	25.55	25.58	25.58	25.56	25.57	39.98	40.01	39.96	39.94	39.92	39.91	39.95	14.38	0
27/04/2009 19:12	25.67	25.67	25.64	25.67	25.66	25.64	25.66	41.8	41.7	41.78	41.81	41.94	41.84	41.81	16.15	0.821
27/04/2009 19:15	25.75	25.76	25.73	25.76	25.75	25.73	25.75	42.09	42.07	42.13	42.13	42.25	42.14	42.14	16.39	0
27/04/2009 19:18	25.83	25.83	25.8	25.83	25.82	25.8	25.82	41.67	41.7	41.68	41.69	41.72	41.67	41.69	15.87	0

27/04/2009 19:21	25.91	25.91	25.89	25.92	25.91	25.89	25.91	41.31	41.34	41.3	41.3	41.31	41.28	41.31	15.40	0
27/04/2009 19:24	26	26	25.98	26	25.99	25.97	25.99	40.96	41	40.95	40.95	40.93	40.91	40.95	14.96	0
27/04/2009 19:27	26.07	26.07	26.05	26.07	26.06	26.05	26.06	40.63	40.67	40.61	40.6	40.58	40.57	40.61	14.55	0
27/04/2009 19:30	26.15	26.14	26.12	26.14	26.14	26.12	26.14	40.31	40.35	40.3	40.29	40.26	40.25	40.29	14.16	0
27/04/2009 19:33	26.23	26.23	26.2	26.23	26.23	26.21	26.22	40.03	40.06	40.01	39.99	39.97	39.96	40.00	13.78	0
27/04/2009 19:36	26.3	26.3	26.28	26.3	26.29	26.28	26.29	41.69	41.51	41.65	41.62	41.78	41.68	41.66	15.36	0
27/04/2009 19:39	25.87	25.85	25.81	25.84	25.82	25.79	25.83	42.16	42.12	42.21	42.2	42.33	42.21	42.21	16.38	0
27/04/2009 19:42	25.8	25.81	25.78	25.81	25.8	25.79	25.80	41.74	41.76	41.75	41.76	41.8	41.74	41.76	15.96	0
27/04/2009 19:45	25.92	25.93	25.9	25.92	25.92	25.9	25.92	41.36	41.4	41.35	41.36	41.37	41.33	41.36	15.45	0
27/04/2009 19:48	26.02	26.02	25.99	26.02	26.01	26	26.01	41.01	41.05	41	41	40.99	40.97	41.00	14.99	0
27/04/2009 19:51	26.1	26.1	26.07	26.1	26.09	26.08	26.09	40.69	40.72	40.67	40.66	40.64	40.63	40.67	14.58	0
27/04/2009 19:54	26.19	26.19	26.16	26.19	26.18	26.16	26.18	40.38	40.41	40.36	40.34	40.33	40.31	40.36	14.18	0
27/04/2009 19:57	26.27	26.27	26.25	26.27	26.26	26.25	26.26	40.09	40.12	40.07	40.05	40.03	40.02	40.06	13.80	0
27/04/2009 20:00	26.05	26.03	25.99	26.01	25.99	25.96	26.01	40.91	40.85	40.86	40.88	40.94	40.88	40.89	14.88	0.815
27/04/2009 20:03	25.32	25.32	25.29	25.31	25.3	25.29	25.31	42.27	42.2	42.31	42.29	42.46	42.34	42.31	17.01	0
27/04/2009 20:06	25.4	25.41	25.37	25.41	25.4	25.38	25.40	41.82	41.84	41.84	41.85	41.91	41.84	41.85	16.46	0
27/04/2009 20:09	25.5	25.51	25.48	25.5	25.5	25.47	25.49	41.44	41.48	41.44	41.45	41.47	41.43	41.45	15.96	0
27/04/2009 20:12	25.59	25.59	25.57	25.59	25.59	25.57	25.58	41.09	41.13	41.08	41.08	41.08	41.05	41.09	15.50	0
27/04/2009 20:15	25.67	25.68	25.65	25.68	25.67	25.65	25.67	40.75	40.79	40.74	40.73	40.72	40.7	40.74	15.07	0
27/04/2009 20:18	25.76	25.76	25.73	25.76	25.75	25.73	25.75	40.44	40.48	40.42	40.41	40.39	40.38	40.42	14.67	0
27/04/2009 20:21	25.85	25.85	25.83	25.85	25.84	25.82	25.84	40.15	40.18	40.13	40.11	40.09	40.08	40.12	14.28	0
27/04/2009 20:24	25.93	25.93	25.9	25.93	25.92	25.91	25.92	40.82	40.73	40.75	40.75	40.8	40.74	40.77	14.85	0
27/04/2009	26	26	25.98	26	26	25.98	25.99	42.45	42.34	42.49	42.47	42.67	42.53	42.49	16.50	0

20:27																
27/04/2009 20:30	26.08	26.08	26.06	26.08	26.07	26.06	26.07	41.99	41.99	42.01	42.01	42.08	42.01	42.02	15.94	0
27/04/2009 20:33	26.15	26.15	26.13	26.15	26.14	26.13	26.14	41.58	41.61	41.58	41.59	41.61	41.56	41.59	15.45	0
27/04/2009 20:36	26.23	26.23	26.21	26.23	26.22	26.21	26.22	41.22	41.27	41.21	41.21	41.21	41.18	41.22	15.00	0
27/04/2009 20:39	26.31	26.31	26.29	26.31	26.3	26.29	26.30	40.88	40.92	40.86	40.85	40.84	40.82	40.86	14.56	0
27/04/2009 20:42	25.83	25.82	25.78	25.8	25.78	25.76	25.80	40.56	40.59	40.54	40.52	40.51	40.49	40.54	14.74	0
27/04/2009 20:45	25.82	25.82	25.8	25.82	25.82	25.8	25.81	40.26	40.29	40.24	40.22	40.2	40.19	40.23	14.42	0
27/04/2009 20:48	25.93	25.94	25.9	25.93	25.93	25.91	25.92	39.96	40	39.94	39.92	39.9	39.89	39.94	14.01	0
27/04/2009 20:51	26.01	26.02	25.99	26.01	26.01	26	26.01	42.43	42.25	42.38	42.41	42.6	42.45	42.42	16.41	0
27/04/2009 20:54	26.11	26.11	26.08	26.1	26.1	26.08	26.10	42.11	42.1	42.15	42.15	42.26	42.16	42.16	16.06	0
27/04/2009 20:57	26.18	26.19	26.17	26.18	26.18	26.17	26.18	41.7	41.73	41.7	41.72	41.75	41.7	41.72	15.54	0
27/04/2009 21:00	26.27	26.27	26.24	26.26	26.26	26.25	26.26	41.34	41.37	41.32	41.33	41.33	41.3	41.33	15.07	0
27/04/2009 21:03	26.05	26.03	25.99	26.01	26	25.96	26.01	40.99	41.02	40.97	40.96	40.95	40.93	40.97	14.96	0
27/04/2009 21:06	25.31	25.3	25.27	25.29	25.28	25.26	25.29	40.66	40.7	40.64	40.63	40.61	40.6	40.64	15.36	0
27/04/2009 21:09	25.4	25.4	25.37	25.39	25.39	25.37	25.39	40.35	40.38	40.33	40.32	40.3	40.28	40.33	14.94	0
27/04/2009 21:12	25.5	25.5	25.48	25.5	25.5	25.48	25.49	40.07	40.09	40.04	40.03	40	40	40.04	14.55	0
27/04/2009 21:15	25.59	25.59	25.57	25.59	25.58	25.57	25.58	41.31	41.24	41.25	41.3	41.37	41.29	41.29	15.71	0
27/04/2009 21:18	25.67	25.67	25.65	25.67	25.67	25.65	25.66	42.37	42.31	42.42	42.4	42.57	42.45	42.42	16.76	0
27/04/2009 21:21	25.76	25.75	25.73	25.75	25.75	25.73	25.75	41.93	41.95	41.94	41.96	42.01	41.94	41.96	16.21	0
27/04/2009 21:24	25.84	25.84	25.81	25.84	25.83	25.82	25.83	41.54	41.58	41.53	41.54	41.55	41.51	41.54	15.71	0
27/04/2009 21:27	25.91	25.91	25.89	25.91	25.91	25.89	25.90	41.17	41.22	41.16	41.16	41.15	41.13	41.17	15.26	0
27/04/2009 21:30	25.99	26	25.97	26	25.99	25.97	25.99	40.84	40.87	40.82	40.81	40.8	40.78	40.82	14.83	0
27/04/2009 21:33	26.07	26.07	26.05	26.07	26.07	26.06	26.07	40.52	40.56	40.5	40.49	40.46	40.46	40.50	14.43	0

27/04/2009 21:36	26.14	26.15	26.12	26.15	26.14	26.13	26.14	40.21	40.25	40.19	40.17	40.15	40.14	40.19	14.05	0
27/04/2009 21:39	26.22	26.23	26.2	26.22	26.21	26.21	26.22	39.92	39.96	39.9	39.88	39.85	39.85	39.89	13.68	0.839
27/04/2009 21:42	26.31	26.31	26.29	26.31	26.3	26.29	26.30	42.61	42.4	42.6	42.57	42.79	42.66	42.61	16.30	0
27/04/2009 21:45	25.84	25.83	25.79	25.8	25.8	25.77	25.81	42.09	42.09	42.12	42.12	42.21	42.12	42.13	16.32	0
27/04/2009 21:48	25.84	25.85	25.83	25.84	25.84	25.82	25.84	41.68	41.71	41.68	41.69	41.72	41.67	41.69	15.86	0
27/04/2009 21:51	25.95	25.95	25.93	25.95	25.95	25.93	25.94	41.31	41.35	41.29	41.3	41.3	41.27	41.30	15.36	0
27/04/2009 21:54	26.05	26.05	26.03	26.05	26.05	26.03	26.04	40.97	41.01	40.96	40.96	40.94	40.92	40.96	14.92	0
27/04/2009 21:57	26.12	26.13	26.1	26.12	26.12	26.1	26.12	40.64	40.68	40.62	40.61	40.59	40.58	40.62	14.51	0
27/04/2009 22:00	26.21	26.21	26.18	26.2	26.2	26.19	26.20	40.33	40.37	40.32	40.3	40.27	40.27	40.31	14.11	0
27/04/2009 22:03	26.29	26.29	26.27	26.29	26.28	26.27	26.28	40.05	40.08	40.03	40	39.98	39.97	40.02	13.74	0
27/04/2009 22:06	25.82	25.79	25.75	25.76	25.75	25.72	25.77	41.73	41.55	41.68	41.66	41.82	41.71	41.69	15.93	0
27/04/2009 22:09	25.34	25.34	25.31	25.33	25.33	25.31	25.33	42.23	42.19	42.27	42.27	42.41	42.3	42.28	16.95	0
27/04/2009 22:12	25.44	25.45	25.41	25.44	25.44	25.42	25.43	41.81	41.84	41.82	41.84	41.88	41.82	41.84	16.40	0
27/04/2009 22:15	25.53	25.53	25.5	25.52	25.52	25.5	25.52	41.43	41.46	41.42	41.42	41.44	41.41	41.43	15.91	0
27/04/2009 22:18	25.62	25.62	25.59	25.61	25.61	25.59	25.61	41.08	41.12	41.06	41.07	41.06	41.03	41.07	15.46	0
27/04/2009 22:21	25.7	25.7	25.68	25.7	25.69	25.68	25.69	40.74	40.79	40.73	40.72	40.71	40.69	40.73	15.04	0
27/04/2009 22:24	25.79	25.79	25.76	25.79	25.78	25.77	25.78	40.44	40.48	40.42	40.41	40.39	40.37	40.42	14.64	0
27/04/2009 22:27	25.86	25.86	25.84	25.86	25.86	25.84	25.85	40.13	40.16	40.11	40.09	40.06	40.06	40.10	14.25	0
27/04/2009 22:30	25.94	25.94	25.91	25.94	25.93	25.91	25.93	40.82	40.72	40.76	40.74	40.81	40.75	40.77	14.84	0
27/04/2009 22:33	26.01	26.02	25.99	26.01	26.01	25.99	26.01	42.37	42.26	42.4	42.38	42.57	42.44	42.40	16.40	0
27/04/2009 22:36	26.09	26.09	26.07	26.09	26.09	26.07	26.08	41.9	41.91	41.92	41.93	42	41.93	41.93	15.85	0
27/04/2009 22:39	26.17	26.17	26.15	26.17	26.16	26.15	26.16	41.51	41.55	41.51	41.52	41.53	41.49	41.52	15.36	0
27/04/2009	26.24	26.24	26.22	26.24	26.24	26.22	26.23	41.15	41.19	41.13	41.14	41.13	41.11	41.14	14.91	0

22:42																
27/04/2009 22:45	26.25	26.24	26.21	26.23	26.23	26.2	26.23	40.81	40.84	40.79	40.79	40.77	40.76	40.79	14.57	0
27/04/2009 22:48	25.78	25.77	25.75	25.75	25.75	25.73	25.76	40.49	40.53	40.47	40.46	40.45	40.43	40.47	14.72	0
27/04/2009 22:51	25.88	25.89	25.86	25.88	25.88	25.86	25.88	40.19	40.22	40.16	40.15	40.13	40.12	40.16	14.29	0
27/04/2009 22:54	25.99	25.99	25.97	25.98	25.98	25.96	25.98	40.52	40.53	40.46	40.52	40.5	40.45	40.50	14.52	0
27/04/2009 22:57	26.08	26.08	26.05	26.07	26.07	26.05	26.07	42.43	42.29	42.46	42.44	42.64	42.5	42.46	16.39	0
27/04/2009 23:00	26.16	26.17	26.14	26.16	26.16	26.14	26.16	41.96	41.97	41.98	41.99	42.07	41.99	41.99	15.84	0
27/04/2009 23:03	26.23	26.23	26.2	26.22	26.22	26.2	26.22	41.56	41.58	41.55	41.56	41.58	41.54	41.56	15.35	0
27/04/2009 23:06	26.3	26.31	26.27	26.3	26.29	26.27	26.29	41.19	41.22	41.18	41.18	41.18	41.15	41.18	14.89	0
27/04/2009 23:09	25.45	25.42	25.38	25.39	25.38	25.35	25.40	40.86	40.89	40.84	40.84	40.82	40.81	40.84	15.45	0
27/04/2009 23:12	25.31	25.32	25.28	25.31	25.31	25.29	25.30	40.54	40.57	40.51	40.5	40.49	40.48	40.52	15.21	0
27/04/2009 23:15	25.43	25.43	25.4	25.42	25.42	25.4	25.42	40.23	40.27	40.22	40.21	40.19	40.17	40.22	14.80	0
27/04/2009 23:18	25.52	25.52	25.5	25.52	25.52	25.5	25.51	39.95	39.98	39.93	39.91	39.89	39.88	39.92	14.41	0
27/04/2009 23:21	25.59	25.6	25.57	25.59	25.59	25.57	25.59	42.58	42.35	42.55	42.53	42.76	42.62	42.57	16.98	0
27/04/2009 23:24	25.69	25.69	25.67	25.69	25.69	25.67	25.68	42.09	42.08	42.12	42.13	42.23	42.13	42.13	16.45	0
27/04/2009 23:27	25.77	25.77	25.75	25.76	25.76	25.75	25.76	41.68	41.71	41.67	41.69	41.71	41.66	41.69	15.93	0
27/04/2009 23:30	25.85	25.85	25.83	25.85	25.85	25.83	25.84	41.31	41.34	41.29	41.3	41.29	41.27	41.30	15.46	0
27/04/2009 23:33	25.92	25.93	25.91	25.93	25.92	25.9	25.92	40.95	40.99	40.93	40.94	40.92	40.9	40.94	15.02	0
27/04/2009 23:36	26.01	26.02	25.99	26.01	26.01	25.99	26.01	40.63	40.67	40.61	40.6	40.58	40.56	40.61	14.60	0
27/04/2009 23:39	26.09	26.09	26.07	26.08	26.08	26.06	26.08	40.31	40.35	40.29	40.28	40.26	40.24	40.29	14.21	0
27/04/2009 23:42	26.16	26.17	26.15	26.16	26.16	26.14	26.16	40.02	40.05	40	39.98	39.96	39.95	39.99	13.84	0
27/04/2009 23:45	26.24	26.24	26.22	26.24	26.24	26.22	26.23	41.73	41.57	41.71	41.68	41.84	41.75	41.71	15.48	0.82
27/04/2009 23:48	26.23	26.22	26.19	26.21	26.2	26.18	26.21	42.2	42.17	42.24	42.23	42.36	42.25	42.24	16.04	0

27/04/2009 23:51	25.6	25.59	25.56	25.57	25.57	25.55	25.57	41.77	41.8	41.78	41.79	41.83	41.78	41.79	16.22	0
27/04/009 23:54	25.69	25.7	25.66	25.68	25.68	25.67	25.68	41.4	41.43	41.39	41.4	41.4	41.37	41.40	15.72	0
27/04/2009 23:57	25.79	25.79	25.76	25.78	25.78	25.76	25.78	41.04	41.08	41.02	41.03	41.01	40.99	41.03	15.25	0
28/04/2009 00:00	25.88	25.88	25.86	25.88	25.88	25.86	25.87	40.72	40.76	40.7	40.69	40.67	40.66	40.70	14.83	0
28/04/2009 00:03	25.96	25.96	25.94	25.95	25.95	25.94	25.95	40.4	40.43	40.38	40.36	40.34	40.33	40.37	14.42	0
28/04/2009 00:06	26.04	26.04	26.02	26.04	26.04	26.02	26.03	40.11	40.14	40.09	40.06	40.04	40.03	40.08	14.05	0
28/04/2009 00:09	26.12	26.12	26.1	26.11	26.11	26.1	26.11	40.89	40.82	40.85	40.84	40.91	40.86	40.86	14.75	0.831
28/04/2009 00:12	26.19	26.2	26.17	26.19	26.19	26.17	26.19	42.38	42.3	42.42	42.41	42.59	42.46	42.43	16.24	0
28/04/2009 00:15	26.27	26.28	26.26	26.27	26.27	26.25	26.27	41.94	41.95	41.96	41.96	42.02	41.95	41.96	15.70	0
28/04/2009 00:18	25.95	25.93	25.9	25.91	25.9	25.87	25.91	41.55	41.58	41.54	41.55	41.57	41.53	41.55	15.64	0
28/04/2009 00:21	25.69	25.69	25.66	25.68	25.68	25.66	25.68	41.19	41.23	41.17	41.17	41.17	41.15	41.18	15.50	0
28/04/2009 00:24	25.8	25.81	25.79	25.8	25.8	25.79	25.80	40.85	40.89	40.83	40.82	40.81	40.79	40.83	15.03	0
28/04/2009 00:27	25.9	25.9	25.87	25.89	25.89	25.87	25.89	40.52	40.56	40.5	40.49	40.47	40.46	40.50	14.61	0
28/04/2009 00:30	25.98	25.98	25.96	25.97	25.97	25.96	25.97	40.22	40.26	40.2	40.18	40.16	40.15	40.20	14.23	0
28/04/2009 00:33	26.06	26.07	26.04	26.06	26.06	26.04	26.06	39.94	39.99	39.93	39.91	39.88	39.88	39.92	13.87	0.832
28/04/2009 00:36	26.13	26.14	26.11	26.13	26.13	26.11	26.13	42.59	42.4	42.6	42.56	42.8	42.66	42.60	16.48	0
28/04/2009 00:39	26.22	26.22	26.2	26.21	26.21	26.2	26.21	42.09	42.09	42.12	42.12	42.21	42.13	42.13	15.92	0
28/04/2009 00:42	26.29	26.29	26.27	26.29	26.28	26.27	26.28	41.68	41.71	41.68	41.69	41.72	41.67	41.69	15.41	0
28/04/2009 00:45	25.7	25.68	25.63	25.64	25.64	25.6	25.65	41.31	41.36	41.3	41.31	41.3	41.28	41.31	15.66	0
28/04/2009 00:48	25.24	25.25	25.22	25.23	25.24	25.22	25.23	40.97	41	40.95	40.95	40.93	40.91	40.95	15.72	0
28/04/2009 00:51	25.36	25.37	25.34	25.36	25.36	25.34	25.36	40.64	40.68	40.62	40.61	40.59	40.58	40.62	15.27	0
28/04/2009 00:54	25.47	25.47	25.44	25.46	25.46	25.44	25.46	40.34	40.38	40.32	40.3	40.28	40.27	40.32	14.86	0
28/04/2009	25.54	25.55	25.52	25.54	25.54	25.52	25.54	40.04	40.07	40.02	39.99	39.97	39.96	40.01	14.47	0

00:57															
28/04/2009 01:00	25.63	25.64	25.61	25.63	25.63	25.61	25.63	41.73	41.57	41.7	41.67	41.84	41.74	41.71	16.08	0.836
28/04/2009 01:03	25.72	25.72	25.7	25.71	25.71	25.7	25.71	42.21	42.18	42.25	42.24	42.37	42.26	42.25	16.54	0
28/04/2009 01:06	25.8	25.8	25.78	25.79	25.8	25.78	25.79	41.78	41.81	41.79	41.8	41.84	41.78	41.80	16.01	0
28/04/2009 01:09	25.87	25.88	25.85	25.87	25.87	25.85	25.87	41.4	41.43	41.38	41.4	41.4	41.37	41.40	15.53	0
28/04/2009 01:12	25.95	25.95	25.93	25.95	25.95	25.93	25.94	41.04	41.08	41.02	41.02	41.01	40.99	41.03	15.08	0
28/04/2009 01:15	26.04	26.04	26.02	26.03	26.03	26.02	26.03	40.71	40.75	40.7	40.68	40.67	40.65	40.69	14.66	0
28/04/2009 01:18	26.11	26.11	26.09	26.11	26.1	26.09	26.10	40.39	40.43	40.37	40.36	40.34	40.32	40.37	14.27	0
28/04/2009 01:21	26.19	26.19	26.16	26.18	26.18	26.16	26.18	40.09	40.13	40.07	40.05	40.02	40.02	40.06	13.89	0
28/04/2009 01:24	26.27	26.27	26.25	26.26	26.26	26.25	26.26	40.97	40.92	40.93	40.95	41.01	40.95	40.96	14.70	0.838
28/04/2009 01:27	25.88	25.86	25.82	25.83	25.82	25.79	25.83	42.34	42.27	42.38	42.37	42.53	42.41	42.38	16.55	0
28/04/2009 01:30	25.28	25.27	25.24	25.25	25.26	25.24	25.26	41.89	41.91	41.91	41.92	41.97	41.91	41.92	16.66	0
28/04/2009 01:33	25.38	25.38	25.35	25.37	25.37	25.35	25.37	41.5	41.54	41.49	41.51	41.51	41.48	41.51	16.14	0
28/04/2009 01:36	25.48	25.48	25.45	25.47	25.47	25.45	25.47	41.14	41.18	41.13	41.13	41.12	41.1	41.13	15.67	0
28/04/2009 01:39	25.56	25.56	25.53	25.55	25.55	25.54	25.55	40.8	40.84	40.78	40.77	40.76	40.74	40.78	15.23	0
28/04/2009 01:42	25.65	25.66	25.63	25.65	25.64	25.63	25.64	40.49	40.53	40.47	40.45	40.44	40.42	40.47	14.82	0
28/04/2009 01:45	25.74	25.74	25.71	25.73	25.73	25.71	25.73	40.19	40.22	40.17	40.15	40.12	40.11	40.16	14.43	0
28/04/2009 01:48	25.81	25.82	25.79	25.81	25.81	25.79	25.81	40.53	40.55	40.46	40.52	40.51	40.46	40.51	14.70	0
28/04/2009 01:51	25.89	25.89	25.87	25.88	25.88	25.87	25.88	42.5	42.37	42.53	42.51	42.71	42.57	42.53	16.65	0
28/04/2009 01:54	25.96	25.96	25.94	25.96	25.96	25.94	25.95	42.02	42.02	42.04	42.04	42.12	42.04	42.05	16.09	0
28/04/2009 01:57	26.04	26.05	26.03	26.04	26.04	26.03	26.04	41.62	41.65	41.61	41.62	41.64	41.6	41.62	15.59	0
28/04/2009 02:00	26.12	26.12	26.1	26.11	26.11	26.1	26.11	41.24	41.28	41.23	41.23	41.23	41.2	41.24	15.13	0
28/04/2009 02:03	26.19	26.19	26.17	26.19	26.19	26.17	26.18	40.9	40.93	40.88	40.87	40.86	40.84	40.88	14.70	0

28/04/2009 02:06	26.28	26.29	26.26	26.27	26.27	26.26	26.27	40.59	40.63	40.57	40.56	40.54	40.52	40.57	14.30	0
28/04/2009 02:09	25.96	25.94	25.91	25.91	25.91	25.89	25.92	40.27	40.31	40.25	40.23	40.21	40.2	40.25	14.33	0
28/04/2009 02:12	25.69	25.7	25.67	25.68	25.69	25.67	25.68	39.98	40.01	39.96	39.93	39.92	39.9	39.95	14.27	0
28/04/2009 02:15	25.83	25.83	25.8	25.82	25.82	25.8	25.82	42.61	42.39	42.56	42.56	42.78	42.63	42.59	16.77	0
28/04/2009 02:18	25.91	25.91	25.9	25.91	25.91	25.9	25.91	42.17	42.16	42.2	42.21	42.31	42.22	42.21	16.31	0
28/04/2009 02:21	25.99	25.99	25.97	25.98	25.98	25.97	25.98	41.75	41.78	41.75	41.76	41.79	41.75	41.76	15.78	0
28/04/2009 02:24	26.07	26.08	26.05	26.07	26.06	26.05	26.06	41.38	41.42	41.36	41.37	41.37	41.34	41.37	15.31	0
28/04/2009 02:27	26.14	26.14	26.13	26.14	26.14	26.12	26.14	41.02	41.06	41	41	40.99	40.97	41.01	14.87	0
28/04/2009 02:30	26.21	26.22	26.2	26.21	26.21	26.2	26.21	40.69	40.73	40.67	40.66	40.64	40.63	40.67	14.46	0
28/04/2009 02:33	26.24	26.24	26.21	26.23	26.22	26.2	26.22	40.39	40.42	40.36	40.35	40.33	40.32	40.36	14.14	0
28/04/2009 02:36	25.69	25.68	25.65	25.65	25.66	25.64	25.66	40.09	40.13	40.07	40.04	40.03	40.01	40.06	14.40	0
28/04/2009 02:39	25.79	25.8	25.77	25.79	25.79	25.77	25.79	41.33	41.26	41.27	41.32	41.39	41.31	41.31	15.53	0
28/04/2009 02:42	25.9	25.9	25.88	25.89	25.9	25.88	25.89	42.34	42.28	42.38	42.37	42.53	42.41	42.39	16.49	0
28/04/2009 02:45	25.98	25.99	25.96	25.98	25.98	25.96	25.98	41.9	41.92	41.9	41.92	41.97	41.91	41.92	15.95	0
28/04/2009 02:48	26.07	26.07	26.05	26.06	26.06	26.05	26.06	41.51	41.55	41.51	41.51	41.52	41.49	41.52	15.46	0
28/04/2009 02:51	26.14	26.14	26.12	26.13	26.13	26.12	26.13	41.14	41.19	41.13	41.13	41.12	41.1	41.14	15.01	0
28/04/2009 02:54	26.21	26.21	26.19	26.21	26.21	26.2	26.21	40.81	40.85	40.79	40.78	40.77	40.75	40.79	14.59	0
28/04/2009 02:57	26.28	26.29	26.27	26.28	26.28	26.27	26.28	40.5	40.53	40.47	40.46	40.43	40.43	40.47	14.19	0
28/04/2009 03:00	25.53	25.51	25.47	25.47	25.47	25.43	25.48	40.2	40.23	40.18	40.16	40.14	40.13	40.17	14.69	0
28/04/2009 03:03	25.33	25.34	25.31	25.32	25.33	25.31	25.32	40.37	40.41	40.32	40.38	40.34	40.31	40.36	15.03	0
28/04/2009 03:06	25.43	25.44	25.42	25.43	25.43	25.42	25.43	42.48	42.33	42.5	42.47	42.68	42.55	42.50	17.07	0
28/04/2009 03:09	25.53	25.53	25.5	25.52	25.52	25.5	25.52	42	42	42.02	42.02	42.1	42.02	42.03	16.51	0
28/04/2009	25.61	25.62	25.59	25.61	25.61	25.59	25.61	41.6	41.62	41.59	41.6	41.62	41.58	41.60	16.00	0

03:12																
28/04/2009 03:15	25.7	25.7	25.68	25.69	25.69	25.67	25.69	41.23	41.27	41.21	41.22	41.21	41.19	41.22	15.53	0
28/04/2009 03:18	25.78	25.78	25.75	25.77	25.77	25.75	25.77	40.88	40.92	40.86	40.85	40.84	40.82	40.86	15.10	0
28/04/2009 03:21	25.86	25.86	25.84	25.86	25.85	25.84	25.85	40.57	40.6	40.54	40.53	40.51	40.5	40.54	14.69	0
28/04/2009 03:24	25.94	25.94	25.91	25.93	25.93	25.91	25.93	40.25	40.29	40.23	40.21	40.19	40.18	40.23	14.30	0
28/04/2009 03:27	26.01	26.01	25.99	26	26	25.99	26.00	39.96	39.99	39.94	39.91	39.89	39.88	39.93	13.93	0
28/04/2009 03:30	26.08	26.09	26.06	26.08	26.08	26.06	26.08	42.61	42.39	42.58	42.56	42.79	42.64	42.60	16.52	0
28/04/2009 03:33	26.15	26.16	26.14	26.15	26.15	26.13	26.15	42.12	42.11	42.16	42.16	42.26	42.16	42.16	16.02	0
28/04/2009 03:36	26.23	26.24	26.22	26.23	26.23	26.22	26.23	41.72	41.74	41.72	41.73	41.76	41.71	41.73	15.50	0
28/04/2009 03:39	26.2	26.19	26.16	26.17	26.17	26.15	26.17	41.34	41.38	41.33	41.34	41.33	41.31	41.34	15.17	0
28/04/2009 03:42	25.67	25.67	25.64	25.65	25.65	25.64	25.65	41	41.04	40.98	40.98	40.97	40.95	40.99	15.33	0
28/04/2009 03:45	25.78	25.79	25.76	25.78	25.78	25.76	25.78	40.67	40.71	40.65	40.64	40.62	40.61	40.65	14.88	0
28/04/2009 03:48	25.87	25.88	25.86	25.87	25.88	25.85	25.87	40.35	40.39	40.33	40.32	40.29	40.29	40.33	14.46	0
28/04/2009 03:51	25.96	25.97	25.95	25.95	25.96	25.94	25.96	40.06	40.09	40.04	40.02	39.99	39.99	40.03	14.08	0
28/04/2009 03:54	26.04	26.04	26.02	26.03	26.03	26.01	26.03	41.75	41.57	41.7	41.68	41.84	41.74	41.71	15.69	0
28/04/2009 03:57	26.12	26.12	26.11	26.11	26.11	26.1	26.11	42.25	42.22	42.29	42.28	42.42	42.31	42.30	16.18	0
28/04/2009 04:00	26.2	26.2	26.18	26.19	26.19	26.18	26.19	41.83	41.84	41.83	41.84	41.88	41.82	41.84	15.65	0
28/04/2009 04:03	26.27	26.27	26.25	26.26	26.27	26.25	26.26	41.44	41.47	41.43	41.43	41.44	41.41	41.44	15.18	0
28/04/2009 04:06	25.77	25.76	25.7	25.72	25.71	25.67	25.72	41.09	41.13	41.07	41.07	41.06	41.04	41.08	15.36	0
28/04/2009 04:09	25.34	25.34	25.32	25.33	25.34	25.31	25.33	40.75	40.79	40.73	40.72	40.71	40.7	40.73	15.40	0
28/04/2009 04:12	25.44	25.44	25.41	25.43	25.43	25.41	25.43	40.44	40.47	40.41	40.4	40.38	40.37	40.41	14.99	0
28/04/2009 04:15	25.52	25.53	25.5	25.52	25.52	25.5	25.52	40.14	40.17	40.12	40.1	40.08	40.07	40.11	14.60	0
28/04/2009 04:18	25.61	25.62	25.59	25.6	25.6	25.59	25.60	40.89	40.78	40.84	40.81	40.89	40.84	40.84	15.24	0.831

28/04/2009 04:21	25.69	25.69	25.67	25.68	25.68	25.66	25.68	42.44	42.35	42.48	42.46	42.64	42.51	42.48	16.80	0
28/04/2009 04:24	25.76	25.76	25.74	25.75	25.76	25.74	25.75	41.98	41.99	41.99	42	42.06	42	42.00	16.25	0
28/04/2009 04:27	25.83	25.84	25.82	25.83	25.83	25.81	25.83	41.58	41.61	41.57	41.57	41.59	41.55	41.58	15.75	0
28/04/2009 04:30	25.92	25.92	25.9	25.91	25.91	25.9	25.91	41.22	41.26	41.2	41.2	41.19	41.17	41.21	15.30	0
28/04/2009 04:33	25.99	26	25.97	25.99	25.99	25.97	25.99	40.87	40.91	40.85	40.84	40.82	40.81	40.85	14.87	0
28/04/2009 04:36	26.07	26.07	26.05	26.06	26.06	26.05	26.06	40.56	40.59	40.53	40.51	40.5	40.48	40.53	14.47	0
28/04/2009 04:39	26.14	26.15	26.12	26.13	26.14	26.12	26.13	40.24	40.27	40.22	40.2	40.17	40.17	40.21	14.08	0
28/04/2009 04:42	26.21	26.22	26.19	26.21	26.2	26.19	26.20	39.94	39.97	39.92	39.89	39.87	39.86	39.91	13.71	0
28/04/2009 04:45	26.29	26.29	26.26	26.28	26.28	26.27	26.28	42.6	42.39	42.59	42.56	42.79	42.65	42.60	16.32	0
28/04/2009 04:48	25.72	25.7	25.67	25.67	25.67	25.65	25.68	42.08	42.08	42.11	42.11	42.21	42.12	42.12	16.44	0
28/04/2009 04:51	25.7	25.7	25.67	25.69	25.69	25.68	25.69	41.67	41.71	41.67	41.69	41.71	41.67	41.69	16.00	0
28/04/2009 04:54	25.8	25.8	25.78	25.79	25.8	25.78	25.79	41.3	41.34	41.28	41.29	41.29	41.26	41.29	15.50	0
28/04/2009 04:57	25.89	25.89	25.87	25.88	25.88	25.87	25.88	40.96	40.99	40.93	40.93	40.91	40.9	40.94	15.06	0
28/04/2009 05:00	25.97	25.97	25.95	25.96	25.97	25.95	25.96	40.63	40.67	40.61	40.6	40.58	40.57	40.61	14.65	0
28/04/2009 05:03	26.05	26.05	26.03	26.04	26.05	26.03	26.04	40.32	40.36	40.3	40.28	40.26	40.25	40.30	14.25	0
28/04/2009 05:06	26.12	26.13	26.1	26.11	26.11	26.1	26.11	40.02	40.06	40	39.98	39.96	39.95	40.00	13.88	0
28/04/2009 05:09	26.2	26.21	26.19	26.2	26.2	26.18	26.20	41.75	41.6	41.72	41.7	41.85	41.76	41.73	15.53	0.838
28/04/2009 05:12	26.27	26.28	26.25	26.26	26.26	26.25	26.26	42.22	42.19	42.26	42.25	42.38	42.28	42.26	16.00	0
28/04/2009 05:15	25.66	25.63	25.59	25.59	25.59	25.55	25.60	41.79	41.82	41.8	41.81	41.85	41.8	41.81	16.21	0
28/04/2009 05:18	25.21	25.21	25.18	25.19	25.2	25.18	25.20	41.42	41.46	41.4	41.41	41.42	41.39	41.42	16.22	0
28/04/2009 05:21	25.32	25.32	25.3	25.31	25.32	25.3	25.31	41.06	41.1	41.04	41.04	41.03	41.01	41.05	15.74	0
28/04/2009 05:24	25.42	25.42	25.39	25.41	25.41	25.4	25.41	40.73	40.77	40.71	40.7	40.68	40.67	40.71	15.30	0

28/04/2009 05:27	25.49	25.5	25.47	25.48	25.49	25.47	25.48	40.41	40.44	40.38	40.37	40.35	40.34	40.38	14.90	0
28/04/2009 05:30	25.59	25.59	25.57	25.58	25.58	25.56	25.58	40.11	40.15	40.09	40.07	40.05	40.04	40.09	14.51	0
28/04/2009 05:33	25.67	25.67	25.64	25.66	25.66	25.65	25.66	40.97	40.92	40.92	40.95	41	40.94	40.95	15.29	0.833
28/04/2009 05:36	25.75	25.75	25.73	25.74	25.74	25.73	25.74	42.34	42.27	42.38	42.36	42.53	42.4	42.38	16.64	0
28/04/2009 05:39	25.83	25.83	25.81	25.82	25.82	25.81	25.82	41.89	41.91	41.9	41.91	41.96	41.9	41.91	16.09	0
28/04/2009 05:42	25.9	25.9	25.88	25.89	25.89	25.88	25.89	41.49	41.53	41.48	41.49	41.5	41.46	41.49	15.60	0
28/04/2009 05:45	25.98	25.98	25.95	25.97	25.97	25.95	25.97	41.13	41.17	41.11	41.11	41.1	41.08	41.12	15.15	0
28/04/2009 05:48	26.05	26.06	26.03	26.04	26.04	26.03	26.04	40.79	40.83	40.76	40.76	40.74	40.72	40.77	14.73	0
28/04/2009 05:51	26.13	26.13	26.11	26.12	26.12	26.12	26.12	40.47	40.51	40.45	40.43	40.41	40.4	40.45	14.32	0
28/04/2009 05:54	26.2	26.2	26.18	26.18	26.19	26.17	26.19	40.16	40.19	40.13	40.11	40.09	40.08	40.13	13.94	0
28/04/2009 05:57	26.28	26.28	26.26	26.27	26.27	26.26	26.27	40.88	40.77	40.82	40.79	40.87	40.81	40.82	14.55	0
28/04/2009 06:00	25.75	25.73	25.7	25.7	25.7	25.67	25.71	42.39	42.3	42.43	42.41	42.59	42.46	42.43	16.72	0
28/04/2009 06:03	25.66	25.66	25.64	25.65	25.66	25.64	25.65	41.94	41.95	41.95	41.97	42.03	41.96	41.97	16.32	0
28/04/2009 06:06	25.77	25.77	25.75	25.76	25.77	25.75	25.76	41.55	41.59	41.54	41.54	41.56	41.52	41.55	15.79	0
28/04/2009 06:09	25.86	25.86	25.83	25.85	25.85	25.84	25.85	41.19	41.22	41.17	41.17	41.16	41.13	41.17	15.33	0
28/04/2009 06:12	25.93	25.94	25.91	25.92	25.93	25.91	25.92	40.84	40.88	40.82	40.81	40.79	40.78	40.82	14.90	0
28/04/2009 06:15	26.01	26.01	25.99	26	26	25.99	26.00	40.52	40.55	40.49	40.48	40.45	40.44	40.49	14.49	0
28/04/2009 06:18	26.08	26.08	26.06	26.07	26.07	26.06	26.07	40.2	40.24	40.18	40.16	40.14	40.13	40.18	14.11	0
28/04/2009 06:21	26.16	26.17	26.14	26.15	26.15	26.14	26.15	40.39	40.43	40.33	40.39	40.36	40.32	40.37	14.22	0
28/04/2009 06:24	26.23	26.24	26.21	26.22	26.22	26.21	26.22	42.44	42.3	42.46	42.43	42.64	42.51	42.46	16.24	0
28/04/2009 06:27	26.15	26.15	26.11	26.12	26.11	26.1	26.12	41.97	41.98	41.99	41.99	42.06	41.99	42.00	15.87	0

APPENDIX C1 - Specific Heat Capacity

Prototype Panel P3 -1

Date & Time	**Panel Temperature (^{0}C)**				**Average Panel Temperature (^{0}C)**	**Water Temperature (^{0}C)**		**Average Water Temperature (^{0}C)**
	TC1	**TC2**	**TC3**	**TC4**		**TC5**	**TC6**	
21/07/2009 14:15	23.56	23.51	24.95	24.99	24.2525	24.9	25.04	24.97
21/07/2009 14:16	23.52	23.25	24.95	25	24.18	24.9	25.05	24.975
21/07/2009 14:17	23.3	23.3	24.95	25	24.1375	24.88	25	24.94
21/07/2009 14:18	30.49	32.3	56.64	59.56	44.7475	27.38	25.58	26.48
21/07/2009 14:19	41.45	42.42	71.88	75.72	57.8675	27.57	26.84	27.205
21/07/2009 14:20	43.17	41.54	75.6	76.87	59.295	28.87	28.61	28.74
21/07/2009 14:21	43.41	42.23	77.41	76.31	59.84	29.97	30.08	30.025
21/07/2009 14:22	44.37	43.47	78.61	75.5	60.4875	30.98	31.29	31.135
21/07/2009 14:23	44.78	44.93	79.25	74.76	60.93	31.81	32.23	32.02
21/07/2009 14:24	45.98	44.08	79.39	73.99	60.86	32.58	32.99	32.785
21/07/2009 14:25	45.87	45.2	79.32	73.2	60.8975	33.25	33.67	33.46
21/07/2009 14:26	45.81	45.44	79.04	72.38	60.6675	33.83	34.23	34.03
21/07/2009 14:27	46.2	45.2	78.49	71.52	60.3525	34.34	34.75	34.545
21/07/2009 14:28	46.24	45.85	77.91	70.64	60.16	34.78	35.15	34.965
21/07/2009 14:29	46.88	46.28	77.26	69.74	60.04	35.2	35.54	35.37
21/07/2009 14:30	46.87	47.05	76.55	68.83	59.825	35.56	35.89	35.725
21/07/2009 14:31	47.16	46.05	75.75	67.95	59.2275	35.89	36.23	36.06
21/07/2009 14:32	47.2	46.43	75.01	67.07	58.9275	36.19	36.52	36.355
21/07/2009 14:33	47.27	46.58	74.2	66.2	58.5625	36.47	36.77	36.62
21/07/2009 14:34	47.47	46.45	73.4	65.35	58.1675	36.73	37.02	36.875
21/07/2009 14:35	47.57	46.61	72.59	64.55	57.83	36.98	37.26	37.12
21/07/2009 14:36	47.72	47.2	71.83	63.74	57.6225	37.21	37.49	37.35
21/07/2009 14:37	47.84	47.1	71.02	62.99	57.2375	37.39	37.68	37.535
21/07/2009 14:38	47.95	47.09	70.26	62.27	56.8925	37.62	37.91	37.765
21/07/2009 14:39	48.01	47.66	69.49	61.56	56.68	37.82	38.11	37.965
21/07/2009 14:40	48.04	47.98	68.77	60.91	56.425	38	38.3	38.15
21/07/2009 14:41	48.11	47.47	68.05	60.28	55.9775	38.16	38.46	38.31

21/07/2009 14:42	48.25	47.06	67.33	59.65	55.5725	38.33	38.64	38.485
21/07/2009 14:43	48.28	47.92	66.62	59.06	55.47	38.48	38.78	38.63
21/07/2009 14:44	48.32	47.06	65.95	58.51	54.96	38.63	38.94	38.785
21/07/2009 14:45	48.38	47.33	65.3	57.95	54.74	38.78	39.09	38.935
21/07/2009 14:46	48.41	47.38	64.66	57.44	54.4725	38.92	39.24	39.08
21/07/2009 14:47	48.41	47.19	64.07	56.96	54.1575	39.06	39.38	39.22
21/07/2009 14:48	48.39	47.37	63.47	56.48	53.9275	39.16	39.5	39.33
21/07/2009 14:49	48.44	46.86	62.89	56.04	53.5575	39.31	39.64	39.475
21/07/2009 14:50	48.38	47.6	62.34	55.62	53.485	39.43	39.77	39.6
21/07/2009 14:51	48.4	47.39	61.81	55.19	53.1975	39.53	39.88	39.705
21/07/2009 14:52	48.42	47.32	61.28	54.81	52.9575	39.67	40.01	39.84
21/07/2009 14:53	48.38	47.31	60.79	54.44	52.73	39.77	40.1	39.935
21/07/2009 14:54	48.32	47.25	60.27	54.06	52.475	39.85	40.22	40.035
21/07/2009 14:55	48.29	47.06	59.81	53.72	52.22	39.95	40.33	40.14
21/07/2009 14:56	48.26	47.31	59.35	53.39	52.0775	40.05	40.43	40.24
21/07/2009 14:57	48.22	47.28	58.88	53.05	51.8575	40.13	40.51	40.32
21/07/2009 14:58	48.21	47.61	58.47	52.78	51.7675	40.24	40.61	40.425
21/07/2009 14:59	48.18	47.44	58.04	52.49	51.5375	40.33	40.71	40.52
21/07/2009 15:00	48.18	47.22	57.65	52.21	51.315	40.42	40.8	40.61
21/07/2009 15:01	48.11	47.04	57.26	51.94	51.0875	40.52	40.9	40.71
21/07/2009 15:02	48.18	47.13	56.9	51.7	50.9775	40.61	40.99	40.8
21/07/2009 15:03	48.22	47.37	56.54	51.44	50.8925	40.69	41.03	40.86
21/07/2009 15:04	48.04	47.2	56.18	51.22	50.66	40.78	41.12	40.95
21/07/2009 15:05	48.19	47.12	55.84	50.98	50.5325	40.84	41.21	41.025
21/07/2009 15:06	48.05	46.96	55.5	50.75	50.315	40.92	41.25	41.085
21/07/2009 15:07	48.08	47.14	55.16	50.53	50.2275	40.97	41.32	41.145
21/07/2009 15:08	48.04	47.24	54.85	50.33	50.115	41.05	41.39	41.22
21/07/2009 15:09	47.96	47.06	54.55	50.13	49.925	41.11	41.45	41.28
21/07/2009 15:10	47.9	46.99	54.27	49.95	49.7775	41.18	41.53	41.355
21/07/2009 15:11	47.95	47.05	53.99	49.77	49.69	41.24	41.59	41.415
21/07/2009 15:12	47.89	47.06	53.71	49.59	49.5625	41.32	41.67	41.495
21/07/2009 15:13	47.87	46.97	53.46	49.43	49.4325	41.37	41.7	41.535
21/07/2009 15:14	47.77	46.94	53.2	49.27	49.295	41.42	41.76	41.59
21/07/2009 15:15	47.61	46.85	52.95	49.11	49.13	41.48	41.82	41.65
21/07/2009 15:16	47.56	46.66	52.71	48.95	48.97	41.53	41.86	41.695

21/07/2009 15:17	47.51	46.77	52.45	48.81	48.885	41.58	41.92	41.75
21/07/2009 15:18	47.45	46.87	52.22	48.65	48.7975	41.63	41.95	41.79
21/07/2009 15:19	47.41	46.77	52.01	48.53	48.68	41.69	42	41.845
21/07/2009 15:20	47.35	46.67	51.78	48.39	48.5475	41.73	42.05	41.89
21/07/2009 15:21	47.3	46.62	51.59	48.26	48.4425	41.79	42.1	41.945
21/07/2009 15:22	47.27	46.61	51.41	48.15	48.36	41.84	42.14	41.99
21/07/2009 15:23	47.22	46.57	51.22	48.04	48.2625	41.91	42.19	42.05
21/07/2009 15:24	47.19	46.55	51.03	47.94	48.1775	41.95	42.25	42.1
21/07/2009 15:25	47.14	46.5	50.86	47.83	48.0825	41.99	42.3	42.145
21/07/2009 15:26	47.1	46.5	50.68	47.75	48.0075	42.05	42.34	42.195
21/07/2009 15:27	47.05	46.42	50.51	47.64	47.905	42.1	42.37	42.235
21/07/2009 15:28	46.99	46.35	50.32	47.53	47.7975	42.12	42.4	42.26
21/07/2009 15:29	46.95	46.3	50.17	47.43	47.7125	42.16	42.44	42.3
21/07/2009 15:30	46.89	46.19	50	47.32	47.6	42.19	42.44	42.315
21/07/2009 15:31	46.83	46.26	49.86	47.23	47.545	42.22	42.45	42.335
21/07/2009 15:32	46.77	46.2	49.71	47.15	47.4575	42.26	42.47	42.365
21/07/2009 15:33	46.71	46.17	49.56	47.07	47.3775	42.29	42.5	42.395
21/07/2009 15:34	46.65	46.11	49.4	46.98	47.285	42.32	42.52	42.42
21/07/2009 15:35	46.56	46.06	49.27	46.88	47.1925	42.35	42.55	42.45
21/07/2009 15:36	46.49	46.03	49.12	46.79	47.1075	42.36	42.55	42.455
21/07/2009 15:37	46.46	46	48.99	46.71	47.04	42.4	42.6	42.5
21/07/2009 15:38	46.4	45.96	48.86	46.64	46.965	42.42	42.61	42.515
21/07/2009 15:39	46.33	45.91	48.73	46.57	46.885	42.44	42.65	42.545
21/07/2009 15:40	46.28	45.88	48.61	46.49	46.815	42.49	42.68	42.585
21/07/2009 15:41	46.21	45.83	48.48	46.41	46.7325	42.49	42.68	42.585
21/07/2009 15:42	46.15	45.82	48.38	46.36	46.6775	42.51	42.7	42.605
21/07/2009 15:43	46.08	45.77	48.26	46.28	46.5975	42.56	42.73	42.645
21/07/2009 15:44	46.05	45.75	48.18	46.24	46.555	42.58	42.77	42.675
21/07/2009 15:45	46	45.73	48.06	46.18	46.4925	42.6	42.77	42.685
21/07/2009 15:46	45.96	45.69	47.95	46.12	46.43	42.63	42.78	42.705
21/07/2009 15:47	45.91	45.64	47.86	46.03	46.36	42.64	42.79	42.715
21/07/2009 15:48	45.87	45.61	47.74	46	46.305	42.66	42.82	42.74
21/07/2009 15:49	45.83	45.55	47.65	45.91	46.235	42.66	42.83	42.745
21/07/2009 15:50	45.8	45.52	47.56	45.88	46.19	42.71	42.87	42.79
21/07/2009 15:51	45.76	45.47	47.47	45.81	46.1275	42.72	42.87	42.795

21/07/2009 15:52	45.72	45.45	47.37	45.77	46.0775	42.75	42.9	42.825
21/07/2009 15:53	45.68	45.41	47.3	45.72	46.0275	42.78	42.89	42.835
21/07/2009 15:54	45.64	45.36	47.21	45.65	45.965	42.76	42.89	42.825
21/07/2009 15:55	45.61	45.34	47.13	45.62	45.925	42.79	42.9	42.845
21/07/2009 15:56	45.58	45.31	47.06	45.58	45.8825	42.82	42.95	42.885
21/07/2009 15:57	45.55	45.29	46.99	45.53	45.84	42.82	42.95	42.885
21/07/2009 15:58	45.52	45.26	46.9	45.49	45.7925	42.84	42.98	42.91
21/07/2009 15:59	45.48	45.22	46.83	45.44	45.7425	42.85	42.98	42.915
21/07/2009 16:00	45.45	45.2	46.77	45.4	45.705	42.86	42.96	42.91
21/07/2009 16:01	45.4	45.14	46.69	45.35	45.645	42.85	42.97	42.91
21/07/2009 16:02	45.38	45.12	46.62	45.32	45.61	42.89	43	42.945
21/07/2009 16:03	45.34	45.08	46.54	45.26	45.555	42.87	43.01	42.94
21/07/2009 16:04	45.3	45.06	46.46	45.23	45.5125	42.88	43	42.94
21/07/2009 16:05	45.28	45.03	46.41	45.18	45.475	42.9	42.99	42.945
21/07/2009 16:06	45.25	45	46.36	45.16	45.4425	42.91	43.02	42.965
21/07/2009 16:07	45.21	44.96	46.27	45.11	45.3875	42.93	43.03	42.98
21/07/2009 16:08	45.18	44.95	46.22	45.08	45.3575	42.93	43.04	42.985
21/07/2009 16:09	45.16	44.91	46.16	45.05	45.32	42.94	43.05	42.995
21/07/2009 16:10	45.14	44.9	46.12	45.02	45.295	42.96	43.05	43.005
21/07/2009 16:11	45.11	44.88	46.05	44.99	45.2575	42.96	43.04	43
21/07/2009 16:12	45.07	44.86	46.01	44.95	45.2225	42.96	43.05	43.005
21/07/2009 16:13	45.04	44.85	45.93	44.91	45.1825	42.97	43.06	43.015
21/07/2009 16:14	45	44.82	45.89	44.87	45.145	42.97	43.04	43.005
21/07/2009 16:15	44.97	44.77	45.82	44.84	45.1	42.98	43.05	43.015
21/07/2009 16:16	44.95	44.75	45.79	44.81	45.075	42.97	43.06	43.015
21/07/2009 16:17	44.91	44.7	45.71	44.77	45.0225	42.98	43.07	43.025
21/07/2009 16:18	44.89	44.7	45.68	44.75	45.005	42.99	43.05	43.02
21/07/2009 16:19	44.86	44.67	45.61	44.71	44.9625	42.97	43.07	43.02
21/07/2009 16:20	44.83	44.65	45.57	44.69	44.935	42.99	43.06	43.025
21/07/2009 16:21	44.83	44.62	45.55	44.66	44.915	43	43.05	43.025
21/07/2009 16:22	44.79	44.59	45.49	44.64	44.8775	43	43.06	43.03
21/07/2009 16:23	44.77	44.57	45.44	44.62	44.85	43	43.05	43.025
21/07/2009 16:24	44.76	44.56	45.41	44.61	44.835	43.01	43.06	43.035
21/07/2009 16:25	44.74	44.5	45.37	44.58	44.7975	43.03	43.11	43.07

APPENDIX C2

Inner Surface of Sand Panel

Date/Time	Panel 1 Point 1	Point 2	Point 3	Point 4	Avg P1	St Dev	Panel 2 Point 1	Point 2	Point 3	Point 4	Avg P2	St Dev	Panel 3 Point 1	Point 2	Point 3	Point 4	Avg P3	St Dev	Panel 4 Point 1	Point 2	Point 3	Point 4	Avg P4	St Dev
01/04/2009 00:00	29.53	29.68	29.32	29.47	29.50	0.15	29.14	29.30	28.83	29.01	29.07	0.20	29.54	29.66	29.52	29.61	29.58	0.06	29.68	29.58	29.65	29.50	29.60	0.08
01/04/2009 00:30	29.21	29.36	29.03	29.18	29.20	0.14	28.82	28.96	28.58	28.73	28.77	0.16	29.20	29.33	29.18	29.28	29.25	0.07	29.34	29.22	29.30	29.15	29.25	0.08
01/04/2009 01:00	28.94	29.09	28.77	28.92	28.93	0.13	28.60	28.72	28.36	28.49	28.54	0.15	28.94	29.07	28.92	29.02	28.99	0.07	29.07	28.96	29.05	28.91	29.00	0.08
01/04/2009 01:30	28.60	28.76	28.44	28.59	28.60	0.13	28.28	28.41	28.04	28.20	28.23	0.15	28.61	28.75	28.59	28.70	28.66	0.08	28.74	28.63	28.73	28.59	28.67	0.07
01/04/2009 02:00	28.39	28.53	28.23	28.38	28.38	0.12	28.09	28.20	27.88	28.00	28.04	0.14	28.41	28.54	28.38	28.48	28.45	0.07	28.53	28.42	28.52	28.39	28.47	0.07
01/04/2009 02:30	28.12	28.26	27.96	28.11	28.11	0.12	27.85	27.96	27.64	27.77	27.81	0.13	28.16	28.29	28.13	28.23	28.20	0.07	28.27	28.16	28.26	28.14	28.21	0.07
01/04/2009 03:00	27.92	28.05	27.77	27.90	27.91	0.11	27.67	27.76	27.47	27.59	27.62	0.12	27.96	28.08	27.93	28.02	28.00	0.07	28.08	27.96	28.06	27.94	28.01	0.07
01/04/2009 03:30	27.68	27.81	27.55	27.67	27.68	0.11	27.45	27.55	27.26	27.40	27.42	0.12	27.72	27.84	27.69	27.79	27.76	0.07	27.83	27.72	27.81	27.71	27.77	0.06
01/04/2009 04:00	27.46	27.58	27.32	27.45	27.45	0.11	27.24	27.34	27.05	27.19	27.21	0.12	27.50	27.63	27.47	27.57	27.54	0.07	27.61	27.49	27.60	27.48	27.55	0.07
01/04/2009 04:30	27.20	27.33	27.09	27.21	27.21	0.10	27.01	27.12	26.84	26.98	26.99	0.12	27.26	27.39	27.24	27.34	27.31	0.07	27.37	27.25	27.36	27.24	27.31	0.07
01/04/2009 05:00	27.01	27.12	26.91	27.02	27.02	0.09	26.82	26.93	26.67	26.81	26.81	0.11	27.06	27.19	27.04	27.14	27.11	0.07	27.17	27.05	27.15	27.04	27.10	0.07
01/04/2009 05:30	26.78	26.89	26.68	26.80	26.79	0.09	26.60	26.72	26.46	26.61	26.60	0.11	26.84	26.97	26.82	26.92	26.89	0.07	26.93	26.82	26.92	26.82	26.87	0.06
01/04/2009 06:00	26.58	26.69	26.50	26.61	26.60	0.08	26.43	26.53	26.30	26.43	26.42	0.09	26.65	26.78	26.63	26.73	26.70	0.07	26.75	26.63	26.74	26.62	26.69	0.07
01/04/2009 06:30	26.36	26.46	26.27	26.38	26.37	0.08	26.22	26.33	26.09	26.22	26.22	0.10	26.44	26.57	26.43	26.52	26.49	0.07	26.54	26.42	26.52	26.42	26.48	0.06
01/04/2009 07:00	26.18	26.27	26.10	26.20	26.19	0.07	26.04	26.14	25.91	26.05	26.04	0.09	26.25	26.38	26.24	26.33	26.30	0.07	26.35	26.22	26.34	26.23	26.29	0.07
01/04/2009 07:30	26.00	26.08	25.92	26.02	26.01	0.07	25.86	25.96	25.75	25.88	25.86	0.09	26.06	26.19	26.05	26.15	26.11	0.07	26.17	26.04	26.16	26.05	26.11	0.07
01/04/2009 08:00	25.89	25.97	25.84	25.94	25.91	0.06	25.78	25.86	25.71	25.81	25.79	0.06	26.00	26.12	25.96	26.05	26.03	0.07	26.08	25.96	26.04	25.95	26.01	0.06
01/04/2009 08:30	26.12	26.17	26.12	26.14	26.14	0.02	26.08	26.09	26.04	26.07	26.07	0.02	26.21	26.30	26.12	26.22	26.21	0.07	26.23	26.13	26.15	26.09	26.15	0.06
01/04/2009 09:00	26.88	26.89	26.93	26.82	26.88	0.05	27.03	26.91	26.90	26.88	26.93	0.07	26.86	26.88	26.61	26.83	26.80	0.13	26.70	26.62	26.55	26.51	26.60	0.08
01/04/2009 09:30	28.15	28.07	28.21	27.94	28.09	0.12	28.50	28.30	28.20	28.18	28.30	0.15	28.07	27.95	27.55	27.93	27.88	0.23	27.63	27.57	27.35	27.31	27.47	0.16
01/04/2009 10:00	29.72	29.55	29.76	29.36	29.60	0.18	30.24	29.99	29.75	29.76	29.94	0.23	29.59	29.29	28.79	29.35	29.26	0.34	28.88	28.87	28.46	28.42	28.66	0.25
01/04/2009 10:30	31.38	31.10	31.40	30.87	31.19	0.25	31.94	31.69	31.29	31.36	31.57	0.30	31.06	30.54	30.11	30.82	30.63	0.41	30.16	30.22	29.72	29.68	29.95	0.28
01/04/2009 11:00	32.88	32.49	32.87	32.26	32.63	0.30	33.40	33.17	32.64	32.74	32.99	0.36	32.15	31.49	31.38	32.19	31.80	0.43	31.26	31.37	30.98	30.92	31.13	0.22
01/04/2009 11:30	34.08	33.63	34.04	33.41	33.79	0.32	34.49	34.32	33.69	33.81	34.08	0.39	32.93	32.18	32.50	33.27	32.72	0.48	32.16	32.32	32.13	32.06	32.17	0.11
01/04/2009 12:00	35.06	34.55	34.99	34.34	34.74	0.35	35.29	35.17	34.50	34.63	34.90	0.39	33.55	32.78	33.38	34.08	33.45	0.54	32.90	33.10	33.12	33.04	33.04	0.10
01/04/2009 12:30	35.81	35.30	35.74	35.15	35.50	0.32	35.92	35.84	35.19	35.31	35.57	0.37	34.21	33.41	34.12	34.63	34.09	0.51	33.63	33.93	33.91	33.89	33.84	0.14
01/04/2009 13:00	36.20	35.76	36.26	35.74	35.99	0.28	36.26	36.22	35.67	35.80	35.99	0.30	34.86	34.04	34.71	35.05	34.67	0.44	34.28	34.66	34.51	34.57	34.51	0.16
01/04/2009 13:30	36.53	36.09	36.61	36.14	36.34	0.27	36.44	36.41	35.94	36.04	36.21	0.25	35.44	34.65	35.21	35.41	35.18	0.37	34.86	35.29	35.04	35.16	35.09	0.18
01/04/2009 14:00	36.77	36.35	36.84	36.41	36.59	0.25	36.62	36.55	36.13	36.18	36.37	0.25	35.88	35.07	35.56	35.70	35.55	0.35	35.39	35.81	35.44	35.59	35.56	0.19
01/04/2009 14:30	37.02	36.63	37.04	36.64	36.83	0.23	36.82	36.74	36.32	36.32	36.55	0.27	36.33	35.54	35.93	36.01	35.95	0.32	35.90	36.31	35.82	35.98	36.00	0.22
01/04/2009 15:00	37.17	36.79	37.17	36.79	36.98	0.22	36.90	36.82	36.43	36.40	36.64	0.26	36.52	35.75	36.11	36.18	36.14	0.32	36.20	36.58	36.07	36.18	36.26	0.22
01/04/2009 15:30	37.14	36.76	37.11	36.74	36.94	0.22	36.75	36.70	36.24	36.27	36.49	0.27	36.44	35.72	36.07	36.13	36.09	0.30	36.26	36.56	36.14	36.15	36.28	0.20
01/04/2009 16:00	37.10	36.74	37.05	36.73	36.91	0.20	36.63	36.59	36.20	36.18	36.40	0.24	36.47	35.82	36.10	36.15	36.14	0.27	36.38	36.62	36.23	36.19	36.36	0.19
01/04/2009 16:30	37.19	36.89	37.09	36.83	37.00	0.17	36.78	36.71	36.32	36.25	36.52	0.27	36.84	36.20	36.41	36.41	36.47	0.27	36.70	36.96	36.48	36.49	36.66	0.23
01/04/2009 17:00	37.13	36.82	37.01	36.75	36.93	0.17	36.63	36.58	36.18	36.14	36.38	0.26	36.64	36.06	36.27	36.29	36.32	0.24	36.62	36.81	36.43	36.38	36.56	0.20
01/04/2009 17:30	36.79	36.48	36.66	36.39	36.58	0.18	36.17	36.17	35.75	35.76	35.96	0.24	36.16	35.66	35.88	35.94	35.91	0.21	36.24	36.35	36.13	35.98	36.18	0.16
01/04/2009 18:00	36.30	36.01	36.15	35.90	36.09	0.17	35.57	35.62	35.17	35.20	35.39	0.24	35.65	35.27	35.43	35.50	35.46	0.16	35.83	35.88	35.78	35.52	35.75	0.16
01/04/2009 18:30	35.76	35.53	35.61	35.41	35.58	0.15	35.00	35.08	34.60	34.69	34.84	0.23	35.18	34.87	35.00	35.07	35.03	0.13	35.43	35.41	35.39	35.08	35.33	0.17

01/04/2009 19:00	35.13	35.06	35.02	34.93	35.04	0.08	34.49	34.57	34.13	34.20	34.35	0.22	34.72	34.48	34.58	34.65	34.61	0.10	34.94	34.92	34.89	34.63	34.85	0.14
01/04/2009 19:30	34.62	34.63	34.49	34.50	34.56	0.08	34.03	34.14	33.71	33.80	33.92	0.20	34.29	34.14	34.19	34.27	34.22	0.07	34.53	34.47	34.49	34.24	34.43	0.13
01/04/2009 20:00	34.12	34.16	34.01	34.02	34.08	0.07	33.52	33.64	33.22	33.33	33.43	0.19	33.80	33.71	33.73	33.81	33.76	0.05	34.05	33.97	34.01	33.79	33.96	0.11
01/04/2009 20:30	33.60	33.61	33.49	33.49	33.55	0.07	32.94	33.10	32.68	32.80	32.88	0.18	33.27	33.24	33.21	33.31	33.26	0.04	33.48	33.42	33.49	33.25	33.41	0.11
01/04/2009 21:00	33.13	33.19	33.04	33.08	33.11	0.06	32.50	32.62	32.26	32.37	32.44	0.16	32.84	32.83	32.78	32.88	32.83	0.04	33.06	32.99	33.07	32.84	32.99	0.11
01/04/2009 21:30	32.68	32.77	32.62	32.66	32.68	0.06	32.09	32.20	31.88	31.97	32.04	0.14	32.45	32.45	32.39	32.48	32.44	0.04	32.62	32.56	32.63	32.43	32.56	0.09
01/04/2009 22:00	32.35	32.42	32.28	32.34	32.35	0.06	31.77	31.87	31.59	31.68	31.73	0.12	32.10	32.15	32.05	32.14	32.11	0.05	32.26	32.20	32.29	32.10	32.21	0.08
01/04/2009 22:30	32.02	32.09	31.94	32.01	32.02	0.06	31.47	31.57	31.31	31.40	31.44	0.11	31.78	31.84	31.73	31.83	31.80	0.05	31.92	31.85	31.96	31.79	31.88	0.08
01/04/2009 23:00	31.66	31.74	31.59	31.66	31.66	0.06	31.14	31.25	30.98	31.08	31.11	0.11	31.43	31.53	31.40	31.50	31.47	0.06	31.59	31.51	31.62	31.46	31.55	0.07
01/04/2009 23:30	31.23	31.36	31.19	31.27	31.26	0.07	30.77	30.86	30.59	30.68	30.73	0.12	31.05	31.15	31.02	31.12	31.09	0.06	31.19	31.13	31.22	31.07	31.15	0.07
02/04/2009 00:00	30.94	31.04	30.88	30.94	30.95	0.07	30.47	30.57	30.30	30.42	30.44	0.11	30.73	30.84	30.71	30.83	30.78	0.07	30.88	30.79	30.93	30.75	30.84	0.08
02/04/2009 00:30	30.63	30.70	30.56	30.63	30.63	0.06	30.15	30.26	30.01	30.12	30.14	0.10	30.41	30.53	30.39	30.51	30.46	0.07	30.55	30.45	30.61	30.43	30.51	0.08
02/04/2009 01:00	30.32	30.39	30.25	30.33	30.32	0.06	29.87	29.98	29.75	29.86	29.87	0.09	30.13	30.27	30.11	30.24	30.19	0.08	30.25	30.15	30.31	30.14	30.21	0.08
02/04/2009 01:30	30.01	30.06	29.95	30.01	30.01	0.04	29.56	29.67	29.43	29.55	29.55	0.10	29.80	29.95	29.80	29.92	29.87	0.08	29.93	29.83	30.00	29.81	29.89	0.09
02/04/2009 02:00	29.72	29.78	29.64	29.70	29.71	0.06	29.28	29.39	29.14	29.28	29.27	0.10	29.53	29.68	29.51	29.64	29.59	0.08	29.65	29.55	29.71	29.53	29.61	0.08
02/04/2009 02:30	29.41	29.48	29.33	29.41	29.41	0.06	29.01	29.12	28.88	29.02	29.01	0.10	29.25	29.41	29.23	29.36	29.31	0.09	29.35	29.26	29.41	29.25	29.32	0.08
02/04/2009 03:00	29.14	29.21	29.07	29.14	29.14	0.06	28.77	28.87	28.65	28.78	28.77	0.09	29.01	29.17	28.99	29.12	29.07	0.09	29.08	29.00	29.16	29.00	29.06	0.08
02/04/2009 03:30	28.84	28.92	28.79	28.87	28.86	0.05	28.49	28.59	28.38	28.51	28.49	0.09	28.71	28.88	28.70	28.83	28.78	0.09	28.80	28.71	28.88	28.72	28.78	0.08
02/04/2009 04:00	28.59	28.67	28.53	28.61	28.60	0.06	28.26	28.36	28.16	28.29	28.27	0.08	28.49	28.66	28.47	28.59	28.55	0.09	28.58	28.48	28.63	28.49	28.55	0.07
02/04/2009 04:30	28.30	28.39	28.27	28.35	28.33	0.05	28.00	28.10	27.90	28.03	28.01	0.08	28.22	28.39	28.20	28.33	28.29	0.09	28.30	28.21	28.36	28.22	28.27	0.07
02/04/2009 05:00	28.07	28.15	28.05	28.13	28.10	0.05	27.78	27.90	27.73	27.84	27.81	0.07	27.99	28.17	27.98	28.11	28.06	0.09	28.09	27.98	28.14	28.01	28.06	0.07
02/04/2009 05:30	27.81	27.90	27.79	27.87	27.84	0.05	27.56	27.67	27.48	27.61	27.58	0.08	27.78	27.96	27.76	27.88	27.85	0.09	27.86	27.76	27.90	27.78	27.83	0.07
02/04/2009 06:00	27.58	27.66	27.57	27.63	27.61	0.04	27.34	27.45	27.26	27.39	27.36	0.08	27.56	27.73	27.54	27.65	27.62	0.09	27.62	27.53	27.66	27.55	27.59	0.06
02/04/2009 06:30	27.36	27.43	27.34	27.40	27.38	0.04	27.12	27.23	27.06	27.18	27.15	0.07	27.33	27.51	27.32	27.44	27.40	0.09	27.39	27.31	27.43	27.32	27.36	0.06
02/04/2009 07:00	27.16	27.23	27.14	27.22	27.19	0.04	26.94	27.05	26.89	27.01	26.97	0.07	27.14	27.32	27.13	27.25	27.21	0.09	27.19	27.10	27.25	27.13	27.17	0.07
02/04/2009 07:30	26.93	27.01	26.92	26.99	26.96	0.04	26.73	26.84	26.67	26.79	26.76	0.07	26.93	27.11	26.91	27.03	27.00	0.09	27.00	26.90	27.03	26.92	26.96	0.06
02/04/2009 08:00	26.79	26.87	26.79	26.87	26.83	0.05	26.62	26.72	26.59	26.69	26.66	0.06	26.84	27.00	26.80	26.91	26.89	0.09	26.89	26.80	26.90	26.80	26.85	0.05
02/04/2009 08:30	26.80	26.87	26.82	26.88	26.84	0.04	26.70	26.76	26.66	26.74	26.72	0.04	26.86	26.99	26.80	26.91	26.89	0.08	26.88	26.80	26.86	26.79	26.83	0.04
02/04/2009 09:00	27.05	27.11	27.09	27.11	27.09	0.03	27.06	27.06	27.01	27.06	27.05	0.02	27.11	27.19	26.99	27.13	27.11	0.08	27.05	27.00	26.99	26.96	27.00	0.04
02/04/2009 09:30	27.65	27.67	27.70	27.63	27.66	0.03	27.80	27.72	27.66	27.69	27.72	0.06	27.73	27.73	27.45	27.65	27.64	0.13	27.51	27.50	27.35	27.36	27.43	0.09
02/04/2009 10:00	28.63	28.58	28.69	28.50	28.60	0.08	28.94	28.79	28.69	28.70	28.78	0.12	28.64	28.53	28.19	28.51	28.47	0.19	28.22	28.26	27.98	28.02	28.12	0.14
02/04/2009 10:30	29.80	29.68	29.85	29.56	29.72	0.13	30.24	30.07	29.85	29.89	30.01	0.18	29.70	29.45	29.13	29.57	29.46	0.24	29.12	29.18	28.83	28.87	29.00	0.18
02/04/2009 11:00	31.02	30.83	31.06	30.68	30.90	0.18	31.53	31.34	31.03	31.09	31.25	0.23	30.69	30.30	30.17	30.69	30.46	0.27	30.02	30.15	29.82	29.86	29.96	0.15
02/04/2009 11:30	32.19	31.94	32.20	31.77	32.03	0.21	32.71	32.53	32.11	32.20	32.39	0.28	31.63	31.14	31.23	31.80	31.45	0.32	30.93	31.13	30.85	30.90	30.95	0.12
02/04/2009 12:00	33.26	32.96	33.24	32.77	33.06	0.24	33.75	33.58	33.09	33.19	33.40	0.31	32.47	31.89	32.19	32.72	32.32	0.36	31.78	32.05	31.83	31.91	31.89	0.12
02/04/2009 12:30	34.13	33.80	34.14	33.66	33.93	0.24	34.55	34.42	33.93	34.03	34.23	0.30	33.20	32.58	32.98	33.42	33.05	0.36	32.54	32.86	32.66	32.77	32.71	0.14
02/04/2009 13:00	34.80	34.47	34.87	34.41	34.64	0.23	35.14	35.06	34.59	34.69	34.87	0.27	34.03	33.35	33.73	34.07	33.80	0.33	33.35	33.73	33.42	33.59	33.52	0.17
02/04/2009 13:30	35.11	34.82	35.26	34.82	35.00	0.22	35.33	35.29	34.87	34.98	35.12	0.23	34.28	33.60	34.05	34.34	34.07	0.34	33.76	34.10	33.84	33.99	33.92	0.15
02/04/2009 14:00	35.30	35.04	35.39	35.04	35.19	0.18	35.39	35.39	34.95	35.08	35.20	0.22	34.56	33.92	34.35	34.58	34.35	0.31	34.14	34.45	34.18	34.29	34.27	0.14
02/04/2009 14:30	35.50	35.32	35.53	35.30	35.41	0.12	35.60	35.62	35.17	35.29	35.42	0.22	35.13	34.47	34.82	34.96	34.85	0.28	34.65	35.00	34.59	34.71	34.74	0.18
02/04/2009 15:00	35.70	35.54	35.70	35.49	35.61	0.11	35.74	35.76	35.31	35.41	35.56	0.23	35.43	34.79	35.09	35.18	35.12	0.26	34.98	35.35	34.88	35.00	35.05	0.21
02/04/2009 15:30	35.94	35.69	35.90	35.63	35.79	0.15	35.82	35.77	35.40	35.48	35.62	0.21	35.49	34.87	35.19	35.25	35.20	0.26	35.15	35.43	35.10	35.15	35.21	0.15
02/04/2009 16:00	35.97	35.69	35.94	35.65	35.81	0.17	35.72	35.72	35.34	35.40	35.55	0.20	35.34	34.82	35.12	35.23	35.13	0.22	35.18	35.36	35.15	35.12	35.20	0.11
02/04/2009 16:30	35.72	35.44	35.65	35.36	35.54	0.17	35.31	35.34	34.92	35.01	35.15	0.21	35.01	34.56	34.85	34.96	34.85	0.20	34.99	35.10	35.01	34.88	35.00	0.09
02/04/2009 17:00	35.30	35.03	35.20	34.92	35.11	0.17	34.72	34.80	34.30	34.44	34.57	0.23	34.56	34.20	34.44	34.55	34.44	0.17	34.69	34.71	34.73	34.49	34.66	0.11
02/04/2009 17:30	34.85	34.59	34.74	34.47	34.66	0.17	34.18	34.27	33.78	33.90	34.03	0.23	34.15	33.87	34.06	34.15	34.06	0.13	34.33	34.32	34.40	34.10	34.29	0.13
02/04/2009 18:00	34.31	34.08	34.18	33.95	34.13	0.15	33.56	33.69	33.20	33.32	33.44	0.22	33.60	33.41	33.56	33.66	33.56	0.11	33.81	33.76	33.93	33.60	33.78	0.14
02/04/2009 18:30	33.78	33.57	33.65	33.45	33.61	0.14	32.97	33.10	32.63	32.75	32.86	0.21	33.06	32.93	33.05	33.16	33.05	0.09	33.32	33.24	33.46	33.10	33.28	0.15

02/04/2009 19:00	33.29	33.11	33.16	33.00	33.14	0.12	32.46	32.59	32.17	32.27	32.37	0.19	32.63	32.55	32.62	32.71	32.63	0.07	32.88	32.79	33.03	32.67	32.84	0.15
02/04/2009 19:30	32.86	32.70	32.74	32.60	32.73	0.11	32.03	32.13	31.78	31.85	31.95	0.16	32.25	32.19	32.23	32.31	32.25	0.05	32.50	32.41	32.66	32.30	32.47	0.15
02/04/2009 20:00	32.43	32.29	32.31	32.21	32.31	0.09	31.59	31.69	31.38	31.44	31.53	0.14	31.84	31.81	31.83	31.91	31.85	0.04	32.09	32.00	32.25	31.92	32.07	0.14
02/04/2009 20:30	32.04	31.91	31.93	31.85	31.93	0.08	31.23	31.33	31.05	31.11	31.18	0.12	31.46	31.47	31.46	31.55	31.49	0.04	31.75	31.64	31.90	31.58	31.72	0.14
02/04/2009 21:00	31.62	31.52	31.51	31.45	31.53	0.07	30.83	30.93	30.66	30.72	30.79	0.12	31.08	31.11	31.08	31.17	31.11	0.04	31.36	31.26	31.51	31.20	31.33	0.14
02/04/2009 21:30	31.21	31.12	31.11	31.06	31.13	0.06	30.44	30.54	30.28	30.34	30.40	0.11	30.70	30.76	30.69	30.79	30.74	0.05	30.98	30.86	31.12	30.82	30.95	0.14
02/04/2009 22:00	30.82	30.74	30.73	30.68	30.74	0.06	30.07	30.16	29.91	29.98	30.03	0.11	30.34	30.41	30.33	30.43	30.38	0.05	30.61	30.50	30.75	30.45	30.58	0.13
02/04/2009 22:30	30.44	30.37	30.35	30.31	30.37	0.05	29.72	29.81	29.56	29.64	29.68	0.11	30.00	30.08	29.98	30.08	30.04	0.05	30.24	30.13	30.39	30.08	30.21	0.14
02/04/2009 23:00	30.14	30.10	30.08	30.06	30.10	0.03	29.49	29.57	29.37	29.44	29.47	0.08	29.75	29.85	29.74	29.83	29.79	0.06	29.97	29.86	30.10	29.83	29.94	0.12
02/04/2009 23:30	29.82	29.79	29.76	29.75	29.78	0.03	29.23	29.31	29.12	29.19	29.21	0.08	29.46	29.57	29.45	29.55	29.51	0.06	29.66	29.56	29.79	29.54	29.64	0.11
03/04/2009 00:00	29.51	29.48	29.45	29.44	29.47	0.03	28.94	29.03	28.82	28.91	28.93	0.09	29.18	29.29	29.16	29.27	29.23	0.06	29.38	29.27	29.49	29.25	29.35	0.11
03/04/2009 00:30	29.21	29.19	29.16	29.17	29.18	0.02	28.68	28.78	28.59	28.68	28.68	0.08	28.91	29.04	28.90	29.01	28.97	0.07	29.07	28.97	29.19	28.97	29.05	0.10
03/04/2009 01:00	28.96	28.94	28.91	28.93	28.94	0.02	28.45	28.53	28.36	28.44	28.45	0.07	28.68	28.81	28.66	28.77	28.73	0.07	28.85	28.74	28.96	28.73	28.82	0.11
03/04/2009 01:30	28.71	28.70	28.67	28.69	28.69	0.02	28.24	28.31	28.16	28.24	28.24	0.06	28.46	28.59	28.44	28.54	28.51	0.07	28.62	28.51	28.71	28.51	28.59	0.10
03/04/2009 02:00	28.45	28.44	28.40	28.43	28.43	0.02	28.00	28.08	27.92	28.00	28.00	0.07	28.22	28.36	28.20	28.30	28.27	0.07	28.37	28.27	28.46	28.26	28.34	0.09
03/04/2009 02:30	28.20	28.19	28.16	28.19	28.19	0.02	27.77	27.86	27.70	27.79	27.78	0.07	28.00	28.14	27.97	28.08	28.05	0.08	28.14	28.04	28.23	28.03	28.11	0.09
03/04/2009 03:00	27.94	27.94	27.91	27.94	27.93	0.02	27.55	27.64	27.48	27.57	27.56	0.07	27.77	27.91	27.74	27.85	27.82	0.08	27.90	27.80	27.98	27.79	27.87	0.09
03/04/2009 03:30	27.71	27.70	27.67	27.70	27.70	0.02	27.32	27.41	27.25	27.35	27.33	0.07	27.54	27.67	27.52	27.62	27.59	0.07	27.68	27.57	27.76	27.57	27.65	0.09
03/04/2009 04:00	27.49	27.49	27.46	27.50	27.49	0.02	27.13	27.21	27.08	27.16	27.15	0.05	27.34	27.48	27.31	27.42	27.39	0.08	27.47	27.37	27.54	27.37	27.44	0.08
03/04/2009 04:30	27.26	27.27	27.24	27.28	27.26	0.02	26.92	27.02	26.87	26.97	26.95	0.06	27.13	27.28	27.11	27.21	27.18	0.08	27.26	27.16	27.32	27.15	27.22	0.08
03/04/2009 05:00	27.04	27.05	27.02	27.05	27.04	0.01	26.72	26.81	26.66	26.76	26.74	0.06	26.93	27.07	26.90	27.00	26.98	0.08	27.06	26.95	27.11	26.95	27.02	0.08
03/04/2009 05:30	26.83	26.84	26.82	26.86	26.84	0.02	26.53	26.62	26.49	26.58	26.56	0.06	26.74	26.88	26.71	26.81	26.79	0.08	26.87	26.76	26.91	26.75	26.82	0.08
03/04/2009 06:00	26.62	26.63	26.60	26.64	26.62	0.02	26.33	26.42	26.29	26.38	26.36	0.06	26.54	26.68	26.51	26.60	26.58	0.07	26.66	26.56	26.71	26.55	26.62	0.08
03/04/2009 06:30	26.38	26.39	26.37	26.41	26.39	0.02	26.10	26.21	26.06	26.16	26.13	0.07	26.32	26.47	26.29	26.38	26.37	0.08	26.44	26.34	26.48	26.32	26.40	0.08
03/04/2009 07:00	26.17	26.17	26.15	26.18	26.17	0.01	25.89	26.00	25.84	25.95	25.92	0.07	26.11	26.26	26.08	26.18	26.16	0.08	26.24	26.13	26.28	26.11	26.19	0.08
03/04/2009 07:30	25.94	25.96	25.93	25.96	25.95	0.02	25.68	25.79	25.64	25.74	25.71	0.07	25.91	26.06	25.88	25.97	25.96	0.08	26.03	25.92	26.07	25.91	25.98	0.08
03/04/2009 08:00	25.83	25.85	25.83	25.89	25.85	0.03	25.62	25.71	25.62	25.70	25.66	0.05	25.86	26.00	25.81	25.90	25.89	0.08	25.95	25.85	25.95	25.83	25.90	0.06
03/04/2009 08:30	26.04	26.07	26.10	26.11	26.08	0.03	25.96	25.98	25.98	26.00	25.98	0.02	26.08	26.19	25.97	26.09	26.08	0.09	26.09	26.01	26.04	25.96	26.03	0.05
03/04/2009 09:00	26.72	26.71	26.82	26.70	26.74	0.06	26.83	26.74	26.74	26.75	26.77	0.04	26.70	26.73	26.43	26.65	26.63	0.14	26.52	26.48	26.37	26.34	26.43	0.09
03/04/2009 09:30	27.70	27.61	27.79	27.56	27.67	0.10	27.97	27.83	27.76	27.76	27.83	0.10	27.66	27.57	27.18	27.53	27.49	0.21	27.26	27.26	26.99	26.98	27.12	0.16
03/04/2009 10:00	28.82	28.64	28.90	28.55	28.73	0.16	29.18	29.03	28.83	28.87	28.98	0.16	28.70	28.48	28.05	28.55	28.45	0.28	28.14	28.16	27.79	27.79	27.97	0.21
03/04/2009 10:30	29.88	29.63	29.92	29.52	29.74	0.19	30.28	30.15	29.82	29.90	30.04	0.21	29.71	29.37	28.98	29.54	29.40	0.31	29.09	29.13	28.70	28.68	28.90	0.24
03/04/2009 11:00	30.88	30.59	30.90	30.46	30.71	0.22	31.29	31.18	30.77	30.85	31.02	0.25	30.68	30.22	29.96	30.52	30.35	0.32	30.03	30.13	29.66	29.66	29.87	0.25
03/04/2009 11:30	31.98	31.65	31.98	31.48	31.77	0.25	32.42	32.29	31.79	31.86	32.09	0.31	31.67	31.11	31.02	31.57	31.34	0.33	30.97	31.19	30.67	30.71	30.89	0.24
03/04/2009 12:00	33.21	32.83	33.20	32.64	32.97	0.28	33.64	33.50	32.96	33.01	33.28	0.34	32.62	31.97	32.08	32.58	32.31	0.34	31.90	32.21	31.71	31.81	31.91	0.22
03/04/2009 12:30	34.29	33.89	34.34	33.79	34.08	0.28	34.68	34.55	34.12	34.18	34.38	0.27	33.37	32.69	32.93	33.31	33.08	0.32	32.70	33.07	32.60	32.76	32.78	0.20
03/04/2009 13:00	35.03	34.68	35.18	34.72	34.90	0.24	35.29	35.27	34.84	35.06	35.12	0.21	34.12	33.44	33.73	33.99	33.82	0.30	33.52	33.89	33.45	33.63	33.62	0.19
03/04/2009 13:30	35.45	35.10	35.62	35.20	35.34	0.24	35.62	35.54	35.31	35.40	35.47	0.14	34.56	33.85	34.16	34.35	34.23	0.30	34.01	34.38	33.92	34.11	34.11	0.20
03/04/2009 14:00	35.84	35.50	35.98	35.59	35.73	0.22	35.90	35.80	35.61	35.69	35.75	0.13	35.07	34.37	34.65	34.76	34.71	0.29	34.55	34.92	34.45	34.64	34.64	0.20
03/04/2009 14:30	36.10	35.78	36.20	35.87	35.99	0.20	36.09	35.98	35.80	35.85	35.93	0.13	35.42	34.75	35.01	35.07	35.06	0.28	34.96	35.31	34.84	35.03	35.04	0.20
03/04/2009 15:00	36.34	36.05	36.39	36.12	36.23	0.17	36.27	36.17	35.96	35.97	36.09	0.15	35.82	35.17	35.36	35.39	35.44	0.27	35.36	35.71	35.21	35.38	35.42	0.21
03/04/2009 15:30	36.45	36.18	36.45	36.21	36.32	0.15	36.30	36.22	35.97	36.00	36.12	0.16	35.98	35.37	35.55	35.55	35.61	0.26	35.62	35.93	35.46	35.60	35.65	0.20
03/04/2009 16:00	36.41	36.12	36.40	36.15	36.27	0.16	36.10	36.07	35.79	35.83	35.95	0.16	35.74	35.23	35.43	35.47	35.47	0.21	35.57	35.77	35.46	35.48	35.57	0.14
03/04/2009 16:30	36.46	36.22	36.41	36.23	36.33	0.12	36.17	36.13	35.86	35.86	36.01	0.17	36.05	35.55	35.67	35.67	35.74	0.22	35.84	36.05	35.68	35.72	35.82	0.17
03/04/2009 17:00	36.48	36.27	36.39	36.23	36.34	0.11	36.19	36.13	35.88	35.85	36.01	0.17	36.19	35.71	35.79	35.77	35.87	0.22	36.01	36.22	35.80	35.85	35.97	0.19
03/04/2009 17:30	36.45	36.24	36.34	36.18	36.30	0.12	36.13	36.09	35.79	35.80	35.95	0.18	36.19	35.72	35.79	35.77	35.87	0.22	36.08	36.27	35.86	35.87	36.02	0.20
03/04/2009 18:00	35.64	35.40	35.46	35.16	35.42	0.20	35.06	35.25	34.45	34.75	34.88	0.35	35.01	34.75	34.86	34.97	34.90	0.12	35.10	35.15	35.08	34.86	35.05	0.13
03/04/2009 18:30	34.96	34.66	34.76	34.41	34.70	0.23	34.08	34.33	33.53	33.79	33.93	0.35	34.08	33.91	34.04	34.20	34.06	0.12	34.39	34.26	34.47	34.01	34.28	0.20

03/04/2009 19:00	34.33	34.08	34.14	33.88	34.11	0.19	33.46	33.64	32.99	33.17	33.32	0.29	33.59	33.50	33.56	33.69	33.59	0.08	33.92	33.75	34.01	33.53	33.80	0.21
03/04/2009 19:30	33.73	33.54	33.53	33.35	33.54	0.16	32.85	33.00	32.47	32.60	32.73	0.24	33.12	33.07	33.07	33.17	33.11	0.05	33.42	33.26	33.53	33.07	33.32	0.20
03/04/2009 20:00	33.11	32.95	32.91	32.78	32.94	0.14	32.22	32.35	31.87	31.96	32.10	0.22	32.56	32.54	32.50	32.58	32.55	0.03	32.88	32.73	32.98	32.55	32.79	0.19
03/04/2009 20:30	32.55	32.41	32.35	32.24	32.39	0.13	31.64	31.77	31.34	31.42	31.54	0.20	32.01	32.03	31.96	32.05	32.01	0.04	32.35	32.20	32.46	32.04	32.26	0.18
03/04/2009 21:00	32.01	31.89	31.80	31.73	31.86	0.12	31.11	31.25	30.84	30.94	31.04	0.18	31.51	31.58	31.46	31.56	31.53	0.05	31.84	31.69	31.96	31.55	31.76	0.18
03/04/2009 21:30	31.50	31.41	31.32	31.26	31.37	0.10	30.64	30.76	30.39	30.48	30.57	0.16	31.03	31.12	30.98	31.08	31.05	0.06	31.35	31.21	31.47	31.09	31.28	0.17
03/04/2009 22:00	31.08	31.00	30.91	30.89	30.97	0.09	30.24	30.35	30.05	30.12	30.19	0.13	30.62	30.72	30.58	30.68	30.65	0.06	30.93	30.79	31.05	30.69	30.87	0.16
03/04/2009 22:30	30.68	30.62	30.53	30.53	30.59	0.07	29.89	29.99	29.73	29.79	29.85	0.11	30.26	30.37	30.22	30.31	30.29	0.06	30.54	30.42	30.66	30.34	30.49	0.14
03/04/2009 23:00	30.25	30.20	30.10	30.11	30.17	0.07	29.50	29.60	29.32	29.41	29.46	0.12	29.85	29.99	29.81	29.92	29.89	0.08	30.14	30.01	30.24	29.93	30.08	0.14
03/04/2009 23:30	29.86	29.82	29.71	29.73	29.78	0.07	29.14	29.23	28.99	29.07	29.11	0.10	29.47	29.62	29.43	29.55	29.52	0.08	29.75	29.62	29.86	29.55	29.70	0.14
04/04/2009 00:00	29.47	29.44	29.33	29.34	29.40	0.07	28.77	28.88	28.60	28.71	28.74	0.12	29.10	29.25	29.06	29.18	29.15	0.08	29.36	29.23	29.47	29.16	29.31	0.14
04/04/2009 00:30	29.13	29.10	29.02	29.02	29.07	0.06	28.46	28.57	28.31	28.42	28.44	0.11	28.78	28.94	28.74	28.87	28.83	0.09	29.02	28.89	29.14	28.84	28.97	0.14
04/04/2009 01:00	28.82	28.80	28.72	28.74	28.77	0.05	28.19	28.29	28.09	28.18	28.19	0.08	28.49	28.65	28.45	28.58	28.54	0.09	28.72	28.59	28.82	28.55	28.67	0.12
04/04/2009 01:30	28.51	28.49	28.41	28.43	28.46	0.05	27.92	28.02	27.81	27.91	27.92	0.09	28.20	28.35	28.17	28.30	28.26	0.08	28.41	28.28	28.51	28.25	28.36	0.12
04/04/2009 02:00	28.24	28.23	28.16	28.20	28.21	0.04	27.69	27.79	27.62	27.71	27.70	0.07	27.95	28.10	27.93	28.05	28.01	0.08	28.14	28.00	28.24	28.00	28.10	0.12
04/04/2009 02:30	28.00	28.00	27.93	27.98	27.98	0.03	27.50	27.60	27.44	27.53	27.52	0.07	27.73	27.89	27.72	27.84	27.80	0.08	27.91	27.78	28.01	27.78	27.87	0.11
04/04/2009 03:00	27.77	27.76	27.70	27.74	27.74	0.03	27.29	27.39	27.24	27.32	27.31	0.06	27.52	27.67	27.50	27.62	27.58	0.08	27.69	27.56	27.77	27.56	27.65	0.10
04/04/2009 03:30	27.55	27.56	27.50	27.54	27.54	0.03	27.13	27.21	27.08	27.16	27.15	0.05	27.35	27.49	27.32	27.43	27.40	0.08	27.50	27.37	27.56	27.38	27.45	0.09
04/04/2009 04:00	27.33	27.33	27.28	27.32	27.32	0.02	26.92	27.02	26.88	26.97	26.95	0.06	27.12	27.27	27.11	27.22	27.18	0.08	27.28	27.15	27.35	27.17	27.24	0.09
04/04/2009 04:30	27.12	27.12	27.08	27.11	27.11	0.02	26.74	26.82	26.69	26.78	26.76	0.06	26.94	27.09	26.92	27.03	27.00	0.08	27.08	26.97	27.14	26.97	27.04	0.08
04/04/2009 05:00	26.93	26.94	26.89	26.93	26.92	0.02	26.58	26.66	26.53	26.61	26.60	0.05	26.78	26.92	26.75	26.85	26.83	0.08	26.91	26.80	26.96	26.80	26.87	0.08
04/04/2009 05:30	26.73	26.73	26.69	26.72	26.72	0.02	26.40	26.49	26.35	26.45	26.42	0.06	26.59	26.74	26.56	26.67	26.64	0.08	26.73	26.61	26.77	26.61	26.68	0.08
04/04/2009 06:00	26.55	26.55	26.52	26.55	26.54	0.02	26.24	26.33	26.21	26.30	26.27	0.05	26.42	26.57	26.40	26.51	26.48	0.08	26.55	26.44	26.59	26.44	26.51	0.08
04/04/2009 06:30	26.38	26.38	26.35	26.38	26.37	0.01	26.09	26.18	26.06	26.15	26.12	0.05	26.27	26.41	26.25	26.34	26.32	0.07	26.40	26.29	26.43	26.28	26.35	0.08
04/04/2009 07:00	26.21	26.21	26.19	26.22	26.21	0.01	25.94	26.03	25.92	26.00	25.97	0.05	26.12	26.26	26.09	26.19	26.17	0.08	26.25	26.14	26.27	26.13	26.20	0.07
04/04/2009 07:30	26.04	26.05	26.02	26.04	26.04	0.01	25.79	25.88	25.77	25.86	25.83	0.05	25.97	26.10	25.94	26.03	26.01	0.07	26.09	25.98	26.11	25.98	26.04	0.07
04/04/2009 08:00	25.94	25.94	25.93	25.96	25.94	0.01	25.72	25.81	25.72	25.80	25.76	0.05	25.91	26.04	25.87	25.96	25.95	0.07	26.01	25.90	26.01	25.89	25.95	0.07
04/04/2009 08:30	26.09	26.10	26.11	26.12	26.11	0.01	25.98	26.00	25.97	26.02	25.99	0.02	26.14	26.23	26.02	26.12	26.13	0.09	26.17	26.09	26.10	26.03	26.10	0.06
04/04/2009 09:00	26.73	26.72	26.77	26.67	26.72	0.04	26.83	26.74	26.71	26.72	26.75	0.05	26.81	26.82	26.53	26.70	26.72	0.13	26.65	26.62	26.45	26.45	26.54	0.11
04/04/2009 09:30	27.82	27.73	27.87	27.62	27.76	0.11	28.10	27.93	27.84	27.83	27.93	0.13	27.82	27.71	27.31	27.63	27.62	0.22	27.43	27.43	27.11	27.13	27.28	0.18
04/04/2009 10:00	29.16	28.98	29.20	28.82	29.04	0.18	29.58	29.38	29.16	29.18	29.33	0.20	29.12	28.87	28.38	28.85	28.81	0.31	28.51	28.53	28.06	28.09	28.30	0.26
04/04/2009 10:30	30.59	30.32	30.60	30.11	30.41	0.24	31.09	30.89	30.51	30.56	30.76	0.28	30.47	30.04	29.59	30.19	30.07	0.37	29.71	29.78	29.20	29.23	29.48	0.31
04/04/2009 11:00	32.02	31.67	32.01	31.43	31.78	0.29	32.54	32.34	31.85	31.93	32.17	0.33	31.65	31.07	30.87	31.54	31.28	0.37	30.84	31.00	30.44	30.47	30.69	0.28
04/04/2009 11:30	33.39	32.98	33.36	32.73	33.12	0.32	33.87	33.69	33.10	33.20	33.47	0.37	32.64	31.95	32.12	32.79	32.38	0.40	31.87	32.11	31.69	31.74	31.85	0.19
04/04/2009 12:00	34.60	34.14	34.56	33.89	34.30	0.34	35.01	34.86	34.23	34.32	34.61	0.39	33.55	32.79	33.21	33.81	33.34	0.44	32.82	33.12	32.83	32.89	32.92	0.14
04/04/2009 12:30	35.55	35.06	35.54	34.89	35.26	0.34	35.83	35.75	35.10	35.23	35.48	0.37	34.22	33.45	34.01	34.47	34.04	0.43	33.59	33.92	33.71	33.79	33.75	0.14
04/04/2009 13:00	36.04	35.53	36.13	35.50	35.80	0.33	36.13	36.10	35.54	35.68	35.86	0.30	34.62	33.86	34.48	34.84	34.45	0.42	34.16	34.46	34.31	34.37	34.33	0.13
04/04/2009 13:30	36.41	35.92	36.49	35.92	36.19	0.31	36.37	36.35	35.82	35.95	36.12	0.28	35.21	34.43	35.01	35.24	34.97	0.38	34.77	35.08	34.88	34.96	34.92	0.13
04/04/2009 14:00	36.48	35.98	36.54	36.01	36.25	0.30	36.23	36.21	35.77	35.88	36.02	0.23	35.14	34.41	35.05	35.21	34.95	0.37	34.91	35.13	35.06	35.05	35.04	0.09
04/04/2009 14:30	36.51	36.04	36.55	36.08	36.30	0.27	36.13	36.14	35.73	35.82	35.96	0.21	35.24	34.58	35.14	35.29	35.06	0.33	35.11	35.30	35.24	35.16	35.20	0.08
04/04/2009 15:00	36.40	35.95	36.41	35.95	36.18	0.26	35.88	35.88	35.48	35.58	35.71	0.21	35.25	34.58	35.12	35.19	35.04	0.31	35.22	35.36	35.32	35.17	35.27	0.09
04/04/2009 15:30	36.27	35.84	36.25	35.83	36.05	0.25	35.66	35.64	35.24	35.35	35.47	0.21	35.13	34.52	35.04	35.07	34.94	0.28	35.22	35.31	35.32	35.11	35.24	0.10
04/04/2009 16:00	36.19	35.79	36.16	35.80	35.99	0.22	35.56	35.55	35.19	35.26	35.39	0.19	35.16	34.62	35.05	35.10	34.98	0.25	35.26	35.33	35.33	35.12	35.26	0.10
04/04/2009 16:30	36.11	35.73	36.06	35.72	35.91	0.21	35.46	35.45	35.10	35.15	35.29	0.19	35.14	34.62	35.02	35.06	34.96	0.23	35.28	35.33	35.33	35.10	35.26	0.11
04/04/2009 17:00	35.86	35.47	35.78	35.43	35.64	0.22	35.12	35.13	34.72	34.79	34.94	0.22	34.83	34.38	34.74	34.81	34.69	0.21	35.05	35.05	35.13	34.84	35.02	0.12
04/04/2009 17:30	35.64	35.28	35.54	35.22	35.42	0.20	34.86	34.88	34.49	34.56	34.70	0.20	34.65	34.25	34.57	34.64	34.53	0.19	34.90	34.88	34.99	34.66	34.86	0.14
04/04/2009 18:00	35.29	34.95	35.18	34.87	35.07	0.20	34.45	34.49	34.05	34.15	34.29	0.22	34.33	33.99	34.26	34.34	34.23	0.16	34.65	34.58	34.75	34.38	34.59	0.16
04/04/2009 18:30	34.88	34.59	34.75	34.48	34.68	0.18	34.03	34.07	33.65	33.72	33.87	0.21	33.99	33.72	33.93	34.01	33.91	0.13	34.30	34.24	34.42	34.05	34.25	0.15

04/04/2009 19:00	34.50	34.23	34.36	34.15	34.31	0.15	33.64	33.68	33.32	33.38	33.51	0.18	33.65	33.43	33.60	33.69	33.59	0.11	33.96	33.88	34.10	33.72	33.92	0.16
04/04/2009 19:30	34.11	33.87	33.97	33.79	33.94	0.14	33.28	33.32	32.99	33.04	33.16	0.17	33.33	33.16	33.29	33.37	33.29	0.09	33.64	33.55	33.78	33.42	33.60	0.15
04/04/2009 20:00	33.68	33.49	33.56	33.40	33.53	0.12	32.86	32.92	32.57	32.64	32.75	0.17	32.95	32.82	32.93	33.00	32.93	0.08	33.27	33.18	33.41	33.07	33.23	0.14
04/04/2009 20:30	33.25	33.08	33.13	33.00	33.12	0.10	32.43	32.49	32.19	32.23	32.34	0.15	32.56	32.47	32.55	32.62	32.55	0.06	32.89	32.78	33.04	32.70	32.85	0.15
04/04/2009 21:00	32.77	32.62	32.66	32.53	32.65	0.10	31.95	32.03	31.71	31.78	31.87	0.15	32.12	32.09	32.13	32.20	32.14	0.05	32.44	32.34	32.60	32.27	32.41	0.14
04/04/2009 21:30	32.34	32.21	32.22	32.13	32.23	0.09	31.53	31.61	31.33	31.38	31.46	0.13	31.73	31.72	31.74	31.81	31.75	0.04	32.05	31.93	32.21	31.87	32.02	0.15
04/04/2009 22:00	31.87	31.76	31.75	31.67	31.76	0.08	31.06	31.15	30.85	30.93	31.00	0.13	31.29	31.32	31.30	31.39	31.33	0.05	31.63	31.50	31.78	31.44	31.59	0.15
04/04/2009 22:30	31.49	31.39	31.37	31.33	31.40	0.07	30.70	30.78	30.55	30.59	30.66	0.10	30.94	31.00	30.95	31.04	30.98	0.05	31.26	31.14	31.41	31.09	31.23	0.14
04/04/2009 23:00	31.14	31.06	31.04	31.00	31.06	0.06	30.40	30.48	30.26	30.30	30.36	0.10	30.65	30.72	30.65	30.74	30.69	0.05	30.94	30.82	31.08	30.78	30.91	0.14
04/04/2009 23:30	30.80	30.75	30.71	30.68	30.74	0.05	30.11	30.18	29.98	30.03	30.08	0.09	30.36	30.44	30.35	30.44	30.40	0.05	30.63	30.51	30.76	30.48	30.60	0.13
05/04/2009 00:00	30.50	30.44	30.41	30.37	30.43	0.05	29.84	29.90	29.71	29.77	29.81	0.08	30.07	30.16	30.06	30.15	30.11	0.05	30.33	30.21	30.45	30.18	30.29	0.12
05/04/2009 00:30	30.20	30.16	30.11	30.11	30.15	0.04	29.58	29.65	29.47	29.53	29.56	0.08	29.80	29.91	29.80	29.89	29.85	0.06	30.05	29.93	30.17	29.91	30.02	0.12
05/04/2009 01:00	29.90	29.86	29.83	29.82	29.85	0.04	29.31	29.39	29.20	29.27	29.29	0.08	29.54	29.64	29.52	29.62	29.58	0.06	29.77	29.65	29.89	29.63	29.74	0.12
05/04/2009 01:30	29.61	29.57	29.53	29.53	29.56	0.04	29.06	29.13	28.96	29.02	29.04	0.07	29.28	29.40	29.26	29.36	29.33	0.07	29.51	29.38	29.62	29.37	29.47	0.12
05/04/2009 02:00	29.34	29.31	29.27	29.27	29.30	0.03	28.81	28.89	28.72	28.79	28.80	0.07	29.03	29.16	29.02	29.11	29.08	0.07	29.26	29.13	29.36	29.12	29.22	0.11
05/04/2009 02:30	29.09	29.06	29.03	29.03	29.05	0.03	28.60	28.67	28.53	28.59	28.60	0.06	28.82	28.95	28.80	28.89	28.87	0.07	29.03	28.90	29.12	28.90	28.99	0.11
05/04/2009 03:00	28.80	28.78	28.75	28.74	28.77	0.03	28.33	28.42	28.22	28.31	28.32	0.08	28.55	28.68	28.53	28.63	28.60	0.07	28.76	28.63	28.85	28.62	28.72	0.11
05/04/2009 03:30	28.56	28.54	28.51	28.51	28.53	0.02	28.12	28.20	28.03	28.10	28.11	0.07	28.33	28.46	28.31	28.41	28.38	0.07	28.52	28.40	28.61	28.39	28.48	0.10
05/04/2009 04:00	28.24	28.23	28.20	28.19	28.22	0.02	27.84	27.95	27.72	27.83	27.84	0.09	28.05	28.17	28.04	28.13	28.10	0.06	28.22	28.10	28.31	28.08	28.18	0.11
05/04/2009 04:30	28.01	28.01	27.97	27.99	28.00	0.02	27.62	27.72	27.54	27.63	27.63	0.07	27.83	27.96	27.82	27.92	27.88	0.07	28.00	27.88	28.08	27.86	27.96	0.10
05/04/2009 05:00	27.79	27.79	27.76	27.78	27.78	0.01	27.44	27.53	27.36	27.45	27.45	0.07	27.64	27.77	27.62	27.73	27.69	0.07	27.80	27.68	27.88	27.67	27.76	0.10
05/04/2009 05:30	27.58	27.59	27.55	27.58	27.58	0.02	27.26	27.34	27.20	27.27	27.27	0.06	27.45	27.58	27.44	27.53	27.50	0.07	27.60	27.49	27.67	27.48	27.56	0.09
05/04/2009 06:00	27.36	27.37	27.34	27.36	27.36	0.01	27.07	27.15	26.99	27.08	27.07	0.07	27.26	27.39	27.24	27.33	27.31	0.07	27.40	27.28	27.47	27.28	27.36	0.09
05/04/2009 06:30	27.17	27.18	27.15	27.18	27.17	0.01	26.89	26.98	26.83	26.92	26.91	0.06	27.08	27.21	27.06	27.15	27.13	0.07	27.21	27.10	27.27	27.10	27.17	0.08
05/04/2009 07:00	26.96	26.98	26.95	26.97	26.97	0.01	26.70	26.79	26.64	26.74	26.72	0.06	26.89	27.02	26.87	26.96	26.94	0.07	27.02	26.91	27.08	26.91	26.98	0.08
05/04/2009 07:30	26.77	26.79	26.75	26.79	26.78	0.02	26.52	26.61	26.47	26.55	26.54	0.06	26.71	26.84	26.69	26.78	26.76	0.07	26.84	26.73	26.89	26.72	26.80	0.08
05/04/2009 08:00	26.64	26.66	26.64	26.68	26.66	0.02	26.43	26.51	26.40	26.47	26.45	0.05	26.64	26.76	26.60	26.68	26.67	0.07	26.74	26.63	26.77	26.62	26.69	0.08
05/04/2009 08:30	26.81	26.84	26.86	26.87	26.85	0.03	26.73	26.74	26.72	26.74	26.73	0.01	26.86	26.95	26.75	26.86	26.86	0.08	26.87	26.79	26.84	26.75	26.81	0.05
05/04/2009 09:00	27.54	27.54	27.63	27.52	27.56	0.05	27.66	27.57	27.58	27.57	27.60	0.04	27.51	27.53	27.25	27.46	27.44	0.13	27.30	27.28	27.19	27.16	27.23	0.07
05/04/2009 09:30	28.76	28.67	28.88	28.61	28.73	0.12	29.08	28.90	28.84	28.84	28.92	0.11	28.60	28.49	28.11	28.51	28.43	0.22	28.13	28.12	27.90	27.89	28.01	0.13
05/04/2009 10:00	30.22	30.04	30.34	29.93	30.13	0.18	30.67	30.45	30.28	30.29	30.42	0.18	29.99	29.71	29.24	29.83	29.69	0.32	29.26	29.28	28.92	28.91	29.09	0.21
05/04/2009 10:30	31.72	31.45	31.82	31.30	31.57	0.24	32.23	32.01	31.68	31.76	31.92	0.25	31.34	30.88	30.48	31.21	30.98	0.38	30.46	30.53	30.13	30.09	30.30	0.22
05/04/2009 11:00	33.11	32.75	33.19	32.59	32.91	0.29	33.58	33.39	32.91	33.06	33.24	0.31	32.34	31.74	31.69	32.47	32.06	0.40	31.50	31.63	31.34	31.29	31.44	0.16
05/04/2009 11:30	34.24	33.82	34.26	33.65	33.99	0.31	34.60	34.47	33.87	34.03	34.24	0.35	33.15	32.47	32.77	33.53	32.98	0.46	32.40	32.60	32.44	32.39	32.46	0.10
05/04/2009 12:00	35.11	34.67	35.09	34.51	34.85	0.30	35.33	35.26	34.64	34.78	35.00	0.34	33.83	33.09	33.62	34.23	33.69	0.47	33.16	33.42	33.36	33.33	33.32	0.11
05/04/2009 12:30	35.85	35.42	35.86	35.32	35.61	0.28	36.01	35.94	35.39	35.52	35.72	0.31	34.62	33.82	34.38	34.82	34.41	0.43	33.96	34.30	34.15	34.19	34.15	0.14
05/04/2009 13:00	36.07	35.62	36.22	35.67	35.90	0.30	35.99	35.98	35.53	35.70	35.80	0.22	34.63	33.88	34.54	34.87	34.48	0.42	34.21	34.50	34.47	34.45	34.41	0.13
05/04/2009 13:30	35.82	35.34	35.96	35.39	35.63	0.31	35.39	35.49	34.98	35.24	35.28	0.22	34.18	33.58	34.22	34.53	34.13	0.40	34.03	34.21	34.35	34.18	34.19	0.13
05/04/2009 14:00	35.98	35.56	36.11	35.67	35.83	0.26	35.55	35.58	35.24	35.37	35.44	0.16	34.73	34.09	34.63	34.82	34.57	0.33	34.53	34.74	34.74	34.62	34.66	0.10
05/04/2009 14:30	36.13	35.74	36.23	35.84	35.99	0.23	35.71	35.71	35.39	35.45	35.57	0.17	35.02	34.40	34.90	35.03	34.84	0.30	34.85	35.06	34.97	34.89	34.94	0.09
05/04/2009 15:00	36.26	35.87	36.32	35.94	36.10	0.23	35.80	35.77	35.41	35.49	35.62	0.20	35.21	34.59	35.05	35.14	35.00	0.28	35.11	35.29	35.19	35.11	35.18	0.09
05/04/2009 15:30	35.91	35.50	35.91	35.44	35.69	0.26	35.23	35.27	34.72	34.93	35.04	0.26	34.64	34.13	34.58	34.72	34.52	0.26	34.76	34.84	34.91	34.68	34.80	0.10
05/04/2009 16:00	35.37	34.95	35.33	34.88	35.13	0.25	34.51	34.60	33.99	34.22	34.33	0.28	34.00	33.62	34.04	34.20	33.97	0.25	34.23	34.23	34.48	34.09	34.26	0.16
05/04/2009 16:30	34.53	34.16	34.41	33.99	34.27	0.24	33.50	33.69	32.90	33.19	33.32	0.35	33.18	32.91	33.28	33.46	33.21	0.23	33.51	33.41	33.82	33.31	33.51	0.22
05/04/2009 17:00	33.58	33.25	33.46	33.07	33.34	0.23	32.39	32.61	31.80	32.02	32.21	0.36	32.21	32.06	32.39	32.57	32.31	0.22	32.63	32.45	32.99	32.37	32.61	0.28
05/04/2009 17:30	32.75	32.46	32.57	32.26	32.51	0.21	31.50	31.71	30.95	31.19	31.34	0.34	31.51	31.39	31.67	31.81	31.60	0.18	31.92	31.71	32.29	31.62	31.89	0.30
05/04/2009 18:00	32.09	31.85	31.93	31.72	31.90	0.15	30.85	31.00	30.46	30.59	30.73	0.24	30.92	30.85	31.07	31.20	31.01	0.16	31.31	31.10	31.69	31.05	31.29	0.29
05/04/2009 18:30	31.49	31.29	31.31	31.14	31.31	0.14	30.31	30.44	29.91	30.04	30.18	0.24	30.42	30.40	30.55	30.67	30.51	0.13	30.83	30.62	31.19	30.58	30.81	0.28

05/04/2009 19:00	30.90	30.73	30.72	30.60	30.74	0.12	29.78	29.89	29.41	29.53	29.65	0.22	29.91	29.90	30.03	30.15	30.00	0.12	30.27	30.09	30.62	30.07	30.26	0.25
05/04/2009 19:30	30.51	30.38	30.34	30.29	30.38	0.09	29.47	29.53	29.21	29.26	29.37	0.16	29.58	29.60	29.69	29.80	29.67	0.10	29.92	29.75	30.25	29.76	29.92	0.23
05/04/2009 20:00	30.02	29.92	29.84	29.81	29.90	0.09	29.05	29.14	28.78	28.85	28.96	0.17	29.18	29.21	29.28	29.37	29.26	0.08	29.49	29.33	29.80	29.36	29.50	0.21
05/04/2009 20:30	29.63	29.55	29.47	29.47	29.53	0.08	28.71	28.78	28.49	28.55	28.63	0.14	28.85	28.90	28.93	29.03	28.93	0.08	29.13	28.99	29.42	29.02	29.14	0.20
05/04/2009 21:00	29.25	29.19	29.10	29.11	29.16	0.07	28.39	28.46	28.19	28.24	28.32	0.13	28.54	28.59	28.60	28.71	28.61	0.07	28.82	28.68	29.08	28.72	28.83	0.18
05/04/2009 21:30	28.86	28.81	28.72	28.73	28.78	0.07	28.05	28.12	27.85	27.91	27.98	0.12	28.20	28.26	28.26	28.36	28.27	0.07	28.46	28.34	28.72	28.37	28.47	0.17
05/04/2009 22:00	28.52	28.48	28.40	28.42	28.46	0.06	27.75	27.83	27.59	27.64	27.70	0.11	27.91	27.98	27.96	28.06	27.98	0.06	28.17	28.04	28.39	28.08	28.17	0.16
05/04/2009 22:30	28.22	28.19	28.11	28.14	28.17	0.05	27.51	27.57	27.38	27.42	27.47	0.09	27.66	27.73	27.70	27.80	27.72	0.06	27.90	27.77	28.11	27.81	27.90	0.15
05/04/2009 23:00	27.94	27.92	27.83	27.87	27.89	0.05	27.28	27.35	27.15	27.20	27.25	0.09	27.44	27.51	27.47	27.56	27.50	0.05	27.67	27.53	27.85	27.58	27.66	0.14
05/04/2009 23:30	27.67	27.66	27.58	27.62	27.63	0.04	27.08	27.14	26.97	27.01	27.05	0.08	27.23	27.30	27.25	27.34	27.28	0.05	27.44	27.31	27.60	27.35	27.43	0.13
AVERAGE	29.99	30.02	29.88	29.91	29.95	0.07	29.43	29.54	29.25	29.36	29.40	0.12	29.72	29.84	29.70	29.81	29.77	0.07	29.93	29.82	30.00	29.77	29.88	0.11
	29.68	29.70	29.58	29.62	29.64	0.06	29.14	29.24	28.99	29.10	29.12	0.10	29.42	29.55	29.40	29.51	29.47	0.07	29.61	29.49	29.68	29.46	29.56	0.11
	29.39	29.42	29.30	29.35	29.36	0.06	28.88	28.98	28.75	28.85	28.87	0.10	29.16	29.29	29.13	29.25	29.21	0.07	29.33	29.22	29.41	29.19	29.29	0.10
	29.09	29.12	29.00	29.05	29.06	0.06	28.61	28.71	28.48	28.58	28.60	0.09	28.87	29.01	28.85	28.96	28.92	0.07	29.04	28.93	29.11	28.91	29.00	0.10
	28.83	28.86	28.74	28.80	28.81	0.05	28.37	28.47	28.26	28.36	28.36	0.09	28.63	28.77	28.61	28.72	28.68	0.08	28.79	28.67	28.86	28.66	28.75	0.10
	28.56	28.60	28.48	28.54	28.55	0.05	28.15	28.24	28.04	28.14	28.14	0.08	28.39	28.54	28.37	28.48	28.44	0.08	28.54	28.43	28.61	28.42	28.50	0.09
	28.31	28.35	28.24	28.29	28.30	0.05	27.92	28.02	27.81	27.91	27.92	0.08	28.16	28.30	28.14	28.25	28.21	0.08	28.30	28.19	28.36	28.18	28.26	0.09
	28.07	28.11	28.00	28.06	28.06	0.05	27.70	27.79	27.60	27.70	27.70	0.08	27.93	28.07	27.91	28.02	27.98	0.07	28.07	27.95	28.12	27.95	28.02	0.09
	27.82	27.86	27.76	27.81	27.81	0.05	27.48	27.58	27.38	27.49	27.48	0.08	27.70	27.84	27.68	27.79	27.75	0.08	27.83	27.72	27.89	27.72	27.79	0.09
	27.58	27.62	27.53	27.59	27.58	0.04	27.26	27.36	27.17	27.28	27.27	0.08	27.48	27.62	27.46	27.57	27.53	0.08	27.60	27.49	27.65	27.49	27.56	0.08
	27.37	27.41	27.33	27.38	27.37	0.04	27.07	27.17	26.99	27.09	27.08	0.07	27.28	27.42	27.26	27.37	27.33	0.08	27.41	27.29	27.45	27.29	27.36	0.08
	27.15	27.19	27.11	27.17	27.15	0.04	26.87	26.97	26.80	26.90	26.88	0.07	27.08	27.23	27.06	27.16	27.13	0.08	27.20	27.09	27.23	27.09	27.15	0.08
	26.94	26.98	26.91	26.96	26.95	0.03	26.68	26.78	26.61	26.72	26.70	0.07	26.89	27.03	26.86	26.96	26.94	0.08	27.00	26.89	27.03	26.89	26.95	0.08
	26.73	26.77	26.70	26.75	26.74	0.03	26.48	26.59	26.42	26.53	26.50	0.07	26.69	26.83	26.67	26.77	26.74	0.08	26.80	26.69	26.83	26.69	26.75	0.07
	26.54	26.57	26.51	26.56	26.54	0.03	26.30	26.40	26.24	26.35	26.32	0.07	26.50	26.65	26.48	26.58	26.55	0.08	26.61	26.50	26.64	26.50	26.56	0.08
	26.34	26.38	26.31	26.36	26.35	0.03	26.12	26.22	26.06	26.16	26.14	0.07	26.32	26.46	26.29	26.39	26.37	0.08	26.43	26.31	26.45	26.32	26.38	0.07
	26.22	26.26	26.21	26.27	26.24	0.03	26.03	26.12	26.01	26.09	26.06	0.05	26.25	26.38	26.21	26.30	26.29	0.08	26.33	26.23	26.33	26.22	26.28	0.06
	26.37	26.41	26.40	26.42	26.40	0.03	26.29	26.31	26.27	26.31	26.30	0.02	26.43	26.53	26.33	26.44	26.43	0.08	26.45	26.36	26.40	26.32	26.38	0.05
	26.98	26.99	27.05	26.96	27.00	0.04	27.08	27.00	26.99	27.00	27.02	0.05	27.00	27.03	26.76	26.95	26.94	0.12	26.84	26.80	26.71	26.68	26.76	0.08
	28.02	27.95	28.09	27.87	27.98	0.10	28.29	28.14	28.06	28.06	28.14	0.11	27.98	27.89	27.52	27.85	27.81	0.20	27.59	27.58	27.34	27.33	27.46	0.14
	29.31	29.16	29.38	29.03	29.22	0.16	29.72	29.53	29.34	29.36	29.49	0.18	29.21	28.98	28.53	29.02	28.93	0.29	28.60	28.62	28.24	28.25	28.43	0.21
	30.67	30.44	30.72	30.27	30.53	0.21	31.16	30.96	30.63	30.69	30.86	0.24	30.46	30.06	29.66	30.27	30.11	0.34	29.71	29.77	29.32	29.31	29.53	0.25
	31.98	31.67	32.01	31.48	31.78	0.25	32.47	32.28	31.84	31.93	32.13	0.30	31.50	30.96	30.81	31.48	31.19	0.36	30.73	30.86	30.45	30.44	30.62	0.21
	33.18	32.80	33.17	32.61	32.94	0.28	33.62	33.46	32.91	33.02	33.25	0.34	32.40	31.77	31.93	32.59	32.17	0.40	31.67	31.87	31.56	31.56	31.66	0.15
	34.25	33.83	34.22	33.63	33.98	0.30	34.60	34.47	33.88	33.99	34.24	0.36	33.20	32.50	32.90	33.48	33.02	0.43	32.51	32.78	32.57	32.60	32.61	0.14
	35.13	34.69	35.12	34.56	34.88	0.29	35.40	35.30	34.75	34.85	35.07	0.32	33.92	33.19	33.68	34.13	33.73	0.41	33.28	33.62	33.41	33.48	33.45	0.15
	35.63	35.21	35.73	35.21	35.45	0.28	35.76	35.73	35.23	35.39	35.53	0.26	34.45	33.71	34.24	34.56	34.24	0.38	33.90	34.25	34.03	34.12	34.08	0.16
	35.86	35.45	35.99	35.49	35.70	0.27	35.83	35.82	35.38	35.52	35.64	0.22	34.73	34.02	34.53	34.77	34.52	0.36	34.29	34.61	34.41	34.48	34.45	0.16
	36.07	35.69	36.17	35.74	35.92	0.24	35.94	35.91	35.54	35.64	35.76	0.20	35.08	34.37	34.85	35.01	34.83	0.33	34.70	35.01	34.77	34.84	34.83	0.14
	36.25	35.90	36.31	35.95	36.10	0.21	36.07	36.04	35.68	35.75	35.88	0.20	35.43	34.75	35.16	35.27	35.15	0.30	35.09	35.40	35.09	35.15	35.18	0.15
	36.37	36.04	36.40	36.06	36.22	0.20	36.12	36.08	35.72	35.77	35.92	0.21	35.65	34.98	35.35	35.42	35.35	0.29	35.37	35.66	35.33	35.37	35.43	0.16
	36.34	35.99	36.32	35.97	36.16	0.20	35.95	35.92	35.51	35.61	35.75	0.22	35.54	34.92	35.29	35.34	35.27	0.27	35.40	35.61	35.39	35.34	35.44	0.15
	36.21	35.86	36.18	35.84	36.02	0.20	35.70	35.71	35.30	35.38	35.52	0.22	35.34	34.82	35.15	35.23	35.14	0.24	35.32	35.46	35.33	35.20	35.33	0.14
	36.00	35.69	35.92	35.63	35.81	0.18	35.44	35.46	35.02	35.09	35.26	0.24	35.24	34.77	35.05	35.11	35.04	0.23	35.26	35.37	35.26	35.10	35.25	0.16
	35.67	35.37	35.57	35.28	35.47	0.18	35.01	35.05	34.58	34.65	34.82	0.25	34.89	34.48	34.73	34.80	34.72	0.21	35.00	35.05	35.02	34.79	34.96	0.18
	35.30	35.01	35.17	34.90	35.10	0.17	34.57	34.62	34.15	34.24	34.40	0.24	34.53	34.18	34.39	34.46	34.39	0.19	34.69	34.71	34.73	34.45	34.65	0.18

34.73	34.46	34.58	34.32	34.52	0.17	33.90	34.01	33.47	33.60	33.74	0.26	33.90	33.65	33.84	33.93	33.83	0.14	34.14	34.09	34.25	33.88	34.09	0.17
34.17	33.93	34.02	33.78	33.97	0.17	33.28	33.40	32.86	33.00	33.14	0.25	33.35	33.17	33.31	33.42	33.31	0.12	33.65	33.55	33.79	33.36	33.59	0.19
33.63	33.44	33.48	33.31	33.47	0.13	32.77	32.87	32.40	32.51	32.64	0.22	32.90	32.77	32.88	32.98	32.88	0.10	33.19	33.09	33.33	32.92	33.13	0.18
33.17	33.02	33.01	32.91	33.03	0.11	32.33	32.42	32.03	32.11	32.22	0.18	32.51	32.43	32.49	32.58	32.51	0.07	32.80	32.69	32.94	32.56	32.75	0.17
32.67	32.56	32.53	32.44	32.55	0.10	31.85	31.95	31.56	31.64	31.75	0.18	32.07	32.02	32.05	32.13	32.07	0.06	32.36	32.24	32.49	32.14	32.31	0.16
32.21	32.11	32.07	32.01	32.10	0.09	31.39	31.49	31.15	31.22	31.31	0.16	31.63	31.62	31.62	31.71	31.65	0.05	31.92	31.81	32.06	31.72	31.88	0.16
31.76	31.68	31.62	31.58	31.66	0.09	30.96	31.06	30.73	30.81	30.89	0.15	31.22	31.24	31.21	31.30	31.24	0.05	31.50	31.39	31.64	31.32	31.46	0.15
31.32	31.26	31.20	31.17	31.24	0.08	30.55	30.65	30.35	30.42	30.49	0.13	30.82	30.86	30.81	30.90	30.85	0.05	31.09	30.98	31.23	30.92	31.05	0.14
30.93	30.88	30.81	30.80	30.86	0.07	30.18	30.27	30.00	30.07	30.13	0.12	30.45	30.52	30.44	30.54	30.49	0.05	30.72	30.61	30.85	30.55	30.68	0.14
30.57	30.53	30.46	30.46	30.51	0.06	29.86	29.94	29.71	29.77	29.82	0.10	30.13	30.20	30.12	30.21	30.17	0.05	30.37	30.26	30.51	30.22	30.34	0.13
30.23	30.20	30.13	30.14	30.17	0.06	29.56	29.65	29.42	29.49	29.53	0.10	29.82	29.92	29.81	29.91	29.87	0.06	30.06	29.95	30.18	29.92	30.03	0.12
29.88	29.88	29.79	29.81	29.84	0.05	29.27	29.34	29.13	29.20	29.23	0.09	29.51	29.62	29.50	29.60	29.56	0.06	29.73	29.63	29.85	29.60	29.70	0.12

Outer Surface of Sand Panel

	Panel 1						Panel 2						Panel 3						Panel 4					
	Point 1	Point 2	Point 3	Point 4	Avg P1	St Dev	Point 1	Point 2	Point 3	Point 4	Avg P2	St Dev	Point 1	Point 2	Point 3	Point 4	Avg P3	St Dev	Point 1	Point 2	Point 3	Point 4	Avg P4	St Dev
01/04/2009 00:00	28.37	28.58	28.08	28.47	28.38	0.21	27.45	27.43	27.64	27.41	27.48	0.11	27.71	27.67	27.21	27.15	27.44	0.30	27.47	27.62	27.08	27.21	27.35	0.24
01/04/2009 00:30	28.09	28.28	27.84	28.19	28.10	0.19	27.22	27.20	27.38	27.18	27.25	0.09	27.46	27.44	26.99	26.95	27.21	0.28	27.22	27.36	26.85	26.97	27.10	0.23
01/04/2009 01:00	27.85	28.04	27.60	27.92	27.85	0.19	27.01	26.98	27.14	26.95	27.02	0.08	27.26	27.25	26.79	26.75	27.01	0.28	27.06	27.16	26.67	26.77	26.92	0.23
01/04/2009 01:30	27.57	27.78	27.34	27.68	27.59	0.19	26.82	26.80	26.95	26.78	26.84	0.08	27.05	27.04	26.60	26.58	26.82	0.26	26.79	26.91	26.47	26.55	26.68	0.20
01/04/2009 02:00	27.39	27.55	27.16	27.47	27.39	0.17	26.64	26.62	26.77	26.60	26.66	0.08	26.84	26.86	26.42	26.41	26.63	0.25	26.63	26.73	26.31	26.39	26.52	0.20
01/04/2009 02:30	27.19	27.37	26.99	27.28	27.21	0.16	26.52	26.50	26.63	26.48	26.53	0.07	26.72	26.73	26.32	26.31	26.52	0.24	26.50	26.58	26.22	26.27	26.39	0.17
01/04/2009 03:00	27.05	27.21	26.86	27.12	27.06	0.15	26.41	26.40	26.52	26.39	26.43	0.06	26.59	26.60	26.21	26.23	26.41	0.22	26.37	26.45	26.13	26.18	26.28	0.15
01/04/2009 03:30	26.70	26.88	26.50	26.78	26.72	0.16	26.07	26.07	26.19	26.06	26.10	0.06	26.34	26.36	25.92	25.90	26.13	0.25	26.11	26.20	25.81	25.88	26.00	0.18
01/04/2009 04:00	26.46	26.62	26.25	26.53	26.47	0.16	25.82	25.82	25.95	25.81	25.85	0.07	26.10	26.13	25.67	25.64	25.89	0.27	25.90	25.97	25.56	25.63	25.77	0.20
01/04/2009 04:30	26.24	26.40	26.05	26.31	26.25	0.15	25.63	25.63	25.76	25.63	25.66	0.07	25.91	25.94	25.48	25.45	25.70	0.27	25.70	25.76	25.35	25.41	25.56	0.21
01/04/2009 05:00	26.05	26.21	25.88	26.14	26.07	0.14	25.49	25.49	25.61	25.50	25.52	0.06	25.78	25.80	25.35	25.32	25.56	0.26	25.56	25.62	25.20	25.26	25.41	0.21
01/04/2009 05:30	25.83	25.99	25.66	25.91	25.85	0.14	25.29	25.30	25.42	25.31	25.33	0.06	25.59	25.61	25.16	25.14	25.38	0.26	25.35	25.43	25.02	25.07	25.22	0.20
01/04/2009 06:00	25.62	25.77	25.45	25.70	25.64	0.14	25.09	25.10	25.22	25.11	25.13	0.06	25.40	25.43	24.96	24.94	25.18	0.27	25.18	25.24	24.81	24.87	25.03	0.22
01/04/2009 06:30	25.41	25.56	25.24	25.48	25.42	0.14	24.89	24.89	25.01	24.91	24.93	0.06	25.22	25.24	24.76	24.74	24.99	0.28	24.99	25.04	24.61	24.67	24.83	0.22
01/04/2009 07:00	25.22	25.36	25.06	25.29	25.23	0.13	24.72	24.72	24.84	24.75	24.76	0.06	25.04	25.08	24.59	24.57	24.82	0.28	24.83	24.88	24.44	24.49	24.66	0.23
01/04/2009 07:30	25.19	25.32	25.03	25.25	25.20	0.12	24.73	24.72	24.83	24.74	24.76	0.05	25.04	25.09	24.57	24.59	24.82	0.28	24.85	24.89	24.46	24.48	24.67	0.23
01/04/2009 08:00	29.62	29.78	29.64	29.76	29.70	0.08	30.96	30.75	30.22	30.54	30.62	0.32	30.90	31.08	30.72	31.20	30.98	0.21	30.67	31.00	30.91	29.93	30.63	0.49
01/04/2009 08:30	35.17	35.22	35.04	35.29	35.18	0.11	38.79	38.56	36.92	37.99	38.07	0.83	38.94	38.79	40.46	40.52	39.68	0.94	38.15	39.84	39.44	38.12	38.89	0.88
01/04/2009 09:00	39.39	39.23	39.50	39.52	39.41	0.13	44.11	44.17	41.86	43.33	43.37	1.08	45.34	44.88	45.54	46.92	45.67	0.88	43.87	46.68	46.08	44.65	45.32	1.29
01/04/2009 09:30	42.85	42.51	42.76	42.81	42.73	0.15	48.13	48.26	45.58	47.30	47.32	1.23	49.84	49.04	50.64	51.67	50.30	1.12	48.67	51.97	51.11	49.69	50.36	1.47
01/04/2009 10:00	45.49	45.03	45.78	45.59	45.47	0.32	50.90	51.23	48.41	50.16	50.18	1.26	44.80	42.38	53.51	54.55	48.81	6.12	43.27	45.79	54.55	53.09	49.18	5.49
01/04/2009 10:30	44.80	44.04	44.89	44.68	44.60	0.38	49.18	50.01	47.18	48.66	48.76	1.19	40.77	39.66	51.51	52.29	46.06	6.77	40.84	41.70	53.27	52.28	47.02	6.66
01/04/2009 11:00	44.74	44.15	44.99	44.83	44.68	0.37	48.59	49.24	47.02	48.28	48.28	0.93	39.38	38.63	50.00	50.93	44.74	6.63	39.77	40.25	52.42	51.30	45.94	6.86
01/04/2009 11:30	43.84	43.24	44.04	43.94	43.77	0.36	47.00	47.64	45.76	46.85	46.81	0.78	38.69	38.05	43.16	43.72	40.91	2.95	39.08	39.51	45.28	45.42	42.32	3.50
01/04/2009 12:00	42.01	41.20	44.34	44.00	42.89	1.52	43.87	44.48	45.35	46.20	44.98	1.02	38.71	38.11	41.60	41.11	39.88	1.73	39.22	39.54	42.42	42.42	40.90	1.76
01/04/2009 12:30	39.71	39.04	41.06	41.10	40.23	1.02	40.81	41.19	41.97	42.61	41.65	0.80	39.04	38.43	39.51	40.04	39.26	0.69	39.31	39.78	41.12	41.12	40.33	0.93

01/04/2009 13:00	39.69	39.03	39.71	40.03	39.62	0.42	40.71	40.81	40.77	41.18	40.87	0.21	39.61	39.00	39.68	40.26	39.64	0.52	39.88	40.42	40.94	40.91	40.54	0.50
01/04/2009 13:30	40.17	39.52	40.14	40.35	40.05	0.36	41.22	41.30	41.02	41.42	41.24	0.17	40.19	39.54	40.51	40.93	40.29	0.59	40.31	40.93	41.47	41.33	41.01	0.52
01/04/2009 14:00	39.97	39.37	39.85	40.09	39.82	0.32	40.85	40.93	40.57	40.90	40.81	0.17	40.08	39.45	40.36	40.77	40.17	0.55	40.24	40.81	41.26	41.14	40.86	0.46
01/04/2009 14:30	39.77	39.25	39.63	39.80	39.61	0.25	40.51	40.66	40.19	40.41	40.44	0.20	40.26	39.60	40.26	40.52	40.16	0.39	40.33	40.94	41.09	40.99	40.84	0.34
01/04/2009 15:00	39.41	38.95	39.29	39.43	39.27	0.22	39.90	40.01	39.62	39.78	39.83	0.17	39.61	39.01	39.40	39.90	39.48	0.37	39.71	40.22	40.47	40.41	40.20	0.35
01/04/2009 15:30	37.96	37.59	37.80	37.92	37.82	0.17	37.87	38.00	37.76	37.75	37.85	0.12	38.00	37.43	37.19	37.89	37.63	0.38	38.17	38.59	38.46	38.64	38.47	0.21
01/04/2009 16:00	39.02	38.63	38.71	38.91	38.82	0.18	39.26	39.24	38.85	38.92	39.07	0.21	39.20	38.79	39.89	39.40	39.32	0.46	39.53	39.79	39.79	39.55	39.67	0.14
01/04/2009 16:30	39.05	38.71	38.66	38.91	38.83	0.18	39.45	39.47	38.91	39.06	39.22	0.28	39.57	39.06	39.21	39.76	39.40	0.32	39.56	40.14	39.98	39.93	39.90	0.25
01/04/2009 17:00	36.92	36.69	36.67	36.84	36.78	0.12	36.51	36.67	36.45	36.37	36.50	0.13	37.15	36.64	36.12	36.69	36.65	0.42	37.08	37.62	37.04	37.40	37.29	0.28
01/04/2009 17:30	35.82	35.67	35.64	35.84	35.74	0.10	35.11	35.18	35.27	35.08	35.16	0.08	35.64	35.27	34.76	34.95	35.16	0.39	35.58	35.97	35.34	35.66	35.64	0.26
01/04/2009 18:00	35.04	34.94	34.81	35.07	34.97	0.12	34.13	34.16	34.36	34.10	34.19	0.12	34.47	34.16	33.68	33.73	34.01	0.37	34.43	34.71	34.10	34.34	34.40	0.25
01/04/2009 18:30	34.45	34.39	34.19	34.49	34.38	0.13	33.54	33.54	33.72	33.47	33.57	0.11	33.76	33.50	33.02	33.11	33.35	0.35	33.65	33.93	33.31	33.52	33.60	0.26
01/04/2009 19:00	33.94	33.92	33.72	33.99	33.89	0.12	32.95	32.94	33.15	32.89	32.98	0.11	33.15	32.91	32.44	32.50	32.75	0.34	33.05	33.30	32.63	32.83	32.95	0.29
01/04/2009 19:30	33.29	33.31	33.10	33.32	33.26	0.10	32.18	32.17	32.38	32.07	32.20	0.13	32.40	32.17	31.74	31.68	32.00	0.35	32.34	32.53	31.86	32.06	32.20	0.30
01/04/2009 20:00	32.58	32.64	32.42	32.65	32.57	0.11	31.36	31.38	31.65	31.32	31.43	0.15	31.69	31.49	31.01	30.88	31.27	0.38	31.61	31.76	31.05	31.24	31.42	0.33
01/04/2009 20:30	32.11	32.21	31.95	32.18	32.11	0.12	30.89	30.87	31.14	30.82	30.93	0.14	31.16	30.99	30.55	30.38	30.77	0.37	31.09	31.22	30.54	30.70	30.89	0.32
01/04/2009 21:00	31.81	31.92	31.64	31.89	31.82	0.13	30.68	30.65	30.91	30.63	30.72	0.13	30.85	30.70	30.32	30.21	30.52	0.30	30.74	30.88	30.28	30.41	30.58	0.28
01/04/2009 21:30	31.46	31.60	31.29	31.58	31.48	0.14	30.42	30.38	30.62	30.36	30.45	0.12	30.55	30.43	30.06	30.02	30.27	0.26	30.39	30.56	30.01	30.15	30.28	0.25
01/04/2009 22:00	31.20	31.32	31.05	31.31	31.22	0.13	30.19	30.16	30.38	30.14	30.22	0.11	30.28	30.19	29.85	29.82	30.04	0.23	30.14	30.28	29.82	29.92	30.04	0.21
01/04/2009 22:30	30.90	31.02	30.77	30.99	30.92	0.11	29.92	29.89	30.10	29.87	29.95	0.11	30.03	29.96	29.61	29.60	29.80	0.23	29.89	30.02	29.59	29.68	29.80	0.20
01/04/2009 23:00	30.44	30.58	30.30	30.53	30.46	0.12	29.45	29.44	29.64	29.42	29.49	0.10	29.64	29.59	29.18	29.16	29.39	0.26	29.48	29.61	29.16	29.27	29.38	0.20
01/04/2009 23:30	30.03	30.21	29.88	30.17	30.07	0.15	29.10	29.08	29.31	29.09	29.15	0.11	29.30	29.25	28.85	28.84	29.06	0.25	29.04	29.21	28.78	28.90	28.98	0.19
02/04/2009 00:00	29.69	29.84	29.55	29.79	29.72	0.13	28.75	28.74	28.95	28.74	28.80	0.10	28.97	28.96	28.53	28.49	28.74	0.26	28.79	28.90	28.46	28.56	28.68	0.20
02/04/2009 00:30	29.41	29.57	29.28	29.50	29.44	0.13	28.51	28.49	28.70	28.50	28.55	0.10	28.71	28.70	28.28	28.24	28.48	0.26	28.53	28.62	28.20	28.29	28.41	0.20
02/04/2009 01:00	29.29	29.45	29.18	29.38	29.33	0.12	28.46	28.44	28.62	28.44	28.49	0.09	28.57	28.57	28.21	28.20	28.39	0.21	28.41	28.48	28.16	28.20	28.31	0.16
02/04/2009 01:30	28.92	29.08	28.80	29.01	28.95	0.12	28.09	28.09	28.27	28.10	28.14	0.09	28.28	28.28	27.88	27.87	28.08	0.23	28.08	28.18	27.82	27.90	28.00	0.16
02/04/2009 02:00	28.54	28.68	28.42	28.63	28.57	0.11	27.67	27.68	27.87	27.69	27.73	0.10	27.93	27.94	27.49	27.46	27.71	0.27	27.74	27.83	27.42	27.51	27.63	0.19
02/04/2009 02:30	28.23	28.37	28.10	28.31	28.25	0.12	27.37	27.37	27.56	27.38	27.42	0.09	27.63	27.65	27.17	27.13	27.40	0.28	27.43	27.51	27.09	27.18	27.30	0.20
02/04/2009 03:00	27.91	28.06	27.80	28.00	27.94	0.11	27.07	27.07	27.26	27.09	27.12	0.09	27.32	27.36	26.87	26.83	27.10	0.28	27.14	27.21	26.76	26.86	26.99	0.22
02/04/2009 03:30	27.63	27.79	27.52	27.74	27.67	0.12	26.84	26.84	27.03	26.86	26.89	0.09	27.08	27.12	26.63	26.60	26.86	0.28	26.87	26.94	26.52	26.59	26.73	0.21
02/04/2009 04:00	27.41	27.55	27.30	27.50	27.44	0.11	26.64	26.64	26.82	26.67	26.69	0.09	26.89	26.93	26.43	26.41	26.67	0.28	26.67	26.74	26.31	26.38	26.53	0.21
02/04/2009 04:30	27.14	27.30	27.04	27.24	27.18	0.11	26.41	26.41	26.59	26.45	26.47	0.09	26.67	26.71	26.22	26.19	26.45	0.28	26.42	26.51	26.08	26.15	26.29	0.21
02/04/2009 05:00	26.92	27.06	26.82	27.00	26.95	0.10	26.20	26.20	26.36	26.22	26.25	0.08	26.47	26.51	26.00	25.99	26.24	0.29	26.23	26.30	25.87	25.94	26.09	0.21
02/04/2009 05:30	26.67	26.82	26.58	26.77	26.71	0.11	25.98	25.99	26.16	26.03	26.04	0.08	26.27	26.32	25.80	25.79	26.05	0.29	26.02	26.09	25.66	25.72	25.87	0.21
02/04/2009 06:00	26.46	26.61	26.37	26.56	26.50	0.11	25.81	25.82	25.98	25.86	25.87	0.08	26.09	26.15	25.63	25.62	25.87	0.29	25.85	25.92	25.48	25.55	25.70	0.22
02/04/2009 06:30	26.26	26.40	26.18	26.35	26.30	0.10	25.63	25.64	25.80	25.68	25.69	0.08	25.91	25.96	25.45	25.44	25.69	0.28	25.68	25.74	25.31	25.37	25.53	0.22
02/04/2009 07:00	26.09	26.21	26.00	26.17	26.12	0.09	25.47	25.49	25.64	25.52	25.53	0.08	25.73	25.79	25.29	25.29	25.53	0.27	25.51	25.57	25.15	25.20	25.36	0.21
02/04/2009 07:30	26.09	26.22	26.00	26.19	26.13	0.10	25.59	25.59	25.71	25.62	25.63	0.06	25.81	25.87	25.39	25.43	25.63	0.25	25.59	25.63	25.29	25.28	25.45	0.19
02/04/2009 08:00	27.80	27.91	27.59	27.90	27.80	0.15	28.10	28.00	27.83	27.91	27.96	0.12	28.00	28.06	27.45	28.11	27.91	0.31	27.75	27.93	27.88	27.52	27.77	0.18
02/04/2009 08:30	29.73	29.81	29.35	29.80	29.67	0.22	30.79	30.61	30.11	30.40	30.48	0.29	30.52	30.47	30.83	31.32	30.79	0.39	30.36	30.80	30.88	30.38	30.61	0.27
02/04/2009 09:00	33.62	33.57	33.14	33.64	33.49	0.24	35.92	35.73	34.63	35.31	35.40	0.57	35.62	35.51	37.49	37.30	36.48	1.06	35.36	36.35	36.69	35.71	36.03	0.60
02/04/2009 09:30	37.42	37.27	36.86	37.47	37.26	0.28	41.02	41.00	39.16	40.24	40.36	0.88	40.89	40.44	43.12	43.17	41.91	1.44	40.24	42.13	42.58	41.41	41.59	1.02
02/04/2009 10:00	39.34	38.97	38.85	39.35	39.13	0.26	43.08	43.20	41.27	42.46	42.50	0.88	38.94	37.82	45.33	45.65	41.94	4.13	37.93	39.67	45.45	44.32	41.84	3.61
02/04/2009 10:30	40.54	40.09	40.05	40.54	40.31	0.27	44.25	44.49	42.53	43.76	43.76	0.87	37.84	37.16	46.57	46.86	42.11	5.33	37.62	38.54	47.03	45.93	42.28	4.88
02/04/2009 11:00	41.29	40.85	40.87	41.40	41.10	0.28	44.90	45.04	43.34	44.51	44.45	0.77	37.88	37.31	46.10	46.86	42.04	5.14	37.93	38.63	47.43	46.57	42.64	5.05
02/04/2009 11:30	41.43	41.00	41.24	41.66	41.33	0.28	44.78	45.01	43.48	44.56	44.46	0.68	38.17	37.66	42.70	43.03	40.39	2.87	38.25	38.91	43.67	43.61	41.11	2.93
02/04/2009 12:00	40.45	39.81	41.69	41.83	40.95	0.98	42.72	43.11	43.40	44.29	43.38	0.67	38.51	37.95	41.00	41.59	39.76	1.80	38.64	39.20	42.50	42.27	40.65	2.02
02/04/2009 12:30	39.28	38.62	39.70	40.01	39.40	0.60	41.05	41.22	41.19	41.93	41.35	0.40	38.80	38.25	40.46	41.03	39.64	1.32	38.98	39.57	41.69	41.50	40.44	1.36

02/04/2009 13:00	39.33	38.75	39.24	39.53	39.21	0.33	41.00	41.13	40.58	41.14	40.96	0.26	39.32	38.74	40.32	41.09	39.87	1.04	39.44	40.06	41.66	41.44	40.65	1.07
02/04/2009 13:30	37.75	37.27	37.68	37.87	37.64	0.26	38.70	38.91	38.47	38.81	38.72	0.19	37.59	37.04	38.32	38.75	37.93	0.76	37.78	38.26	39.36	39.37	38.69	0.80
02/04/2009 14:00	38.56	38.09	38.38	38.63	38.42	0.24	39.63	39.70	39.26	39.59	39.55	0.20	38.42	38.00	39.00	39.58	38.75	0.69	38.71	39.04	39.99	39.75	39.37	0.60
02/04/2009 14:30	38.86	38.41	38.46	38.86	38.65	0.25	40.07	40.02	39.46	39.82	39.84	0.28	39.14	38.69	39.62	40.22	39.42	0.66	39.26	39.82	40.32	40.25	39.91	0.49
02/04/2009 15:00	38.62	38.20	38.24	38.59	38.41	0.22	39.56	39.53	39.04	39.32	39.36	0.24	39.02	38.58	39.09	39.85	39.14	0.53	39.07	39.69	39.94	39.96	39.67	0.42
02/04/2009 15:30	37.55	37.23	37.22	37.58	37.40	0.20	38.07	38.02	37.77	37.91	37.94	0.13	37.72	37.30	37.93	38.30	37.81	0.42	37.55	38.26	38.42	38.65	38.22	0.47
02/04/2009 16:00	36.27	36.01	36.06	36.21	36.14	0.12	36.20	36.32	36.11	36.11	36.19	0.10	36.43	36.03	35.97	36.27	36.18	0.21	36.39	36.84	36.68	36.89	36.70	0.23
02/04/2009 16:30	35.10	34.94	34.98	35.12	35.04	0.09	34.63	34.72	34.78	34.62	34.69	0.08	34.78	34.45	34.08	34.41	34.43	0.29	34.77	35.08	34.81	35.05	34.93	0.16
02/04/2009 17:00	34.54	34.42	34.38	34.57	34.48	0.09	33.94	34.00	34.09	33.87	33.98	0.09	33.91	33.65	33.24	33.55	33.59	0.28	33.89	34.16	33.93	34.08	34.02	0.13
02/04/2009 17:30	33.64	33.56	33.50	33.66	33.59	0.07	32.81	32.86	33.02	32.74	32.86	0.12	32.84	32.57	32.16	32.31	32.47	0.30	32.81	33.04	32.65	32.86	32.84	0.16
02/04/2009 18:00	32.87	32.84	32.78	32.93	32.86	0.06	31.85	31.88	32.15	31.85	31.93	0.15	31.91	31.69	31.30	31.30	31.55	0.30	31.91	32.09	31.61	31.81	31.86	0.20
02/04/2009 18:30	32.25	32.23	32.13	32.29	32.23	0.07	31.10	31.11	31.41	31.09	31.18	0.16	31.19	31.00	30.56	30.54	30.82	0.32	31.19	31.36	30.79	30.98	31.08	0.25
02/04/2009 19:00	31.75	31.78	31.65	31.82	31.75	0.07	30.59	30.60	30.90	30.57	30.67	0.16	30.60	30.43	30.07	30.02	30.28	0.28	30.56	30.73	30.20	30.37	30.47	0.23
02/04/2009 19:30	31.39	31.45	31.30	31.49	31.41	0.08	30.28	30.26	30.56	30.26	30.34	0.15	30.23	30.08	29.79	29.73	29.96	0.24	30.13	30.30	29.81	29.97	30.05	0.21
02/04/2009 20:00	30.93	30.99	30.83	31.01	30.94	0.08	29.81	29.81	30.07	29.79	29.87	0.13	29.82	29.68	29.37	29.31	29.55	0.24	29.69	29.86	29.35	29.52	29.61	0.22
02/04/2009 20:30	30.49	30.54	30.40	30.55	30.50	0.07	29.32	29.30	29.57	29.28	29.37	0.14	29.38	29.28	28.93	28.84	29.11	0.26	29.29	29.44	28.90	29.06	29.17	0.24
02/04/2009 21:00	30.04	30.13	29.96	30.10	30.06	0.07	28.88	28.87	29.14	28.86	28.94	0.14	29.01	28.91	28.54	28.44	28.73	0.28	28.86	29.00	28.48	28.62	28.74	0.23
02/04/2009 21:30	29.71	29.80	29.62	29.78	29.73	0.08	28.58	28.55	28.82	28.55	28.63	0.13	28.73	28.65	28.25	28.17	28.45	0.28	28.56	28.69	28.19	28.30	28.44	0.23
02/04/2009 22:00	29.39	29.52	29.30	29.49	29.43	0.10	28.35	28.33	28.57	28.33	28.40	0.12	28.47	28.40	28.02	27.98	28.22	0.25	28.26	28.41	27.96	28.05	28.17	0.20
02/04/2009 22:30	29.04	29.17	28.96	29.16	29.08	0.10	28.05	28.03	28.28	28.06	28.11	0.12	28.17	28.11	27.74	27.73	27.94	0.24	27.92	28.08	27.65	27.75	27.85	0.19
02/04/2009 23:00	28.87	28.97	28.80	28.96	28.90	0.08	27.92	27.90	28.12	27.93	27.97	0.10	28.03	28.00	27.63	27.62	27.82	0.23	27.83	27.94	27.56	27.63	27.74	0.18
02/04/2009 23:30	28.56	28.65	28.50	28.65	28.59	0.07	27.62	27.61	27.83	27.64	27.68	0.10	27.81	27.80	27.38	27.36	27.59	0.25	27.62	27.73	27.31	27.38	27.51	0.20
03/04/2009 00:00	28.28	28.37	28.20	28.34	28.30	0.08	27.37	27.36	27.56	27.39	27.42	0.09	27.59	27.58	27.15	27.13	27.36	0.26	27.40	27.50	27.09	27.15	27.29	0.20
03/04/2009 00:30	28.02	28.13	27.94	28.10	28.05	0.09	27.16	27.15	27.35	27.19	27.21	0.09	27.39	27.39	26.95	26.93	27.17	0.26	27.18	27.27	26.87	26.93	27.06	0.19
03/04/2009 01:00	27.76	27.87	27.70	27.84	27.79	0.08	26.92	26.92	27.11	26.95	26.98	0.09	27.13	27.14	26.71	26.69	26.92	0.25	26.93	27.02	26.62	26.68	26.81	0.19
03/04/2009 01:30	27.53	27.62	27.46	27.59	27.55	0.07	26.70	26.71	26.88	26.74	26.76	0.08	26.93	26.95	26.50	26.49	26.72	0.26	26.75	26.82	26.41	26.48	26.62	0.20
03/04/2009 02:00	27.28	27.38	27.22	27.36	27.31	0.07	26.50	26.51	26.68	26.54	26.56	0.08	26.73	26.75	26.31	26.29	26.52	0.25	26.53	26.61	26.20	26.26	26.40	0.20
03/04/2009 02:30	27.02	27.15	26.98	27.12	27.07	0.08	26.29	26.29	26.46	26.33	26.34	0.08	26.52	26.55	26.10	26.08	26.31	0.26	26.30	26.38	25.98	26.04	26.18	0.19
03/04/2009 03:00	26.81	26.94	26.76	26.91	26.86	0.08	26.12	26.12	26.28	26.15	26.17	0.08	26.35	26.38	25.93	25.92	26.15	0.25	26.13	26.20	25.80	25.86	26.00	0.20
03/04/2009 03:30	26.60	26.72	26.57	26.69	26.65	0.07	25.91	25.92	26.08	25.96	25.97	0.08	26.16	26.20	25.74	25.72	25.96	0.26	25.96	26.03	25.61	25.66	25.82	0.21
03/04/2009 04:00	26.37	26.48	26.33	26.45	26.41	0.07	25.69	25.70	25.86	25.73	25.75	0.08	25.95	25.99	25.51	25.50	25.74	0.27	25.75	25.81	25.39	25.45	25.60	0.21
03/04/2009 04:30	26.14	26.26	26.11	26.22	26.18	0.07	25.48	25.50	25.65	25.53	25.54	0.08	25.76	25.79	25.31	25.30	25.54	0.27	25.54	25.60	25.20	25.25	25.40	0.20
03/04/2009 05:00	25.91	26.01	25.88	25.98	25.95	0.06	25.26	25.27	25.44	25.32	25.32	0.08	25.55	25.60	25.10	25.08	25.33	0.28	25.35	25.41	24.98	25.04	25.20	0.22
03/04/2009 05:30	25.66	25.77	25.63	25.73	25.70	0.06	25.01	25.03	25.19	25.07	25.08	0.08	25.32	25.36	24.84	24.82	25.09	0.30	25.10	25.16	24.72	24.78	24.94	0.22
03/04/2009 06:00	25.45	25.54	25.42	25.52	25.48	0.06	24.80	24.82	24.99	24.87	24.87	0.09	25.11	25.17	24.65	24.62	24.89	0.29	24.91	24.96	24.50	24.57	24.74	0.23
03/04/2009 06:30	25.18	25.31	25.16	25.27	25.23	0.07	24.57	24.59	24.76	24.64	24.64	0.09	24.91	24.95	24.42	24.39	24.67	0.30	24.67	24.73	24.26	24.32	24.50	0.24
03/04/2009 07:00	24.98	25.10	24.96	25.07	25.03	0.07	24.39	24.41	24.57	24.46	24.46	0.08	24.72	24.76	24.24	24.20	24.48	0.30	24.49	24.55	24.08	24.13	24.31	0.24
03/04/2009 07:30	24.99	25.10	24.96	25.08	25.03	0.07	24.47	24.47	24.62	24.52	24.52	0.07	24.74	24.79	24.29	24.30	24.53	0.27	24.52	24.57	24.16	24.16	24.35	0.22
03/04/2009 08:00	29.93	30.09	29.26	30.09	29.84	0.40	31.47	31.14	30.66	31.02	31.07	0.33	31.06	31.22	31.06	31.78	31.28	0.34	30.94	31.31	31.21	30.28	30.94	0.46
03/04/2009 08:30	33.73	33.71	32.84	33.77	33.51	0.45	36.81	36.63	35.17	36.08	36.17	0.74	36.69	36.47	37.79	38.41	37.34	0.92	35.85	37.39	37.22	36.37	36.71	0.73
03/04/2009 09:00	35.93	35.71	35.18	35.98	35.70	0.37	39.27	39.44	37.68	38.75	38.79	0.79	39.88	39.42	40.61	41.55	40.37	0.93	38.87	40.87	40.91	39.96	40.15	0.96
03/04/2009 09:30	37.86	37.38	37.28	37.81	37.58	0.30	41.45	41.95	39.81	41.03	41.06	0.91	42.56	42.03	43.97	43.88	43.11	0.97	41.24	43.53	44.05	43.01	42.96	1.22
03/04/2009 10:00	37.88	37.32	37.36	37.79	37.59	0.29	40.98	41.51	39.55	40.61	40.66	0.83	38.72	37.73	42.98	43.28	40.68	2.86	38.14	39.55	43.83	43.01	41.13	2.72
03/04/2009 10:30	38.85	38.36	38.46	38.91	38.65	0.28	41.94	42.36	40.70	41.69	41.67	0.70	37.52	36.79	43.30	43.91	40.38	3.74	37.62	38.27	44.67	43.70	41.07	3.63
03/04/2009 11:00	41.75	41.30	41.34	41.97	41.59	0.32	45.55	45.81	44.08	45.18	45.16	0.76	37.75	37.16	46.28	46.91	42.03	5.29	38.00	38.52	47.86	46.62	42.75	5.21
03/04/2009 11:30	43.33	42.88	43.08	43.67	43.24	0.34	47.34	47.65	45.83	47.10	46.98	0.80	38.36	37.80	41.98	42.56	40.18	2.44	38.57	39.15	43.32	43.33	41.09	2.59
03/04/2009 12:00	41.82	41.04	43.92	44.13	42.73	1.53	44.41	44.99	45.99	47.05	45.61	1.16	39.29	38.70	40.55	41.63	40.04	1.31	39.52	40.10	42.44	42.22	41.07	1.48
03/04/2009 12:30	39.80	39.06	40.00	40.66	39.88	0.66	41.74	41.84	42.06	42.88	42.13	0.52	39.41	38.86	40.73	41.37	40.09	1.16	39.53	40.30	41.74	41.77	40.84	1.11

03/04/2009 13:00	39.57	38.87	39.10	39.80	39.34	0.43	41.09	40.94	40.83	41.29	41.04	0.20	39.78	39.30	40.51	41.14	40.18	0.81	39.82	40.57	41.28	41.34	40.75	0.71
03/04/2009 13:30	39.10	38.52	38.62	39.33	38.89	0.39	40.49	40.34	40.19	40.59	40.40	0.18	39.62	39.17	39.82	40.63	39.81	0.61	39.48	40.34	40.51	40.80	40.28	0.57
03/04/2009 14:00	38.82	38.28	38.24	38.96	38.58	0.37	39.97	39.78	39.61	39.90	39.82	0.16	39.53	39.13	39.52	40.16	39.59	0.43	39.32	40.18	39.97	40.32	39.95	0.44
03/04/2009 14:30	38.55	38.05	37.91	38.58	38.27	0.34	39.46	39.29	39.06	39.30	39.28	0.16	39.37	39.02	39.22	39.76	39.34	0.31	39.10	39.93	39.50	39.85	39.60	0.38
03/04/2009 15:00	38.73	38.28	38.07	38.66	38.44	0.31	39.54	39.40	39.05	39.29	39.32	0.21	39.72	39.36	39.46	39.86	39.60	0.23	39.53	40.29	39.75	39.92	39.87	0.32
03/04/2009 15:30	37.96	37.61	37.48	37.94	37.75	0.24	38.48	38.38	38.14	38.28	38.32	0.15	38.66	38.31	38.12	38.76	38.46	0.30	38.31	39.13	38.62	38.98	38.76	0.37
03/04/2009 16:00	37.06	36.79	36.73	37.01	36.90	0.16	37.04	37.06	36.94	36.93	36.99	0.07	37.64	37.35	36.53	37.17	37.17	0.47	37.64	38.05	37.42	37.61	37.68	0.27
03/04/2009 16:30	37.97	37.68	37.41	37.84	37.73	0.24	38.35	38.31	37.90	38.02	38.15	0.22	38.75	38.46	38.10	38.60	38.48	0.28	38.68	39.22	38.65	38.60	38.79	0.29
03/04/2009 17:00	37.53	37.29	36.96	37.43	37.30	0.25	37.80	37.79	37.41	37.49	37.62	0.20	38.38	38.05	37.85	38.17	38.11	0.22	38.17	38.82	38.13	38.22	38.34	0.33
03/04/2009 17:30	36.97	36.80	36.55	36.92	36.81	0.19	37.06	37.09	36.79	36.81	36.94	0.16	37.38	37.04	36.88	37.28	37.15	0.23	37.09	37.72	37.32	37.46	37.40	0.26
03/04/2009 18:00	32.93	33.09	32.63	32.60	32.81	0.24	31.83	32.04	32.15	31.86	31.97	0.15	33.47	33.11	31.78	32.24	32.65	0.78	32.88	33.58	32.62	33.16	33.06	0.41
03/04/2009 18:30	32.71	32.69	32.41	32.67	32.62	0.14	31.30	31.19	31.76	31.24	31.37	0.26	31.92	31.72	30.91	30.78	31.33	0.57	31.79	32.04	31.26	31.57	31.67	0.33
03/04/2009 19:00	32.17	32.18	31.91	32.18	32.11	0.13	30.77	30.76	31.14	30.71	30.85	0.20	31.14	30.98	30.22	30.07	30.60	0.54	31.05	31.22	30.44	30.65	30.84	0.36
03/04/2009 19:30	31.56	31.62	31.34	31.58	31.53	0.13	30.17	30.13	30.49	30.08	30.22	0.19	30.39	30.23	29.56	29.40	29.90	0.49	30.27	30.42	29.65	29.86	30.05	0.36
03/04/2009 20:00	30.98	31.07	30.76	31.01	30.96	0.14	29.58	29.55	29.92	29.51	29.64	0.19	29.75	29.61	28.99	28.85	29.30	0.45	29.60	29.76	29.02	29.19	29.39	0.35
03/04/2009 20:30	30.55	30.63	30.38	30.61	30.54	0.11	29.17	29.15	29.51	29.14	29.24	0.18	29.30	29.18	28.61	28.50	28.90	0.40	29.13	29.29	28.60	28.72	28.94	0.33
03/04/2009 21:00	30.15	30.24	29.95	30.20	30.14	0.13	28.81	28.79	29.12	28.79	28.88	0.16	28.96	28.84	28.32	28.22	28.59	0.37	28.77	28.92	28.27	28.40	28.59	0.31
03/04/2009 21:30	29.74	29.84	29.56	29.79	29.73	0.12	28.44	28.41	28.72	28.41	28.50	0.15	28.58	28.50	27.96	27.91	28.24	0.35	28.39	28.55	27.95	28.06	28.24	0.28
03/04/2009 22:00	29.41	29.52	29.23	29.46	29.41	0.13	28.16	28.13	28.39	28.11	28.20	0.13	28.30	28.23	27.73	27.68	27.99	0.33	28.12	28.26	27.70	27.79	27.97	0.27
03/04/2009 22:30	29.11	29.21	28.92	29.15	29.10	0.13	27.91	27.88	28.12	27.86	27.94	0.12	28.05	28.01	27.51	27.48	27.76	0.31	27.86	28.01	27.49	27.57	27.73	0.24
03/04/2009 23:00	28.74	28.85	28.59	28.79	28.74	0.11	27.58	27.56	27.81	27.57	27.63	0.12	27.77	27.73	27.22	27.21	27.48	0.31	27.56	27.69	27.20	27.28	27.43	0.23
03/04/2009 23:30	28.38	28.49	28.22	28.43	28.38	0.12	27.27	27.25	27.49	27.26	27.32	0.12	27.47	27.45	26.95	26.93	27.20	0.30	27.28	27.38	26.91	26.99	27.14	0.23
04/04/2009 00:00	28.05	28.17	27.90	28.10	28.06	0.11	26.97	26.95	27.19	26.97	27.02	0.11	27.21	27.19	26.67	26.65	26.93	0.31	26.98	27.10	26.63	26.70	26.85	0.22
04/04/2009 00:30	27.78	27.89	27.65	27.84	27.79	0.10	26.75	26.73	26.96	26.76	26.80	0.11	26.99	26.99	26.48	26.46	26.73	0.30	26.78	26.89	26.42	26.49	26.65	0.23
04/04/2009 01:00	27.52	27.64	27.39	27.58	27.53	0.11	26.53	26.51	26.73	26.53	26.58	0.10	26.77	26.79	26.27	26.26	26.52	0.30	26.58	26.67	26.21	26.28	26.44	0.22
04/04/2009 01:30	27.33	27.42	27.21	27.38	27.34	0.09	26.39	26.38	26.57	26.41	26.44	0.09	26.64	26.67	26.17	26.16	26.41	0.28	26.46	26.55	26.09	26.14	26.31	0.23
04/04/2009 02:00	27.21	27.30	27.12	27.27	27.23	0.08	26.39	26.38	26.53	26.40	26.43	0.07	26.63	26.66	26.22	26.20	26.43	0.25	26.48	26.53	26.11	26.14	26.32	0.22
04/04/2009 02:30	27.03	27.11	26.93	27.07	27.04	0.08	26.25	26.26	26.38	26.28	26.29	0.06	26.52	26.55	26.10	26.10	26.32	0.25	26.36	26.43	26.01	26.05	26.21	0.21
04/04/2009 03:00	26.74	26.83	26.64	26.79	26.75	0.08	25.97	25.98	26.11	26.00	26.02	0.06	26.27	26.30	25.81	25.83	26.05	0.27	26.08	26.17	25.74	25.80	25.95	0.21
04/04/2009 03:30	26.59	26.67	26.50	26.63	26.60	0.07	25.86	25.86	25.99	25.89	25.90	0.06	26.15	26.20	25.72	25.73	25.95	0.26	25.99	26.05	25.64	25.68	25.84	0.21
04/04/2009 04:00	26.44	26.51	26.37	26.48	26.45	0.06	25.76	25.77	25.89	25.80	25.81	0.06	26.05	26.10	25.64	25.65	25.86	0.25	25.90	25.95	25.55	25.59	25.75	0.21
04/04/2009 04:30	26.17	26.25	26.10	26.22	26.19	0.07	25.50	25.52	25.64	25.55	25.55	0.06	25.81	25.86	25.37	25.39	25.61	0.26	25.64	25.71	25.30	25.35	25.50	0.21
04/04/2009 05:00	25.96	26.05	25.89	26.01	25.98	0.07	25.32	25.34	25.46	25.36	25.37	0.06	25.64	25.68	25.20	25.20	25.43	0.27	25.47	25.52	25.11	25.16	25.32	0.21
04/04/2009 05:30	25.79	25.87	25.73	25.84	25.81	0.06	25.18	25.19	25.31	25.23	25.23	0.06	25.49	25.53	25.05	25.04	25.28	0.27	25.31	25.36	24.95	25.00	25.16	0.21
04/04/2009 06:00	25.64	25.72	25.59	25.68	25.66	0.06	25.06	25.08	25.19	25.11	25.11	0.06	25.37	25.41	24.96	24.94	25.17	0.25	25.21	25.25	24.85	24.88	25.05	0.21
04/04/2009 06:30	25.48	25.55	25.43	25.52	25.50	0.05	24.91	24.94	25.05	24.97	24.97	0.06	25.22	25.27	24.80	24.79	25.02	0.26	25.06	25.10	24.69	24.73	24.90	0.21
04/04/2009 07:00	25.29	25.37	25.23	25.33	25.31	0.06	24.74	24.76	24.87	24.79	24.79	0.06	25.05	25.09	24.62	24.61	24.84	0.26	24.87	24.91	24.52	24.56	24.72	0.20
04/04/2009 07:30	25.36	25.43	25.29	25.40	25.37	0.06	24.90	24.91	25.00	24.94	24.94	0.05	25.18	25.24	24.76	24.80	25.00	0.25	25.05	25.06	24.70	24.68	24.87	0.21
04/04/2009 08:00	28.32	28.42	27.75	28.38	28.22	0.31	29.09	28.90	28.59	28.79	28.84	0.21	29.04	29.14	28.31	29.35	28.96	0.45	29.06	29.22	29.03	28.41	28.93	0.36
04/04/2009 08:30	34.25	34.21	33.05	34.29	33.95	0.60	37.26	37.06	35.67	36.51	36.63	0.71	37.25	37.23	38.47	38.72	37.92	0.79	36.70	37.97	37.88	36.59	37.29	0.74
04/04/2009 09:00	37.52	37.33	36.01	37.48	37.09	0.72	41.60	41.55	39.52	40.78	40.86	0.97	42.23	41.74	44.00	44.25	43.06	1.26	41.17	43.50	43.16	42.12	42.49	1.06
04/04/2009 09:30	39.94	39.51	38.76	39.88	39.52	0.54	44.13	44.54	42.13	43.47	43.57	1.05	45.40	44.85	46.44	47.02	45.93	0.98	43.76	46.63	46.96	45.75	45.78	1.44
04/04/2009 10:00	41.87	41.44	40.54	41.90	41.44	0.63	46.38	46.77	44.36	45.77	45.82	1.06	41.38	40.23	48.64	49.39	44.91	4.77	40.30	42.32	49.55	48.40	45.14	4.53
04/04/2009 10:30	43.64	43.11	41.96	43.72	43.11	0.81	48.14	48.61	46.26	47.61	47.66	1.02	39.93	39.07	50.45	50.97	45.11	6.49	39.81	40.74	51.62	50.46	45.66	6.24
04/04/2009 11:00	44.45	43.92	42.14	44.62	43.78	1.13	48.75	49.24	47.07	48.40	48.37	0.93	39.73	39.07	50.46	50.78	45.01	6.48	39.88	40.58	51.66	50.76	45.72	6.36
04/04/2009 11:30	44.54	44.01	42.69	44.82	44.02	0.95	48.30	48.86	46.92	48.08	48.04	0.82	39.94	39.24	43.92	44.76	41.97	2.78	40.19	40.77	45.90	45.88	43.19	3.13
04/04/2009 12:00	42.33	41.46	42.47	44.23	42.62	1.16	44.65	45.31	45.94	46.87	45.69	0.95	40.01	39.35	42.30	42.60	41.07	1.63	40.20	40.78	43.74	43.68	42.10	1.87
04/04/2009 12:30	40.31	39.51	39.37	40.92	40.03	0.72	41.68	42.12	41.98	42.65	42.11	0.41	39.60	38.97	40.74	41.23	40.14	1.03	39.74	40.29	42.29	42.19	41.13	1.30

04/04/2009 13:00	40.25	39.53	38.99	40.45	39.81	0.67	41.49	41.72	41.37	41.82	41.60	0.21	39.73	39.09	40.67	41.17	40.17	0.93	39.93	40.46	42.05	41.84	41.07	1.04
04/04/2009 13:30	39.91	39.32	38.57	40.02	39.46	0.67	41.05	41.16	40.77	41.12	41.03	0.18	39.82	39.21	40.14	40.89	40.02	0.70	39.93	40.53	41.50	41.38	40.84	0.74
04/04/2009 14:00	38.08	37.63	36.55	38.17	37.61	0.74	38.47	38.60	38.46	38.55	38.52	0.07	37.76	37.18	37.77	38.29	37.75	0.45	37.72	38.35	38.93	39.10	38.53	0.63
04/04/2009 14:30	38.40	37.95	36.93	38.48	37.94	0.71	38.85	38.88	38.72	38.81	38.82	0.07	38.00	37.51	38.02	38.48	38.00	0.40	37.96	38.48	39.05	39.03	38.63	0.52
04/04/2009 15:00	37.61	37.23	36.23	37.71	37.20	0.68	37.76	37.84	37.71	37.71	37.76	0.06	37.03	36.56	36.91	37.35	36.96	0.33	36.90	37.45	37.85	37.93	37.53	0.47
04/04/2009 15:30	37.55	37.16	35.92	37.52	37.04	0.77	37.62	37.62	37.46	37.43	37.53	0.10	36.86	36.41	36.81	37.38	36.87	0.40	36.85	37.35	37.78	37.72	37.43	0.43
04/04/2009 16:00	37.66	37.28	36.21	37.61	37.19	0.67	37.76	37.79	37.51	37.52	37.65	0.15	37.06	36.60	37.04	37.60	37.08	0.41	37.09	37.55	38.01	37.85	37.63	0.40
04/04/2009 16:30	36.94	36.66	35.65	36.94	36.55	0.61	36.88	36.95	36.72	36.73	36.82	0.11	36.44	35.96	35.84	36.76	36.25	0.43	36.39	36.91	37.10	37.11	36.88	0.34
04/04/2009 17:00	35.99	35.77	34.68	36.06	35.63	0.64	35.64	35.68	35.65	35.57	35.64	0.05	35.36	34.97	34.71	35.48	35.13	0.35	35.28	35.74	35.78	35.87	35.67	0.26
04/04/2009 17:30	35.35	35.20	34.09	35.38	35.01	0.62	34.86	34.88	34.85	34.73	34.83	0.07	34.78	34.38	34.02	34.66	34.46	0.34	34.66	35.11	34.92	35.02	34.93	0.19
04/04/2009 18:00	34.56	34.44	33.40	34.56	34.24	0.56	33.85	33.89	33.90	33.73	33.84	0.08	33.84	33.49	33.15	33.61	33.52	0.29	33.74	34.11	33.87	33.97	33.92	0.16
04/04/2009 18:30	33.95	33.87	33.05	33.92	33.70	0.43	33.07	33.08	33.16	32.96	33.07	0.08	33.07	32.74	32.48	32.70	32.75	0.24	33.09	33.30	33.04	33.12	33.14	0.11
04/04/2009 19:00	33.32	33.23	32.49	33.32	33.09	0.40	32.33	32.35	32.47	32.24	32.35	0.09	32.34	32.07	31.79	31.90	32.03	0.24	32.35	32.54	32.19	32.31	32.35	0.15
04/04/2009 19:30	32.73	32.70	32.07	32.74	32.56	0.33	31.67	31.68	31.85	31.60	31.70	0.11	31.71	31.47	31.22	31.19	31.40	0.24	31.72	31.85	31.45	31.58	31.65	0.17
04/04/2009 20:00	32.16	32.15	31.48	32.19	32.00	0.34	31.03	31.01	31.24	30.98	31.07	0.12	31.11	30.92	30.62	30.54	30.80	0.26	31.06	31.22	30.74	30.88	30.98	0.21
04/04/2009 20:30	31.65	31.66	31.05	31.68	31.51	0.31	30.47	30.45	30.71	30.43	30.52	0.13	30.57	30.42	30.10	29.98	30.27	0.27	30.54	30.66	30.15	30.29	30.41	0.23
04/04/2009 21:00	31.14	31.18	30.46	31.18	30.99	0.35	29.98	29.96	30.23	29.95	30.03	0.13	30.08	29.95	29.58	29.50	29.78	0.28	29.96	30.10	29.61	29.74	29.85	0.22
04/04/2009 21:30	30.67	30.73	30.03	30.72	30.54	0.34	29.49	29.47	29.73	29.44	29.53	0.13	29.60	29.48	29.11	29.00	29.30	0.29	29.48	29.60	29.12	29.25	29.36	0.22
04/04/2009 22:00	30.29	30.36	29.66	30.30	30.15	0.33	29.10	29.08	29.33	29.05	29.14	0.13	29.25	29.15	28.74	28.65	28.95	0.30	29.08	29.20	28.73	28.83	28.96	0.22
04/04/2009 22:30	30.09	30.17	29.54	30.12	29.98	0.30	29.00	28.96	29.19	28.94	29.02	0.11	29.05	28.96	28.62	28.56	28.80	0.24	28.91	29.00	28.62	28.67	28.80	0.18
04/04/2009 23:00	29.83	29.92	29.34	29.87	29.74	0.27	28.80	28.77	28.97	28.75	28.82	0.10	28.85	28.77	28.43	28.41	28.62	0.23	28.67	28.76	28.44	28.48	28.59	0.15
04/04/2009 23:30	29.53	29.62	29.05	29.59	29.45	0.27	28.55	28.51	28.72	28.52	28.58	0.10	28.62	28.56	28.22	28.21	28.40	0.22	28.47	28.55	28.25	28.28	28.39	0.15
05/04/2009 00:00	29.19	29.28	28.74	29.23	29.11	0.25	28.21	28.19	28.40	28.21	28.25	0.10	28.37	28.32	27.95	27.92	28.14	0.24	28.22	28.30	27.96	28.00	28.12	0.17
05/04/2009 00:30	28.88	28.97	28.45	28.92	28.81	0.24	27.91	27.90	28.12	27.93	27.97	0.10	28.10	28.06	27.66	27.63	27.86	0.25	27.92	28.01	27.66	27.70	27.82	0.17
05/04/2009 01:00	28.61	28.70	28.17	28.65	28.53	0.24	27.69	27.67	27.87	27.69	27.73	0.09	27.86	27.84	27.43	27.41	27.64	0.25	27.66	27.75	27.41	27.46	27.57	0.16
05/04/2009 01:30	28.34	28.44	27.92	28.38	28.27	0.24	27.46	27.44	27.63	27.45	27.50	0.09	27.64	27.63	27.20	27.20	27.42	0.25	27.45	27.52	27.19	27.22	27.35	0.16
05/04/2009 02:00	28.10	28.20	27.68	28.15	28.03	0.24	27.26	27.25	27.43	27.26	27.30	0.09	27.45	27.44	27.02	27.01	27.23	0.25	27.23	27.30	26.99	27.01	27.13	0.16
05/04/2009 02:30	27.88	27.99	27.51	27.93	27.83	0.22	27.08	27.06	27.22	27.06	27.11	0.08	27.25	27.25	26.83	26.83	27.04	0.24	27.04	27.11	26.81	26.83	26.95	0.15
05/04/2009 03:00	27.58	27.72	27.14	27.67	27.53	0.26	26.86	26.84	27.02	26.86	26.90	0.08	27.05	27.04	26.62	26.63	26.84	0.24	26.76	26.87	26.56	26.59	26.70	0.15
05/04/2009 03:30	27.35	27.47	26.96	27.42	27.30	0.23	26.63	26.62	26.79	26.65	26.67	0.08	26.83	26.83	26.41	26.41	26.62	0.24	26.59	26.66	26.34	26.37	26.49	0.16
05/04/2009 04:00	27.01	27.17	26.56	27.15	26.97	0.28	26.38	26.36	26.56	26.42	26.43	0.09	26.60	26.59	26.16	26.18	26.38	0.25	26.28	26.39	26.07	26.12	26.22	0.15
05/04/2009 04:30	26.85	26.97	26.49	26.94	26.81	0.22	26.20	26.19	26.36	26.23	26.25	0.08	26.40	26.41	25.99	26.00	26.20	0.24	26.14	26.21	25.89	25.93	26.04	0.16
05/04/2009 05:00	26.69	26.83	26.36	26.80	26.67	0.22	26.10	26.10	26.26	26.13	26.15	0.08	26.28	26.29	25.89	25.90	26.09	0.23	26.01	26.08	25.79	25.81	25.92	0.14
05/04/2009 05:30	26.50	26.62	26.20	26.58	26.48	0.19	25.92	25.92	26.06	25.95	25.96	0.07	26.11	26.13	25.72	25.72	25.92	0.23	25.87	25.93	25.62	25.65	25.77	0.16
05/04/2009 06:00	26.27	26.40	25.98	26.36	26.25	0.19	25.69	25.70	25.85	25.73	25.74	0.07	25.94	25.96	25.51	25.52	25.73	0.25	25.67	25.75	25.41	25.45	25.57	0.17
05/04/2009 06:30	26.09	26.19	25.81	26.17	26.07	0.18	25.51	25.52	25.66	25.55	25.56	0.07	25.75	25.77	25.33	25.33	25.55	0.25	25.51	25.57	25.22	25.26	25.39	0.18
05/04/2009 07:00	25.89	26.00	25.63	25.97	25.87	0.17	25.34	25.35	25.49	25.39	25.39	0.07	25.57	25.61	25.17	25.17	25.38	0.24	25.35	25.41	25.06	25.09	25.23	0.18
05/04/2009 07:30	25.91	26.01	25.63	25.99	25.89	0.18	25.43	25.42	25.55	25.45	25.46	0.06	25.64	25.69	25.23	25.27	25.46	0.24	25.44	25.48	25.17	25.15	25.31	0.17
05/04/2009 08:00	29.91	30.17	28.86	30.14	29.77	0.62	31.21	30.94	30.55	30.82	30.88	0.27	30.93	31.06	31.06	31.52	31.14	0.26	30.84	31.16	30.98	30.24	30.81	0.40
05/04/2009 08:30	35.88	35.88	33.85	35.97	35.40	1.03	39.32	39.18	37.60	38.56	38.67	0.78	39.50	39.43	40.14	40.95	40.01	0.71	38.49	40.21	40.06	38.67	39.36	0.90
05/04/2009 09:00	39.75	39.69	36.54	39.80	38.95	1.60	44.52	44.07	42.12	43.43	43.54	1.04	45.05	44.46	46.70	47.55	45.94	1.43	44.02	46.80	45.93	45.04	45.45	1.19
05/04/2009 09:30	42.22	41.96	39.21	42.29	41.42	1.48	47.28	47.27	44.86	46.40	46.45	1.14	48.38	47.79	50.10	50.95	49.31	1.47	46.42	50.19	49.74	48.86	48.80	1.68
05/04/2009 10:00	44.27	43.98	41.79	44.46	43.63	1.24	49.32	49.69	47.19	48.70	48.73	1.10	42.62	41.48	52.09	52.71	47.23	6.00	41.14	43.51	52.52	51.52	47.17	5.70
05/04/2009 10:30	44.98	44.56	42.62	45.14	44.33	1.16	49.58	50.10	47.75	49.12	49.14	1.01	40.41	39.57	51.76	52.61	46.09	7.06	40.10	41.14	53.00	52.14	46.60	6.92
05/04/2009 11:00	42.29	41.71	40.40	42.32	41.68	0.90	45.54	46.11	44.26	45.39	45.33	0.77	39.67	39.02	46.82	47.55	43.27	4.54	39.73	40.47	48.17	48.19	44.14	4.67
05/04/2009 11:30	43.81	43.45	42.75	44.20	43.55	0.62	46.97	47.47	45.98	46.88	46.83	0.62	39.62	38.98	42.00	43.15	40.94	1.97	39.79	40.34	44.31	44.39	42.21	2.48
05/04/2009 12:00	40.57	39.89	41.19	42.99	41.16	1.33	42.46	42.76	44.26	45.04	43.63	1.23	39.22	38.66	40.56	41.49	39.98	1.28	39.29	40.00	42.06	42.31	40.92	1.50
05/04/2009 12:30	40.09	39.42	39.00	40.93	39.86	0.84	41.60	41.58	41.92	42.56	41.92	0.46	39.55	38.99	40.67	41.29	40.13	1.04	39.54	40.31	41.64	41.76	40.81	1.07

05/04/2009 13:00	37.51	37.06	36.51	37.87	37.24	0.59	37.95	38.20	38.19	38.39	38.18	0.18	37.06	36.49	36.72	37.71	37.00	0.53	36.90	37.61	38.31	38.71	37.88	0.80
05/04/2009 13:30	38.17	37.72	36.81	38.43	37.78	0.71	38.52	38.59	38.69	38.34	38.54	0.15	37.31	36.88	36.94	37.93	37.27	0.48	37.40	37.84	38.75	38.64	38.16	0.65
05/04/2009 14:00	39.12	38.61	38.11	39.27	38.78	0.53	39.79	39.84	39.58	39.71	39.73	0.11	38.61	38.07	38.03	39.35	38.52	0.62	38.62	39.18	40.08	39.81	39.42	0.65
05/04/2009 14:30	39.17	38.67	37.77	39.25	38.72	0.68	39.81	39.81	39.49	39.68	39.70	0.15	38.74	38.16	38.24	39.74	38.72	0.73	38.77	39.40	40.17	40.01	39.59	0.64
05/04/2009 15:00	37.60	37.16	36.20	37.65	37.15	0.67	37.78	37.84	37.61	37.71	37.74	0.10	37.29	36.73	36.56	37.88	37.12	0.60	37.12	37.85	38.16	38.35	37.87	0.54
05/04/2009 15:30	35.51	35.24	34.07	35.44	35.07	0.67	34.98	35.16	35.10	34.93	35.04	0.11	34.81	34.33	34.07	34.86	34.52	0.38	34.51	35.11	35.30	35.62	35.14	0.47
05/04/2009 16:00	33.82	33.68	32.69	33.79	33.50	0.54	32.80	32.92	33.16	32.82	32.93	0.17	32.75	32.40	32.07	32.33	32.39	0.28	32.60	32.92	32.80	33.17	32.87	0.24
05/04/2009 16:30	32.47	32.36	31.23	32.56	32.16	0.62	31.16	31.20	31.63	31.20	31.30	0.22	31.12	30.87	30.43	30.49	30.73	0.33	30.92	31.17	30.85	31.21	31.04	0.18
05/04/2009 17:00	31.33	31.25	29.97	31.32	30.97	0.67	29.73	29.64	30.15	29.52	29.76	0.27	29.71	29.51	28.98	28.98	29.30	0.37	29.49	29.73	29.33	29.64	29.55	0.18
05/04/2009 17:30	30.58	30.68	29.10	30.69	30.26	0.78	29.25	29.17	29.55	29.23	29.30	0.17	28.96	28.77	28.41	28.44	28.65	0.27	28.56	28.89	28.47	28.79	28.68	0.20
05/04/2009 18:00	30.09	30.32	28.58	30.05	29.76	0.80	28.88	28.78	28.95	28.62	28.81	0.14	28.52	28.35	28.09	28.12	28.27	0.20	28.28	28.51	28.16	28.37	28.33	0.15
05/04/2009 18:30	29.92	30.07	28.83	30.09	29.73	0.60	28.68	28.61	28.89	28.56	28.69	0.15	28.33	28.13	27.87	27.99	28.08	0.20	27.95	28.27	27.93	28.12	28.07	0.16
05/04/2009 19:00	29.43	29.55	28.51	29.59	29.27	0.51	28.18	28.12	28.41	28.11	28.21	0.14	27.90	27.73	27.51	27.62	27.69	0.17	27.59	27.86	27.55	27.74	27.69	0.14
05/04/2009 19:30	29.10	29.18	28.39	29.19	28.97	0.39	27.83	27.80	28.01	27.73	27.84	0.12	27.62	27.48	27.25	27.29	27.41	0.17	27.43	27.62	27.33	27.44	27.46	0.12
05/04/2009 20:00	28.57	28.67	27.83	28.69	28.44	0.41	27.34	27.30	27.54	27.27	27.36	0.12	27.24	27.10	26.83	26.88	27.01	0.19	26.92	27.16	26.86	26.99	26.98	0.13
05/04/2009 20:30	28.23	28.34	27.67	28.33	28.14	0.32	27.01	26.98	27.21	26.96	27.04	0.12	26.97	26.87	26.57	26.58	26.75	0.20	26.75	26.90	26.61	26.69	26.74	0.12
05/04/2009 21:00	27.91	28.03	27.34	28.00	27.82	0.32	26.76	26.73	26.92	26.67	26.77	0.11	26.77	26.68	26.35	26.35	26.54	0.22	26.53	26.68	26.38	26.44	26.51	0.13
05/04/2009 21:30	27.55	27.70	27.00	27.66	27.48	0.32	26.47	26.44	26.64	26.41	26.49	0.10	26.51	26.43	26.11	26.12	26.29	0.21	26.24	26.40	26.10	26.16	26.23	0.13
05/04/2009 22:00	27.27	27.41	26.77	27.37	27.21	0.30	26.26	26.22	26.42	26.21	26.28	0.10	26.30	26.23	25.90	25.91	26.09	0.21	26.04	26.17	25.89	25.95	26.01	0.12
05/04/2009 22:30	27.05	27.17	26.60	27.14	26.99	0.26	26.08	26.04	26.23	26.03	26.10	0.09	26.11	26.06	25.75	25.76	25.92	0.19	25.88	26.00	25.72	25.77	25.84	0.12
05/04/2009 23:00	26.86	26.98	26.45	26.93	26.81	0.24	25.96	25.93	26.08	25.90	25.97	0.08	26.01	25.97	25.65	25.67	25.83	0.19	25.78	25.88	25.66	25.67	25.75	0.10
05/04/2009 23:30	26.65	26.78	26.23	26.73	26.60	0.25	25.83	25.80	25.94	25.78	25.84	0.07	25.91	25.86	25.54	25.58	25.72	0.19	25.65	25.76	25.54	25.55	25.63	0.10
AVERAGE	28.72	28.85	28.49	28.79	28.71	0.16	27.75	27.73	27.95	27.74	27.79	0.10	27.97	27.94	27.50	27.47	27.72	0.27	27.77	27.88	27.44	27.52	27.66	0.21
	28.44	28.57	28.23	28.51	28.44	0.15	27.51	27.49	27.70	27.51	27.55	0.10	27.73	27.72	27.27	27.24	27.49	0.27	27.53	27.63	27.20	27.28	27.41	0.20
	28.21	28.34	28.01	28.27	28.21	0.15	27.32	27.30	27.49	27.31	27.36	0.09	27.52	27.52	27.08	27.06	27.30	0.26	27.33	27.42	27.01	27.08	27.21	0.19
	27.94	28.07	27.75	28.01	27.94	0.14	27.09	27.08	27.26	27.10	27.13	0.09	27.31	27.31	26.87	26.86	27.09	0.26	27.11	27.20	26.80	26.86	26.99	0.19
	27.70	27.82	27.52	27.78	27.71	0.13	26.89	26.89	27.06	26.90	26.93	0.08	27.12	27.13	26.69	26.67	26.90	0.25	26.92	27.00	26.61	26.66	26.80	0.19
	27.47	27.60	27.30	27.54	27.48	0.13	26.70	26.70	26.85	26.71	26.74	0.08	26.93	26.95	26.50	26.49	26.72	0.25	26.73	26.80	26.42	26.47	26.61	0.19
	27.22	27.35	27.04	27.30	27.23	0.14	26.49	26.48	26.64	26.50	26.53	0.08	26.72	26.74	26.29	26.29	26.51	0.25	26.50	26.58	26.20	26.26	26.38	0.18
	26.97	27.11	26.81	27.05	26.99	0.13	26.26	26.26	26.42	26.28	26.31	0.07	26.51	26.54	26.08	26.07	26.30	0.26	26.30	26.38	25.98	26.04	26.18	0.19
	26.74	26.87	26.56	26.82	26.75	0.14	26.06	26.06	26.22	26.09	26.10	0.08	26.32	26.35	25.88	25.88	26.11	0.26	26.10	26.17	25.78	25.83	25.97	0.20
	26.51	26.64	26.36	26.59	26.52	0.12	25.84	25.85	26.00	25.88	25.89	0.07	26.11	26.14	25.67	25.67	25.90	0.26	25.89	25.96	25.56	25.62	25.76	0.20
	26.31	26.43	26.17	26.39	26.32	0.12	25.67	25.68	25.83	25.71	25.72	0.07	25.94	25.98	25.51	25.50	25.73	0.26	25.72	25.79	25.39	25.44	25.59	0.20
	26.09	26.21	25.96	26.17	26.11	0.11	25.48	25.49	25.63	25.52	25.53	0.07	25.76	25.79	25.31	25.30	25.54	0.27	25.53	25.59	25.19	25.24	25.39	0.20
	25.89	26.01	25.76	25.96	25.91	0.11	25.29	25.30	25.45	25.34	25.34	0.07	25.58	25.62	25.14	25.13	25.37	0.27	25.36	25.42	25.01	25.06	25.22	0.21
	25.68	25.80	25.56	25.76	25.70	0.11	25.10	25.12	25.26	25.15	25.16	0.07	25.40	25.44	24.95	24.94	25.18	0.27	25.18	25.24	24.82	24.87	25.03	0.21
	25.49	25.61	25.38	25.57	25.51	0.10	24.93	24.95	25.08	24.98	24.99	0.07	25.22	25.27	24.78	24.77	25.01	0.27	25.01	25.06	24.65	24.69	24.85	0.21
	25.51	25.62	25.38	25.58	25.52	0.11	25.02	25.02	25.14	25.05	25.06	0.06	25.28	25.34	24.85	24.88	25.09	0.26	25.09	25.13	24.76	24.75	24.93	0.21
	29.12	29.27	28.62	29.25	29.07	0.31	30.17	29.95	29.57	29.82	29.87	0.25	29.99	30.11	29.72	30.39	30.05	0.31	29.85	30.12	30.00	29.28	29.81	0.38
	33.75	33.77	32.83	33.82	33.54	0.48	36.59	36.41	35.09	35.91	36.00	0.67	36.58	36.48	37.54	37.98	37.15	0.75	35.91	37.24	37.10	36.03	36.57	0.71
	37.24	37.11	36.07	37.28	36.93	0.61	41.08	40.99	39.16	40.32	40.39	0.89	41.62	41.20	42.87	43.51	42.30	1.11	40.66	42.84	42.55	41.50	41.89	1.02
	40.06	39.73	38.97	40.05	39.70	0.55	44.40	44.60	42.31	43.69	43.75	1.04	45.41	44.83	46.85	47.34	46.11	1.20	44.07	46.89	46.89	45.74	45.90	1.37
	41.77	41.35	40.86	41.82	41.45	0.55	46.13	46.48	44.16	45.54	45.58	1.03	41.29	39.93	48.51	49.12	44.71	4.78	40.16	42.17	49.18	48.07	44.89	4.41
	42.56	42.03	41.60	42.60	42.20	0.58	46.62	47.11	44.88	46.17	46.20	0.96	39.29	38.45	48.72	49.33	43.95	5.88	39.20	40.08	49.92	48.90	44.52	5.67
	42.90	42.39	41.95	43.03	42.57	0.60	46.67	47.09	45.15	46.35	46.32	0.83	38.88	38.24	47.93	48.61	43.41	5.62	39.06	39.69	49.51	48.69	44.24	5.63
	43.39	42.92	42.76	43.66	43.18	0.51	46.88	47.33	45.59	46.69	46.62	0.74	38.96	38.35	42.75	43.44	40.87	2.60	39.18	39.74	44.50	44.53	41.98	2.93

41.44	40.68	42.72	43.44	42.07	1.31	43.62	44.13	44.99	45.89	44.66	1.00	39.15	38.55	41.20	41.68	40.15	1.55	39.37	39.92	42.63	42.58	41.13	1.73
39.84	39.13	39.83	40.72	39.88	0.77	41.38	41.59	41.82	42.53	41.83	0.52	39.28	38.70	40.42	40.99	39.85	1.05	39.42	40.05	41.70	41.67	40.71	1.16
39.27	38.65	38.71	39.54	39.04	0.49	40.45	40.56	40.35	40.76	40.53	0.21	39.10	38.52	39.58	40.27	39.37	0.77	39.19	39.82	40.85	40.85	40.18	0.82
39.02	38.47	38.36	39.20	38.76	0.48	40.00	40.06	39.83	40.06	39.99	0.17	38.91	38.37	39.15	39.83	39.06	0.63	38.98	39.58	40.32	40.30	39.80	0.66
38.91	38.40	38.23	39.02	38.64	0.44	39.74	39.77	39.50	39.73	39.68	0.14	38.88	38.37	38.94	39.63	38.95	0.55	38.92	39.51	40.05	40.02	39.63	0.56
38.95	38.47	38.14	38.99	38.64	0.45	39.74	39.73	39.38	39.60	39.62	0.17	39.10	38.60	39.07	39.74	39.13	0.50	39.08	39.71	40.03	40.03	39.71	0.47
38.39	37.96	37.61	38.41	38.09	0.42	38.91	38.92	38.61	38.76	38.80	0.15	38.53	38.05	38.28	38.97	38.46	0.41	38.47	39.10	39.23	39.31	39.03	0.42
37.31	36.97	36.50	37.28	37.01	0.41	37.40	37.44	37.25	37.26	37.34	0.12	37.21	36.76	36.82	37.44	37.06	0.38	37.08	37.69	37.72	37.92	37.60	0.39
36.77	36.48	36.08	36.71	36.51	0.34	36.61	36.67	36.51	36.46	36.56	0.14	36.62	36.23	36.30	36.55	36.43	0.37	36.65	37.03	36.94	37.01	36.91	0.26
36.31	36.07	35.59	36.27	36.06	0.35	36.09	36.13	35.99	35.93	36.03	0.18	36.13	35.76	35.53	36.00	35.86	0.33	36.06	36.50	36.28	36.38	36.31	0.24
35.26	35.08	34.53	35.24	35.03	0.35	34.72	34.76	34.75	34.56	34.70	0.15	34.90	34.56	34.18	34.57	34.56	0.33	34.78	35.21	34.84	35.04	34.97	0.23
34.47	34.38	33.78	34.50	34.28	0.35	33.82	33.84	33.90	33.72	33.82	0.12	33.92	33.61	33.25	33.53	33.58	0.30	33.74	34.15	33.74	33.96	33.90	0.21
33.10	33.13	32.44	33.04	32.93	0.36	32.11	32.15	32.30	32.03	32.15	0.13	32.44	32.16	31.60	31.80	32.00	0.39	32.25	32.60	32.07	32.33	32.31	0.23
32.66	32.65	32.12	32.69	32.53	0.28	31.54	31.51	31.79	31.46	31.57	0.15	31.65	31.42	30.97	31.02	31.27	0.34	31.53	31.78	31.27	31.46	31.51	0.22
32.12	32.13	31.66	32.18	32.02	0.25	30.96	30.95	31.21	30.90	31.01	0.14	31.03	30.82	30.41	30.42	30.67	0.31	30.92	31.13	30.60	30.78	30.86	0.23
31.61	31.65	31.24	31.66	31.54	0.21	30.43	30.41	30.66	30.35	30.46	0.14	30.47	30.29	29.91	29.86	30.13	0.30	30.38	30.54	30.02	30.18	30.28	0.23
31.04	31.10	30.66	31.11	30.98	0.22	29.82	29.81	30.08	29.77	29.87	0.14	29.92	29.76	29.36	29.29	29.58	0.31	29.78	29.95	29.40	29.56	29.67	0.25
30.61	30.68	30.29	30.67	30.56	0.18	29.37	29.35	29.63	29.33	29.42	0.14	29.48	29.35	28.95	28.86	29.16	0.30	29.36	29.50	28.96	29.09	29.23	0.25
30.21	30.30	29.87	30.27	30.16	0.20	29.02	29.00	29.26	28.98	29.07	0.13	29.13	29.02	28.62	28.54	28.83	0.29	28.97	29.12	28.60	28.72	28.85	0.23
29.83	29.93	29.50	29.91	29.79	0.20	28.68	28.65	28.91	28.63	28.72	0.13	28.79	28.70	28.30	28.24	28.51	0.28	28.61	28.76	28.27	28.38	28.51	0.22
29.51	29.63	29.20	29.59	29.48	0.20	28.41	28.38	28.62	28.37	28.45	0.12	28.52	28.44	28.05	28.01	28.25	0.26	28.33	28.46	28.02	28.11	28.23	0.20
29.24	29.35	28.96	29.31	29.21	0.18	28.19	28.16	28.38	28.15	28.22	0.11	28.28	28.22	27.85	27.83	28.04	0.24	28.09	28.22	27.81	27.89	28.00	0.19
28.95	29.06	28.70	29.02	28.93	0.17	27.94	27.92	28.12	27.91	27.98	0.10	28.06	28.01	27.62	27.61	27.83	0.24	27.86	27.98	27.60	27.67	27.78	0.17
28.63	28.75	28.38	28.71	28.62	0.17	27.67	27.65	27.86	27.66	27.71	0.10	27.82	27.78	27.39	27.38	27.59	0.24	27.61	27.73	27.36	27.42	27.53	0.17

APPENDIX C3

Date	Time	Inner Surface & Air Temp: Sand Panels P1 (In)	P2 (In)	P3 (In)	P4 (In)	Soil Panels P5 (In)	P6 (In)	P7 (In)	P8 (In)	Air (In)	Outer Surface & Air Temp: Sand Panels P1 (Out)	P2 (Out)	P3 (Out)	P4 (Out)	P1 P2 Air (Out)	P3 P4 Air (Out)	Soil Panels P5 (Out)	P6 (Out)	P7 (Out)	P8 (Out)	P5 P6 Air (Out)	P7 P8 Air (Out)
01/08/2009	00:00	30.1	29.6	30.1	30.2	30.4	30.1	30.4	30.4	29.3	28	27.3	27	26.9	26.2	26.24	28	27.4	27.4	27.7	26.38	26.27
	00:15	29.9	29.4	29.9	30.1	30.3	29.9	30.3	30.2	29.4	27.9	27.2	26.9	26.8	26.2	26.17	27.9	27.3	27.2	27.6	26.13	25.9
	00:30	29.8	29.3	29.8	29.9	30.1	29.8	30.2	30.1	29.4	27.8	27.1	26.7	26.6	25.7	25.86	27.7	27.1	27	27.4	26	25.74
	00:45	29.7	29.2	29.6	29.8	30	29.6	30	30	29.2	27.6	26.9	26.6	26.5	25.6	25.78	27.6	27	26.9	27.2	25.93	25.65
	01:00	29.5	29.1	29.5	29.6	29.8	29.5	29.9	29.8	29.2	27.5	26.8	26.4	26.4	25.4	25.52	27.4	26.8	26.8	27.1	25.74	25.55
	01:15	29.4	28.9	29.4	29.5	29.6	29.4	29.8	29.7	29	27.3	26.7	26.3	26.2	25.3	25.46	27.3	26.7	26.7	27	25.83	25.64
	01:30	29.3	28.8	29.2	29.3	29.5	29.3	29.6	29.6	28.9	27.2	26.5	26.2	26.1	25.1	25.33	27.2	26.6	26.5	26.8	25.39	25.39
	01:45	29.1	28.7	29.1	29.2	29.4	29.1	29.5	29.4	28.9	27.1	26.4	26.1	26	25	25.16	27	26.4	26.4	26.7	25.54	25.22
	02:00	29	28.5	29	29.1	29.2	29	29.4	29.3	28.4	26.8	26.3	26	25.8	24.8	24.9	26.9	26.4	26.3	26.6	25.34	25.53
	02:15	28.8	28.4	28.8	28.9	29.1	28.8	29.2	29.1	28.4	26.8	26.2	25.9	25.7	24.8	24.89	26.8	26.2	26.2	26.5	25.18	25.16
	02:30	28.7	28.3	28.7	28.8	28.9	28.7	29.1	29	28.3	26.7	26	25.7	25.6	24.8	24.9	26.6	26.1	26	26.3	25.27	24.94
	02:45	28.6	28.1	28.6	28.6	28.8	28.6	29	28.9	28	26.6	26	25.7	25.6	24.8	24.84	26.7	26.1	26	26.4	25.28	25.44
	03:00	28.5	28.1	28.5	28.5	28.7	28.5	28.8	28.8	28.2	26.7	26	25.7	25.5	24.6	24.77	26.5	26.1	25.9	26.2	25.06	25
	03:15	28.3	27.9	28.4	28.4	28.5	28.4	28.7	28.7	28.2	26.8	26.1	25.8	25.7	24.9	25.09	26.7	26.2	26	26.3	25.46	25.22
	03:30	28.2	27.8	28.3	28.3	28.4	28.3	28.6	28.6	28.1	26.7	26.1	25.8	25.6	25	25.02	26.6	26.2	26	26.3	25.32	25.22
	03:45	28.1	27.7	28.2	28.2	28.3	28.2	28.5	28.5	28	26.5	26	25.7	25.5	24.9	24.93	26.5	26.1	25.9	26.2	25.21	25.08
	04:00	28	27.7	28.1	28.1	28.2	28.1	28.4	28.3	27.8	26.4	25.9	25.6	25.5	24.9	24.95	26.4	26	25.9	26.1	25.29	25.24
	04:15	27.9	27.6	28	28	28.1	28	28.3	28.2	27.8	26.3	25.8	25.5	25.4	24.9	24.93	26.3	25.9	25.8	26	24.99	24.91
	04:30	27.8	27.5	27.9	27.9	28	27.9	28.2	28.1	27.7	26.3	25.8	25.5	25.4	24.8	24.87	26.3	25.9	25.8	26	25.15	25.08
	04:45	27.7	27.4	27.8	27.8	27.9	27.8	28.1	28.1	27.7	26.3	25.8	25.5	25.4	25	25.05	26.2	25.8	25.7	26	24.99	24.9
	05:00	27.7	27.3	27.7	27.7	27.8	27.7	28	28	27.5	26.1	25.6	25.4	25.3	24.8	24.82	26	25.7	25.6	25.8	25.14	25.07
	05:15	27.6	27.2	27.6	27.6	27.7	27.6	27.9	27.9	27.4	26	25.5	25.3	25.1	24.6	24.69	25.9	25.6	25.5	25.7	24.84	24.66
	05:30	27.5	27.2	27.5	27.5	27.6	27.5	27.9	27.8	27.4	26	25.6	25.3	25.2	24.6	24.65	25.9	25.5	25.4	25.7	24.92	24.74
	05:45	27.4	27.1	27.4	27.4	27.5	27.5	27.8	27.7	27.1	25.9	25.5	25.3	25.1	24.6	24.58	25.9	25.6	25.5	25.7	24.99	25.03
	06:00	27.3	27	27.4	27.3	27.4	27.4	27.7	27.6	27.3	26.1	25.6	25.4	25.2	24.6	24.71	26	25.7	25.6	25.8	25.03	24.9
	06:15	27.2	26.9	27.3	27.2	27.3	27.3	27.6	27.5	27.2	26	25.6	25.4	25.2	24.8	24.86	26	25.7	25.6	25.8	25.03	24.97
	06:30	27.2	26.9	27.2	27.2	27.3	27.2	27.5	27.5	26.9	25.9	25.6	25.4	25.2	25	24.99	25.8	25.5	25.5	25.7	25.26	25.24
	06:45	27.1	26.8	27.1	27.1	27.2	27.1	27.5	27.4	26.8	25.9	25.6	25.4	25.2	24.9	24.89	26	25.7	25.6	25.8	25.15	25.19
	07:00	27	26.8	27.1	27	27.1	27.1	27.4	27.3	26.9	25.9	25.5	25.3	25.2	24.8	24.84	25.9	25.6	25.5	25.7	25.13	25.07
	07:15	27	26.7	27	27	27.1	27.1	27.3	27.2	27	25.9	25.6	25.4	25.3	25.1	25.11	25.9	25.7	25.5	25.7	25	24.93
	07:30	26.9	26.7	27	26.9	27	27	27.3	27.2	27	26	25.6	25.5	25.3	25	24.96	25.9	25.6	25.5	25.7	24.92	24.86
	07:45	26.9	26.6	26.9	26.9	27	27	27.2	27.1	26.9	26.2	25.9	25.9	25.7	25.3	25.24	25.9	25.7	25.6	25.8	25.06	24.99
	08:00	26.8	26.6	26.9	26.8	26.9	26.9	27.2	27.1	26.7	27.1	26.8	26.9	26.7	25.6	25.56	26.3	26.2	26.1	26.2	25.57	25.9
	08:15	26.8	26.6	26.9	26.8	26.9	26.9	27.1	27.1	26.9	28.8	28.5	28.9	28.8	27	26.86	27.1	27.2	26.9	27	26.02	26.2
	08:30	26.8	26.6	26.8	26.8	26.8	26.9	27.1	27.1	26.9	28.2	28.3	28.5	28.4	26.5	26.48	27.3	27.4	27.1	27.3	26.34	26.47

08:45	26.8	26.7	26.9	26.8	26.9	26.9	27.1	27.1	27	30.8	31	31.7	31.6	27.8	27.66	27.9	28.1	27.9	28	26.8	27.02
09:00	26.9	26.8	26.9	26.8	26.9	26.9	27.1	27.1	27.2	32.9	33.6	34.4	34.4	28.8	28.74	28.8	29.2	28.9	29.1	27.98	28
09:15	27.1	27	27.1	26.9	27	27	27.2	27.3	27.3	32.7	33.7	34.8	34.9	29.1	29.22	29.2	29.6	29.3	29.5	28.24	28.36
09:30	27.3	27.3	27.3	27.1	27.1	27.1	27.3	27.4	27.4	31.5	32.4	33.6	33.7	28.9	29.16	29.2	29.6	29.2	29.5	28.35	28.5
09:45	27.6	27.6	27.5	27.3	27.2	27.2	27.4	27.5	27.4	36.3	37.1	39.7	39.5	33.9	33.07	30	30.6	30.4	30.6	28.98	29.07
10:00	27.9	28	27.8	27.6	27.3	27.3	27.6	27.7	27.6	36	37	39	38.7	31.9	30.92	30.4	31.1	31	31.1	29.12	29.21
10:15	28.3	28.4	28.1	27.9	27.5	27.5	27.8	28	28.1	36.5	37.9	36.9	37.2	32.2	31.04	30.8	31.5	31.6	31.7	30.23	30.06
10:30	28.7	28.8	28.4	28.2	27.7	27.7	28	28.2	28.1	38.9	40.4	38	38.2	34.7	32.13	31.8	32.7	32.6	32.9	30.12	30.11
10:45	29.1	29.2	28.8	28.6	28	27.9	28.3	28.6	28.3	39	40.9	38.8	39.2	34.4	32.46	32.7	33.7	33.8	33.9	30.93	31.06
11:00	29.5	29.7	29.1	29	28.2	28.2	28.5	28.9	28.6	37.5	39.1	38.4	38.8	32.9	32.03	33.2	34.1	34.2	34.4	30.99	30.92
11:15	30	30.2	29.5	29.4	28.5	28.5	28.8	29.2	28.9	39	40.1	39	39.6	33.9	32.29	34.6	35.8	35.7	35.7	32.36	32.65
11:30	30.4	30.6	29.8	29.7	28.8	28.7	29	29.4	29.3	34.1	35.1	35.6	35.9	30.2	30.29	32.4	33.2	33.1	33.5	30.56	30.57
11:45	30.8	31	30	30	29	28.9	29.2	29.6	29.4	33.8	34.4	35	35.5	30	30.17	31.5	32	32.4	32.6	29.97	29.83
12:00	31.1	31.2	30.3	30.3	29.2	29.1	29.3	29.7	29.5	33.5	33.9	34.6	35	30.3	30.54	31.7	32.3	32.6	32.7	30.26	30.29
12:15	31.3	31.4	30.4	30.6	29.5	29.3	29.5	29.9	29.7	36.1	36.2	36.9	37.5	32.8	32.28	33.8	34.7	34.6	34.5	31.14	31.42
12:30	31.4	31.5	30.6	30.8	29.7	29.5	29.7	30.1	29.8	35.2	35.7	36.3	36.8	32.1	31.99	33.8	34.7	34.5	34.5	31.17	31.38
12:45	31.6	31.6	30.8	31	29.9	29.7	29.9	30.2	30	34.2	34.9	35.5	35.9	31.2	31.22	33.4	34.1	34.2	34.3	31.12	31.07
13:00	31.7	31.7	30.9	31.2	30	29.8	30	30.4	30.1	35	35	35.8	36.3	31.7	31.63	34.3	35.2	34.9	34.8	31.12	31.53
13:15	31.8	31.8	31.1	31.4	30.2	30	30.2	30.5	30.3	35.8	36.2	36.9	37.3	31.9	32.13	35.5	36.7	36.2	36.2	31.93	32.17
13:30	32	31.9	31.3	31.6	30.4	30.2	30.4	30.8	30.5	37.4	37.7	38.5	39.1	33.1	33.09	37.6	39.1	38.3	38.1	33.51	34.1
13:45	32.1	32	31.5	31.7	30.7	30.4	30.6	31	30.7	35	35.7	36.2	36.7	31.3	31.53	34.5	35.4	35.1	35.5	31.04	31.1
14:00	32.3	32.2	31.6	31.9	30.9	30.6	30.7	31.1	30.7	35.3	35.5	36.2	36.8	31.7	31.78	36.3	37.2	36.7	36.7	32.79	33.33
14:15	32.4	32.3	31.8	32.1	31.1	30.8	30.9	31.3	30.9	36.1	36.5	37	37.6	32.2	31.99	36.2	37.3	36.6	36.7	32.37	32.69
14:30	32.6	32.4	31.9	32.2	31.3	31	31.1	31.4	31	35.7	35.9	36.7	37.2	32.2	32.21	36.3	37.4	36.4	36.4	32.32	32.61
14:45	32.7	32.6	32	32.4	31.5	31.2	31.3	31.6	31.2	36.3	36.7	37.5	38	32.9	32.89	37.7	39	37.4	37.4	32.76	33.38
15:00	32.8	32.7	32.2	32.5	31.7	31.4	31.4	31.8	31.4	36.3	36.7	37.3	37.8	32.7	32.69	38.6	40	38.6	38.5	33.6	34.28
15:15	32.9	32.8	32.3	32.6	31.9	31.6	31.6	31.9	31.5	36	36.3	37.1	37.6	32.5	32.5	40.8	42.6	38.5	38.6	33.16	34.19
15:30	33.1	32.9	32.4	32.8	32.1	31.8	31.8	32.1	31.7	36.1	36.4	37.3	37.8	32.8	32.93	41.7	43.9	39.1	39.1	33.61	34.65
15:45	33.2	33	32.6	32.9	32.4	32	31.9	32.2	31.8	35.2	35.4	36.1	36.5	31.6	31.75	38.1	39.4	36.9	37.2	32.33	32.46
16:00	33.3	33.1	32.7	33	32.6	32.1	32.1	32.3	31.9	35.4	35.5	36.3	36.7	32.2	32.39	38.4	39.5	37.8	37.9	32.99	33.24
16:15	33.4	33.2	32.8	33.1	32.8	32.4	32.2	32.5	32	34.9	35.1	35.8	36.2	32	32.05	39.5	41	39.4	39.3	32.99	33.25
16:30	33.4	33.2	32.9	33.2	33.1	32.5	32.3	32.6	32	34.4	34.6	35.2	35.6	31.6	31.77	37.7	38.7	37.6	38	32.39	32.53
16:45	33.5	33.2	32.9	33.3	33.2	32.7	32.4	32.6	32.1	34.8	34.8	35.5	35.9	32.1	32.21	41.6	43.2	43	42.6	33.84	34.19
17:00	33.5	33.2	33	33.4	33.4	32.8	32.5	32.7	32.1	34.4	34.4	35	35.4	31.8	32.01	37.7	38.5	38.1	38.3	32.57	32.78
17:15	33.5	33.2	33	33.4	33.6	32.9	32.6	32.8	32.1	33.8	33.8	34.3	34.6	31.2	31.25	35.9	36.1	36.1	36.3	31.92	32.01
17:30	33.5	33.2	33	33.4	33.7	33	32.7	32.8	32.1	33.7	33.6	34	34.4	31.4	31.54	35.4	35.6	35.7	35.8	31.5	31.63
17:45	33.5	33.1	33	33.4	33.7	33.1	32.7	32.8	32.1	33.4	33.2	33.5	33.8	31.2	31.27	34.8	34.7	35	35	31.36	31.46
18:00	33.4	33.1	32.9	33.4	33.7	33.1	32.7	32.8	32.2	32.9	32.7	33	33.3	30.8	30.91	33.8	33.7	34	34	30.88	30.82
18:15	33.4	33	32.9	33.3	33.7	33.1	32.7	32.8	32	32.6	32.3	32.5	32.8	30.6	30.82	33.3	33.1	33.4	33.4	30.89	30.77
18:30	33.3	32.9	32.8	33.2	33.6	33	32.7	32.8	32	32.3	32	32.1	32.4	30.1	30.26	32.9	32.6	33	33	30.14	29.89
18:45	33.2	32.8	32.8	33.2	33.5	32.9	32.7	32.7	31.8	32.1	31.7	31.8	32	30.2	30.23	32.6	32.2	32.6	32.7	30.67	30.64
19:00	33.1	32.6	32.7	33.1	33.4	32.8	32.6	32.7	31.8	31.9	31.5	31.6	31.8	30	30.22	32.4	32.1	32.5	32.5	30.21	30.04
19:15	32.9	32.5	32.6	33	33.2	32.7	32.5	32.6	31.7	31.5	31	31	31.2	29.3	29.55	31.7	31.3	31.6	31.8	29.19	29.09
19:30	32.8	32.4	32.5	32.8	33.1	32.5	32.4	32.5	31.6	31.1	30.5	30.5	30.7	28.7	28.93	31.1	30.6	31	31.1	28.75	28.52
19:45	32.7	32.2	32.3	32.7	32.9	32.4	32.3	32.4	31.5	30.8	30.2	30	30.2	28.5	28.7	30.7	30.2	30.5	30.6	28.42	28.07
20:00	32.5	32	32.2	32.6	32.8	32.3	32.2	32.2	31.5	30.5	29.8	29.7	29.9	27.9	28.14	30.4	29.8	30	30.1	27.95	27.81
20:15	32.4	31.9	32.1	32.4	32.6	32.1	32.1	32.1	31.3	30.2	29.5	29.3	29.5	27.8	28.03	30	29.4	29.6	29.8	27.62	27.4
20:30	32.2	31.7	31.9	32.3	32.4	31.9	31.9	32	31.1	30	29.3	29	29.1	27.5	27.75	29.7	29.1	29.3	29.4	27.65	27.5

	20:45	32	31.5	31.8	32.1	32.2	31.7	31.8	31.8	31	29.7	29	28.7	28.8	27.1	27.33	29.5	28.8	28.9	29.1	27.23	27.05
	21:00	31.8	31.3	31.6	31.9	32	31.6	31.7	31.6	30.9	29.5	28.7	28.4	28.5	26.9	27.13	29.2	28.6	28.6	28.8	27	26.78
	21:15	31.7	31.1	31.4	31.7	31.8	31.4	31.5	31.5	30.8	29.2	28.5	28.2	28.2	27.2	27.18	29	28.4	28.4	28.6	26.91	26.78
	21:30	31.5	30.9	31.3	31.6	31.6	31.2	31.4	31.3	30.6	29	28.3	27.9	28	26.8	26.91	28.8	28.2	28.2	28.4	26.78	26.59
	21:45	31.3	30.7	31.1	31.4	31.4	31	31.2	31.2	30.4	28.9	28.1	27.7	27.8	26.6	26.74	28.7	28.1	28	28.3	27.05	26.78
	22:00	31.1	30.6	30.9	31.2	31.2	30.8	31	31	30.3	28.8	28	27.6	27.6	26.4	26.64	28.5	27.9	27.8	28.1	26.6	26.54
	22:15	30.9	30.4	30.8	31	31	30.7	30.9	30.9	30.1	28.5	27.7	27.3	27.3	26	26.15	28.3	27.7	27.6	27.9	26.23	26.08
	22:30	30.7	30.2	30.6	30.8	30.8	30.4	30.7	30.7	29.4	28.2	27.6	27.2	27.1	25.9	25.96	28.1	27.5	27.4	27.7	26.3	26.66
	22:45	30.6	30	30.4	30.6	30.6	30.3	30.5	30.5	29.4	28.1	27.4	27.1	26.9	26	26.05	28	27.4	27.3	27.5	26.35	26.4
	23:00	30.4	29.8	30.2	30.4	30.4	30.1	30.4	30.3	29.5	28	27.3	26.9	26.8	26	25.92	27.9	27.3	27.1	27.4	26.24	26.07
	23:15	30.2	29.6	30.1	30.3	30.2	29.9	30.2	30.2	29.3	27.9	27.2	26.8	26.7	25.9	25.98	27.7	27.2	27	27.3	26.23	26.13
	23:30	30	29.5	29.9	30.1	30.1	29.8	30.1	30	29.4	27.9	27.1	26.6	26.6	25.8	25.86	27.6	27.1	26.9	27.2	26.07	25.77
	23:45	29.9	29.3	29.8	29.9	29.9	29.7	30	29.9	29.3	27.8	27	26.5	26.5	25.8	25.9	27.5	27	26.8	27.1	25.86	25.71
02/08/2009	00:00	29.7	29.2	29.6	29.7	29.8	29.5	29.8	29.8	29.1	27.6	26.9	26.4	26.3	25.4	25.58	27.4	26.8	26.6	26.9	25.81	25.62
	00:15	29.6	29	29.5	29.6	29.6	29.4	29.7	29.6	29	27.6	26.8	26.4	26.3	25.6	25.63	27.3	26.8	26.6	26.8	25.77	25.45
	00:30	29.4	28.9	29.3	29.4	29.4	29.2	29.6	29.5	28.9	27.5	26.7	26.3	26.2	25.3	25.51	27.3	26.8	26.5	26.8	25.63	25.55
	00:45	29.3	28.8	29.2	29.3	29.3	29.1	29.4	29.3	28.6	27.4	26.7	26.3	26.2	25.8	25.86	27.1	26.6	26.4	26.7	25.79	25.66
	01:00	29.1	28.6	29	29.1	29.1	28.9	29.3	29.2	28.6	27.3	26.6	26.2	26.2	25.7	25.72	27.1	26.6	26.4	26.7	25.96	25.9
	01:15	29	28.5	28.9	29	29	28.8	29.1	29	28.2	27.1	26.5	26.2	26	25.4	25.49	26.9	26.4	26.3	26.5	25.62	25.64
	01:30	28.9	28.4	28.8	28.8	28.9	28.7	29	28.9	28.4	27	26.3	26	25.9	25.2	25.24	26.7	26.2	26.1	26.4	25.16	25.06
	01:45	28.7	28.2	28.6	28.7	28.7	28.5	28.9	28.7	28.2	26.9	26.2	25.9	25.8	25.2	25.28	26.6	26.1	26	26.2	25.3	25.11
	02:00	28.6	28.1	28.5	28.5	28.6	28.4	28.7	28.6	28	26.7	26.1	25.8	25.6	25	25.04	26.5	26	25.9	26.2	25.27	25.21
	02:15	28.4	28	28.4	28.4	28.4	28.3	28.6	28.5	27.7	26.5	25.9	25.6	25.5	24.8	24.85	26.3	25.9	25.8	26	25.11	25.28
	02:30	28.3	27.8	28.2	28.2	28.3	28.1	28.5	28.3	27.8	26.4	25.8	25.5	25.4	24.7	24.82	26.2	25.7	25.6	25.9	24.79	24.68
	02:45	28.2	27.7	28.1	28.1	28.2	28	28.4	28.2	27.8	26.4	25.7	25.4	25.3	24.5	24.71	26.1	25.7	25.5	25.8	24.86	24.78
	03:00	28.1	27.6	28	28	28.1	27.9	28.2	28.1	27.6	26.2	25.6	25.3	25.1	24.5	24.57	26	25.5	25.4	25.7	24.84	24.71
	03:15	28	27.5	27.9	27.9	27.9	27.8	28.1	28	27.5	26.1	25.5	25.2	25	24.6	24.55	25.8	25.4	25.2	25.5	24.26	24.14
	03:30	27.8	27.4	27.8	27.8	27.8	27.7	28	27.9	27.3	26	25.4	25.1	24.9	24.2	24.27	25.7	25.3	25.1	25.4	24.42	24.32
	03:45	27.7	27.3	27.7	27.7	27.7	27.6	27.9	27.8	27.1	25.8	25.3	25	24.8	24.2	24.2	25.6	25.2	25.1	25.3	24.49	24.45
	04:00	27.6	27.2	27.5	27.5	27.6	27.5	27.8	27.7	27	25.7	25.2	24.9	24.7	24.2	24.16	25.5	25.1	25	25.2	24.37	24.31
	04:15	27.5	27.1	27.4	27.4	27.5	27.4	27.7	27.6	27.2	25.8	25.1	24.8	24.7	23.9	24.03	25.4	25	24.9	25.1	24.44	24.3
	04:30	27.4	27	27.3	27.3	27.4	27.3	27.6	27.5	26.9	25.7	25	24.7	24.6	23.8	24	25.3	24.9	24.8	25	24.32	24.05
	04:45	27.3	26.9	27.2	27.2	27.2	27.2	27.5	27.4	26.9	25.5	25	24.7	24.5	24.2	24.25	25.3	24.9	24.8	25	24.25	24.09
	05:00	27.2	26.8	27.1	27.1	27.1	27.1	27.4	27.3	26.8	25.4	24.9	24.6	24.4	23.9	23.9	25.2	24.8	24.7	24.9	24.24	24.19
	05:15	27.1	26.7	27	27	27	27	27.3	27.2	26.7	25.3	24.8	24.5	24.4	23.9	23.92	25.1	24.7	24.6	24.8	24.21	24.1
	05:30	26.9	26.6	26.9	26.9	26.9	26.9	27.2	27.1	26.6	25.3	24.8	24.5	24.3	24	23.98	25.1	24.7	24.6	24.8	24.24	24.19
	05:45	26.8	26.5	26.8	26.8	26.8	26.8	27.1	26.9	26.3	25.3	24.8	24.5	24.4	23.9	23.81	25	24.6	24.5	24.8	24.03	24.21
	06:00	26.7	26.4	26.7	26.7	26.7	26.7	27	26.9	26.4	25.3	24.9	24.5	24.4	23.9	23.84	25.1	24.8	24.6	24.8	24.15	24.13
	06:15	26.7	26.3	26.7	26.6	26.6	26.6	26.9	26.8	26.6	25.4	25	24.6	24.5	23.9	23.98	25.3	25	24.7	24.9	24.12	24.12
	06:30	26.6	26.2	26.6	26.5	26.6	26.5	26.8	26.7	26.5	25.4	24.9	24.6	24.5	24	24.04	25.2	25	24.8	24.9	24.26	24.18
	06:45	26.5	26.2	26.5	26.5	26.5	26.5	26.8	26.7	26.4	25.3	24.9	24.6	24.5	24	24.09	25.2	24.9	24.7	24.9	24.2	24.17
	07:00	26.4	26.1	26.4	26.4	26.4	26.4	26.7	26.6	26.1	25.2	24.9	24.6	24.5	24.1	24.11	25.2	24.9	24.7	24.9	24.4	24.42
	07:15	26.4	26.1	26.4	26.3	26.3	26.3	26.6	26.5	26.1	25.2	24.9	24.6	24.5	23.9	23.99	25.1	24.9	24.7	24.9	24.35	24.33
	07:30	26.3	26	26.3	26.2	26.3	26.3	26.5	26.4	26.2	25.2	24.8	24.6	24.5	23.8	23.91	25.1	24.9	24.7	24.9	24.31	24.2
	07:45	26.2	26	26.2	26.2	26.2	26.2	26.5	26.4	26	25.3	25	24.7	24.6	24.2	24.16	25.3	25.1	24.9	25	24.46	24.55
	08:00	26.2	25.9	26.2	26.1	26.2	26.2	26.4	26.3	26.1	25.5	25.1	24.9	24.8	24.2	24.24	25.4	25.2	25	25.2	24.47	24.44
	08:15	26.1	25.9	26.1	26.1	26.1	26.1	26.4	26.3	26.2	25.7	25.3	25.2	25.1	24.4	24.38	25.6	25.5	25.3	25.4	24.51	24.5

08:30	26.1	25.9	26.1	26	26.1	26.1	26.3	26.3	26.2	26.1	25.8	25.7	25.6	25	24.98	26.1	26.1	25.8	25.9	25.22	25.23
08:45	26.1	25.8	26.1	26	26.1	26.1	26.3	26.2	26.1	26.4	26.1	26.1	26	25.1	24.99	26.3	26.4	26.1	26.2	25.27	25.3
09:00	26.1	25.9	26.1	26	26	26.1	26.3	26.2	26.2	27	26.8	26.9	26.9	25.6	25.52	26.9	27.1	26.7	26.8	25.71	26.02
09:15	26.1	25.9	26.1	26	26	26.1	26.3	26.2	26.2	26.9	26.9	27	26.9	26	26.03	26.9	27.2	26.8	26.9	26.04	26.11
09:30	26.1	25.9	26.1	26	26.1	26.1	26.3	26.2	26.3	26.9	26.8	26.9	26.9	25.5	25.55	27	27.2	26.8	27	25.79	25.94
09:45	26.1	26	26.1	26	26.1	26.1	26.3	26.3	26.3	27.8	27.8	27.9	28	26.7	26.53	27.8	28.1	27.7	27.8	26.6	26.82
10:00	26.2	26.1	26.2	26.1	26.1	26.2	26.3	26.3	26.4	28.5	28.6	28.7	28.8	27.2	26.99	28.5	29	28.5	28.6	27.45	27.85
10:15	26.3	26.2	26.3	26.2	26.3	26.3	26.4	26.4	26.5	31.3	31.5	31.4	31.6	28.8	28.39	30.6	31.4	30.5	30.5	28.77	29.25
10:30	26.4	26.4	26.4	26.3	26.4	26.4	26.5	26.6	26.6	31.4	31.8	32.1	32.2	29.2	28.92	31.1	32.1	31.2	31.2	29.08	29.69
10:45	26.7	26.6	26.6	26.5	26.5	26.5	26.7	26.8	26.8	31.3	32.1	32.5	32.7	29.4	29.43	30.7	31.5	30.9	31	29.02	29.15
11:00	26.9	26.9	26.8	26.6	26.7	26.6	26.8	26.9	26.9	29.3	30	30.6	30.7	28.2	28.23	29	29.6	29.3	29.6	27.63	27.53
11:15	27.1	27.2	26.9	26.8	26.8	26.8	26.9	27	26.9	28	28.3	29.1	29.3	26.2	26.6	28	28.1	28.3	28.5	26.4	26.09
11:30	27.3	27.4	27	26.9	27	26.9	26.9	27	26.9	29.1	29.2	30	30.2	26.8	26.71	29.3	29.6	29.6	29.5	26.06	26.41
11:45	27.5	27.5	27.2	27.1	27.1	27.1	27.1	27.2	27.1	32.9	32.9	33.7	34	29.7	29.12	31.4	32.2	32	31.8	28.1	28.63
12:00	27.6	27.7	27.4	27.3	27.3	27.2	27.3	27.4	27.5	32	32.7	33.1	33.4	29.2	29.19	32	32.8	32.3	32.4	29.34	29.64
12:15	27.8	27.9	27.6	27.5	27.5	27.4	27.4	27.6	27.4	32.8	33.4	34	34.4	29.9	29.68	32.7	33.6	32.9	33	29.83	30.29
12:30	28.1	28.2	27.8	27.8	27.7	27.6	27.7	27.9	28	33.2	33.7	34.3	34.7	29.3	29.3	33.2	34.2	33.5	33.7	30.18	30.31
12:45	28.3	28.4	28.1	28	27.9	27.8	27.9	28.1	28.2	33.5	34	34.6	35	29.9	29.66	34	35	34.4	34.6	30.35	30.79
13:00	28.6	28.7	28.3	28.3	28.2	28	28.1	28.4	28.4	34	34.6	35.5	35.9	30.2	30.18	34.8	35.9	35.2	35.4	31.06	31.44
13:15	28.9	29	28.6	28.6	28.4	28.3	28.3	28.6	28.4	35	35.5	36.6	37	31.4	31.29	36.3	37.7	36.8	36.9	31.95	32.75
13:30	29.2	29.3	28.9	28.9	28.7	28.6	28.6	28.9	28.8	35.1	35.5	36.9	37.3	31.8	31.66	36.6	38.4	37.3	37.3	31.35	31.85
13:45	29.5	29.7	29.2	29.2	29	28.8	28.9	29.2	29	35.2	35.7	37.1	37.5	31.8	31.69	36.9	38.8	37.8	38	32.83	33.05
14:00	29.8	30	29.5	29.6	29.4	29.2	29.2	29.5	29.3	35.7	36.2	37.9	38.3	33.3	33.5	37.8	39.8	38.9	38.9	33.54	34.05
14:15	30.2	30.3	29.9	29.9	29.7	29.5	29.5	29.9	29.5	35.4	35.9	37.6	38	32.5	32.74	40.4	42.9	38.8	38.9	33.11	34.29
14:30	30.5	30.6	30.2	30.3	30.1	29.8	29.8	30.2	29.8	35	35.3	37	37.5	32.1	32.25	41.3	42.8	39	39	33.82	35.44
14:45	30.8	30.9	30.5	30.6	30.4	30.1	30.1	30.4	29.9	35.3	35.8	37.6	38.1	32.5	32.64	42.1	44.3	39.4	39.4	33.65	35.2
15:00	31	31.1	30.8	30.9	30.8	30.4	30.4	30.7	30.2	35.2	35.9	37.5	37.9	32.6	32.79	40.8	42.9	39.6	39.6	33.75	34.63
15:15	31.3	31.4	31	31.2	31.2	30.8	30.6	31	30.4	35	35.6	37.1	37.6	32.2	32.37	40.9	42.8	39.9	39.9	33.83	34.54
15:30	31.5	31.6	31.3	31.5	31.6	31.1	30.9	31.3	30.7	35.2	35.8	37.2	37.8	32.7	32.85	43.6	45.8	40.4	40.5	34.66	36.04
15:45	31.8	31.8	31.5	31.8	32	31.5	31.2	31.5	31	34.5	34.9	36.6	37.1	32.8	32.98	41.3	43.5	39.7	39.8	33.8	34.02
16:00	31.9	32	31.7	32	32.3	31.8	31.4	31.7	31.1	34	34.4	35.8	36.2	31.8	31.99	38.3	39.5	37.9	38	32.38	32.44
16:15	32.1	32.1	31.9	32.2	32.7	32.1	31.5	31.9	31.2	33.9	34.2	35.6	36.1	32.1	32.35	39	40.3	39.3	39	32.46	32.73
16:30	32.2	32.2	32	32.4	32.9	32.3	31.7	32	31.4	34.7	34.9	36.6	37	32.8	33.12	44.8	47.6	46.9	46.4	34.82	35.3
16:45	32.3	32.3	32.2	32.6	33.2	32.6	31.9	32.2	31.6	34.3	34.5	35.9	36.4	32.8	33.17	41.6	43.8	42.9	43.3	33.82	34.29
17:00	32.4	32.4	32.3	32.7	33.4	32.7	32.1	32.3	31.7	34	34.2	35.5	36	32.1	32.44	41.4	43.2	43	43.2	33.24	33.64
17:15	32.5	32.4	32.4	32.8	33.6	32.9	32.2	32.4	31.7	33.6	33.7	34.8	35.2	31.7	31.82	40.9	42	42.3	42.2	34.28	34.82
17:30	32.6	32.5	32.5	32.9	33.8	33.1	32.4	32.5	31.8	33.2	33.2	34.2	34.6	31.5	31.65	38.3	38.7	39.5	39.4	32.41	32.32
17:45	32.6	32.5	32.5	32.9	34	33.2	32.5	32.6	31.8	33.3	33.3	34.1	34.5	31.8	31.87	40.1	39.6	42.3	42.2	33.95	33.52
18:00	32.6	32.5	32.5	33	34.1	33.3	32.6	32.7	31.9	33	33	33.8	34.1	31.6	31.77	37.1	37.2	38.1	38.4	32.21	32.15
18:15	32.6	32.5	32.6	33	34.1	33.4	32.7	32.8	32	32.7	32.6	33.4	33.7	31.2	31.45	36.1	36.1	37.2	37.2	31.87	31.67
18:30	32.6	32.4	32.6	33	34.1	33.3	32.8	32.8	31.9	32.2	32.1	32.8	33.1	30.6	30.88	35.2	35.1	36.2	36.2	30.99	30.9
18:45	32.6	32.4	32.5	33	34.1	33.3	32.8	32.8	31.9	32.1	32	32.5	32.9	30.5	30.71	34.6	34.4	35.5	35.4	30.62	30.44
19:00	32.5	32.3	32.5	32.9	34	33.2	32.8	32.8	31.8	31.8	31.6	32	32.3	30.5	30.7	33.8	33.5	34.5	34.5	31.15	31.02
19:15	32.5	32.2	32.4	32.9	33.9	33.2	32.8	32.8	31.7	31.4	31.1	31.5	31.8	30	30.36	33.1	32.6	33.5	33.5	30.27	30.15
19:30	32.4	32.1	32.4	32.8	33.8	33.1	32.7	32.7	31.7	31	30.7	31	31.2	29.5	29.85	32.4	31.8	32.7	32.7	29.53	29.42
19:45	32.3	32	32.3	32.7	33.6	32.9	32.6	32.6	31.6	30.7	30.3	30.5	30.7	29	29.19	31.8	31.2	31.9	32	29.07	28.89
20:00	32.2	31.9	32.2	32.6	33.4	32.8	32.5	32.5	31.5	30.3	29.9	30	30.2	28.5	28.76	31.3	30.6	31.3	31.3	28.45	28.31
20:15	32.1	31.7	32	32.5	33.2	32.6	32.4	32.4	31.3	30.1	29.6	29.7	29.8	28.3	28.58	30.9	30.2	30.8	30.8	28.29	28.25

	20:30	31.9	31.6	31.9	32.3	33	32.4	32.3	32.3	31.1	29.9	29.3	29.3	29.5	28	28.29	30.6	29.9	30.4	30.4	27.96	28.02
	20:45	31.8	31.4	31.8	32.2	32.8	32.2	32.1	32.1	31.1	29.6	29	28.9	29.1	27.6	27.81	30.3	29.6	29.9	30	27.93	27.69
	21:00	31.6	31.2	31.6	32	32.6	32	32	32	30.9	29.4	28.8	28.7	28.8	27.3	27.55	30	29.3	29.6	29.7	27.54	27.36
	21:15	31.5	31.1	31.5	31.8	32.4	31.8	31.8	31.8	30.8	29.3	28.6	28.4	28.6	27	27.34	29.7	29	29.2	29.4	27.53	27.3
	21:30	31.3	30.9	31.3	31.7	32.1	31.6	31.7	31.6	30.4	29	28.5	28.3	28.3	27.1	27.33	29.5	28.8	29	29.2	27.54	27.37
	21:45	31.1	30.7	31.1	31.5	31.9	31.4	31.5	31.5	30.5	28.9	28.3	28	28.1	26.8	27.03	29.3	28.7	28.7	29	27.42	27.03
	22:00	31	30.6	31	31.3	31.7	31.2	31.4	31.3	30.2	28.6	28.1	27.8	27.8	26.6	26.77	29.1	28.4	28.4	28.7	26.95	26.86
	22:15	30.8	30.4	30.8	31.1	31.5	31	31.2	31.2	30.2	28.5	27.9	27.6	27.6	26.4	26.68	28.8	28.2	28.2	28.5	26.84	26.62
	22:30	30.6	30.2	30.7	31	31.3	30.9	31	31	30.1	28.3	27.7	27.4	27.4	26.3	26.45	28.7	28	28	28.3	26.76	26.39
	22:45	30.5	30	30.5	30.8	31.1	30.6	30.9	30.8	29.5	28.3	27.7	27.4	27.4	26.4	26.5	28.7	28	28	28.3	26.9	27.01
	23:00	30.3	29.8	30.3	30.6	30.8	30.4	30.7	30.6	29.2	28.1	27.6	27.3	27.2	26.5	26.53	28.4	27.8	27.7	28	26.82	27.15
	23:15	30.1	29.7	30.2	30.4	30.7	30.3	30.5	30.5	29.5	28	27.5	27.2	27.1	26.5	26.55	28.2	27.6	27.6	27.9	26.67	26.55
	23:30	30	29.5	30	30.2	30.5	30.1	30.4	30.3	29.2	27.9	27.3	27.1	27	26.5	26.6	28.1	27.5	27.4	27.7	26.73	26.85
	23:45	29.8	29.4	29.9	30	30.3	29.9	30.2	30.1	29.3	27.7	27.2	26.9	26.8	26.1	26.16	27.9	27.3	27.2	27.5	26.36	26.31
03/08/2009	00:00	29.7	29.2	29.7	29.9	30.1	29.8	30.1	30	29.2	27.6	27	26.8	26.7	25.9	26.03	27.7	27.2	27.1	27.4	26.32	26.08
	00:15	29.5	29.1	29.6	29.7	30	29.7	29.9	29.9	29.2	27.6	27	26.7	26.6	25.8	26.01	27.8	27.3	27.1	27.4	26.2	25.98
	00:30	29.4	29	29.4	29.6	29.8	29.5	29.8	29.7	28.8	27.5	26.9	26.7	26.5	25.9	26.01	27.7	27.1	27	27.3	26.3	26.29
	00:45	29.3	28.8	29.3	29.4	29.7	29.4	29.7	29.6	28.8	27.3	26.8	26.5	26.4	26	26.03	27.4	26.9	26.8	27.1	26.17	26.13
	01:00	29.1	28.7	29.2	29.3	29.5	29.2	29.5	29.4	28.4	27.2	26.7	26.5	26.3	25.7	25.77	27.3	26.7	26.7	27	26.07	26.18
	01:15	29	28.6	29	29.1	29.3	29.1	29.4	29.3	28.6	27	26.5	26.2	26.1	25.6	25.67	27.1	26.6	26.5	26.8	25.83	25.83
	01:30	28.9	28.5	28.9	29	29.2	28.9	29.2	29.2	28.5	26.9	26.3	26.1	26	25.5	25.56	26.9	26.4	26.3	26.6	25.72	25.5
	01:45	28.7	28.3	28.8	28.8	29.1	28.8	29.1	29	28.5	26.8	26.2	25.9	25.8	25.2	25.23	26.8	26.3	26.2	26.5	25.32	24.96
	02:00	28.6	28.2	28.7	28.7	28.9	28.7	29	28.9	28.4	26.8	26.1	25.9	25.8	24.9	24.97	26.8	26.3	26.2	26.4	25.25	25.14
	02:15	28.5	28.1	28.5	28.6	28.7	28.5	28.8	28.7	27.8	26.5	26	25.8	25.6	24.9	24.95	26.6	26	26	26.3	25.29	25.53
	02:30	28.3	28	28.4	28.4	28.6	28.4	28.7	28.6	27.8	26.4	25.9	25.7	25.5	25	25	26.4	25.9	25.8	26.1	25.28	25.37
	02:45	28.2	27.8	28.3	28.3	28.5	28.3	28.6	28.5	27.9	26.4	25.8	25.5	25.4	24.7	24.9	26.4	25.9	25.8	26.1	24.85	24.77
	03:00	28.1	27.7	28.2	28.2	28.4	28.2	28.5	28.4	27.9	26.5	25.9	25.6	25.5	24.8	24.95	26.4	26	25.8	26.1	25.25	25.1
	03:15	28	27.6	28.1	28.1	28.2	28.1	28.4	28.3	27.8	26.3	25.7	25.5	25.4	25	25.08	26.2	25.8	25.7	25.9	24.98	24.77
	03:30	27.9	27.5	27.9	28	28.1	28	28.3	28.2	27.7	26.2	25.7	25.4	25.3	24.7	24.9	26.1	25.7	25.6	25.8	25.14	24.83
	03:45	27.8	27.4	27.8	27.8	28	27.9	28.2	28.1	27.6	26	25.5	25.2	25.1	24.5	24.64	25.9	25.5	25.4	25.7	24.88	24.66
	04:00	27.7	27.3	27.7	27.7	27.9	27.8	28.1	28	27.6	26	25.4	25.1	25	24.2	24.47	25.8	25.4	25.3	25.6	24.7	24.53
	04:15	27.6	27.2	27.6	27.6	27.8	27.7	28	27.9	27.3	25.7	25.3	25	24.9	24.2	24.3	25.7	25.3	25.2	25.4	24.61	24.48
	04:30	27.5	27.1	27.5	27.5	27.6	27.6	27.8	27.8	27.3	25.7	25.2	24.9	24.8	24.2	24.29	25.6	25.2	25.1	25.4	24.43	24.47
	04:45	27.4	27	27.4	27.4	27.5	27.4	27.7	27.6	27.1	25.6	25.1	24.8	24.7	24.1	24.14	25.5	25.1	25	25.3	24.45	24.35
	05:00	27.3	26.9	27.3	27.3	27.4	27.3	27.6	27.5	27	25.5	25	24.8	24.7	24.2	24.21	25.5	25.1	25	25.2	24.44	24.47
	05:15	27.1	26.8	27.2	27.2	27.3	27.2	27.5	27.4	26.7	25.4	25	24.8	24.6	24.3	24.26	25.3	25	24.9	25.2	24.52	24.47
	05:30	27	26.7	27.1	27.1	27.2	27.1	27.4	27.3	26.9	25.4	24.9	24.7	24.5	24.2	24.24	25.3	24.9	24.8	25.1	24.47	24.4
	05:45	26.9	26.6	27	27	27.1	27.1	27.3	27.2	26.8	25.3	24.9	24.6	24.5	24.2	24.23	25.2	24.8	24.8	25	24.35	24.13
	06:00	26.8	26.6	26.9	26.9	27	26.9	27.2	27.1	26.7	25.3	24.9	24.7	24.5	24.1	24.15	25.3	24.9	24.8	25	24.3	24.33
	06:15	26.8	26.5	26.8	26.8	26.9	26.9	27.1	27	26.7	25.3	24.8	24.6	24.5	24.2	24.28	25.1	24.8	24.7	24.9	24.34	24.28
	06:30	26.7	26.4	26.8	26.7	26.8	26.8	27.1	27	26.6	25.2	24.8	24.6	24.4	24.2	24.27	25.1	24.8	24.7	24.9	24.36	24.26
	06:45	26.6	26.3	26.7	26.6	26.7	26.7	27	26.9	26.5	25.2	24.7	24.5	24.3	24.1	24.13	25	24.7	24.6	24.8	24.15	24.05
	07:00	26.5	26.3	26.6	26.6	26.6	26.6	26.9	26.8	26.4	25.1	24.7	24.5	24.3	24.2	24.22	25	24.7	24.6	24.8	24.12	24.06
	07:15	26.4	26.2	26.5	26.5	26.6	26.6	26.8	26.7	26.4	25.2	24.8	24.6	24.4	24.2	24.27	25	24.8	24.7	24.9	24.39	24.39
	07:30	26.4	26.1	26.5	26.4	26.5	26.5	26.8	26.7	26.4	25.3	24.9	24.7	24.6	24.3	24.29	25.2	25	24.8	25	24.34	24.26
	07:45	26.3	26.1	26.4	26.3	26.4	26.4	26.7	26.6	26.4	25.5	25.1	25	24.8	24.3	24.41	25.4	25.2	25	25.2	24.44	24.42
	08:00	26.2	26	26.3	26.3	26.3	26.4	26.6	26.5	26.4	25.8	25.5	25.4	25.3	24.9	24.88	25.7	25.6	25.4	25.5	24.91	24.91

08:15	26.2	26	26.3	26.2	26.3	26.3	26.6	26.5	26.3	26	25.7	25.7	25.6	25	25.05	25.9	25.9	25.6	25.8	25.17	25.2
08:30	26.2	26	26.3	26.2	26.3	26.3	26.5	26.5	26.3	26.8	26.5	26.6	26.6	25.8	25.65	26.3	26.4	26.1	26.2	25.57	25.69
08:45	26.2	26	26.3	26.2	26.2	26.3	26.5	26.4	26.3	27.1	27	27.1	27	26	25.87	26.8	26.9	26.5	26.7	25.99	26.22
09:00	26.2	26	26.3	26.2	26.2	26.3	26.5	26.4	26.4	27.3	27.1	27.3	27.3	26.6	26.45	27	27.3	26.9	26.9	26.24	26.35
09:15	26.2	26.1	26.3	26.2	26.3	26.3	26.5	26.5	26.5	27.9	28	28.3	28.3	27.1	27.15	27.7	28	27.6	27.6	27.14	27.36
09:30	26.3	26.2	26.3	26.2	26.3	26.3	26.5	26.5	26.5	27.5	27.4	27.7	27.7	26.7	26.65	27.3	27.6	27.3	27.4	26.59	26.67
09:45	26.4	26.3	26.4	26.3	26.3	26.4	26.6	26.6	26.6	29.6	29.8	30.3	30.3	28.7	28.49	28.7	29.2	28.8	28.8	28.14	28.4
10:00	26.5	26.4	26.5	26.4	26.5	26.5	26.7	26.7	26.9	32	32.5	32.8	32.9	29.4	29.07	30.1	30.7	30.2	30.3	29.09	29.16
10:15	26.7	26.6	26.7	26.6	26.6	26.6	26.9	26.9	26.9	30.8	31.5	31.9	32.1	29.3	29.27	30.1	30.9	30.3	30.5	29.18	29.26
10:30	26.9	26.9	26.9	26.7	26.7	26.7	27	27.1	27	30.8	31.2	31.8	32	29.3	29.13	29.9	30.6	30.2	30.4	28.97	29.02
10:45	27.2	27.2	27.1	27	26.9	26.9	27.1	27.3	27.2	33.5	34.2	34.1	34.4	31	30.48	31.4	32.3	31.9	32	30.1	30.3
11:00	27.4	27.5	27.3	27.2	27.1	27.1	27.3	27.5	27.4	32.1	32.7	33.3	33.6	30	30	30.9	31.8	31.5	31.7	29.63	29.72
11:15	27.7	27.8	27.5	27.4	27.3	27.3	27.5	27.7	27.6	33.1	33.8	34.3	34.5	30.8	30.49	31.9	32.8	32.5	32.6	29.96	30.12
11:30	28.1	28.2	27.8	27.7	27.6	27.6	27.7	27.9	28	33.3	33.7	34.5	34.8	30.9	30.71	32.5	33.4	32.9	33	30.28	30.54
11:45	28.3	28.5	28.1	28	27.8	27.8	27.9	28.1	28.1	34.1	34.8	35.5	35.8	31.4	31.19	33.8	34.9	34.1	34.2	31.17	31.51
12:00	28.6	28.8	28.3	28.3	28	28	28.1	28.3	28.2	34.4	35.1	35.9	36.3	31.9	31.74	33.8	35	34.5	34.5	31.34	31.41
12:15	28.9	29.1	28.6	28.5	28.3	28.2	28.3	28.6	28.4	35.2	35.8	36.6	37	31.9	31.61	34.6	35.9	35.4	35.4	31.83	31.93
12:30	29.2	29.4	28.9	28.9	28.6	28.5	28.5	28.8	28.7	35.4	36	36.9	37.4	32	31.81	35.4	36.7	35.9	35.9	31.94	32.21
12:45	29.5	29.7	29.2	29.2	28.9	28.7	28.8	29.1	28.8	35.7	36.1	37.4	37.8	33.1	32.88	35.5	36.9	36.5	36.4	32.28	32.51
13:00	29.9	30	29.5	29.5	29.2	29	29.1	29.4	29.2	36.2	36.9	37.9	38.4	32.9	32.78	36.7	38.2	37.7	37.7	33.17	33.4
13:15	30.2	30.4	29.8	29.9	29.5	29.4	29.4	29.8	29.7	36.5	37.4	38.4	38.9	33.6	33.72	37.7	39.3	38.7	38.9	34.29	34.42
13:30	30.6	30.7	30.2	30.2	29.9	29.7	29.7	30.1	29.8	36.7	37.4	38.9	39.3	33.6	33.71	37.8	39.5	38.9	39	33.54	33.65
13:45	30.9	31.1	30.5	30.6	30.2	30	30	30.4	30.1	35.9	36.4	37.9	38.4	32.9	33.12	37.2	38.7	38.1	38.3	33.58	33.93
14:00	31.2	31.4	30.8	30.9	30.6	30.3	30.3	30.7	30.5	35.4	36.2	37.5	37.9	32.6	32.88	37.1	38.3	38.2	38.4	33.24	33.24
14:15	31.5	31.6	31	31.2	30.9	30.5	30.5	30.9	30.5	35.1	35.6	37	37.4	32.5	32.74	36	37	37	37.2	32.73	32.82
14:30	31.8	31.8	31.3	31.5	31.1	30.8	30.7	31.1	30.7	35.8	36.1	37.4	37.9	32.8	33.03	39.1	40.7	38.1	38.1	33.6	35.1
14:45	32	32	31.5	31.8	31.4	31.1	31	31.3	31.1	36.8	37.1	38.5	39	34.1	34.34	42.4	44.7	39.5	39.6	34.23	35.82
15:00	32.2	32.2	31.7	32	31.7	31.3	31.2	31.6	31.2	35.2	35.7	36.9	37.3	32.6	32.76	38.8	40.5	37.9	38.1	33.21	33.44
15:15	32.4	32.4	31.9	32.2	32	31.5	31.4	31.7	31.3	35.7	35.9	37.4	37.9	33.1	33.39	43	45.3	39.3	39.3	34.11	36.29
15:30	32.5	32.5	32.1	32.4	32.3	31.8	31.6	31.9	31.4	34.9	35.3	36.5	37	32.5	32.75	38.8	40.2	38	38.1	33.2	33.86
15:45	32.7	32.6	32.2	32.6	32.5	32	31.7	32.1	31.6	35.5	35.6	37	37.5	33	33.18	42.5	44.3	39.3	39.1	34.29	35.83
16:00	32.8	32.7	32.4	32.8	32.8	32.3	31.9	32.2	31.8	35.3	35.3	36.7	37.1	33.2	33.37	42	44	39.5	39.4	34.4	34.84
16:15	32.9	32.8	32.5	32.9	33.1	32.5	32.1	32.4	31.9	35.4	35.6	36.9	37.4	33.1	33.24	45.8	48.4	46.3	45.4	36.1	36.97
16:30	33	32.9	32.6	33.1	33.3	32.7	32.3	32.6	32.1	35.7	35.8	37.3	37.8	33.5	33.74	47	49.8	49.3	48.6	36.99	37.84
16:45	33.1	33	32.8	33.2	33.6	33	32.5	32.8	32.3	35	35.3	36.5	36.9	32.9	33.1	46.3	49.3	48.1	48.4	36.12	36.85
17:00	33.2	33	32.9	33.3	33.9	33.2	32.7	32.9	32.3	35	35.1	36.4	36.8	33	33.14	47.6	50.4	51.1	50.8	36.08	37.31
17:15	33.3	33.1	33	33.4	34.2	33.5	32.9	33.1	32.4	34.8	34.8	36.2	36.6	32.8	33.13	47.5	50.1	51.4	51	36.29	36.53
17:30	33.4	33.2	33.1	33.5	34.5	33.7	33.1	33.2	32.5	34.3	34.3	35.5	35.9	32.1	32.39	45.5	45.3	49.1	49.1	35.41	35.45
17:45	33.4	33.2	33.1	33.6	34.8	33.9	33.3	33.4	32.5	34.1	34	35.1	35.5	32.4	32.8	42.9	43.7	47.7	47.9	34.42	33.26
18:00	33.4	33.2	33.2	33.6	35.1	34.1	33.4	33.5	32.6	33.6	33.5	34.6	34.9	31.6	32.08	39.4	39.4	42.4	43.1	32.81	32.5
18:15	33.4	33.2	33.2	33.7	35.2	34.3	33.6	33.6	32.6	33.2	33	33.9	34.3	31.1	31.47	37.8	37.7	40.2	40.4	31.97	31.61
18:30	33.4	33.1	33.2	33.7	35.3	34.3	33.7	33.7	32.5	32.8	32.5	33.3	33.7	30.7	31.11	36.5	36.2	38.4	38.4	31.41	31.07
18:45	33.3	33	33.2	33.6	35.3	34.3	33.8	33.7	32.4	32.4	32.1	32.7	33	30.2	30.42	35.5	35.1	37	37	30.71	30.3
19:00	33.3	32.9	33.1	33.6	35.2	34.2	33.8	33.7	32.5	31.9	31.6	32.1	32.4	30.1	30.2	34.6	34	35.7	35.7	30.01	29.8
19:15	33.2	32.8	33	33.5	35.1	34.1	33.7	33.6	32.3	31.4	31	31.4	31.7	29.2	29.52	33.6	32.9	34.4	34.4	29.33	29.25
19:30	33.1	32.7	32.9	33.4	34.9	33.9	33.6	33.5	32.1	31.1	30.6	30.8	31.1	29	29.31	33	32.2	33.5	33.5	29.55	29.18
19:45	32.9	32.5	32.8	33.2	34.7	33.7	33.5	33.4	32	30.8	30.3	30.4	30.7	28.6	29.02	32.5	31.7	32.9	32.8	29.01	28.79
20:00	32.8	32.3	32.7	33.1	34.4	33.5	33.4	33.3	31.8	30.6	30	30.1	30.3	28.4	28.79	32.1	31.3	32.3	32.3	29.4	28.76

	20:15	32.6	32.2	32.5	33	34.2	33.3	33.2	33.1	31.8	30.5	29.8	29.8	30	28.1	28.49	31.7	30.9	31.7	31.8	28.93	28.64
	20:30	32.4	32	32.4	32.8	33.9	33.1	33.1	33	31.7	30.1	29.4	29.3	29.6	27.5	27.77	31.3	30.5	31.1	31.2	28.31	27.97
	20:45	32.3	31.8	32.2	32.6	33.7	32.9	32.9	32.8	31.5	29.9	29.2	29.1	29.2	27.6	27.83	31	30.1	30.7	30.8	27.89	27.51
	21:00	32.1	31.6	32	32.5	33.4	32.6	32.8	32.7	31.4	29.8	29	28.7	28.9	27	27.31	30.6	29.8	30.2	30.4	27.86	27.44
	21:15	31.9	31.4	31.9	32.3	33.1	32.4	32.6	32.5	31	29.4	28.7	28.5	28.5	27	27.24	30.2	29.4	29.8	30	27.66	27.37
	21:30	31.7	31.2	31.7	32.1	32.9	32.2	32.4	32.3	30.8	29.2	28.5	28.3	28.3	26.9	27.01	30	29.2	29.4	29.7	27.38	27.37
	21:45	31.6	31	31.5	31.9	32.6	31.9	32.2	32.1	30.4	28.9	28.3	28	28	26.8	26.81	29.7	28.9	29.1	29.4	27.2	27.43
	22:00	31.4	30.9	31.3	31.7	32.4	31.7	32	31.9	30.7	28.9	28.2	27.9	27.8	26.7	26.86	29.5	28.7	28.8	29.1	27.01	26.7
	22:15	31.2	30.7	31.2	31.5	32.1	31.5	31.8	31.7	30.5	28.7	27.9	27.5	27.5	26.2	26.48	29.2	28.4	28.5	28.8	26.58	26.35
	22:30	31	30.5	31	31.3	31.9	31.3	31.6	31.6	30.4	28.5	27.7	27.4	27.4	26.2	26.35	28.9	28.2	28.2	28.5	26.85	26.45
	22:45	30.8	30.3	30.8	31.1	31.6	31.1	31.4	31.3	29.8	28.2	27.6	27.3	27.2	26.3	26.39	28.7	27.9	28	28.3	26.78	26.64
	23:00	30.6	30.1	30.6	30.9	31.4	30.8	31.2	31.1	29.6	28.1	27.5	27.2	27.1	26.3	26.37	28.6	27.8	27.8	28.2	26.75	26.91
	23:15	30.4	29.9	30.4	30.7	31.2	30.7	31	30.9	29.8	28	27.3	27	26.9	26	26.09	28.4	27.7	27.7	28	26.65	26.44
	23:30	30.3	29.7	30.3	30.5	30.9	30.4	30.8	30.7	29.2	27.8	27.2	26.9	26.7	26	25.98	28.2	27.4	27.4	27.8	26.36	26.72
	23:45	30.1	29.5	30.1	30.3	30.7	30.2	30.6	30.5	29	27.6	27	26.7	26.5	25.6	25.66	28	27.2	27.2	27.6	26.18	26.49
04/08/2009	00:00	29.9	29.3	29.9	30.1	30.5	30	30.4	30.3	28.8	27.4	26.8	26.6	26.4	25.7	25.66	27.8	27.1	27	27.4	26.06	26.34
	00:15	29.7	29.2	29.7	29.9	30.3	29.9	30.2	30.1	29.3	27.4	26.7	26.4	26.3	25.4	25.59	27.7	27	26.9	27.3	25.66	25.55
	00:30	29.6	29.1	29.6	29.7	30.1	29.7	30.1	30	29.2	27.2	26.6	26.3	26.1	25.3	25.38	27.5	26.8	26.7	27.1	25.88	25.6
	00:45	29.4	28.9	29.4	29.5	29.9	29.6	29.9	29.8	29.1	27.3	26.5	26.1	26	25.2	25.38	27.3	26.7	26.6	26.9	25.94	25.43
	01:00	29.3	28.8	29.3	29.4	29.8	29.4	29.8	29.7	28.9	27.1	26.3	25.9	25.8	24.7	24.98	27.1	26.5	26.4	26.8	25.42	25.17
	01:15	29.1	28.6	29.2	29.2	29.6	29.3	29.6	29.6	28.7	26.8	26.2	25.8	25.7	24.6	24.71	27	26.3	26.2	26.6	25.08	24.91
	01:30	29	28.5	29	29.1	29.4	29.1	29.5	29.4	28.7	26.8	26	25.7	25.6	24.6	24.77	26.8	26.2	26.1	26.5	25.05	24.86
	01:45	28.8	28.3	28.9	28.9	29.2	28.9	29.3	29.2	28.2	26.6	26	25.7	25.5	24.9	24.92	26.8	26.2	26.1	26.4	25.3	25.45
	02:00	28.7	28.2	28.7	28.7	29	28.8	29.1	29.1	28	26.6	26	25.7	25.6	25	25	26.9	26.3	26.2	26.5	25.42	25.76
	02:15	28.5	28	28.6	28.6	28.9	28.6	29	28.9	27.9	26.7	26.2	25.8	25.7	25.2	25.21	26.9	26.3	26.1	26.5	25.43	25.52
	02:30	28.4	27.9	28.4	28.4	28.7	28.5	28.9	28.8	28.2	26.6	26	25.6	25.5	24.9	24.98	26.7	26.2	26	26.3	25.41	25.05
	02:45	28.3	27.8	28.3	28.3	28.6	28.4	28.7	28.6	28.1	26.4	25.8	25.5	25.4	24.6	24.75	26.5	25.9	25.8	26.1	24.83	24.71
	03:00	28.2	27.7	28.2	28.2	28.5	28.3	28.6	28.5	27.9	26.3	25.7	25.4	25.3	24.8	24.91	26.3	25.8	25.7	26	25.14	24.97
	03:15	28	27.6	28.1	28	28.3	28.1	28.4	28.4	27.3	26	25.5	25.3	25.1	24.5	24.56	26.1	25.6	25.5	25.9	24.81	25.19
	03:30	27.9	27.5	27.9	27.9	28.1	28	28.3	28.2	27.4	25.9	25.4	25.1	25	24.2	24.27	26	25.5	25.4	25.7	24.67	24.66
	03:45	27.8	27.4	27.8	27.8	28	27.9	28.2	28.1	27.6	25.9	25.3	25	24.9	24.4	24.44	25.9	25.4	25.3	25.6	24.3	24.15
	04:00	27.7	27.3	27.7	27.7	27.9	27.8	28.1	28	27.5	26	25.3	25	24.9	24.4	24.36	26	25.5	25.4	25.7	24.54	24.41
	04:15	27.6	27.2	27.6	27.6	27.8	27.7	28	27.9	27.4	25.9	25.4	25.1	24.9	24.4	24.54	25.9	25.5	25.3	25.6	24.8	24.61
	04:30	27.4	27.1	27.5	27.5	27.7	27.5	27.9	27.8	27.1	25.7	25.3	25	24.8	24.1	24.13	26	25.5	25.3	25.6	24.56	24.66
	04:45	27.3	27	27.4	27.3	27.5	27.4	27.7	27.6	26.9	25.8	25.4	25.1	24.9	24.5	24.53	25.8	25.4	25.3	25.5	24.73	24.73
	05:00	27.2	26.9	27.3	27.2	27.4	27.3	27.6	27.5	27	25.6	25.1	24.9	24.7	24.4	24.47	25.6	25.2	25.1	25.4	24.41	24.43
	05:15	27.1	26.8	27.2	27.1	27.3	27.3	27.5	27.5	27	25.5	25	24.7	24.6	24.1	24.21	25.5	25.1	25	25.2	24.19	24.2
	05:30	27	26.7	27.1	27.1	27.3	27.2	27.5	27.4	27	25.6	25.1	24.8	24.7	24	24.19	25.6	25.3	25.1	25.3	24.46	24.39
	05:45	27	26.6	27	27	27.1	27.1	27.4	27.3	26.7	25.5	25.1	24.9	24.7	24.4	24.38	25.7	25.3	25.1	25.4	24.66	24.8
	06:00	26.9	26.5	26.9	26.9	27.1	27	27.3	27.2	26.6	25.5	25.1	24.8	24.7	24.3	24.25	25.6	25.2	25.1	25.3	24.54	24.69
	06:15	26.7	26.5	26.8	26.8	26.9	26.9	27.2	27.1	26.5	25.2	24.8	24.7	24.5	24.3	24.34	25.3	24.9	24.9	25.1	24.47	24.79
	06:30	26.7	26.4	26.8	26.7	26.9	26.8	27.1	27	26.4	25.1	24.7	24.6	24.4	24.2	24.26	25.2	24.8	24.8	25	24.51	24.58
	06:45	26.6	26.3	26.7	26.6	26.8	26.7	27	26.9	26.6	25	24.6	24.4	24.3	23.8	23.87	25	24.6	24.6	24.8	23.92	23.76
	07:00	26.5	26.3	26.6	26.5	26.7	26.7	26.9	26.8	26.5	24.9	24.5	24.3	24.2	23.6	23.75	24.9	24.5	24.5	24.7	23.84	23.76
	07:15	26.4	26.2	26.5	26.5	26.6	26.6	26.8	26.8	26.5	24.9	24.5	24.3	24.1	23.7	23.74	24.8	24.5	24.5	24.7	23.88	23.79
	07:30	26.4	26.1	26.4	26.4	26.5	26.5	26.8	26.7	26.1	25.1	24.7	24.6	24.4	23.9	23.95	24.9	24.6	24.6	24.8	24.26	24.29
	07:45	26.3	26	26.4	26.3	26.4	26.4	26.7	26.6	26.2	25.6	25.2	25.2	25.1	24.2	24.17	25.1	24.9	24.8	25	24.05	24.03

08:00	26.2	26	26.3	26.2	26.4	26.4	26.6	26.5	26.3	26.7	26.4	26.7	26.5	25.2	25.19	25.5	25.4	25.2	25.4	24.74	24.62
08:15	26.2	25.9	26.3	26.2	26.3	26.3	26.6	26.5	26.4	27.2	27	27.4	27.2	25.8	25.69	25.8	25.8	25.6	25.8	25.06	25.03
08:30	26.2	26	26.3	26.2	26.3	26.3	26.5	26.5	26.4	27.2	27.2	27.5	27.4	25.9	25.88	26.2	26.3	26.1	26.2	25.51	25.54
08:45	26.2	26	26.3	26.2	26.3	26.3	26.5	26.5	26.4	26.9	26.9	27.1	27.1	25.5	25.48	26.6	26.6	26.3	26.5	25.71	25.94
09:00	26.3	26.1	26.3	26.2	26.2	26.3	26.5	26.5	26.4	27.6	27.7	27.9	27.9	25.9	25.87	27	27.1	26.8	27	26.01	26.32
09:15	26.3	26.2	26.3	26.2	26.3	26.3	26.5	26.5	26.5	28.5	28.7	29.2	29.2	26.7	26.76	27.6	27.8	27.4	27.6	26.47	26.78
09:30	26.4	26.3	26.4	26.3	26.3	26.3	26.5	26.5	26.5	28.5	28.6	29.2	29.2	27	27.02	28	28.3	28	28.1	27	27.14
09:45	26.5	26.4	26.5	26.4	26.4	26.4	26.6	26.6	26.6	29.3	29.4	29.8	29.9	27.6	27.45	28.9	29.4	28.9	29	27.86	28.38
10:00	26.6	26.6	26.6	26.5	26.5	26.5	26.7	26.7	26.7	33	33.2	33.8	34.1	29.9	28.93	30	30.6	30.2	30.3	28.84	29.1
10:15	26.8	26.8	26.8	26.7	26.6	26.6	26.9	27	26.9	35.4	36.5	34.9	34.9	32.1	30.49	30.8	31.6	31.4	31.6	29.76	29.7
10:30	27.1	27.1	27.1	26.9	26.8	26.8	27.1	27.2	27.3	35.7	37.1	35.1	35.3	31.8	30.8	31.6	32.4	32.1	32.4	30.4	30.29
10:45	27.5	27.5	27.4	27.2	27.1	27.1	27.3	27.5	27.7	36.9	38.4	35.9	36.3	32.3	31.11	32.5	33.4	33.2	33.4	31.24	31.16
11:00	27.9	28	27.7	27.5	27.3	27.3	27.6	27.9	27.8	38.2	39.8	37.5	37.8	34	32.23	33.9	35	34.8	35	31.47	31.7
11:15	28.4	28.6	28	27.9	27.6	27.6	27.8	28.2	28	37.7	38.7	37.4	37.8	34.9	32.78	33.8	35	34.7	34.9	31.1	31.36
11:30	28.9	29.1	28.4	28.3	27.9	27.9	28.1	28.5	28.6	36.4	37.5	37.3	37.9	32.2	31.92	34.9	36	35.8	35.9	32.86	32.7
11:45	29.4	29.6	28.8	28.7	28.3	28.2	28.5	28.9	28.9	36.4	37.3	37.4	38.1	31.5	31.5	35.3	36.6	36.4	36.7	32.56	32.6
12:00	29.8	30.1	29.1	29.1	28.6	28.5	28.7	29.2	29	36.9	37.4	38.3	38.7	33.2	32.81	35.4	36.8	36.6	36.7	32.56	32.56
12:15	30.2	30.5	29.5	29.5	29	28.8	29	29.5	29.3	35.8	36.7	37.5	37.8	32.6	32.47	35.3	36.5	36.4	36.6	32.3	32.4
12:30	30.6	30.8	29.9	29.9	29.3	29.2	29.3	29.8	29.5	37	37.7	38.8	39.2	33.1	33.22	36.3	38	37.5	37.6	32.4	32.56
12:45	31	31.2	30.2	30.3	29.7	29.5	29.6	30.1	29.9	36.2	37	38	38.4	32.7	32.52	36.3	37.5	37.1	37.3	32.76	33.02
13:00	31.3	31.4	30.5	30.6	30	29.8	29.9	30.4	30	36.3	36.7	37.9	38.5	32.8	32.85	35.3	36.5	36.5	36.6	32.19	32.32
13:15	31.6	31.7	30.8	31	30.3	30.1	30.2	30.7	30.4	37.6	38.4	39.2	39.8	34.1	33.85	37.7	39.1	38.5	38.5	33.64	34.02
13:30	31.8	32	31.1	31.3	30.6	30.4	30.4	30.9	30.5	34.8	35.6	36.6	37	32.2	32.5	35.3	36.2	36.4	36.6	32.67	32.76
13:45	32.1	32.2	31.3	31.6	30.9	30.6	30.6	31.1	30.8	36.3	36.9	37.6	38.1	33.2	32.95	37	38	37.7	37.7	33.93	34.2
14:00	32.3	32.3	31.5	31.8	31.2	30.8	30.8	31.3	30.9	34.9	35.5	36.3	36.7	32.2	32.29	34.9	35.5	35.8	35.9	32.19	32.36
14:15	32.4	32.5	31.7	32	31.4	31	31	31.4	31.1	36.8	37.1	38	38.4	33.4	33.23	38.8	40.3	38.1	38	33.3	34.32
14:30	32.6	32.6	31.9	32.2	31.6	31.2	31.2	31.6	31.2	34.9	35.5	36.2	36.7	32	32.18	35	35.6	35.6	35.8	32.42	32.41
14:45	32.7	32.7	32	32.4	31.7	31.4	31.4	31.7	31.2	34	34.3	35.1	35.5	31.7	31.83	33.9	34.3	34.8	34.7	31.34	31.36
15:00	32.8	32.7	32.1	32.5	31.9	31.5	31.5	31.8	31.4	35.2	35.3	36	36.5	32.5	32.51	35.8	36.6	36.3	36.1	32.67	33.15
15:15	32.9	32.8	32.3	32.7	32.1	31.7	31.6	31.9	31.5	34.8	35.1	35.7	36.1	32.3	32.36	35.2	36	35.5	35.5	32.11	32.27
15:30	32.9	32.8	32.3	32.7	32.2	31.8	31.7	32	31.5	34.4	34.6	35.1	35.5	32	32.01	34.8	35.3	35.3	35.2	32.31	32.41
15:45	33	32.8	32.4	32.8	32.3	31.8	31.8	32.1	31.5	34.5	34.6	35.1	35.5	31.9	31.92	34.3	34.7	34.9	34.8	31.67	31.54
16:00	33	32.8	32.5	32.9	32.3	31.9	31.9	32.2	31.6	34.4	34.6	35.1	35.4	32.1	32.12	34.6	35	35.1	35.1	32.26	32.42
16:15	33	32.8	32.5	32.9	32.4	32	32	32.2	31.7	34.7	34.7	35.3	35.7	32.5	32.55	35.8	36.5	36.4	36.2	32.54	32.79
16:30	33.1	32.9	32.6	33	32.5	32.1	32.1	32.3	31.8	35.3	35.3	35.9	36.3	32.8	32.83	40	41.7	40.9	40.7	34.02	34.42
16:45	33.1	32.9	32.6	33	32.6	32.2	32.2	32.4	31.9	35.3	35.5	36.1	36.5	33	33.09	40.2	41.9	41.1	41.1	33.92	34.36
17:00	33.2	33	32.7	33.1	32.7	32.3	32.3	32.5	32	35.6	35.7	36.3	36.7	33.1	33.02	41.7	43.7	43.3	43.3	35.07	35.2
17:15	33.3	33	32.8	33.2	32.9	32.4	32.4	32.6	32.2	35.5	35.6	36.4	36.7	33.1	33.15	40.9	42.6	42.4	42.5	35.13	35.14
17:30	33.3	33.1	32.9	33.2	33.1	32.6	32.5	32.8	32.2	34.6	34.8	35.4	35.8	32.3	32.41	37.8	38.6	38.6	39	32.61	32.7
17:45	33.4	33.1	32.9	33.3	33.3	32.8	32.7	32.8	32.2	34.3	34.2	34.9	35.3	32.3	32.54	36.5	37	37.4	37.5	32.52	32.65
18:00	33.4	33.2	33	33.3	33.5	32.9	32.7	32.9	32.3	33.9	33.8	34.4	34.7	31.9	32.09	35.5	35.8	36.4	36.5	31.99	31.86
18:15	33.4	33.2	33	33.4	33.6	33	32.8	32.9	32.3	33.6	33.5	34	34.3	31.4	31.61	35.1	35.2	35.9	35.9	31.69	31.55
18:30	33.4	33.1	33	33.4	33.6	33.1	32.9	33	32.3	33.3	33.2	33.6	33.9	31.5	31.71	34.6	34.6	35.4	35.4	31.79	31.67
18:45	33.4	33.1	33	33.4	33.6	33.1	32.9	33	32.2	32.9	32.7	33	33.3	31.4	31.47	33.9	33.8	34.6	34.6	31.6	31.51
19:00	33.3	33	33	33.3	33.6	33	32.9	33	32.2	32.5	32.2	32.5	32.8	30.7	30.92	33.2	33	33.8	33.8	30.94	30.67
19:15	33.3	32.9	32.9	33.3	33.5	33	32.9	32.9	32.1	32.1	31.7	31.9	32.2	30.2	30.38	32.5	32.2	33	33	30.2	30.1
19:30	33.2	32.8	32.8	33.2	33.4	32.9	32.8	32.9	32	31.8	31.4	31.5	31.8	29.8	30.04	32.1	31.6	32.4	32.4	29.88	29.79
19:45	33.1	32.7	32.7	33.1	33.3	32.8	32.8	32.8	32	31.5	31	31.1	31.3	29.6	29.82	31.6	31.1	31.8	31.9	29.45	29.27

	20:00	32.9	32.5	32.6	33	33.2	32.7	32.7	32.7	31.9	31.2	30.7	30.7	30.9	29.2	29.37	31.2	30.7	31.4	31.4	29.19	28.99
	20:15	32.8	32.4	32.5	32.9	33	32.6	32.6	32.6	31.7	31	30.5	30.4	30.5	29.1	29.28	31	30.5	31	31.1	29.21	29.02
	20:30	32.6	32.2	32.4	32.8	32.9	32.4	32.5	32.5	31.3	30.6	30.2	30.1	30.1	28.6	28.79	30.8	30.2	30.6	30.8	28.97	29.08
	20:45	32.5	32.1	32.3	32.6	32.7	32.3	32.4	32.4	31.5	30.5	30	29.8	29.9	28.4	28.6	30.5	30	30.3	30.4	28.74	28.43
	21:00	32.4	31.9	32.2	32.5	32.5	32.1	32.3	32.3	31.4	30.4	29.7	29.5	29.7	28.4	28.59	30.3	29.7	30	30.1	28.34	28.21
	21:15	32.2	31.8	32	32.3	32.4	32	32.1	32.1	31.3	30.2	29.5	29.3	29.4	27.8	27.98	30	29.5	29.7	29.9	28.16	27.94
	21:30	32.1	31.6	31.9	32.2	32.2	31.8	32	32	31.1	29.9	29.3	29.1	29.1	27.8	27.9	29.8	29.3	29.5	29.6	28.2	28.06
	21:45	31.9	31.4	31.7	32	32	31.6	31.9	31.9	30.7	29.7	29.2	28.9	28.9	27.8	27.83	29.7	29.1	29.3	29.5	28.12	28.24
	22:00	31.7	31.2	31.6	31.8	31.8	31.5	31.7	31.7	30.4	29.5	29	28.7	28.7	27.5	27.52	29.5	28.9	29	29.3	27.89	28.13
	22:15	31.5	31.1	31.4	31.7	31.7	31.3	31.6	31.5	30.7	29.4	28.8	28.5	28.5	27.4	27.46	29.3	28.7	28.8	29.1	27.86	27.51
	22:30	31.4	30.9	31.3	31.5	31.5	31.2	31.5	31.4	30.6	29.2	28.6	28.3	28.3	27.3	27.39	29.1	28.5	28.6	28.8	27.56	27.31
	22:45	31.2	30.8	31.1	31.4	31.3	31	31.3	31.3	30.2	29	28.5	28.2	28.1	27.2	27.24	28.9	28.4	28.5	28.7	27.45	27.57
	23:00	31.1	30.6	31	31.2	31.2	30.9	31.2	31.1	30.4	29	28.3	28	27.9	26.9	27.06	28.8	28.2	28.3	28.5	27.2	27.04
	23:15	30.9	30.5	30.8	31	31	30.7	31	31	30.3	28.8	28.1	27.8	27.8	26.5	26.72	28.6	28	28	28.3	27.1	26.73
	23:30	30.8	30.3	30.7	30.9	30.9	30.6	30.9	30.8	30.1	28.7	28	27.6	27.5	26.4	26.59	28.4	27.9	27.9	28.1	26.77	26.61
	23:45	30.6	30.2	30.5	30.7	30.7	30.5	30.8	30.7	30.1	28.6	27.8	27.5	27.4	26.2	26.46	28.3	27.7	27.7	27.9	26.59	26.38
05/08/2009	00:00	30.5	30	30.4	30.6	30.5	30.3	30.6	30.6	29.9	28.4	27.7	27.3	27.2	26.1	26.26	28.1	27.5	27.5	27.8	26.41	26.27
	00:15	30.3	29.8	30.2	30.4	30.3	30.1	30.5	30.4	29.3	28.1	27.5	27.2	27	26	26.13	27.9	27.3	27.4	27.6	26.44	26.47
	00:30	30.2	29.7	30.1	30.2	30.2	30	30.3	30.3	29.6	28	27.3	26.9	26.9	25.9	26.02	27.8	27.2	27.2	27.5	26.08	25.85
	00:45	30	29.6	30	30.1	30.1	29.9	30.2	30.1	29.5	27.9	27.2	26.8	26.8	25.6	25.78	27.6	27.1	27.1	27.3	26.07	25.81
	01:00	29.9	29.4	29.8	29.9	29.9	29.7	30.1	30	29.1	27.7	27.1	26.7	26.6	25.7	25.78	27.5	27	26.9	27.2	26.11	26.07
	01:15	29.7	29.2	29.7	29.8	29.7	29.5	29.9	29.8	28.8	27.5	26.9	26.6	26.5	25.7	25.7	27.3	26.8	26.8	27.1	25.95	26.01
	01:30	29.5	29.1	29.5	29.6	29.6	29.4	29.8	29.7	28.6	27.4	26.8	26.5	26.4	25.5	25.59	27.2	26.7	26.7	27	25.89	26.18
	01:45	29.4	29	29.4	29.5	29.5	29.3	29.6	29.5	28.9	27.3	26.8	26.4	26.3	25.6	25.68	27.1	26.7	26.6	26.9	25.69	25.61
	02:00	29.3	28.8	29.3	29.3	29.3	29.2	29.5	29.4	28.8	27.3	26.7	26.4	26.3	25.7	25.76	27.1	26.6	26.6	26.8	25.88	25.7
	02:15	29.1	28.7	29.1	29.2	29.2	29	29.4	29.3	28.6	27.3	26.8	26.4	26.3	25.7	25.7	27.1	26.7	26.6	26.8	25.78	25.7
	02:30	29	28.6	29	29.1	29.1	28.9	29.3	29.2	28.7	27.5	26.9	26.5	26.4	25.8	25.87	27.2	26.8	26.6	26.9	25.95	25.89
	02:45	28.9	28.5	28.9	28.9	28.9	28.8	29.2	29.1	28.6	27.4	26.8	26.4	26.3	25.8	25.89	27.1	26.7	26.5	26.8	25.88	25.74
	03:00	28.8	28.4	28.8	28.8	28.8	28.7	29.1	29	28.5	27.1	26.6	26.3	26.2	25.6	25.76	27	26.5	26.4	26.7	25.86	25.74
	03:15	28.7	28.3	28.7	28.7	28.7	28.6	29	28.9	28.4	27.1	26.5	26.2	26.1	25.5	25.64	26.8	26.4	26.3	26.6	25.72	25.63
	03:30	28.6	28.2	28.6	28.6	28.6	28.5	28.9	28.8	28.2	27	26.5	26.2	26.1	25.7	25.69	26.8	26.4	26.3	26.5	25.92	25.72
	03:45	28.5	28.1	28.5	28.5	28.5	28.5	28.8	28.7	28.3	27.1	26.6	26.3	26.2	25.9	25.91	26.9	26.5	26.4	26.6	26	25.92
	04:00	28.4	28.1	28.4	28.4	28.4	28.3	28.7	28.6	28.1	26.9	26.4	26.1	26	25.4	25.5	26.7	26.3	26.2	26.4	25.76	25.58
	04:15	28.3	28	28.3	28.3	28.3	28.2	28.6	28.5	27.8	26.8	26.3	26.1	25.9	25.3	25.38	26.6	26.2	26.1	26.4	25.62	25.74
	04:30	28.2	27.9	28.2	28.2	28.2	28.2	28.5	28.4	27.9	26.6	26.1	25.9	25.7	25.2	25.35	26.4	26.1	26	26.2	25.38	25.15
	04:45	28.1	27.8	28.1	28.1	28.1	28.1	28.4	28.3	27.9	26.8	26.3	26	25.9	25.2	25.28	26.5	26.2	26.1	26.3	25.55	25.31
	05:00	28	27.7	28.1	28	28.1	28	28.3	28.2	27.6	26.7	26.3	26	25.9	25.3	25.28	26.6	26.3	26.1	26.3	25.67	25.86
	05:15	28	27.7	28	28	28	27.9	28.3	28.2	27.8	26.8	26.3	26	25.9	25.4	25.54	26.6	26.3	26.1	26.3	25.65	25.65
	05:30	27.9	27.6	27.9	27.9	27.9	27.9	28.2	28.1	27.7	26.7	26.3	26	25.9	25.5	25.58	26.6	26.3	26.1	26.3	25.83	25.56
	05:45	27.8	27.5	27.8	27.8	27.8	27.8	28.1	28	27.7	26.7	26.3	26	25.9	25.3	25.42	26.5	26.3	26.1	26.3	25.67	25.55
	06:00	27.8	27.5	27.8	27.7	27.8	27.8	28.1	28	27.6	26.6	26.2	26	25.9	25.4	25.43	26.5	26.3	26.1	26.3	25.74	25.74
	06:15	27.7	27.4	27.7	27.7	27.7	27.7	28	27.9	27.5	26.5	26.2	25.9	25.8	25.3	25.35	26.5	26.2	26.1	26.3	25.66	25.59
	06:30	27.6	27.4	27.6	27.6	27.6	27.6	27.9	27.8	27.4	26.4	26.1	25.9	25.7	25.4	25.36	26.4	26.2	26.1	26.2	25.56	25.71
	06:45	27.5	27.3	27.6	27.5	27.6	27.6	27.8	27.7	27.4	26.4	26.1	25.9	25.7	25.3	25.35	26.3	26	26	26.1	25.55	25.56
	07:00	27.5	27.2	27.5	27.5	27.5	27.5	27.7	27.6	27.2	26.2	25.9	25.8	25.6	25.5	25.54	26.1	25.8	25.8	26	25.6	25.61
	07:15	27.4	27.2	27.4	27.4	27.4	27.4	27.7	27.6	27.2	26	25.7	25.6	25.4	25.1	25.16	25.9	25.6	25.7	25.8	25.26	25.32
	07:30	27.3	27.1	27.4	27.3	27.4	27.4	27.6	27.5	27.1	26.2	25.9	25.7	25.6	25	25.05	26	25.8	25.7	25.9	25.27	25.22

07:45	27.3	27.1	27.3	27.3	27.3	27.3	27.5	27.5	27.2	26.4	26.1	25.9	25.8	25.6	25.55	26.2	26	25.9	26.1	25.32	25.32
08:00	27.2	27	27.3	27.2	27.2	27.3	27.5	27.4	27.1	26.8	26.4	26.4	26.3	25.9	25.92	26.4	26.3	26.2	26.3	25.73	25.66
08:15	27.2	27	27.2	27.2	27.2	27.2	27.4	27.4	27.2	27.9	27.6	27.7	27.6	26.2	26.19	26.9	26.9	26.7	26.8	25.98	26.19
08:30	27.1	26.9	27.2	27.1	27.2	27.2	27.4	27.3	27.1	28.2	28.2	28.3	28.2	26.6	26.68	27.3	27.3	27.1	27.3	26.55	26.62
08:45	27.1	27	27.2	27.1	27.1	27.2	27.4	27.3	27.3	29.7	29.5	30.1	30.1	28.1	27.95	27.9	28.1	27.8	27.9	26.83	26.97
09:00	27.2	27	27.2	27.1	27.1	27.2	27.4	27.3	27.4	28.2	28.2	28.5	28.5	27	26.98	27.6	27.8	27.5	27.6	26.66	26.66
09:15	27.3	27.1	27.3	27.2	27.2	27.2	27.4	27.4	27.4	28.6	28.5	28.9	28.9	27.4	27.34	28	28.2	28	28	27.16	27.27
09:30	27.3	27.3	27.3	27.2	27.2	27.2	27.4	27.4	27.5	30.9	30.9	31.5	31.6	28.9	28.71	29.3	29.7	29.3	29.4	28.19	28.37
09:45	27.4	27.4	27.4	27.3	27.3	27.3	27.5	27.5	27.5	30.3	30.8	31.2	31.2	28.8	28.77	29.5	30	29.6	29.7	28.38	28.42
10:00	27.6	27.5	27.5	27.4	27.3	27.4	27.6	27.6	27.6	28.7	29	29.5	29.5	27.5	27.63	28.6	28.8	28.6	28.8	27.63	27.67
10:15	27.7	27.7	27.6	27.5	27.4	27.4	27.6	27.6	27.6	28.2	28.3	28.8	28.9	27.3	27.3	27.9	28	28	28.2	27.24	27.21
10:30	27.8	27.8	27.7	27.6	27.5	27.5	27.6	27.6	27.6	27.8	27.9	28.3	28.4	26.4	26.54	27.5	27.5	27.6	27.7	26.53	26.47
10:45	27.8	27.8	27.7	27.6	27.5	27.5	27.6	27.6	27.4	27.3	27.3	27.7	27.7	25.3	25.46	27	27	27.1	27.2	25.19	25.1
11:00	27.9	27.8	27.7	27.7	27.5	27.5	27.6	27.6	27.4	27.6	27.5	27.7	27.8	25.8	25.66	27.2	27.2	27.2	27.3	25.18	25.19
11:15	27.8	27.8	27.7	27.7	27.5	27.5	27.6	27.6	27.3	27.8	27.7	28	28	25.5	25.71	27.6	27.7	27.5	27.5	25.45	25.59
11:30	27.8	27.8	27.7	27.7	27.5	27.5	27.6	27.6	27.1	27.4	27.4	27.6	27.6	25.4	25.56	27.2	27.2	27	27.1	25.17	25.21
11:45	27.8	27.7	27.7	27.7	27.5	27.5	27.6	27.6	27.4	27.2	27.1	27.2	27.3	25	25.16	26.9	26.8	26.7	26.8	25.05	24.99
12:00	27.8	27.7	27.7	27.7	27.5	27.5	27.5	27.5	27.2	26.7	26.6	26.6	26.6	24.6	24.8	26.4	26.3	26.3	26.4	24.88	24.82
12:15	27.7	27.6	27.6	27.7	27.4	27.4	27.5	27.5	27	26.7	26.5	26.5	26.6	24	24.22	26.6	26.5	26.5	26.5	24.8	24.66
12:30	27.6	27.5	27.6	27.6	27.4	27.4	27.5	27.4	26.9	26.5	26.3	26.4	26.4	24	24.25	26.4	26.2	26.2	26.3	24.39	24.28
12:45	27.6	27.5	27.5	27.6	27.3	27.3	27.4	27.4	26.8	27.9	27.9	27.7	27.7	25.1	24.99	28	28.2	27.6	27.7	25.5	26.14
13:00	27.5	27.4	27.5	27.6	27.3	27.3	27.4	27.4	27.1	27.7	27.7	27.6	27.7	25	25.24	28	28.3	27.8	27.9	25.56	25.79
13:15	27.5	27.4	27.5	27.5	27.3	27.3	27.4	27.3	27.2	27.9	27.8	27.8	27.9	25.1	25.17	28	28.2	27.7	27.8	25.75	25.82
13:30	27.5	27.3	27.4	27.5	27.3	27.2	27.4	27.3	26.9	28.6	28.7	28.4	28.5	25.4	25.31	29.1	29.4	28.6	28.7	26.08	26.99
13:45	27.4	27.3	27.4	27.4	27.3	27.2	27.4	27.3	26.9	29.1	29.3	29.1	29.3	26	26.08	29.3	29.8	29	29.1	26.29	26.75
14:00	27.5	27.4	27.4	27.5	27.3	27.3	27.4	27.3	27.1	29.5	29.7	29.5	29.7	26.2	26.09	29.7	30.1	29.4	29.6	26.87	27.06
14:15	27.5	27.4	27.4	27.4	27.3	27.3	27.4	27.4	26.9	29.2	29.4	29.3	29.5	26.1	25.88	29.6	30	29.4	29.6	26.65	26.92
14:30	27.6	27.5	27.4	27.4	27.3	27.3	27.4	27.3	26.9	29.1	29.4	29.4	29.5	26.1	26.07	29.8	30.2	29.5	29.8	26.75	27.15
14:45	27.6	27.6	27.5	27.5	27.4	27.3	27.4	27.4	27	29	29.2	29.2	29.4	26.1	25.99	29.6	30	29.3	29.6	26.61	26.91
15:00	27.7	27.6	27.5	27.5	27.5	27.4	27.4	27.4	27.1	28.8	29.1	29.2	29.3	26.4	26.36	29.8	30.2	29.7	29.9	27.16	27.48
15:15	27.8	27.7	27.6	27.5	27.5	27.5	27.5	27.4	27.2	28.8	28.9	29.3	29.3	26.7	26.65	30	30.5	30	30.1	26.75	26.79
15:30	27.8	27.7	27.6	27.6	27.6	27.5	27.5	27.5	27.2	28.4	28.5	28.8	28.8	26.5	26.53	29.7	30	29.7	30	27.19	27.59
15:45	27.8	27.8	27.6	27.6	27.7	27.6	27.6	27.6	27.3	28.3	28.3	28.7	28.8	26.7	26.79	29.2	29.5	29.3	29.4	26.55	26.64
16:00	27.9	27.8	27.7	27.7	27.7	27.6	27.6	27.6	27.2	28.3	28.4	28.6	28.6	26.4	26.38	29.2	29.4	29.2	29.5	27.03	27.34
16:15	27.9	27.8	27.7	27.7	27.8	27.7	27.6	27.6	27.4	28.7	28.7	28.9	29.1	26.5	26.54	29.2	29.5	29.4	29.5	26.83	26.78
16:30	27.9	27.8	27.8	27.8	27.8	27.7	27.7	27.7	27.5	28.9	28.9	29.2	29.3	27.1	26.93	29.3	29.6	29.4	29.5	26.91	27.04
16:45	27.9	27.9	27.8	27.8	27.9	27.8	27.7	27.7	27.5	28.9	28.9	29.2	29.3	27.1	27.09	29.2	29.6	29.4	29.5	26.57	26.67
17:00	28	27.9	27.8	27.8	27.9	27.8	27.8	27.8	27.5	29	29	29.2	29.4	27.2	27.08	29.3	29.6	29.5	29.6	27.64	27.78
17:15	28	27.9	27.8	27.9	28	27.8	27.8	27.8	27.5	28.9	28.9	29.2	29.3	27.3	27.25	28.9	29.1	29	29.1	26.59	26.77
17:30	28	28	27.9	27.9	28	27.9	27.8	27.9	27.6	29	29	29.3	29.5	27.5	27.35	29.1	29.4	29.3	29.3	26.8	26.92
17:45	28	28	27.9	27.9	28	27.9	27.9	27.9	27.5	28.6	28.6	28.8	29	27	27.06	28.9	29	28.9	29.1	27.46	27.69
18:00	28.1	28	27.9	28	28	27.9	27.9	27.9	27.6	28.3	28.2	28.5	28.6	26.8	26.86	28.3	28.4	28.4	28.5	26.3	26.3
18:15	28.1	28	27.9	28	28	27.9	27.9	27.9	27.6	28.2	28.2	28.4	28.6	26.9	26.9	28.4	28.5	28.6	28.6	26.68	26.67
18:30	28.1	28	27.9	28	28	27.9	27.9	27.9	27.4	27.9	27.9	28.1	28.1	26.6	26.61	28.1	28.1	28.1	28.3	26.88	27.08
18:45	28.1	28	27.9	28	28	27.9	27.9	27.9	27.5	27.8	27.7	27.9	28	26.5	26.53	28	27.9	28	28.1	26.87	27.13
19:00	28.1	28	27.9	28	28	27.9	27.9	27.9	27.5	27.6	27.5	27.6	27.7	26.5	26.59	27.7	27.6	27.8	27.9	26.58	26.51
19:15	28	27.9	27.9	28	28	27.9	27.9	27.9	27.5	27.3	27.2	27.2	27.3	26	26.09	27.3	27.1	27.4	27.4	25.86	25.8
19:30	28	27.9	27.9	28	28	27.8	27.9	27.9	27.5	27	26.8	26.9	27	25.5	25.68	26.9	26.7	27	27.1	25.62	25.6

	19:45	27.9	27.8	27.9	28	27.9	27.8	27.8	27.8	27.4	26.8
	20:00	27.9	27.7	27.8	27.9	27.8	27.7	27.8	27.8	27.4	26.7
	20:15	27.8	27.6	27.7	27.9	27.8	27.7	27.7	27.7	27.2	26.5
	20:30	27.7	27.5	27.7	27.8	27.7	27.6	27.6	27.6	27.2	26.4
	20:45	27.6	27.4	27.6	27.7	27.6	27.5	27.6	27.6	27.2	26.3
	21:00	27.5	27.3	27.5	27.6	27.5	27.4	27.5	27.5	27.1	26.1
	21:15	27.4	27.2	27.4	27.5	27.4	27.3	27.5	27.4	26.7	26
	21:30	27.3	27.2	27.3	27.5	27.3	27.2	27.4	27.4	26.8	26
	21:45	27.2	27	27.2	27.4	27.2	27.1	27.3	27.3	26.6	25.8
	22:00	27.1	26.9	27.2	27.3	27.1	27.1	27.2	27.2	26.7	25.8
	22:15	27.1	26.9	27.1	27.2	27	27	27.2	27.1	26.6	25.7
	22:30	27	26.8	27	27.1	26.9	26.9	27.1	27	26.3	25.6
	22:45	26.9	26.7	26.9	27	26.9	26.8	27	27	26.6	25.6
	23:00	26.8	26.6	26.8	26.9	26.8	26.7	27	26.9	26.2	25.4
	23:15	26.7	26.5	26.7	26.8	26.7	26.7	26.9	26.8	26.3	25.4
	23:30	26.6	26.4	26.7	26.7	26.6	26.6	26.8	26.7	26.4	25.4
	23:45	26.5	26.3	26.6	26.6	26.5	26.5	26.7	26.6	26.1	25.2
06/08/2009	00:00	26.5	26.3	26.5	26.6	26.4	26.4	26.7	26.6	26.2	25.2
	00:15	26.4	26.2	26.4	26.5	26.4	26.3	26.6	26.5	25.9	25
	00:30	26.3	26.1	26.3	26.4	26.3	26.3	26.5	26.4	25.9	24.9
	00:45	26.2	26	26.2	26.3	26.2	26.2	26.4	26.3	25.7	24.8
	01:00	26.1	25.9	26.2	26.2	26.1	26.1	26.3	26.2	25.7	24.7
	01:15	26	25.8	26.1	26.1	26	26	26.3	26.2	25.8	24.6
	01:30	25.9	25.8	26	26	25.9	25.9	26.2	26.1	25.7	24.6
	01:45	25.9	25.7	25.9	26	25.8	25.9	26.1	26	25.6	24.5
	02:00	25.8	25.6	25.9	25.9	25.8	25.8	26	25.9	25.5	24.5
	02:15	25.7	25.5	25.8	25.8	25.7	25.7	26	25.9	25.5	24.4
	02:30	25.6	25.4	25.7	25.7	25.6	25.6	25.9	25.8	25.3	24.3
	02:45	25.6	25.4	25.6	25.6	25.6	25.6	25.8	25.7	25.4	24.3
	03:00	25.5	25.3	25.6	25.6	25.5	25.5	25.8	25.7	25.4	24.3
	03:15	25.4	25.2	25.5	25.5	25.4	25.5	25.7	25.6	25.3	24.2
	03:30	25.3	25.2	25.4	25.4	25.3	25.4	25.6	25.5	25	24.1
	03:45	25.3	25.1	25.4	25.3	25.3	25.3	25.6	25.5	25.1	24.1
	04:00	25.2	25	25.3	25.3	25.2	25.3	25.5	25.4	25.1	24
	04:15	25.1	25	25.2	25.2	25.1	25.2	25.4	25.3	25.1	24
	04:30	25.1	24.9	25.2	25.1	25.1	25.1	25.4	25.3	25	23.9
	04:45	25	24.9	25.1	25.1	25	25.1	25.3	25.2	24.9	23.8
	05:00	24.9	24.8	25	25	24.9	25	25.2	25.2	24.8	23.7
	05:15	24.9	24.7	25	25	24.9	25	25.2	25.1	24.7	23.6
	05:30	24.8	24.7	24.9	24.9	24.8	24.9	25.1	25	24.7	23.6
	05:45	24.7	24.6	24.9	24.8	24.8	24.8	25.1	25	24.8	23.6
	06:00	24.7	24.6	24.8	24.8	24.7	24.8	25	24.9	24.6	23.5
	06:15	24.6	24.5	24.7	24.7	24.6	24.7	24.9	24.8	24.6	23.4
	06:30	24.6	24.5	24.7	24.6	24.6	24.7	24.9	24.8	24.6	23.4
	06:45	24.5	24.4	24.6	24.6	24.5	24.6	24.8	24.7	24.5	23.3
	07:00	24.4	24.3	24.6	24.5	24.5	24.5	24.8	24.7	24.4	23.3
	07:15	24.4	24.3	24.5	24.5	24.4	24.5	24.7	24.6	24.4	23.3

	19:45	26.6	26.6	26.6	25.4	25.55	26.7	26.4	26.7	26.8	25.46	25.31
	20:00	26.4	26.4	26.5	25.6	25.6	26.4	26.2	26.4	26.5	25.34	25.27
	20:15	26.2	26.1	26.2	25	25.17	26.3	26	26.2	26.3	25.19	25.02
	20:30	26.1	26	26	25.1	25.1	26.1	25.8	26	26.1	24.79	24.73
	20:45	25.9	25.8	25.8	24.8	25.01	26	25.7	25.9	26	24.97	24.78
	21:00	25.8	25.6	25.6	24.7	24.74	25.9	25.6	25.7	25.8	24.83	24.68
	21:15	25.8	25.6	25.6	24.9	24.99	25.8	25.5	25.6	25.8	25.14	25.12
	21:30	25.7	25.5	25.5	24.8	24.86	25.7	25.4	25.5	25.7	25.01	24.98
	21:45	25.5	25.4	25.3	24.6	24.66	25.6	25.3	25.4	25.6	24.82	24.86
	22:00	25.5	25.3	25.3	24.7	24.8	25.6	25.3	25.4	25.5	24.93	25.06
	22:15	25.5	25.2	25.2	24.7	24.77	25.5	25.3	25.3	25.4	24.84	24.87
	22:30	25.3	25.1	25.1	24.5	24.53	25.4	25.1	25.2	25.3	24.74	24.84
	22:45	25.3	25.1	25	24.6	24.65	25.3	25	25.1	25.2	24.69	24.57
	23:00	25.1	25	24.9	24.3	24.37	25.2	24.9	25	25.1	24.53	24.5
	23:15	25.1	24.9	24.8	24.2	24.3	25.2	24.9	24.9	25.1	24.43	24.48
	23:30	25	24.8	24.7	24.2	24.29	25.1	24.8	24.8	25	24.34	24.2
	23:45	25	24.8	24.7	24.2	24.25	25	24.7	24.7	24.9	24.3	24.39
06/08/2009	00:00	24.9	24.6	24.6	24.1	24.18	24.9	24.6	24.6	24.8	24.2	24.03
	00:15	24.7	24.5	24.4	23.9	23.91	24.8	24.5	24.5	24.7	24.1	24.04
	00:30	24.6	24.5	24.3	23.8	23.89	24.7	24.4	24.5	24.6	23.97	23.95
	00:45	24.5	24.3	24.2	23.8	23.8	24.6	24.3	24.4	24.6	23.96	24
	01:00	24.4	24.2	24.1	23.7	23.78	24.5	24.3	24.3	24.5	23.88	23.93
	01:15	24.3	24.1	24	23.5	23.63	24.4	24.2	24.2	24.3	23.59	23.54
	01:30	24.2	24	23.9	23.3	23.47	24.4	24.1	24.1	24.3	23.66	23.53
	01:45	24.2	23.9	23.9	23.4	23.48	24.3	24.1	24	24.2	23.51	23.37
	02:00	24.2	24	23.8	23.5	23.59	24.3	24	24	24.2	23.71	23.52
	02:15	24.1	23.9	23.8	23.4	23.51	24.2	24	24	24.1	23.59	23.51
	02:30	24.1	23.9	23.7	23.4	23.4	24.2	23.9	23.9	24.1	23.55	23.67
	02:45	24	23.8	23.7	23.2	23.35	24.1	23.9	23.9	24	23.51	23.33
	03:00	24	23.8	23.7	23.4	23.42	24.1	23.9	23.8	24	23.43	23.34
	03:15	23.9	23.7	23.6	23.3	23.42	24	23.8	23.7	23.9	23.39	23.26
	03:30	23.8	23.7	23.5	23.3	23.31	23.9	23.7	23.7	23.8	23.45	23.4
	03:45	23.8	23.6	23.5	23.1	23.21	23.8	23.6	23.6	23.8	23.32	23.2
	04:00	23.7	23.5	23.4	23.1	23.18	23.7	23.5	23.5	23.7	23.21	23.13
	04:15	23.7	23.5	23.4	23	23.07	23.7	23.5	23.5	23.7	23.16	23.09
	04:30	23.6	23.5	23.3	23.2	23.21	23.7	23.5	23.5	23.6	23.32	23.24
	04:45	23.5	23.3	23.2	22.9	22.95	23.6	23.4	23.4	23.6	23.03	22.93
	05:00	23.4	23.3	23.2	23	23.05	23.5	23.3	23.4	23.5	23.15	23.1
	05:15	23.4	23.3	23.1	22.9	22.99	23.5	23.3	23.3	23.5	23.1	23.16
	05:30	23.4	23.2	23.1	22.9	22.91	23.4	23.2	23.3	23.4	23.04	23.01
	05:45	23.3	23.1	23	22.8	22.93	23.4	23.2	23.2	23.3	22.8	22.74
	06:00	23.2	23.1	22.9	22.7	22.78	23.3	23.1	23.2	23.3	22.84	22.76
	06:15	23.1	23	22.9	22.6	22.72	23.2	23	23.1	23.2	22.79	22.72
	06:30	23.1	23	22.8	22.6	22.74	23.2	23	23.1	23.2	22.82	22.72
	06:45	23.1	22.9	22.8	22.7	22.73	23.1	23	23	23.1	22.83	22.75
	07:00	23.1	22.9	22.8	22.8	22.88	23.1	22.9	23	23.1	22.86	22.82
	07:15	23.1	22.9	22.8	22.8	22.88	23.1	22.9	23	23.1	22.82	22.74

07:30	24.3	24.2	24.5	24.4	24.4	24.4	24.7	24.6	24.4	23.5	23.2	23.1	23	22.8	22.91	23.1	23	23	23.2	22.82	22.76
07:45	24.3	24.2	24.4	24.4	24.3	24.4	24.6	24.5	24.3	24	23.8	23.8	23.7	23.2	23.25	23.3	23.2	23.2	23.3	23.08	23.08
08:00	24.2	24.1	24.4	24.3	24.2	24.3	24.6	24.5	24.3	25.6	25.5	26	25.8	24.2	24.31	23.7	23.6	23.7	23.8	23.44	23.5
08:15	24.2	24.1	24.4	24.3	24.2	24.3	24.6	24.5	24.4	25.3	25.4	25.9	25.7	24.3	24.38	23.8	23.8	23.8	23.9	23.74	23.73
08:30	24.2	24.2	24.3	24.3	24.2	24.3	24.5	24.5	24.5	26	26	26.6	26.5	25	24.9	24.2	24.2	24.2	24.3	24.08	23.97
08:45	24.3	24.3	24.4	24.3	24.2	24.3	24.6	24.5	24.5	27.1	27.3	28	28	25	24.98	24.6	24.8	24.7	24.8	24.25	24.33
09:00	24.4	24.4	24.5	24.4	24.3	24.4	24.6	24.6	24.6	29.4	30	31	31.1	26.4	26.41	25.5	25.9	25.7	25.8	25.14	25.2
09:15	24.5	24.6	24.6	24.5	24.3	24.4	24.7	24.7	24.7	30.1	30.9	31.9	32	27.1	27.07	26.4	26.9	26.6	26.7	26	26.16
09:30	24.7	24.8	24.8	24.6	24.4	24.5	24.8	24.8	24.8	32.4	33.6	35.7	35.3	29.3	29.23	27.2	27.9	27.6	27.7	27.01	27.07
09:45	25	25.1	25	24.8	24.5	24.6	25	25.1	24.9	32.8	34.3	36	36	29.5	29.21	27.8	28.6	28.5	28.6	27.58	27.58
10:00	25.8	25.8	25.6	25.4	25	25.1	25.3	25.5	25.9	35.4	36.6	38.9	38.7	32.1	30.8	29.1	30	29.8	29.8	28.36	28.4
10:15	25.8	26.1	25.7	25.5	25	25.1	25.4	25.6	25.5	35.5	36.8	37.6	37.6	32.7	30.93	29.7	30.8	30.5	30.5	28.73	28.98
10:30	26.3	26.5	26.1	25.9	25.2	25.3	25.6	25.9	25.7	34	35.2	36	36.4	30.8	30.32	30.2	31.2	30.8	31	29.19	29.4
10:45	26.7	27	26.4	26.3	25.5	25.5	25.9	26.2	26	34.8	36.2	36.8	37.1	31.5	30.79	30.5	31.5	31.5	31.7	29.78	29.69
11:00	27.1	27.4	26.8	26.7	25.8	25.8	26.1	26.5	26.3	35.5	37	36.8	37.2	32.1	30.82	30.9	32.1	32.2	32.3	30.26	30.22
11:15	27.6	27.9	27.2	27.1	26.1	26.1	26.4	26.8	26.6	37.9	39.4	38.1	38.7	32.6	31.38	32.4	33.6	33.6	33.6	31.12	31.11
11:30	28	28.3	27.6	27.5	26.4	26.4	26.7	27.1	26.9	34.7	35.8	36.7	37.1	31.3	31.08	32.4	33.6	33.6	33.6	30.49	30.58
11:45	28.5	28.7	27.9	27.9	26.7	26.7	27	27.4	27.2	34.9	35.7	36.6	37.3	30.8	30.62	32.2	33.3	33.5	33.7	30.98	30.91
12:00	28.9	29.1	28.3	28.3	27	27	27.3	27.7	27.5	36.3	36.9	38.3	38.8	33.1	32.74	33.8	35.2	35.4	35.3	31.59	31.95
12:15	29.2	29.5	28.6	28.7	27.4	27.4	27.6	28.1	27.8	36.1	37.1	38.2	38.8	32.7	32.78	35	36.5	36.5	36.5	32.95	33
12:30	29.6	29.8	29	29.1	27.8	27.7	28	28.5	28.2	35.7	36.7	37.8	38.4	32.1	32.04	34.7	36.1	36.1	36.3	32.39	32.27
12:45	29.9	30.2	29.3	29.4	28.1	28	28.3	28.8	28.9	36.2	37	37.8	38.6	31.9	31.96	36.2	37.7	37.2	37.4	32.99	33.08
13:00	30.2	30.4	29.6	29.8	28.5	28.3	28.5	29	29	35.4	36.2	37.3	37.8	32.1	32.16	35.6	36.8	36.7	36.9	32.5	32.37
13:15	30.5	30.7	29.9	30.1	28.8	28.6	28.8	29.3	28.9	36.1	36.8	38.2	38.8	32.6	32.71	36.1	37.6	37.4	37.4	32.98	33.33
13:30	30.8	30.9	30.2	30.4	29.1	29	29.1	29.6	29.2	35.9	36.6	37.8	38.3	32.5	32.23	36.6	38	37.8	37.9	33.09	33.29
13:45	31.1	31.2	30.5	30.7	29.5	29.3	29.4	29.9	29.6	37	37.7	39.1	39.7	33.2	33.4	38.3	40.1	39.6	39.6	34.58	34.68
14:00	31.3	31.4	30.8	31.1	29.8	29.6	29.8	30.2	29.7	37.1	37.8	39.4	40	33.6	34.04	38.5	40.4	39.9	39.8	33.76	34.02
14:15	31.6	31.7	31	31.4	30.2	29.9	30.1	30.5	30	37.1	37.9	39.3	39.9	33.6	33.75	40.9	42.8	40.1	40.1	34.38	36.07
14:30	31.9	31.9	31.3	31.7	30.5	30.2	30.4	30.8	30.3	36.8	37.2	38.9	39.6	33.5	33.76	39.8	41.9	39.3	39.3	32.84	33.84
14:45	32.1	32.1	31.5	31.9	30.9	30.5	30.6	31	30.4	36.4	36.9	38.6	39.2	33.3	33.38	38.8	40.4	39	38.9	33.55	34.32
15:00	32.3	32.3	31.8	32.2	31.2	30.9	30.9	31.3	30.7	36.9	37.3	38.8	39.5	33.6	33.61	40.8	42.7	40.2	39.9	34.46	35.51
15:15	32.5	32.5	32	32.4	31.6	31.2	31.1	31.5	31	36.6	36.9	38.3	39	33.6	33.72	39.4	41.2	39.1	39.1	33.12	33.62
15:30	32.7	32.6	32.2	32.6	31.9	31.4	31.4	31.8	31.1	36.6	37.1	38.3	39	33.6	33.82	39.9	41.7	39.4	39.5	33.99	34.45
15:45	32.9	32.8	32.4	32.8	32.1	31.7	31.6	31.9	31.2	35.8	36.2	37.5	38.1	32.9	33.07	37.3	38.4	37.8	37.8	32.91	32.93
16:00	33	32.9	32.5	33	32.4	31.9	31.7	32.1	31.3	35.9	36.1	37.5	38.1	32.9	33.16	39.1	40.5	38.4	38.2	33.29	33.93
16:15	33.2	33	32.7	33.1	32.6	32.1	31.9	32.2	31.5	36.4	36.7	38	38.5	33.4	33.58	42.2	44.2	43.2	42.3	34.71	35.48
16:30	33.3	33.1	32.8	33.3	32.8	32.3	32.1	32.4	31.7	35.5	35.8	36.9	37.5	33	32.98	38.1	39.3	38.6	38.8	32.77	32.85
16:45	33.3	33.1	32.9	33.4	33	32.5	32.2	32.5	31.8	34.9	35.1	36.1	36.7	32.2	32.38	37.2	38	37.7	37.8	32.53	32.54
17:00	33.4	33.2	33	33.5	33.2	32.6	32.4	32.6	31.9	35.5	35.4	36.5	37	33.1	33.16	40.7	42.3	42.3	41.9	34.63	35.14
17:15	33.5	33.2	33	33.5	33.4	32.8	32.5	32.7	31.9	35.1	35.1	36.1	36.5	32.7	32.79	40	41.3	41.6	41.4	34.15	34.58
17:30	33.5	33.2	33.1	33.6	33.5	32.9	32.6	32.8	32	34.8	34.8	35.6	36.1	32.2	32.44	37.2	37.9	38	38	33.35	33.16
17:45	33.5	33.2	33.1	33.6	33.6	33	32.7	32.9	32	34	34	34.7	35.2	31.7	31.9	35.7	36	36.6	36.5	32.11	32.02
18:00	33.5	33.2	33.1	33.6	33.7	33	32.8	32.9	32.1	33.7	33.6	34.2	34.6	31.7	31.95	35.1	35.3	35.9	36	31.83	31.87
18:15	33.5	33.2	33.1	33.6	33.7	33.1	32.8	33	32	33.5	33.4	33.9	34.3	31.4	31.52	34.5	34.5	35.1	35.1	31.42	31.31
18:30	33.4	33.1	33.1	33.6	33.7	33.1	32.9	33	32	33.2	33	33.4	33.8	31.3	31.46	34.3	34.2	34.8	34.8	32.07	31.84
18:45	33.4	33	33.1	33.5	33.6	33	32.9	32.9	32	33	32.8	33.1	33.4	30.9	31.01	33.9	33.8	34.4	34.3	31.09	30.98
19:00	33.3	32.9	33	33.5	33.6	33	32.9	32.9	32	32.7	32.4	32.7	33.1	30.8	31.01	33.6	33.5	34	34	30.9	30.8
19:15	33.2	32.9	33	33.4	33.5	32.9	32.8	32.9	32	32.3	31.9	32.1	32.4	30.3	30.49	32.9	32.7	33.3	33.3	30.48	30.29

	19:30	33.1	32.7	32.9	33.3	33.4	32.8	32.8	32.8	31.7	31.8	31.4	31.6	31.8	30	30.07	32.2	31.8	32.4	32.5	30.23	30.13
	19:45	33	32.6	32.8	33.2	33.3	32.7	32.7	32.8	31.7	31.4	31	31.1	31.3	29.3	29.6	31.7	31.3	31.8	31.9	29.76	29.51
	20:00	32.9	32.5	32.6	33.1	33.1	32.6	32.6	32.6	31.4	31	30.6	30.7	30.8	28.7	28.92	31.3	30.8	31.3	31.5	29.19	29.27
	20:15	32.7	32.3	32.5	32.9	32.9	32.4	32.5	32.5	31.2	30.7	30.3	30.3	30.4	28.5	28.63	31	30.4	30.9	31	28.85	29.04
	20:30	32.6	32.1	32.3	32.8	32.8	32.3	32.3	32.3	31	30.5	30.1	30	30	28.4	28.52	30.7	30.1	30.5	30.7	28.9	29.02
	20:45	32.4	31.9	32.2	32.6	32.6	32.1	32.2	32.2	30.8	30.2	29.8	29.7	29.7	28.1	28.13	30.4	29.8	30.2	30.4	28.61	28.68
	21:00	32.2	31.7	32	32.4	32.4	31.9	32.1	32.1	30.9	30	29.5	29.3	29.4	27.7	27.84	30.2	29.5	29.8	30	28.17	28.09
	21:15	32.1	31.6	31.9	32.3	32.2	31.8	32	31.9	31	30	29.3	29	29.2	27.6	27.87	29.9	29.3	29.5	29.7	28.15	27.82
	21:30	31.9	31.4	31.7	32.1	32.1	31.7	31.9	31.8	30.9	29.8	29.1	28.8	28.9	27.3	27.57	29.7	29.1	29.2	29.5	27.68	27.5
	21:45	31.7	31.3	31.6	31.9	31.9	31.5	31.7	31.7	30.7	29.6	28.9	28.6	28.7	27.4	27.54	29.4	28.8	29	29.2	27.37	27.17
	22:00	31.6	31.1	31.4	31.8	31.7	31.3	31.6	31.6	30.6	29.4	28.7	28.4	28.4	27.1	27.26	29.2	28.6	28.7	29	27.51	27.08
	22:15	31.4	30.9	31.3	31.6	31.5	31.2	31.4	31.4	30.3	29.2	28.5	28.2	28.2	27	27.01	29	28.5	28.6	28.8	27.34	27.1
	22:30	31.2	30.7	31.1	31.4	31.3	31	31.3	31.2	29.9	28.9	28.3	28	28	26.7	26.72	28.9	28.3	28.3	28.6	27.07	27.22
	22:45	31	30.6	30.9	31.2	31.2	30.8	31.1	31.1	30.1	28.8	28.1	27.8	27.8	26.5	26.65	28.6	28.1	28.1	28.4	26.86	26.73
	23:00	30.9	30.4	30.8	31	31	30.6	31	30.9	29.7	28.6	28	27.7	27.6	26.6	26.64	28.5	27.9	28	28.2	27.01	27.06
	23:15	30.7	30.2	30.6	30.8	30.8	30.5	30.8	30.8	29.8	28.5	27.9	27.5	27.4	26.5	26.54	28.3	27.7	27.7	28	26.6	26.56
	23:30	30.5	30	30.5	30.7	30.6	30.3	30.7	30.6	29.3	28.3	27.7	27.4	27.3	26.4	26.5	28.2	27.6	27.6	27.9	26.77	26.91
	23:45	30.4	29.9	30.3	30.5	30.5	30.2	30.5	30.4	29.7	28.2	27.6	27.2	27.2	26.2	26.34	28	27.4	27.4	27.7	26.16	26.03
07/08/2009	00:00	30.2	29.7	30.2	30.3	30.3	30	30.4	30.3	29.6	28.1	27.4	27	27	25.9	26.09	27.8	27.2	27.2	27.5	26.21	26.04
	00:15	30.1	29.6	30	30.2	30.1	29.8	30.2	30.1	29.1	28	27.4	27.1	27	26.3	26.38	27.8	27.3	27.3	27.5	26.55	26.61
	00:30	29.9	29.4	29.8	30	29.9	29.7	30.1	30	29	28	27.4	27.1	27	26.2	26.26	27.7	27.2	27.2	27.4	26.41	26.58
	00:45	29.7	29.2	29.7	29.8	29.8	29.5	29.9	29.8	28.9	27.7	27.2	26.9	26.8	26.1	26.22	27.5	27	27	27.3	26.38	26.2
	01:00	29.6	29.1	29.5	29.7	29.6	29.4	29.8	29.7	29	27.6	27.1	26.7	26.7	26	26.03	27.4	26.9	26.9	27.2	26.11	26.01
	01:15	29.5	29	29.4	29.5	29.5	29.3	29.7	29.6	28.9	27.7	27	26.7	26.6	25.9	26	27.3	26.8	26.7	27	25.59	25.5
	01:30	29.3	28.9	29.3	29.4	29.3	29.2	29.5	29.4	28.8	27.7	27.1	26.8	26.7	26	26.11	27.3	26.9	26.8	27	25.66	25.67
	01:45	29.2	28.7	29.2	29.2	29.2	29	29.4	29.3	28.4	27.6	27.1	26.8	26.7	26.1	26.09	27.3	26.9	26.8	27	26.22	26.41
	02:00	29.1	28.6	29	29.1	29.1	28.9	29.3	29.2	28.6	27.5	26.9	26.6	26.5	25.9	25.9	27.1	26.7	26.6	26.9	25.85	25.79
	02:15	29	28.5	28.9	29	29	28.8	29.2	29.1	28.6	27.2	26.6	26.4	26.3	25.5	25.64	26.9	26.5	26.4	26.7	25.59	25.43
	02:30	28.9	28.4	28.8	28.9	28.9	28.7	29.1	29	28.4	27.3	26.7	26.4	26.4	25.8	25.89	26.9	26.5	26.4	26.6	25.53	25.5
	02:45	28.8	28.3	28.7	28.8	28.7	28.6	29	28.9	28.4	27.3	26.7	26.4	26.3	25.8	25.81	27	26.6	26.5	26.7	25.7	25.56
	03:00	28.7	28.3	28.6	28.7	28.6	28.5	28.9	28.8	28.2	27.3	26.8	26.4	26.4	25.7	25.78	27.1	26.7	26.5	26.7	25.97	25.82
	03:15	28.6	28.2	28.5	28.5	28.5	28.4	28.8	28.7	28.3	27.3	26.7	26.5	26.4	25.7	25.81	27	26.7	26.5	26.7	26.09	25.89
	03:30	28.5	28.1	28.4	28.5	28.4	28.3	28.7	28.6	27.9	27.1	26.7	26.4	26.3	25.7	25.7	27	26.6	26.5	26.7	25.95	26.1
	03:45	28.4	28	28.4	28.4	28.3	28.2	28.6	28.5	27.9	27	26.6	26.4	26.2	25.5	25.56	26.9	26.6	26.4	26.7	25.87	26.14
	04:00	28.3	27.9	28.3	28.3	28.3	28.2	28.5	28.4	27.9	27	26.6	26.3	26.2	25.6	25.6	26.9	26.5	26.4	26.6	25.8	25.69
	04:15	28.2	27.9	28.2	28.2	28.2	28.1	28.4	28.3	27.9	26.9	26.5	26.3	26.2	25.7	25.74	26.8	26.5	26.4	26.6	25.88	25.86
	04:30	28.1	27.8	28.1	28.1	28.1	28	28.3	28.3	27.9	26.9	26.5	26.3	26.2	25.8	25.9	26.8	26.5	26.3	26.5	25.73	25.64
	04:45	28	27.7	28	28	28	28	28.3	28.2	27.9	26.9	26.4	26.2	26.1	25.5	25.64	26.7	26.4	26.3	26.5	25.82	25.69
	05:00	28	27.7	28	27.9	28	27.9	28.2	28.1	27.6	26.8	26.5	26.3	26.2	25.8	25.86	26.7	26.4	26.4	26.5	26.01	25.93
	05:15	27.9	27.6	27.9	27.9	27.9	27.9	28.1	28.1	27.7	26.8	26.4	26.2	26.1	25.7	25.7	26.7	26.4	26.3	26.5	25.85	25.94
	05:30	27.8	27.5	27.8	27.8	27.8	27.8	28	28	27.5	26.7	26.4	26.2	26.1	25.8	25.76	26.6	26.4	26.3	26.5	25.9	26.13
	05:45	27.8	27.5	27.8	27.7	27.8	27.7	28	27.9	27.5	26.7	26.4	26.2	26.1	25.7	25.69	26.6	26.3	26.2	26.4	25.89	25.94
	06:00	27.7	27.4	27.7	27.7	27.7	27.6	27.9	27.8	27.4	26.5	26.2	26.1	25.9	25.5	25.54	26.3	26	26.1	26.3	25.65	25.72
	06:15	27.6	27.4	27.6	27.6	27.6	27.6	27.8	27.8	27.3	26.5	26.2	26.1	25.9	25.7	25.7	26.4	26.1	26.1	26.2	25.8	25.93
	06:30	27.6	27.3	27.6	27.5	27.6	27.5	27.8	27.7	27.3	26.6	26.2	26.1	26	25.8	25.81	26.4	26.2	26.1	26.3	25.83	25.87
	06:45	27.5	27.2	27.5	27.5	27.5	27.4	27.7	27.6	27.3	26.5	26.2	26.1	26	25.7	25.76	26.4	26.2	26.1	26.3	25.78	25.79
	07:00	27.4	27.2	27.4	27.4	27.4	27.4	27.6	27.6	27.3	26.6	26.3	26.1	26	26	25.97	26.4	26.2	26.2	26.3	25.92	25.9

07:15	27.4	27.2	27.4	27.3	27.4	27.4	27.6	27.5	27.3	26.5	26.2	26	25.9	25.6	25.63	26.3	26.2	26.1	26.2	25.53	25.53
07:30	27.3	27.1	27.4	27.3	27.3	27.3	27.5	27.5	27.2	26.5	26.2	26.1	26	25.7	25.68	26.4	26.2	26.1	26.2	25.55	25.53
07:45	27.3	27.1	27.3	27.3	27.3	27.3	27.5	27.4	27.2	26.6	26.3	26.1	26	25.6	25.64	26.4	26.3	26.2	26.3	25.67	25.65
08:00	27.2	27	27.3	27.2	27.2	27.2	27.4	27.4	27.2	26.7	26.4	26.3	26.2	25.7	25.72	26.6	26.5	26.4	26.5	25.8	25.74
08:15	27.2	27	27.2	27.2	27.2	27.2	27.4	27.3	26.9	26.9	26.7	26.6	26.6	25.9	25.88	26.6	26.4	26.4	26.6	25.97	26.2
08:30	27.2	27	27.2	27.1	27.2	27.2	27.4	27.3	27.1	28.3	28.4	28.4	28.4	26.8	26.71	27.2	27.2	27.1	27.2	26.57	26.73
08:45	27.2	27	27.2	27.1	27.2	27.2	27.4	27.3	27.2	30.6	30.8	31.5	31.4	28.6	28.36	28.1	28.3	28.1	28.2	27.38	27.47
09:00	27.2	27.1	27.3	27.2	27.2	27.2	27.4	27.4	27.3	30.7	31.5	32.2	32.1	28.6	28.59	28.6	28.9	28.7	28.8	28	28.06
09:15	27.4	27.3	27.4	27.3	27.2	27.2	27.5	27.5	27.5	31.3	32	32.7	32.7	29	29.04	29.4	29.8	29.4	29.5	28.68	28.81
09:30	27.6	27.5	27.5	27.4	27.3	27.3	27.6	27.6	27.6	33.2	33.7	34.8	34.9	30.5	30.12	30.3	30.9	30.4	30.6	29.29	29.47
09:45	27.8	27.8	27.7	27.5	27.4	27.4	27.7	27.7	27.7	30.8	31.2	32.2	32.4	28.9	28.99	29.5	30	29.7	29.9	28.76	28.79
10:00	28	28	27.9	27.7	27.5	27.5	27.7	27.8	27.7	30.6	30.8	31.9	32.1	28.7	28.87	29.5	29.8	29.7	29.8	28.55	28.6
10:15	28.2	28.3	28	27.9	27.6	27.6	27.8	27.9	27.9	30.7	31	31.7	32	28.9	28.9	30.1	30.6	30.4	30.5	29.1	29.25
10:30	28.4	28.4	28.2	28.1	27.7	27.7	27.9	28	27.9	30.5	30.7	31.6	31.8	28.9	28.85	30.1	30.7	30.5	30.6	28.88	28.9
10:45	28.5	28.6	28.3	28.2	27.9	27.9	28	28.1	28.1	31.7	31.9	32.8	33.2	29.6	29.55	31.1	31.8	31.5	31.5	29.59	29.8
11:00	28.6	28.7	28.5	28.4	28	28	28.1	28.2	28.1	31.1	31.3	32.2	32.4	29.4	29.34	30.5	31.2	30.9	31	29.06	29.15
11:15	28.8	28.8	28.6	28.6	28.1	28.1	28.2	28.4	28.2	32.4	33	33.7	33.9	30.4	30.24	32.3	33.1	32.7	32.7	30.23	30.51
11:30	28.9	28.9	28.8	28.7	28.3	28.3	28.4	28.5	28.4	33.8	34	34.8	35.1	31.1	30.91	33	34.1	33.4	33.3	30.16	30.53
11:45	29.1	29.1	29	28.9	28.5	28.4	28.6	28.7	28.6	34.1	34.7	35.5	35.8	31	30.83	33.4	34.4	33.9	34	30.78	31.13
12:00	29.3	29.4	29.2	29.1	28.7	28.6	28.8	29	28.9	33.1	33.8	34.5	34.8	30.4	30.51	32.6	33.4	33.1	33.4	30.6	30.73
12:15	29.6	29.6	29.4	29.4	28.9	28.8	28.9	29.2	29	35.1	35.7	36.3	36.8	31.8	31.6	35	36	35.5	35.5	32.45	32.82
12:30	29.8	29.9	29.6	29.6	29.1	29	29.1	29.4	29.2	35.5	36	37.2	37.6	33	32.38	34.9	36	35.7	35.7	32.02	32.04
12:45	30.1	30.2	29.9	29.9	29.4	29.3	29.4	29.7	29.4	37.4	37.5	38.7	39.1	33.7	33.65	36.3	38	37.3	37.2	32.29	32.6
13:00	30.4	30.5	30.1	30.2	29.7	29.5	29.7	30	29.7	34.7	35.5	36.7	37.1	31.9	31.92	35	36	35.6	35.9	32.02	31.98
13:15	30.7	30.8	30.4	30.4	29.9	29.8	29.9	30.2	29.8	36.9	37.1	38.5	39	33.3	33.12	37.4	39.2	38.2	38.1	33.11	33.47
13:30	31	31.1	30.7	30.7	30.2	30.1	30.2	30.5	30.1	35.1	35.6	36.8	37.2	32.3	32.34	35.8	36.9	36.5	36.6	32.69	32.98
13:45	31.3	31.3	31	31.1	30.5	30.3	30.4	30.8	30.4	36.5	37	38.4	39	33.9	33.99	37.7	39.1	38.7	38.7	34.37	34.48
14:00	31.5	31.6	31.3	31.4	30.8	30.6	30.7	31.1	30.7	37.2	37.6	39.3	39.8	34.1	34.35	38.4	39.9	39.5	39.6	34.87	34.91
14:15	31.8	31.9	31.5	31.6	31.1	30.9	31	31.3	30.9	34.5	35.2	36.4	36.8	31.5	31.77	36.4	37.4	37.1	37.5	31.96	32.03
14:30	32	32	31.6	31.8	31.3	31.1	31.1	31.4	30.8	33.8	34.1	35.4	35.8	31.1	31.2	35.8	36.4	36.3	36.5	31.72	32.01
14:45	32.2	32.2	31.8	32	31.6	31.3	31.2	31.5	31	33.7	34	35	35.3	30.7	30.9	34.6	35.1	35.3	35.5	31.55	31.7
15:00	32.3	32.3	31.9	32.2	31.8	31.4	31.4	31.6	31.1	34	34.2	35.1	35.6	31.2	31.27	34.8	35.3	35.6	35.6	31.76	31.78
15:15	32.4	32.3	32	32.3	31.9	31.6	31.5	31.7	31.2	33.1	33.3	34.1	34.5	30.3	30.6	33.4	33.6	34.3	34.3	30.74	30.55
15:30	32.4	32.4	32.1	32.4	32	31.7	31.6	31.8	31.2	33.6	33.7	34.5	34.9	30.7	31	35.2	35.9	35.5	35.3	31.23	31.74
15:45	32.5	32.4	32.2	32.5	32.1	31.8	31.7	31.9	31.5	35.7	35.8	36.8	37.2	33.1	33.16	42.7	45.1	38.3	38.2	34.45	36.28
16:00	32.5	32.4	32.3	32.6	32.2	31.9	31.9	32.1	31.6	33.7	34	34.6	34.9	31.8	31.89	36.7	37.7	35.6	35.9	32.64	32.74
16:15	32.6	32.4	32.3	32.6	32.3	32	31.9	32.1	31.6	33.8	33.9	34.4	34.8	31.8	31.83	36	36.5	35.6	35.7	32.49	32.74
16:30	32.6	32.5	32.3	32.7	32.5	32.1	31.9	32.1	31.6	33.5	33.6	34.2	34.5	31.1	31.11	35.8	36.3	35.4	35.5	31.65	32.16
16:45	32.6	32.5	32.3	32.7	32.6	32.2	32	32.1	31.6	33.5	33.6	34.2	34.5	31.3	31.4	35.5	35.9	35.8	35.7	31.63	31.95
17:00	32.6	32.5	32.4	32.7	32.7	32.3	32.1	32.2	31.6	33.5	33.6	34	34.3	31.2	31.25	35.3	35.7	35.4	35.5	31.63	31.97
17:15	32.7	32.4	32.4	32.7	32.8	32.3	32.1	32.2	31.7	33.5	33.5	34	34.2	31.3	31.31	36.8	37.4	37.3	37.3	32.44	32.95
17:30	32.6	32.4	32.4	32.7	32.8	32.3	32.1	32.2	31.6	32.9	33	33.3	33.6	30.9	30.96	36.1	36	36.6	36.8	31.89	32.26
17:45	32.6	32.4	32.4	32.7	32.8	32.4	32.2	32.2	31.6	32.4	32.3	32.8	33	30.5	30.66	34.3	34.3	34.6	34.9	31.11	31.05
18:00	32.6	32.4	32.4	32.7	32.8	32.4	32.2	32.3	31.6	32.3	32.1	32.5	32.8	30.3	30.58	33.4	33.2	33.5	33.8	30.34	30.3
18:15	32.6	32.3	32.3	32.6	32.8	32.4	32.2	32.3	31.5	32.1	31.8	32.1	32.4	30.3	30.5	32.9	32.7	33.1	33.2	30.84	30.81
18:30	32.5	32.3	32.3	32.6	32.8	32.4	32.2	32.2	31.5	31.6	31.4	31.7	31.9	29.9	30.12	32.3	32	32.4	32.6	30.18	30.21
18:45	32.4	32.2	32.2	32.5	32.8	32.3	32.1	32.2	31.5	31.3	31	31.2	31.4	29.5	29.77	31.7	31.4	31.7	31.8	29.67	29.59
19:00	32.3	32	32.1	32.4	32.7	32.2	32.1	32.1	31.3	31	30.7	30.8	30.9	29.2	29.31	31.4	31	31.3	31.4	29.5	29.48

	19:15	32.2	31.9	32	32.4	32.6	32.1	32	32	31.2	30.7	30.3	30.4	30.5	28.8	28.97	31	30.5	30.8	30.9	28.97	28.91
	19:30	32.1	31.8	31.9	32.2	32.4	32	31.9	31.9	31.1	30.4	30	29.9	30.1	28.4	28.62	30.5	30.1	30.3	30.4	28.45	28.5
	19:45	32	31.6	31.8	32.1	32.3	31.8	31.8	31.8	31	30.2	29.7	29.6	29.8	28	28.19	30.3	29.8	30	30.1	28.31	28.3
	20:00	31.9	31.5	31.7	32	32.1	31.7	31.7	31.7	31	30.1	29.6	29.4	29.6	28.1	28.3	30.1	29.6	29.8	29.9	28.4	28.24
	20:15	31.7	31.4	31.6	31.9	32	31.6	31.7	31.6	30.9	29.8	29.3	29.1	29.2	27.7	27.86	29.8	29.3	29.5	29.6	27.91	27.75
	20:30	31.6	31.2	31.5	31.7	31.8	31.5	31.5	31.5	30.8	29.6	29.1	28.8	28.9	27.6	27.69	29.6	29.1	29.2	29.3	27.46	27.38
	20:45	31.4	31	31.3	31.6	31.6	31.3	31.4	31.4	30.7	29.5	28.9	28.6	28.7	27.5	27.78	29.5	28.9	29	29.2	27.61	27.44
	21:00	31.3	30.9	31.2	31.4	31.5	31.2	31.3	31.3	30.4	29.3	28.8	28.5	28.5	27.4	27.5	29.3	28.8	28.8	29	27.83	27.6
	21:15	31.1	30.7	31	31.3	31.3	31	31.2	31.1	30.4	29.2	28.6	28.3	28.3	27.2	27.37	29.2	28.6	28.7	28.9	27.53	27.36
	21:30	31	30.6	30.9	31.1	31.1	30.8	31	31	29.9	29	28.4	28.2	28.2	27.1	27.2	29	28.4	28.5	28.7	27.55	27.59
	21:45	30.8	30.4	30.8	31	31	30.7	30.9	30.8	30	28.9	28.3	28	28	26.9	27.04	28.9	28.4	28.3	28.6	27.36	27.33
	22:00	30.7	30.3	30.6	30.8	30.8	30.6	30.8	30.7	29.7	28.7	28.2	27.9	27.9	26.9	26.99	28.7	28.2	28.1	28.4	27.23	27.18
	22:15	30.5	30.1	30.5	30.7	30.7	30.4	30.7	30.6	29.8	28.7	28.1	27.8	27.7	26.7	26.86	28.6	28.1	28	28.3	27.08	27.01
	22:30	30.4	30	30.4	30.5	30.5	30.3	30.5	30.5	29.6	28.5	28	27.7	27.6	26.6	26.6	28.5	28	27.9	28.1	26.91	27.12
	22:45	30.3	29.8	30.2	30.4	30.4	30.2	30.4	30.3	29.7	28.4	27.9	27.5	27.5	26.5	26.66	28.4	27.9	27.8	28	26.97	26.78
	23:00	30.1	29.7	30.1	30.2	30.2	30	30.3	30.2	29.5	28.3	27.8	27.5	27.4	26.5	26.51	28.2	27.8	27.7	27.9	26.79	26.89
	23:15	30	29.6	30	30.1	30.1	29.9	30.2	30.1	29.5	28.4	27.8	27.5	27.4	26.7	26.81	28.3	27.9	27.7	27.9	26.94	26.96
	23:30	29.9	29.5	29.9	30	30	29.8	30.1	30	29.3	28.2	27.7	27.4	27.3	26.7	26.74	28.1	27.7	27.6	27.8	26.46	26.43
	23:45	29.8	29.4	29.7	29.8	29.9	29.7	29.9	29.9	29.4	28.3	27.7	27.4	27.3	26.5	26.59	28.1	27.7	27.6	27.8	26.66	26.61
08/08/2009	00:00	29.7	29.3	29.6	29.7	29.8	29.6	29.9	29.8	29.3	28.2	27.6	27.3	27.2	26.5	26.56	28.1	27.7	27.6	27.8	27.01	26.92
	00:15	29.5	29.2	29.5	29.6	29.6	29.4	29.7	29.7	29	28.1	27.6	27.3	27.2	26.6	26.62	28	27.7	27.5	27.7	26.92	27
	00:30	29.4	29	29.4	29.5	29.5	29.3	29.6	29.6	28.9	28	27.5	27.2	27.2	26.5	26.5	27.9	27.6	27.4	27.6	26.78	26.75
	00:45	29.3	29	29.3	29.4	29.4	29.3	29.5	29.5	28.9	28	27.5	27.2	27.1	26.3	26.42	27.8	27.4	27.3	27.5	26.61	26.6
	01:00	29.2	28.9	29.2	29.3	29.3	29.2	29.4	29.4	28.9	27.8	27.3	27.1	27	26.2	26.29	27.7	27.3	27.2	27.4	26.43	26.33
	01:15	29.1	28.8	29.1	29.2	29.2	29.1	29.4	29.3	28.9	27.8	27.3	27	26.9	26.2	26.3	27.6	27.2	27.1	27.3	26.45	26.28
	01:30	29.1	28.7	29	29.1	29.1	29	29.3	29.2	28.6	27.6	27.2	27	26.8	26.2	26.22	27.6	27.2	27.1	27.3	26.51	26.6
	01:45	29	28.6	28.9	29	29	28.9	29.2	29.1	28.5	27.6	27.2	26.9	26.8	26.2	26.2	27.5	27.2	27.1	27.3	26.52	26.49
	02:00	28.9	28.5	28.9	28.9	28.9	28.8	29.1	29	28.6	27.6	27.1	26.8	26.8	26.2	26.28	27.5	27.2	27	27.2	26.5	26.35
	02:15	28.8	28.5	28.8	28.8	28.8	28.8	29	28.9	28.6	27.5	27.1	26.8	26.7	26.2	26.21	27.3	27	26.9	27.1	26.33	26.25
	02:30	28.7	28.4	28.7	28.7	28.8	28.7	28.9	28.9	28.6	27.5	27.1	26.8	26.7	26.3	26.36	27.4	27	27	27.1	26.43	26.34
	02:45	28.6	28.3	28.6	28.6	28.7	28.6	28.8	28.8	28.3	27.3	26.9	26.7	26.6	26.1	26.14	27.3	27	26.9	27.1	26.41	26.51
	03:00	28.5	28.3	28.5	28.5	28.6	28.5	28.8	28.7	28.4	27.3	26.9	26.7	26.5	25.9	25.98	27.2	26.9	26.8	27	26.15	26.09
	03:15	28.5	28.2	28.5	28.5	28.5	28.4	28.7	28.6	28.2	27.2	26.9	26.6	26.5	25.9	25.92	27.1	26.8	26.8	27	26.16	26.26
	03:30	28.4	28.1	28.4	28.4	28.4	28.4	28.6	28.5	28.3	27.2	26.8	26.6	26.5	26	26.06	27.1	26.8	26.7	26.9	26.3	26.26
	03:45	28.3	28.1	28.3	28.3	28.4	28.3	28.6	28.5	28.2	27.2	26.7	26.5	26.4	25.8	25.89	26.9	26.7	26.6	26.8	26.12	25.97
	04:00	28.2	28	28.3	28.2	28.3	28.2	28.5	28.4	28.1	27	26.6	26.4	26.3	25.7	25.85	26.9	26.6	26.5	26.7	26.04	25.87
	04:15	28.2	27.9	28.2	28.2	28.2	28.2	28.4	28.3	27.9	26.9	26.5	26.3	26.2	25.8	25.83	26.8	26.5	26.4	26.6	26	26.01
	04:30	28.1	27.9	28.1	28.1	28.1	28.1	28.3	28.3	28	26.8	26.4	26.2	26.1	25.5	25.6	26.6	26.3	26.3	26.4	25.81	25.62
	04:45	28	27.8	28	28	28.1	28	28.3	28.2	27.9	26.6	26.2	26	25.9	25.4	25.41	26.4	26.1	26.2	26.3	25.56	25.5
	05:00	27.9	27.7	28	27.9	28	28	28.2	28.1	27.8	26.6	26.2	26	25.9	25.4	25.47	26.5	26.2	26.2	26.4	25.65	25.59
	05:15	27.9	27.6	27.9	27.9	27.9	27.9	28.1	28	27.6	26.5	26.1	25.9	25.8	25.3	25.34	26.4	26.1	26.1	26.3	25.56	25.53
	05:30	27.8	27.6	27.8	27.8	27.8	27.8	28	27.9	27.7	26.4	26	25.7	25.6	24.9	25.08	26.2	26	25.9	26.1	25.36	25.19
	05:45	27.7	27.5	27.7	27.7	27.7	27.7	28	27.9	27.5	26.2	25.9	25.7	25.6	25.1	25.13	26.1	25.8	25.8	26	25.21	25.07
	06:00	27.6	27.4	27.7	27.6	27.7	27.6	27.9	27.8	27.3	26.1	25.8	25.6	25.5	25.1	25.1	26.1	25.8	25.8	25.9	25.3	25.36
	06:15	27.5	27.3	27.6	27.6	27.6	27.6	27.8	27.7	27.2	26.2	25.9	25.7	25.5	25.2	25.22	26.2	25.9	25.9	26	25.59	25.48
	06:30	27.5	27.3	27.5	27.5	27.5	27.5	27.7	27.6	27.4	26.2	25.8	25.6	25.5	25	25.04	26.1	25.8	25.7	25.9	25.2	25.12
	06:45	27.4	27.2	27.4	27.4	27.4	27.4	27.7	27.6	27.3	26.2	25.8	25.6	25.5	24.9	25.07	26.1	25.9	25.8	25.9	25.33	25.23

07:00	27.3	27.1	27.4	27.3	27.4	27.4	27.6	27.5	27.2	26.2	25.8	25.6	25.5	25.3	25.34	26	25.8	25.7	25.8	25.31	25.22
07:15	27.2	27	27.3	27.3	27.3	27.3	27.5	27.5	27	25.9	25.6	25.4	25.3	24.9	24.93	25.8	25.5	25.5	25.7	25.16	25.25
07:30	27.2	27	27.2	27.2	27.2	27.2	27.5	27.4	27	26	25.7	25.6	25.4	24.9	24.89	25.8	25.6	25.5	25.7	25.01	25.12
07:45	27.1	26.9	27.2	27.1	27.2	27.2	27.4	27.3	27	26.4	26.1	26.1	25.9	25.3	25.21	26	25.8	25.8	25.9	25.22	25.12
08:00	27	26.9	27.1	27.1	27.1	27.1	27.3	27.3	27.1	26.5	26.3	26.2	26.1	25.6	25.48	26.3	26.2	26	26.1	25.4	25.35
08:15	27	26.8	27.1	27	27	27.1	27.3	27.2	27	26.8	26.6	26.5	26.4	25.9	25.83	26.5	26.5	26.4	26.5	25.73	25.77
08:30	27	26.8	27.1	27	27	27.1	27.3	27.2	27.1	27.9	27.7	28	27.9	26.6	26.41	26.9	27	26.8	26.9	26.14	26.19
08:45	27	26.8	27	27	27	27	27.2	27.2	27.1	30.6	30.4	31.3	31.1	28.2	28.1	27.4	27.6	27.5	27.6	26.61	26.69
09:00	27	26.9	27.1	27	27	27	27.3	27.2	27.2	30.3	30.8	31.4	31.3	28.2	28.11	27.9	28.1	28	28.1	27.34	27.36
09:15	27.1	27	27.1	27	27	27.1	27.3	27.3	27.3	32.5	32.9	34.3	34.1	29.8	29.59	28.7	29.1	28.9	29	27.8	27.84
09:30	27.3	27.2	27.3	27.1	27.1	27.1	27.4	27.4	27.4	32.5	33.4	34.8	34.6	29.8	29.56	29.2	29.8	29.4	29.5	27.84	27.91
09:45	27.5	27.5	27.4	27.3	27.2	27.2	27.5	27.5	27.5	34.7	35.7	37.3	37.3	30.7	30.68	29.7	30.3	30.2	30.3	28.82	28.84
10:00	27.8	27.8	27.7	27.5	27.3	27.4	27.6	27.7	27.9	36.4	38.4	39.7	39.6	30.9	30.66	30.5	31.1	31	31.2	29.35	29.34
10:15	28.1	28.2	28	27.8	27.5	27.6	27.9	28	28.1	38.3	40.5	38.6	38.2	32.7	30.99	31.3	32	32.1	32.3	30.33	30.24
10:30	28.5	28.7	28.3	28.1	27.8	27.8	28	28.3	28.2	39.2	41	38.1	38.3	34	31.56	31.3	32.2	32.2	32.4	29.46	29.49
10:45	29	29.2	28.7	28.5	28	28	28.3	28.5	28.5	39	41	37.6	37.9	32.7	30.73	32.1	32.9	33.2	33.4	31.02	30.84
11:00	29.5	29.7	29	28.8	28.3	28.2	28.5	28.8	28.9	39.7	41.7	37.7	38.1	33.8	31.48	33	33.8	34.2	34.4	31.63	31.44
11:15	30.1	30.3	29.4	29.2	28.5	28.5	28.8	29.2	29	39.5	41.5	38	38.3	34.6	32.51	33.3	34.2	34.7	34.9	31.68	31.64
11:30	30.6	30.8	29.8	29.7	28.9	28.8	29.1	29.5	29.6	37.8	38.9	38.6	39	33.4	33.61	34.4	35.5	36	36	32.37	32.25
11:45	31.1	31.3	30.1	30.1	29.2	29.1	29.4	29.9	30.1	38.3	39.1	38.8	39.3	33.3	32.94	35.5	36.7	36.8	37	33.6	33.59
12:00	31.5	31.7	30.5	30.5	29.4	29.4	29.7	30.2	29.9	37.1	37.8	38.3	38.6	33.5	33.07	34.6	35.6	36	36.1	32.41	32.39
12:15	32	32.1	30.8	30.9	29.8	29.7	30	30.5	30.5	37.4	38.2	38.5	38.9	33.3	33.26	35.2	36.2	36.4	36.6	32.96	32.96
12:30	32.2	32.4	31.1	31.2	30.1	30	30.3	30.7	30.7	37.4	38.1	38.6	38.9	33.3	33.31	35.9	37	37.1	37.1	33.13	33.23
12:45	32.5	32.6	31.3	31.5	30.4	30.2	30.5	31	30.9	36.2	36.8	37.5	37.9	32.8	32.86	34.6	35.5	35.7	35.9	32.43	32.28
13:00	32.7	32.8	31.6	31.8	30.7	30.5	30.8	31.2	31	36.8	37.5	38.2	38.6	32.9	33.09	36	37	37.2	37.2	33.19	33.23
13:15	32.9	33	31.9	32.1	31	30.8	31	31.5	31.5	38.3	38.8	39.6	40.2	34.3	34.52	37.8	39.3	39.1	39	34.81	34.99
13:30	33.2	33.2	32.1	32.4	31.3	31.1	31.3	31.8	31.7	38.6	39.3	40.1	40.5	34.7	35.06	38.7	40.3	40.2	40.3	35.62	35.52
13:45	33.4	33.4	32.4	32.7	31.6	31.4	31.7	32.1	31.9	38	38.9	39.6	40	33.8	34.09	37.7	39	38.9	39.3	34.43	34.43
14:00	33.6	33.6	32.6	33	31.9	31.6	31.8	32.3	32	37.8	38.2	39.4	40	34.2	34.31	37.6	38.7	38.9	39	34.41	34.59
14:15	33.8	33.8	32.9	33.2	32.2	31.9	32.1	32.5	32.2	38.2	38.4	39.7	40.2	34.1	34.37	41.9	43.3	39.9	39.8	34.74	36.82
14:30	34	33.9	33.1	33.4	32.5	32.1	32.3	32.8	32.4	38.7	39.1	40.3	40.8	34.7	34.77	43.8	45.6	40.5	40.5	35.89	38.09
14:45	34.2	34.1	33.3	33.7	32.7	32.4	32.5	32.9	32.6	38.8	39.2	40.4	41	35.1	35.36	44.1	46.5	40.4	40.4	35.34	37.38
15:00	34.4	34.2	33.5	33.9	33	32.7	32.8	33.2	32.9	39.1	39.3	41.1	41.6	35	35.4	48.4	51.9	41.1	41.2	35	38.04
15:15	34.6	34.4	33.7	34.1	33.4	33	33.1	33.4	33	38.2	38.5	40.1	40.6	34.4	34.87	46.3	48.8	40.7	40.8	35.86	38.32
15:30	34.7	34.5	33.9	34.3	33.7	33.2	33.2	33.6	33.1	37.1	37.4	38.6	39.2	33.6	33.84	41.1	42.6	39.1	39.3	34.7	35.83
15:45	34.9	34.6	34	34.5	34.2	33.6	33.4	33.7	33.3	36.7	37	38.1	38.6	33.5	33.9	42	43.3	39.3	39.5	34.9	35.52
16:00	35	34.7	34.2	34.6	34.5	33.9	33.6	33.9	33.4	37.9	37.9	39.5	40	34.5	34.75	51.1	54.4	41.4	41.2	39.31	40.59
16:15	35.1	34.8	34.4	34.8	34.9	34.2	33.8	34.1	33.6	37.6	37.7	39.3	39.7	34.3	34.53	52.2	55.8	53	51.3	39.81	40.76
16:30	35.2	34.9	34.5	34.9	35.2	34.5	34	34.3	33.8	37.4	37.5	38.9	39.4	34.5	34.83	53	56.8	54.8	54.4	39.39	41.04
16:45	35.2	34.9	34.6	35	35.5	34.7	34.1	34.4	33.9	37.2	37.3	38.6	39.1	34.2	34.61	52.9	56.7	56.2	55.9	39.88	40.11
17:00	35.3	35	34.7	35.2	35.9	35.1	34.4	34.6	34	37.2	37.3	38.7	39.1	34.4	34.75	54.7	58.5	58.5	58.6	40.76	41.07
17:15	35.4	35	34.8	35.3	36.3	35.4	34.7	34.8	34.2	37.1	37.1	38.6	38.9	34.2	34.54	55.5	59.2	60	59.9	40.09	40.61
17:30	35.5	35.1	34.9	35.4	36.8	35.8	35	35	34.3	36.5	36.4	37.6	38	33.4	33.66	51.3	48.9	55.1	55.6	38.22	38.84
17:45	35.5	35.1	35	35.4	37.2	36.1	35.2	35.2	34.3	36.2	36	37.2	37.5	33.3	33.63	46	48.1	55.2	55.4	37.47	35.73
18:00	35.5	35.1	35	35.5	37.5	36.4	35.5	35.4	34.3	35.6	35.5	36.5	36.8	33.1	33.34	42.8	42.8	47.1	47.3	35.51	35.22
18:15	35.5	35.1	35	35.5	37.8	36.6	35.7	35.5	34.3	35.3	35.1	36	36.3	32.9	33.14	40.5	40.2	43.4	43.7	34.1	34.17
18:30	35.4	35	35	35.5	37.9	36.7	35.9	35.7	34.2	34.9	34.6	35.4	35.7	32.2	32.47	39.6	39.2	42.1	42	33.48	33.26
18:45	35.4	35	35	35.5	37.9	36.7	36	35.7	34.2	34.4	34	34.7	34.9	32	32.3	38.5	37.9	40.6	40.5	33.21	33.13

	19:00	35.3	34.8	34.9	35.4	37.8	36.6	36	35.8	34.1	33.8	33.4	33.9	34.2	31.4	31.68	37.2	36.5	38.8	38.7	32	31.75
	19:15	35.2	34.7	34.9	35.3	37.6	36.4	36	35.7	34	33.3	32.8	33.1	33.4	30.6	30.85	36.1	35.4	37.3	37.2	31.1	30.61
	19:30	35	34.6	34.8	35.2	37.3	36.2	35.9	35.6	33.9	32.9	32.3	32.5	32.7	30	30.38	35.3	34.4	36	36	30.67	30.27
	19:45	34.9	34.4	34.6	35.1	37.1	36	35.7	35.5	33.7	32.6	31.9	32.1	32.3	30.1	30.39	34.7	33.7	35.1	35.1	30.49	30.28
	20:00	34.7	34.2	34.5	35	36.8	35.7	35.6	35.4	33.6	32.3	31.6	31.7	31.9	29.8	30.02	34.1	33.2	34.3	34.4	30.27	29.89
	20:15	34.5	34	34.3	34.8	36.5	35.5	35.4	35.2	33.6	32.1	31.4	31.3	31.5	29.4	29.65	33.7	32.7	33.7	33.8	29.62	29.23
	20:30	34.4	33.8	34.2	34.6	36.2	35.2	35.2	35	33.4	31.9	31.1	30.9	31.1	29.1	29.35	33.3	32.3	33.1	33.2	29.35	28.85
	20:45	34.2	33.6	34	34.4	35.9	34.9	35	34.8	33.2	31.7	30.9	30.7	30.8	29.1	29.22	32.9	31.9	32.5	32.7	28.9	28.68
	21:00	34	33.4	33.8	34.2	35.6	34.7	34.8	34.6	33.1	31.5	30.7	30.4	30.5	28.9	29.04	32.6	31.6	32.1	32.3	29.01	28.71
	21:15	33.8	33.2	33.6	34	35.3	34.4	34.5	34.4	32.9	31.2	30.4	30.1	30.2	28.7	28.99	32.3	31.3	31.7	31.9	28.66	28.5
	21:30	33.6	33	33.4	33.8	35	34.1	34.3	34.2	32.7	31	30.2	29.8	29.9	28.2	28.39	32	31	31.3	31.5	28.83	28.61
	21:45	33.4	32.8	33.2	33.6	34.7	33.9	34.1	34	32.6	30.9	30	29.6	29.7	28.1	28.3	31.7	30.7	30.9	31.2	28.72	28.3
	22:00	33.2	32.6	33.1	33.4	34.4	33.6	33.9	33.8	32.4	30.6	29.7	29.3	29.4	27.8	28.01	31.4	30.4	30.5	30.9	28.39	27.99
	22:15	33	32.4	32.9	33.2	34.1	33.4	33.7	33.6	32.2	30.4	29.5	29.1	29.2	28	28.03	31.1	30.1	30.2	30.5	27.93	27.65
	22:30	32.8	32.2	32.7	33	33.8	33.1	33.4	33.4	31.5	30.1	29.3	29	28.9	27.4	27.51	30.8	29.9	29.9	30.3	28.06	28.14
	22:45	32.6	32	32.5	32.8	33.6	32.9	33.2	33.2	31.9	30	29.1	28.7	28.7	27.4	27.54	30.6	29.6	29.7	30	27.65	27.43
	23:00	32.4	31.8	32.3	32.6	33.3	32.7	33	33	31.8	29.8	29	28.6	28.6	27.1	27.32	30.3	29.4	29.4	29.8	27.51	27.29
	23:15	32.2	31.7	32.2	32.4	33.1	32.5	32.8	32.8	31.6	29.7	28.8	28.4	28.4	26.8	27.11	30.1	29.3	29.2	29.6	27.51	27.34
	23:30	32.1	31.5	32	32.2	32.9	32.3	32.6	32.6	31.3	29.5	28.7	28.2	28.2	26.9	26.96	29.9	29	29	29.4	27.55	27.33
	23:45	31.9	31.3	31.8	32	32.6	32.1	32.4	32.4	31.3	29.3	28.5	28.1	28	26.9	26.98	29.7	28.9	28.8	29.2	27.12	27.02
09/08/2009	00:00	31.7	31.1	31.6	31.8	32.4	31.9	32.2	32.2	31	29.2	28.3	27.9	27.8	26.4	26.64	29.5	28.6	28.6	29	26.97	26.86
	00:15	31.5	30.9	31.5	31.6	32.2	31.7	32	32	30.7	28.9	28.1	27.7	27.6	26.3	26.33	29.3	28.4	28.3	28.8	26.91	26.84
	00:30	31.3	30.8	31.3	31.4	32	31.5	31.9	31.8	30.7	28.8	28	27.5	27.5	26.3	26.43	29	28.3	28.1	28.6	26.49	26.34
	00:45	31.2	30.6	31.1	31.2	31.8	31.3	31.7	31.6	30.6	28.6	27.8	27.4	27.3	26.1	26.23	28.8	28.1	28	28.4	26.71	26.45
	01:00	31	30.4	31	31.1	31.6	31.1	31.5	31.5	30.2	28.4	27.7	27.3	27.1	26	25.98	28.7	27.9	27.8	28.2	26.52	26.57
	01:15	30.8	30.3	30.8	30.9	31.3	30.9	31.3	31.2	30.2	28.3	27.5	27.1	27	26	25.99	28.5	27.8	27.6	28.1	26.24	26.04
	01:30	30.7	30.1	30.6	30.7	31.2	30.8	31.2	31.1	30.2	28.3	27.4	27	26.9	25.9	26.06	28.4	27.6	27.5	27.9	26.33	26
	01:45	30.5	30	30.5	30.6	31	30.6	31	30.9	29.8	28	27.3	26.9	26.8	25.7	25.77	28.1	27.4	27.3	27.7	26.25	26.15
	02:00	30.3	29.8	30.3	30.4	30.8	30.4	30.8	30.7	29.8	27.9	27.1	26.7	26.6	25.4	25.49	28	27.3	27.2	27.6	25.8	25.66
	02:15	30.1	29.6	30.2	30.2	30.5	30.2	30.6	30.5	29.2	27.6	27	26.6	26.4	25.4	25.44	27.9	27.1	27	27.4	25.89	26.36
	02:30	30	29.5	30	30	30.4	30.1	30.4	30.4	29.3	27.7	27	26.6	26.4	25.8	25.86	27.8	27.1	27	27.4	26.14	26.1
	02:45	29.8	29.3	29.8	29.9	30.2	29.9	30.3	30.2	29.5	27.5	26.9	26.5	26.4	25.6	25.69	27.7	27	26.9	27.3	25.98	25.84
	03:00	29.7	29.2	29.7	29.7	30	29.8	30.2	30.1	29.2	27.7	27	26.7	26.5	26.1	26.21	27.7	27.1	27	27.3	26.33	26.13
	03:15	29.5	29.1	29.6	29.6	29.9	29.7	30	29.9	29.2	27.5	26.8	26.5	26.3	25.5	25.62	27.5	26.9	26.8	27.1	26.17	25.95
	03:30	29.4	28.9	29.4	29.4	29.7	29.5	29.8	29.8	28.7	27.2	26.6	26.4	26.1	25.6	25.57	27.3	26.7	26.7	27	25.89	26.07
	03:45	29.2	28.8	29.3	29.3	29.5	29.3	29.7	29.6	28.9	27.2	26.6	26.3	26.1	25.7	25.78	27.3	26.7	26.6	26.9	26.11	26.13
	04:00	29.1	28.7	29.2	29.1	29.4	29.2	29.6	29.5	28.8	27.1	26.5	26.2	26	25.5	25.52	27.1	26.6	26.5	26.8	25.76	25.75
	04:15	29	28.6	29	29	29.3	29.1	29.4	29.3	28.7	27	26.4	26.1	25.9	25.3	25.34	27	26.4	26.3	26.7	25.49	25.37
	04:30	28.9	28.5	28.9	28.9	29.1	29	29.3	29.2	28.5	26.9	26.3	26	25.8	25.2	25.21	26.8	26.3	26.2	26.5	25.46	25.59
	04:45	28.7	28.3	28.8	28.8	29	28.8	29.2	29.1	28.3	26.8	26.2	26	25.8	25.3	25.35	26.8	26.3	26.2	26.5	25.61	25.7
	05:00	28.6	28.2	28.7	28.6	28.9	28.7	29.1	29	28.4	26.7	26.1	25.9	25.7	25.1	25.18	26.7	26.2	26.1	26.4	25.48	25.57
	05:15	28.5	28.1	28.6	28.5	28.7	28.6	29	28.9	28.2	26.6	26.1	25.8	25.6	25.2	25.29	26.6	26.1	26	26.3	25.36	25.27
	05:30	28.4	28	28.5	28.4	28.6	28.5	28.8	28.7	28.2	26.6	26	25.8	25.6	25.3	25.35	26.5	26	25.9	26.2	25.08	25.07
	05:45	28.3	27.9	28.4	28.3	28.5	28.4	28.7	28.6	28	26.4	25.9	25.7	25.5	24.8	24.84	26.4	25.9	25.8	26.1	25.18	25.1
	06:00	28.2	27.8	28.3	28.2	28.4	28.3	28.6	28.5	28.1	26.4	25.8	25.5	25.4	24.6	24.81	26.3	25.8	25.7	26	25.2	24.96
	06:15	28.1	27.7	28.2	28.1	28.3	28.2	28.5	28.4	28	26.3	25.7	25.5	25.3	24.8	24.84	26.1	25.7	25.6	25.9	24.96	24.91
	06:30	28	27.6	28.1	28	28.2	28.1	28.4	28.3	27.9	26.2	25.6	25.4	25.2	24.7	24.82	26.1	25.6	25.6	25.8	25.1	24.93

06:45	27.8	27.5	28	27.9	28	28	28.3	28.2	27.6	26	25.5	25.3	25.1	24.4	24.47	26	25.5	25.5	25.7	24.92	24.97
07:00	27.7	27.4	27.8	27.8	27.9	27.9	28.2	28.1	27.3	25.8	25.4	25.2	24.9	24.3	24.34	25.8	25.4	25.4	25.6	24.8	24.86
07:15	27.6	27.4	27.8	27.7	27.8	27.8	28.1	28	27.3	25.8	25.4	25.2	25	24.4	24.42	25.8	25.4	25.4	25.6	24.82	24.95
07:30	27.5	27.2	27.6	27.6	27.7	27.6	28	27.9	27.1	26	25.6	25.4	25.2	24.4	24.45	25.9	25.5	25.4	25.7	24.75	24.97
07:45	27.4	27.2	27.6	27.5	27.6	27.6	27.9	27.8	27.1	26.6	26.2	26.1	25.9	24.9	24.84	26.1	25.8	25.7	26	25.07	25.24
08:00	27.3	27.1	27.5	27.4	27.5	27.5	27.8	27.7	27.3	27.7	27.4	27.5	27.4	25.7	25.67	26.6	26.4	26.2	26.4	25.47	25.42
08:15	27.3	27.1	27.4	27.3	27.5	27.5	27.8	27.7	27.4	28.9	28.7	29.2	29	26.6	26.6	27.1	27	26.8	27	25.89	25.93
08:30	27.3	27.1	27.4	27.3	27.4	27.4	27.7	27.6	27.5	30.7	30.8	31.9	31.6	27.7	27.72	27.5	27.6	27.4	27.6	26.37	26.41
08:45	27.3	27.2	27.4	27.3	27.4	27.4	27.7	27.6	27.5	32.7	33.1	34.1	34.2	28.4	28.42	28.2	28.4	28.1	28.3	27.19	27.19
09:00	27.4	27.3	27.5	27.3	27.4	27.4	27.7	27.7	27.6	32.7	33.4	34.7	34.6	28.4	28.74	28.5	28.7	28.4	28.7	27.31	27.36
09:15	27.6	27.6	27.6	27.4	27.5	27.5	27.8	27.8	27.8	35.3	36.4	38.3	38.2	30.7	30.85	29.3	29.7	29.4	29.7	28.22	28.43
09:30	27.9	27.9	27.9	27.6	27.6	27.6	27.9	27.9	27.9	37	38.5	41.3	40.9	32.9	32.59	30	30.5	30.4	30.6	28.69	28.78
09:45	28.3	28.3	28.2	27.9	27.7	27.7	28.1	28.2	28.1	37.5	39.4	42	42	32.1	32.63	30.5	31.1	31.1	31.3	29.44	29.42
10:00	28.7	28.8	28.5	28.2	27.9	27.9	28.3	28.4	28.5	38.2	39.6	42.1	42.1	32.6	31.65	30.9	31.5	31.6	31.9	29.61	29.61
10:15	29.1	29.3	28.9	28.6	28.1	28.1	28.4	28.7	28.6	40.3	42.4	41.1	40.5	35.4	32.42	31.8	32.7	32.7	32.9	30.41	30.26
10:30	29.6	29.8	29.3	29	28.3	28.3	28.7	29	29	39.4	41.8	39.7	39.9	33.5	32.28	32.4	33.2	33.4	33.7	31	31.05
10:45	30.1	30.4	29.7	29.4	28.6	28.6	28.9	29.3	29.2	39.4	41.3	39.6	39.9	34.5	32.79	32.9	33.7	33.9	34.2	31.4	31.31
11:00	30.7	30.9	30.1	29.9	28.9	28.9	29.2	29.6	29.6	40	41.8	39.7	40	35.6	33.32	33.6	34.6	34.9	35	31.18	31.28
11:15	31.2	31.4	30.5	30.3	29.2	29.1	29.5	30	29.8	38.4	39.8	39	39.3	33.6	32.8	33.8	34.7	34.9	35.2	32.22	32.09
11:30	31.7	31.9	30.8	30.7	29.5	29.5	29.8	30.3	30.3	38.3	39.4	39.4	39.8	33.9	33.52	34.6	35.7	35.9	36.1	32.05	32.01
11:45	32.1	32.3	31.2	31.2	29.8	29.7	30.1	30.6	30.5	38.3	39	39.5	39.9	33.7	33.47	35.1	36.2	36.7	36.8	33.01	32.96
12:00	32.5	32.7	31.5	31.5	30.1	30	30.4	31	30.8	38.2	38.8	39.7	40.3	33.9	34.11	35.5	36.5	37.1	37.2	33.59	33.38
12:15	32.8	33	31.8	31.9	30.5	30.4	30.7	31.3	31.1	38.5	39	40.1	40.6	35	35.04	36.3	37.6	38.1	37.9	33.76	33.75
12:30	33.1	33.2	32.1	32.2	30.7	30.6	30.9	31.5	31.2	36.7	37.3	38.2	38.7	32.9	32.97	35.3	36	36.4	36.5	32.86	33.14
12:45	33.3	33.4	32.3	32.5	31	30.9	31.2	31.7	31.4	36.8	37.5	38.5	38.9	33.5	33.35	35.8	36.8	37	37.1	33.34	33.38
13:00	33.5	33.5	32.5	32.8	31.3	31.1	31.4	31.9	31.6	37	37.4	38.2	38.7	33.7	33.57	36.4	37.4	37.4	37.5	33.83	34.36
13:15	33.7	33.7	32.7	33	31.6	31.4	31.6	32.1	31.8	39	39.2	40.2	40.8	35.1	35.1	37.9	39.3	38.9	38.8	34.53	34.79
13:30	33.8	33.8	33	33.3	31.8	31.6	31.9	32.3	32	36.8	37.4	38.2	38.7	33.4	33.44	36.5	37.4	37.6	37.6	33.53	33.91
13:45	34	33.9	33.1	33.5	32.1	31.8	32	32.5	32.1	37	37.3	38.3	38.9	34.2	34.03	36.8	37.7	37.7	37.6	33.22	33.38
14:00	34.1	34	33.3	33.6	32.3	32	32.2	32.7	32.2	36.5	36.8	37.7	38.2	33.5	33.73	36	36.8	37	37	32.94	33.02
14:15	34.2	34.1	33.4	33.8	32.5	32.2	32.4	32.8	32.4	37	37.3	38	38.6	34	34.09	37	38	37.6	37.6	33.34	33.73
14:30	34.3	34.1	33.5	33.9	32.7	32.4	32.5	32.9	32.5	36.8	37.1	37.6	38.1	33.9	33.63	37.2	38.1	38.3	38.1	33.47	33.76
14:45	34.4	34.2	33.6	34.1	32.9	32.6	32.7	33.1	32.7	38.2	38.4	39.3	39.8	35	35.25	41.3	43.1	39.4	39.4	34.85	37.01
15:00	34.5	34.2	33.8	34.2	33.1	32.7	32.9	33.3	32.8	37	37.4	38	38.3	33.7	33.8	37.1	38	37.4	37.5	33.67	33.42
15:15	34.5	34.3	33.9	34.3	33.2	32.9	33	33.4	32.9	36	36.1	36.8	37.3	32.7	32.87	36.4	37	37.1	37.1	32.44	32.35
15:30	34.6	34.4	33.9	34.4	33.4	33	33.1	33.4	32.9	35.7	35.7	36.4	36.9	32.9	33.02	36.6	37.2	37	37.1	33.1	33.17
15:45	34.6	34.4	34	34.4	33.6	33.2	33.2	33.5	33	35.4	35.4	36	36.4	32.4	32.49	36.3	36.8	36.9	36.9	33.01	33.14
16:00	34.7	34.4	34	34.5	33.7	33.3	33.3	33.6	33	35.9	35.9	36.3	36.7	32.5	32.57	37.4	38.1	37.8	37.8	33.76	33.96
16:15	34.7	34.3	34	34.5	33.8	33.4	33.4	33.6	33	35.6	35.6	36	36.3	32.4	32.44	36.8	37.4	37.3	37.4	33.53	33.35
16:30	34.7	34.3	34.1	34.5	33.9	33.4	33.5	33.7	33.1	35.6	35.5	36	36.4	32.6	32.77	36.8	37.3	37.3	37.3	32.85	32.93
16:45	34.6	34.3	34.1	34.5	33.9	33.5	33.5	33.7	33.1	35.4	35.3	35.7	36.1	32.5	32.59	36.6	37.1	37.1	37.1	32.59	32.66
17:00	34.6	34.2	34.1	34.5	34	33.5	33.5	33.7	33.2	34.9	34.8	35.1	35.4	32.5	32.39	35.5	35.8	36	36.1	32.02	31.99
17:15	34.6	34.2	34.1	34.5	34	33.6	33.6	33.8	33.2	35.2	35	35.3	35.7	32.4	32.63	37.3	37.9	38.1	38	33.4	33.48
17:30	34.6	34.2	34.1	34.5	34.1	33.6	33.7	33.8	33.2	35.3	35.1	35.5	35.9	32.7	32.79	38	37.8	39.1	39	33.48	33.64
17:45	34.5	34.1	34	34.5	34.1	33.6	33.7	33.8	33.1	34.6	34.5	34.7	35	31.9	32.02	35.6	35.7	36.2	36.4	32.65	32.59
18:00	34.5	34.1	34	34.4	34.1	33.6	33.7	33.8	33.1	34.2	34	34.2	34.5	31.6	31.77	35	34.9	35.5	35.6	32.29	32.41
18:15	34.4	34	34	34.4	34.1	33.6	33.7	33.8	32.9	33.6	33.4	33.5	33.7	31.1	31.28	34.1	33.8	34.4	34.6	31.58	31.86
18:30	34.3	33.9	33.9	34.3	34.1	33.6	33.6	33.7	33	33.1	32.7	32.8	33.1	30.1	30.44	33.3	32.9	33.5	33.6	30.38	30.27

	18:45	34.2	33.8	33.8	34.2	34	33.5	33.5	33.6	32.5	32.6	32.2	32.2	32.3	29.6	29.74	32.7	32.2	32.8	33	30.16	30.34
	19:00	34.1	33.6	33.7	34	33.9	33.4	33.5	33.5	32.5	32.1	31.7	31.6	31.8	29.3	29.5	32	31.5	32	32.1	29.26	29.19
	19:15	33.9	33.4	33.5	33.9	33.7	33.2	33.3	33.4	32	31.7	31.3	31.2	31.2	28.9	29	31.8	31.2	31.7	31.9	29.49	29.56
	19:30	33.7	33.2	33.4	33.7	33.6	33.1	33.2	33.2	32.3	31.4	30.9	30.6	30.8	28.1	28.25	31.3	30.8	31.1	31.3	28.63	28.53
	19:45	33.6	33.1	33.3	33.6	33.4	33	33.1	33.1	31.9	31.3	30.7	30.4	30.5	28.3	28.45	31.1	30.5	30.9	31.1	28.9	28.82
	20:00	33.4	32.9	33.1	33.4	33.3	32.8	33	33	31.8	31	30.5	30.2	30.2	28.1	28.27	30.9	30.3	30.6	30.8	28.8	28.72
	20:15	33.2	32.7	32.9	33.3	33.1	32.7	32.9	32.9	31.9	31	30.4	29.9	30	28.1	28.29	30.7	30.1	30.3	30.5	28.55	28.36
	20:30	33	32.5	32.8	33.1	32.9	32.5	32.8	32.8	31.5	30.7	30.1	29.7	29.7	27.8	27.82	30.6	30	30.1	30.4	28.46	28.41
	20:45	32.9	32.3	32.6	32.9	32.8	32.4	32.6	32.6	31.9	30.8	30.1	29.6	29.7	28.3	28.45	30.4	29.8	29.9	30.1	28.33	28.1
	21:00	32.7	32.2	32.5	32.8	32.6	32.3	32.5	32.5	31.8	30.7	29.9	29.5	29.5	28.2	28.39	30.3	29.7	29.7	29.9	28.24	28.04
	21:15	32.5	31.9	32.3	32.5	32.4	32	32.3	32.3	30.9	29.9	29.5	29	28.9	27	27	29.9	29.3	29.3	29.6	27.65	28.12
	21:30	32.3	31.7	32.1	32.3	32.2	31.8	32.1	32.1	30.6	29.8	29.2	28.8	28.7	26.9	26.97	29.7	29	29.1	29.3	27.58	28
	21:45	32.1	31.6	31.9	32.2	32	31.7	32	32	31.2	29.9	29.2	28.7	28.7	27.7	27.71	29.6	29	29	29.2	27.56	27.42
	22:00	31.9	31.4	31.8	32	31.9	31.6	31.9	31.8	31	29.7	29	28.6	28.5	27.1	27.32	29.5	28.9	28.9	29.1	27.76	27.61
	22:15	31.8	31.2	31.6	31.8	31.7	31.4	31.7	31.7	30.4	29.3	28.8	28.3	28.2	26.8	26.94	29.2	28.6	28.6	28.9	27.33	27.42
	22:30	31.6	31.1	31.4	31.6	31.5	31.3	31.6	31.5	30.8	29.4	28.6	28.2	28.1	27.1	27.2	29	28.5	28.4	28.7	27.29	26.91
	22:45	31.4	30.9	31.3	31.5	31.4	31.1	31.5	31.4	30.2	29.2	28.5	28.1	27.9	26.5	26.64	28.9	28.3	28.2	28.5	27.21	27.04
	23:00	31.3	30.8	31.1	31.3	31.2	31	31.3	31.2	30.3	29	28.3	27.8	27.7	26.4	26.51	28.7	28.1	28.1	28.4	26.93	26.88
	23:15	31.1	30.6	31	31.1	31	30.8	31.2	31.1	30.2	28.8	28.1	27.7	27.6	26.4	26.49	28.6	28	28	28.2	27.07	26.77
	23:30	30.9	30.4	30.8	31	30.9	30.7	31	31	30.2	28.7	28	27.6	27.5	26.3	26.32	28.5	27.9	27.8	28.1	26.58	26.46
	23:45	30.8	30.3	30.7	30.8	30.7	30.5	30.9	30.8	29.7	28.6	28	27.6	27.4	26.3	26.33	28.5	27.9	27.8	28.1	26.81	26.78
10/08/2009	00:00	30.6	30.2	30.5	30.6	30.6	30.4	30.8	30.7	30	28.6	28	27.5	27.4	26.3	26.38	28.4	27.9	27.7	28	26.85	26.6
	00:15	30.5	30	30.4	30.5	30.4	30.3	30.7	30.6	29.6	28.5	28	27.5	27.4	26.4	26.46	28.4	27.8	27.7	28	26.89	26.9
	00:30	30.3	29.9	30.3	30.4	30.3	30.2	30.5	30.4	29.7	28.5	27.9	27.4	27.3	26.4	26.55	28.3	27.8	27.7	27.9	26.78	26.67
	00:45	30.2	29.7	30.2	30.2	30.2	30	30.4	30.3	29.4	28.3	27.7	27.3	27.2	26.2	26.24	28.2	27.7	27.5	27.8	26.56	26.9
	01:00	30.1	29.6	30	30.1	30	29.8	30.3	30.1	29.2	28.2	27.7	27.3	27.2	26.3	26.34	28.2	27.7	27.5	27.8	26.77	27
	01:15	29.9	29.5	29.9	29.9	29.9	29.7	30.1	30	29.1	28.1	27.6	27.2	27.1	26.6	26.5	28.1	27.6	27.5	27.8	26.86	26.92
	01:30	29.8	29.4	29.8	29.8	29.8	29.7	30	29.9	29.4	28.1	27.5	27.2	27	26.4	26.45	28	27.5	27.4	27.7	26.52	26.39
	01:45	29.7	29.3	29.7	29.7	29.7	29.6	29.9	29.8	29.3	28	27.5	27.1	26.9	26.2	26.25	27.8	27.4	27.3	27.5	26.57	26.54
	02:00	29.5	29.1	29.5	29.5	29.5	29.4	29.8	29.7	28.8	27.7	27.2	26.9	26.7	25.9	25.93	27.5	27.1	27	27.3	26.28	26.38
	02:15	29.4	29	29.4	29.4	29.4	29.3	29.7	29.5	28.7	27.6	27.2	26.9	26.7	26.2	26.26	27.5	27.1	27	27.3	26.48	26.48
	02:30	29.3	28.9	29.3	29.3	29.3	29.2	29.6	29.4	28.9	27.5	27	26.7	26.5	25.7	25.78	27.4	26.9	26.9	27.1	26.1	26.09
	02:45	29.2	28.8	29.2	29.2	29.2	29.1	29.5	29.3	28.5	27.4	26.9	26.6	26.5	25.8	25.76	27.3	26.9	26.8	27.1	26.17	26.27
	03:00	29.1	28.7	29.1	29.1	29.1	29	29.4	29.2	28.4	27.3	26.9	26.6	26.4	25.7	25.73	27.2	26.8	26.7	27	26.12	26.11
	03:15	29	28.6	29	29	29	28.9	29.3	29.1	28.7	27.4	26.9	26.6	26.5	26	26.07	27.2	26.8	26.7	27	25.86	25.85
	03:30	28.9	28.6	28.9	28.9	28.9	28.8	29.2	29.1	28.5	27.5	27	26.7	26.5	26	26.02	27.3	27	26.8	27	26.3	26.37
	03:45	28.8	28.5	28.8	28.8	28.8	28.8	29.1	29	28.5	27.5	27	26.7	26.5	26.2	26.22	27.3	27	26.8	27	26.01	25.94
	04:00	28.7	28.4	28.7	28.7	28.7	28.6	29	28.9	28.2	27.3	26.9	26.6	26.4	25.8	25.83	27.2	26.9	26.7	26.9	26.24	26.37
	04:15	28.6	28.3	28.6	28.6	28.6	28.5	28.9	28.8	28	27.1	26.7	26.4	26.3	25.6	25.63	27.1	26.7	26.6	26.8	26	26.2
	04:30	28.5	28.2	28.5	28.5	28.5	28.5	28.8	28.7	28.2	27.1	26.7	26.5	26.3	25.9	25.93	27.1	26.8	26.6	26.8	26.18	26.21
	04:45	28.4	28.1	28.5	28.4	28.4	28.4	28.7	28.6	28.3	27.2	26.8	26.5	26.4	26.1	26.14	27.1	26.8	26.6	26.8	26.06	26
	05:00	28.3	28.1	28.4	28.3	28.4	28.4	28.7	28.6	28.3	27.2	26.8	26.5	26.3	25.9	25.96	27	26.7	26.6	26.8	26.13	26.04
	05:15	28.3	28	28.3	28.3	28.3	28.3	28.6	28.5	28.2	27.1	26.7	26.5	26.3	25.9	25.97	27	26.7	26.6	26.8	26.04	26.02
	05:30	28.2	28	28.2	28.2	28.2	28.2	28.5	28.4	27.9	27.1	26.8	26.5	26.3	26	25.94	27	26.8	26.6	26.8	26.29	26.33
	05:45	28.1	27.9	28.2	28.1	28.2	28.1	28.4	28.3	27.7	26.9	26.6	26.3	26.2	25.5	25.54	26.9	26.6	26.5	26.7	25.89	26.06
	06:00	28.1	27.8	28.1	28	28.1	28.1	28.4	28.3	27.7	26.8	26.5	26.3	26.1	25.5	25.53	26.8	26.6	26.4	26.6	25.89	25.98
	06:15	28	27.8	28	28	28	28	28.3	28.2	27.8	26.7	26.4	26.2	26.1	25.6	25.65	26.7	26.5	26.4	26.6	25.87	26.14

06:30	27.9	27.7	28	27.9	27.9	27.9	28.2	28.1	27.5	26.6	26.4	26.2	26	25.6	25.58	26.7	26.4	26.3	26.5	25.89	26.01
06:45	27.8	27.6	27.9	27.8	27.9	27.9	28.1	28.1	27.5	26.6	26.3	26.1	25.9	25.5	25.46	26.6	26.3	26.2	26.4	25.78	25.98
07:00	27.8	27.6	27.8	27.8	27.8	27.8	28.1	28	27.7	26.6	26.3	26	25.9	25.4	25.45	26.5	26.2	26.2	26.4	25.59	25.52
07:15	27.7	27.5	27.8	27.7	27.8	27.8	28	27.9	27.7	26.6	26.3	26	25.9	25.5	25.6	26.5	26.3	26.2	26.4	25.71	25.65
07:30	27.7	27.5	27.7	27.7	27.7	27.7	28	27.9	27.7	26.6	26.3	26.1	26	25.8	25.78	26.5	26.3	26.2	26.4	25.79	25.69
07:45	27.6	27.4	27.7	27.6	27.7	27.7	27.9	27.8	27.6	26.7	26.5	26.3	26.1	26	25.93	26.7	26.5	26.4	26.5	25.79	25.78
08:00	27.5	27.4	27.6	27.6	27.6	27.6	27.9	27.8	27.5	26.9	26.6	26.5	26.3	26	25.89	26.8	26.7	26.6	26.7	26.11	26.15
08:15	27.5	27.3	27.6	27.5	27.6	27.6	27.8	27.7	27.4	27.2	27	26.8	26.7	26.1	26.01	27.2	27.2	27	27.1	26.35	26.54
08:30	27.4	27.3	27.5	27.5	27.5	27.5	27.8	27.7	27.4	27.6	27.4	27.3	27.3	26.2	26.16	27.7	27.7	27.4	27.6	26.52	26.81
08:45	27.4	27.3	27.5	27.4	27.5	27.5	27.8	27.7	27.4	28.3	28.3	28.2	28.2	27	26.97	28.1	28.3	28	28.1	27.15	27.23
09:00	27.4	27.3	27.5	27.4	27.5	27.5	27.8	27.7	27.6	28.9	28.8	28.9	28.9	27.9	27.72	28.5	28.8	28.3	28.4	27.2	27.35
09:15	27.5	27.4	27.5	27.4	27.5	27.6	27.8	27.7	27.7	29.7	29.7	30	30	28.4	28.13	29	29.3	29	29	27.69	27.78
09:30	27.5	27.5	27.6	27.5	27.6	27.6	27.8	27.8	27.7	30.3	30.5	30.9	30.9	28.7	28.62	29.5	30	29.5	29.6	28.05	28.17
09:45	27.6	27.6	27.7	27.6	27.6	27.7	27.9	27.9	27.8	30.5	30.7	31.3	31.2	28.6	28.54	30	30.7	30	30.2	28.04	28.37
10:00	27.8	27.7	27.8	27.6	27.7	27.7	27.9	27.9	27.8	31.4	31.7	32.4	32.5	29.8	29.41	30.6	31.3	30.7	30.8	28.7	29.03
10:15	27.9	27.9	27.9	27.8	27.8	27.8	28	28.1	28	32.7	33.3	33.4	33.5	30.3	29.75	31.4	32.2	31.7	31.8	29.85	30.12
10:30	28.1	28.1	28.1	27.9	27.9	28	28.2	28.2	28.2	34	34.8	33.8	34.2	30.3	29.54	31.5	32.2	31.9	32.2	29.9	30.01
10:45	28.3	28.4	28.3	28.1	28.1	28.1	28.3	28.4	28.2	35.4	36.1	35	35.2	31.6	30.6	31.9	32.7	32.5	32.6	29.72	29.85
11:00	28.6	28.7	28.5	28.4	28.3	28.3	28.5	28.6	28.6	36.7	37.8	36	36.3	32.8	31.25	33	33.9	33.8	33.9	30.9	30.84
11:15	29	29.1	28.8	28.6	28.6	28.5	28.7	28.9	28.9	38.4	39.8	36.5	37.1	32.9	31.31	34.1	35	35.1	35.3	31.93	31.87
11:30	29.4	29.5	29.1	29	28.8	28.8	29	29.2	29.1	36.4	37.4	37.2	37.6	33	32.29	33.5	34.4	34.3	34.6	30.68	30.72
11:45	29.8	30	29.4	29.3	29.1	29	29.2	29.5	29.3	36	36.9	37.1	37.5	32	32.03	34	35	35.2	35.5	32.05	32
12:00	30.2	30.4	29.7	29.6	29.3	29.3	29.5	29.7	29.6	35.7	36.7	37.3	37.8	32.3	32.4	34.2	35.1	35.1	35.4	32.07	32.4
12:15	30.9	31.1	30.2	30.2	29.8	29.7	29.8	30.2	30.4	37.2	37.9	38.8	39.4	34.7	34.5	36	37.3	37.2	37.2	33.41	33.73
12:30	31	31.3	30.4	30.4	30	29.9	30	30.4	30.2	34.7	35.6	36.4	36.8	31.9	31.95	33.9	34.6	35.1	35.4	32.13	31.88
12:45	31.3	31.5	30.7	30.7	30.2	30.1	30.2	30.6	30.5	37	37.6	38.3	38.7	33.8	33.88	36.5	37.7	37.7	37.6	33.8	34.08
13:00	31.6	31.8	31	31	30.5	30.4	30.5	30.8	30.6	37.4	37.9	38.9	39.3	33.9	33.95	37.4	38.9	38.7	38.6	34.05	34.22
13:15	31.9	32	31.2	31.3	30.8	30.6	30.7	31.1	30.9	35.9	36.5	37.4	37.9	33.7	33.42	35.8	36.9	36.9	37.1	32.74	32.72
13:30	32.1	32.2	31.5	31.6	31	30.8	30.9	31.3	31	36.2	36.9	37.8	38.3	33.4	33.37	36	36.9	37	37.1	33.44	33.61
13:45	32.3	32.4	31.7	31.9	31.3	31	31.1	31.5	31.2	35.8	36.3	37.2	37.7	33.1	33.21	35.9	36.8	36.9	36.9	33.07	33.29
14:00	32.5	32.6	31.9	32.1	31.5	31.3	31.3	31.6	31.3	36.7	37.4	38.3	38.7	33.5	33.76	36.8	37.9	37.7	37.6	33.39	33.5
14:15	32.7	32.7	32.1	32.3	31.7	31.5	31.5	31.8	31.5	35.5	36.1	36.9	37.4	32.8	32.85	35.5	36.3	36.5	36.6	33.19	33.13
14:30	32.9	32.9	32.2	32.5	31.9	31.6	31.6	31.9	31.5	34.6	34.9	36	36.5	32.1	32.17	34.2	34.6	35.3	35.3	31.66	31.57
14:45	33	32.9	32.4	32.6	32.1	31.7	31.8	32	31.6	34.5	34.6	35.4	35.8	32	31.96	35.2	35.7	35.9	35.9	31.81	32.14
15:00	33.1	33	32.5	32.8	32.2	31.9	31.9	32.2	31.7	34.9	35.2	35.7	36.1	32.3	32.25	35.1	35.6	35.7	35.8	32.49	32.81
15:15	33.1	33	32.5	32.9	32.3	32	32	32.2	31.7	34	34.3	34.7	35	31.5	31.59	34.2	34.5	34.9	35	32.18	32.27
15:30	33.1	33	32.6	32.9	32.4	32	32.1	32.3	31.7	33.8	34	34.4	34.7	31	31.03	33.9	34.1	34.5	34.6	31.46	31.45
15:45	33.1	33	32.6	33	32.4	32.1	32.1	32.3	31.8	33.7	33.8	34.2	34.5	31	30.97	33.6	33.8	34.2	34.3	31.27	31.31
16:00	33.1	33	32.7	33	32.5	32.1	32.2	32.3	31.8	33.9	33.9	34.3	34.6	31	31.04	33.7	33.9	34.3	34.3	31.3	31.42
16:15	33.1	32.9	32.7	33	32.5	32.2	32.2	32.4	31.8	34	34	34.3	34.7	30.8	31.02	34.1	34.4	34.6	34.6	31.42	31.57
16:30	33.1	32.9	32.7	33	32.5	32.2	32.3	32.4	31.9	34.2	34.2	34.5	34.8	31.3	31.27	35	35.5	35.5	35.5	32.18	32.34
16:45	33.1	32.9	32.7	33	32.6	32.2	32.3	32.5	31.9	33.8	33.9	34.1	34.3	31.2	31.21	34.6	35	35.1	35.3	31.85	31.99
17:00	33.1	32.8	32.7	33	32.6	32.2	32.3	32.4	31.8	32.9	32.8	33	33.3	29.7	29.75	33.6	33.9	33.9	34.1	29.78	29.74
17:15	33	32.8	32.6	33	32.5	32.2	32.3	32.4	31.6	32.1	32.1	32.1	32.3	29	29.05	32.3	32.2	32.5	32.7	29.09	28.95
17:30	32.9	32.7	32.5	32.9	32.5	32.1	32.2	32.3	31.5	32.1	31.8	32	32.2	28.9	28.91	31.9	31.8	32	32.2	28.47	28.45
17:45	32.9	32.6	32.5	32.8	32.5	32.1	32.2	32.2	31.2	31.3	31.1	31.1	31.2	28.1	28.13	31.3	30.9	31.3	31.5	28.42	28.26
18:00	32.7	32.4	32.4	32.7	32.4	32	32.1	32.1	31.1	30.9	30.7	30.6	30.7	27.8	27.97	30.9	30.5	30.9	31	27.96	27.75
18:15	32.6	32.2	32.3	32.6	32.3	31.9	32	32	30.8	30.8	30.4	30.2	30.3	27.6	27.71	30.5	30.1	30.5	30.6	28.04	27.97

18:30	32.4	32.1	32.1	32.5	32.1	31.8	31.9	31.9	30.7	30.5	30.2	29.9	30	27.5	27.82	30.4	29.9	30.2	30.4	28.24	27.95
18:45	32.3	31.9	32	32.3	32	31.6	31.8	31.8	30.6	30.3	29.9	29.5	29.5	27.1	27.27	30.1	29.6	29.8	30	27.65	27.77
19:00	32.1	31.7	31.8	32.1	31.8	31.4	31.6	31.6	30.3	29.9	29.5	29.2	29.2	27.2	27.28	29.8	29.3	29.4	29.6	27.3	27.3
19:15	31.9	31.5	31.6	31.9	31.6	31.3	31.5	31.5	30.3	29.9	29.5	29	29	27.1	27.18	29.7	29.2	29.3	29.5	27.62	27.56
19:30	31.7	31.3	31.4	31.7	31.4	31.1	31.4	31.3	30	29.5	29	28.6	28.6	26.4	26.56	29.3	28.8	28.8	29	26.88	26.77
19:45	31.5	31	31.2	31.5	31.2	30.9	31.2	31.1	29.7	29	28.6	28.2	28.1	25.8	25.87	29.1	28.5	28.5	28.7	26.4	26.95
20:00	31.3	30.9	31.1	31.4	31.1	30.8	31.1	31	30	29.1	28.6	28.1	28.1	26	26.06	29	28.5	28.4	28.6	26.66	26.75
20:15	31.1	30.7	30.9	31.2	31	30.7	30.9	30.9	29.7	29	28.4	27.9	27.9	26.3	26.5	28.7	28.1	28.1	28.3	26.35	26.34
20:30	31	30.5	30.8	31	30.8	30.5	30.8	30.7	29.4	28.6	28.2	27.7	27.6	25.8	25.81	28.5	27.9	27.8	28.1	26.29	26.63
20:45	30.8	30.4	30.6	30.8	30.7	30.4	30.7	30.6	29.9	28.6	27.9	27.4	27.4	25.6	25.86	28.2	27.7	27.6	27.9	26.16	26.06
21:00	30.6	30.2	30.5	30.6	30.5	30.2	30.5	30.4	29.2	28.3	27.8	27.3	27.2	25.8	25.88	28.1	27.6	27.5	27.8	26.32	26.3
21:15	30.5	30	30.3	30.5	30.3	30.1	30.4	30.3	29.5	28.4	27.9	27.4	27.3	25.8	25.83	28.1	27.6	27.5	27.7	26.34	26.15
21:30	30.3	29.9	30.2	30.3	30.2	30	30.3	30.2	29.2	28.3	27.8	27.3	27.1	25.7	25.78	28.2	27.6	27.4	27.7	26.16	26.38
21:45	30.1	29.7	30	30.1	30	29.8	30.1	30	28.9	28	27.6	27.1	27	25.5	25.55	27.9	27.4	27.2	27.5	25.98	26.45
22:00	30	29.6	29.9	30	29.9	29.7	30	29.9	29.3	28.1	27.5	27	26.9	25.8	25.89	27.9	27.4	27.2	27.5	26.17	26.09
22:15	29.8	29.4	29.7	29.8	29.8	29.6	29.9	29.8	29	28.1	27.5	27.1	27	26.2	26.23	27.9	27.4	27.2	27.5	26.26	26.25
22:30	29.7	29.3	29.6	29.7	29.7	29.5	29.8	29.7	29.2	28.1	27.5	27	26.9	25.8	26.01	27.9	27.4	27.2	27.4	26.32	26.19
22:45	29.6	29.2	29.5	29.6	29.5	29.4	29.7	29.6	29	27.9	27.3	26.9	26.8	25.8	25.89	27.6	27.2	27	27.3	26.29	26.08
23:00	29.4	29.1	29.4	29.4	29.4	29.2	29.6	29.5	28.4	27.6	27.2	26.8	26.6	25.7	25.71	27.6	27.1	27	27.3	26.08	26.28
23:15	29.3	28.9	29.2	29.3	29.2	29.1	29.4	29.4	28.2	27.3	26.9	26.6	26.4	25.5	25.51	27.4	26.9	26.8	27.1	25.89	26.21
23:30	29.2	28.8	29.1	29.2	29.2	29	29.4	29.3	28.7	27.4	26.9	26.5	26.4	25.4	25.6	27.3	26.8	26.7	27	25.88	25.76
23:45	29.1	28.7	29	29.1	29.1	28.9	29.3	29.2	28.5	27.4	26.9	26.5	26.4	25.7	25.74	27.2	26.8	26.7	27	26.07	25.99

APPENDIX C4

	Inner Surface & Air Temp								Outer Surface & Air Temp												
	Sand Panels				Soil Panels				Sand Panels						Soil Panels						
Time	P1 (In)	P2 (In)	P3 (In)	P4 (In)	P5 (In)	P6 (In)	P7 (In)	P8 (In)	P1 (Out)	P2 (Out)	P3 (Out)	P4 (Out)	P1 P2 Air (Out)	P3 P4 Air (Out)	P5 (Out)	P6 (Out)	P7 (Out)	P8 (Out)	P5 P6 Air (Out)	P7 P8 Air (Out)	Inner Air Temperature
0:00	29.55	29.15	29.53	29.54	29.46	29.33	29.59	29.72	27.71	27.13	26.80	26.70	25.83	25.93	27.44	26.98	26.89	27.14	26.06	25.98	28.80
0:03	29.52	29.13	29.51	29.51	29.44	29.31	29.56	29.70	27.69	27.11	26.78	26.68	25.82	25.92	27.42	26.96	26.88	27.12	26.04	25.96	28.79
0:06	29.50	29.11	29.48	29.49	29.41	29.28	29.54	29.67	27.66	27.09	26.77	26.66	25.81	25.91	27.39	26.94	26.86	27.10	26.02	25.95	28.76
0:09	29.47	29.08	29.46	29.46	29.39	29.26	29.51	29.65	27.64	27.07	26.75	26.64	25.79	25.89	27.38	26.92	26.84	27.08	26.02	25.95	28.74
0:12	29.44	29.06	29.43	29.43	29.36	29.23	29.49	29.62	27.62	27.05	26.73	26.62	25.78	25.88	27.36	26.90	26.82	27.06	26.01	25.93	28.72
0:15	29.42	29.03	29.41	29.41	29.33	29.21	29.46	29.60	27.60	27.03	26.71	26.60	25.76	25.86	27.33	26.88	26.80	27.04	25.99	25.91	28.70
0:18	29.39	29.01	29.38	29.38	29.31	29.19	29.44	29.58	27.57	27.01	26.69	26.58	25.74	25.84	27.31	26.86	26.78	27.02	25.96	25.90	28.68
0:21	29.37	28.99	29.36	29.36	29.28	29.16	29.42	29.55	27.55	26.99	26.67	26.56	25.74	25.83	27.29	26.84	26.76	27.00	25.96	25.87	28.67
0:24	29.34	28.96	29.34	29.33	29.26	29.14	29.39	29.53	27.54	26.97	26.66	26.55	25.72	25.82	27.27	26.83	26.74	26.98	25.94	25.85	28.65
0:27	29.32	28.94	29.31	29.30	29.23	29.12	29.37	29.51	27.52	26.95	26.64	26.53	25.71	25.81	27.25	26.80	26.72	26.96	25.93	25.83	28.63
0:30	29.29	28.92	29.29	29.28	29.21	29.09	29.35	29.48	27.49	26.94	26.63	26.51	25.69	25.79	27.23	26.79	26.71	26.94	25.92	25.83	28.61
0:33	29.27	28.89	29.26	29.25	29.18	29.07	29.32	29.46	27.47	26.92	26.61	26.49	25.69	25.78	27.21	26.77	26.69	26.93	25.90	25.83	28.59
0:36	29.24	28.87	29.24	29.23	29.16	29.05	29.30	29.44	27.45	26.90	26.59	26.48	25.68	25.77	27.19	26.75	26.67	26.91	25.89	25.81	28.57
0:39	29.22	28.85	29.22	29.20	29.13	29.02	29.28	29.41	27.43	26.89	26.58	26.46	25.67	25.76	27.17	26.73	26.65	26.89	25.89	25.82	28.54
0:42	29.19	28.82	29.19	29.18	29.11	29.00	29.25	29.39	27.41	26.87	26.56	26.44	25.65	25.74	27.15	26.72	26.64	26.87	25.88	25.81	28.52
0:45	29.17	28.80	29.17	29.15	29.08	28.98	29.23	29.37	27.41	26.85	26.55	26.42	25.64	25.73	27.13	26.70	26.62	26.86	25.86	25.79	28.50
0:48	29.14	28.78	29.15	29.13	29.06	28.96	29.21	29.34	27.38	26.84	26.53	26.41	25.63	25.72	27.12	26.68	26.60	26.84	25.85	25.77	28.49
0:51	29.12	28.75	29.12	29.10	29.04	28.93	29.18	29.32	27.38	26.82	26.51	26.39	25.62	25.72	27.10	26.67	26.59	26.82	25.83	25.76	28.48
0:54	29.09	28.73	29.10	29.08	29.01	28.91	29.16	29.30	27.35	26.80	26.50	26.38	25.62	25.71	27.08	26.65	26.57	26.81	25.84	25.75	28.46
0:57	29.07	28.71	29.08	29.05	28.99	28.89	29.14	29.28	27.33	26.78	26.48	26.36	25.61	25.70	27.06	26.64	26.55	26.79	25.82	25.76	28.43
1:00	29.04	28.69	29.05	29.03	28.96	28.87	29.11	29.25	27.31	26.77	26.47	26.34	25.60	25.68	27.04	26.62	26.54	26.77	25.81	25.75	28.41
1:03	29.02	28.66	29.03	29.00	28.94	28.84	29.09	29.23	27.30	26.75	26.45	26.32	25.59	25.68	27.02	26.60	26.52	26.75	25.79	25.74	28.38
1:06	28.99	28.64	29.01	28.98	28.92	28.82	29.07	29.21	27.26	26.73	26.43	26.31	25.57	25.66	27.00	26.58	26.50	26.73	25.78	25.72	28.36
1:09	28.97	28.62	28.98	28.95	28.89	28.80	29.04	29.18	27.24	26.71	26.41	26.29	25.55	25.64	26.98	26.56	26.48	26.72	25.76	25.70	28.35
1:12	28.94	28.60	28.96	28.93	28.87	28.78	29.02	29.16	27.22	26.69	26.40	26.27	25.53	25.62	26.96	26.55	26.47	26.70	25.74	25.68	28.33
1:15	28.92	28.58	28.94	28.91	28.85	28.76	29.00	29.14	27.20	26.67	26.38	26.25	25.52	25.61	26.94	26.53	26.45	26.68	25.72	25.66	28.31
1:18	28.90	28.55	28.92	28.88	28.82	28.74	28.98	29.12	27.18	26.65	26.36	26.24	25.50	25.60	26.92	26.51	26.43	26.66	25.71	25.63	28.30
1:21	28.88	28.53	28.89	28.86	28.80	28.72	28.96	29.10	27.16	26.63	26.34	26.22	25.47	25.57	26.90	26.49	26.41	26.64	25.68	25.60	28.30
1:24	28.85	28.51	28.87	28.84	28.78	28.69	28.93	29.07	27.16	26.62	26.33	26.20	25.47	25.56	26.88	26.47	26.40	26.62	25.67	25.59	28.27
1:27	28.83	28.49	28.85	28.81	28.75	28.67	28.91	29.05	27.13	26.60	26.31	26.18	25.47	25.56	26.87	26.46	26.38	26.61	25.67	25.59	28.25
1:30	28.81	28.47	28.83	28.79	28.73	28.65	28.89	29.03	27.11	26.58	26.30	26.17	25.45	25.55	26.85	26.44	26.37	26.59	25.66	25.58	28.23
1:33	28.78	28.45	28.81	28.77	28.71	28.63	28.87	29.01	27.09	26.57	26.28	26.15	25.44	25.53	26.83	26.43	26.35	26.57	25.64	25.56	28.21
1:36	28.76	28.43	28.78	28.74	28.69	28.61	28.85	28.99	27.07	26.55	26.26	26.13	25.43	25.51	26.81	26.41	26.33	26.56	25.63	25.55	28.19
1:39	28.74	28.41	28.76	28.72	28.66	28.59	28.83	28.97	27.05	26.53	26.25	26.12	25.41	25.50	26.79	26.39	26.32	26.54	25.62	25.54	28.17

1:42	28.71	28.39	28.74	28.70	28.64	28.57	28.80	28.94	27.03	26.51	26.23	26.10	25.40	25.48	26.78	26.37	26.30	26.53	25.60	25.54	28.16
1:45	28.69	28.36	28.72	28.67	28.62	28.55	28.78	28.92	27.01	26.50	26.22	26.08	25.39	25.48	26.76	26.36	26.28	26.51	25.60	25.53	28.13
1:48	28.67	28.34	28.70	28.65	28.60	28.53	28.76	28.90	26.99	26.48	26.20	26.07	25.37	25.46	26.74	26.34	26.27	26.49	25.59	25.53	28.12
1:51	28.65	28.32	28.68	28.63	28.57	28.51	28.74	28.88	26.98	26.47	26.19	26.05	25.37	25.46	26.72	26.33	26.25	26.48	25.57	25.49	28.10
1:54	28.62	28.30	28.65	28.61	28.55	28.49	28.72	28.86	26.95	26.45	26.17	26.03	25.35	25.43	26.71	26.31	26.24	26.46	25.56	25.49	28.08
1:57	28.60	28.28	28.63	28.58	28.53	28.47	28.70	28.84	26.93	26.43	26.16	26.02	25.33	25.42	26.69	26.30	26.22	26.45	25.55	25.48	28.06
2:00	28.58	28.26	28.61	28.56	28.51	28.45	28.68	28.82	26.92	26.42	26.14	26.00	25.32	25.41	26.67	26.28	26.21	26.43	25.54	25.47	28.05
2:03	28.56	28.24	28.59	28.54	28.49	28.43	28.66	28.80	26.90	26.40	26.13	25.99	25.32	25.40	26.65	26.26	26.19	26.41	25.53	25.45	28.03
2:06	28.53	28.22	28.57	28.52	28.47	28.41	28.64	28.78	26.87	26.38	26.11	25.97	25.31	25.39	26.63	26.25	26.18	26.40	25.51	25.44	28.01
2:09	28.51	28.20	28.55	28.50	28.44	28.39	28.61	28.76	26.86	26.36	26.09	25.95	25.28	25.37	26.61	26.23	26.16	26.38	25.49	25.43	27.99
2:12	28.49	28.18	28.53	28.47	28.42	28.37	28.59	28.73	26.84	26.35	26.07	25.94	25.27	25.35	26.60	26.21	26.14	26.36	25.46	25.39	27.98
2:15	28.47	28.16	28.51	28.45	28.40	28.35	28.57	28.71	26.82	26.33	26.06	25.92	25.27	25.35	26.58	26.19	26.12	26.34	25.46	25.38	27.97
2:18	28.45	28.14	28.49	28.43	28.38	28.33	28.55	28.69	26.80	26.32	26.05	25.91	25.27	25.35	26.56	26.18	26.11	26.33	25.45	25.39	27.94
2:21	28.42	28.12	28.47	28.41	28.36	28.31	28.53	28.67	26.78	26.30	26.03	25.89	25.24	25.33	26.54	26.16	26.10	26.31	25.44	25.38	27.92
2:24	28.40	28.10	28.45	28.39	28.34	28.29	28.51	28.65	26.76	26.28	26.02	25.88	25.24	25.32	26.53	26.15	26.08	26.30	25.44	25.36	27.90
2:27	28.38	28.08	28.42	28.37	28.32	28.27	28.49	28.63	26.75	26.27	26.00	25.86	25.22	25.31	26.51	26.13	26.07	26.28	25.42	25.35	27.89
2:30	28.36	28.06	28.40	28.34	28.30	28.25	28.47	28.61	26.73	26.25	25.99	25.85	25.21	25.30	26.49	26.12	26.05	26.26	25.40	25.33	27.88
2:33	28.34	28.04	28.38	28.32	28.28	28.23	28.45	28.59	26.70	26.23	25.97	25.83	25.21	25.30	26.47	26.10	26.03	26.25	25.39	25.31	27.86
2:36	28.32	28.02	28.36	28.30	28.25	28.21	28.43	28.57	26.69	26.22	25.95	25.82	25.18	25.27	26.45	26.08	26.02	26.23	25.38	25.30	27.85
2:39	28.30	28.00	28.34	28.28	28.23	28.19	28.41	28.55	26.68	26.20	25.94	25.80	25.16	25.25	26.44	26.07	26.00	26.21	25.38	25.30	27.82
2:42	28.27	27.98	28.32	28.26	28.21	28.17	28.39	28.53	26.67	26.19	25.92	25.78	25.15	25.23	26.42	26.05	25.99	26.20	25.35	25.28	27.80
2:45	28.25	27.96	28.30	28.24	28.19	28.15	28.37	28.51	26.64	26.17	25.91	25.77	25.13	25.22	26.40	26.03	25.97	26.18	25.33	25.26	27.79
2:48	28.23	27.95	28.28	28.22	28.17	28.13	28.35	28.49	26.62	26.15	25.89	25.75	25.13	25.21	26.38	26.02	25.95	26.16	25.32	25.25	27.77
2:51	28.21	27.93	28.26	28.20	28.15	28.11	28.33	28.47	26.60	26.13	25.87	25.73	25.11	25.19	26.37	26.00	25.94	26.15	25.31	25.23	27.76
2:54	28.19	27.91	28.24	28.18	28.13	28.09	28.31	28.45	26.58	26.12	25.86	25.72	25.11	25.19	26.35	25.98	25.92	26.13	25.30	25.21	27.75
2:57	28.17	27.89	28.22	28.16	28.11	28.07	28.29	28.43	26.57	26.10	25.84	25.70	25.09	25.18	26.33	25.97	25.90	26.11	25.28	25.21	27.73
3:00	28.15	27.87	28.20	28.14	28.09	28.06	28.27	28.41	26.55	26.09	25.83	25.69	25.08	25.17	26.31	25.95	25.89	26.10	25.28	25.19	27.72
3:03	28.13	27.85	28.18	28.12	28.07	28.04	28.25	28.39	26.53	26.07	25.81	25.67	25.06	25.14	26.30	25.94	25.88	26.08	25.25	25.17	27.70
3:06	28.11	27.83	28.16	28.10	28.05	28.02	28.23	28.37	26.51	26.06	25.80	25.66	25.06	25.14	26.28	25.92	25.86	26.07	25.24	25.15	27.68
3:09	28.09	27.81	28.15	28.08	28.03	28.00	28.21	28.35	26.50	26.04	25.79	25.65	25.05	25.13	26.27	25.91	25.85	26.05	25.23	25.15	27.66
3:12	28.07	27.80	28.13	28.06	28.01	27.98	28.19	28.33	26.48	26.03	25.77	25.63	25.04	25.12	26.25	25.89	25.84	26.04	25.22	25.14	27.65
3:15	28.05	27.78	28.11	28.04	27.99	27.96	28.17	28.32	26.47	26.01	25.76	25.62	25.03	25.11	26.23	25.88	25.82	26.03	25.21	25.15	27.63
3:18	28.03	27.76	28.09	28.02	27.97	27.94	28.15	28.30	26.45	26.00	25.75	25.61	25.03	25.11	26.22	25.86	25.81	26.01	25.21	25.13	27.61
3:21	28.01	27.74	28.07	28.00	27.95	27.93	28.14	28.28	26.44	25.99	25.73	25.59	25.02	25.10	26.20	25.85	25.79	26.00	25.19	25.11	27.60
3:24	27.99	27.72	28.05	27.98	27.93	27.91	28.12	28.26	26.42	25.97	25.72	25.58	25.00	25.09	26.18	25.83	25.78	25.98	25.19	25.12	27.58
3:27	27.97	27.70	28.03	27.96	27.91	27.89	28.10	28.24	26.40	25.96	25.71	25.56	25.00	25.08	26.17	25.82	25.76	25.97	25.18	25.10	27.56
3:30	27.95	27.69	28.01	27.94	27.89	27.87	28.08	28.22	26.39	25.94	25.69	25.55	24.99	25.07	26.15	25.80	25.75	25.95	25.16	25.09	27.55
3:33	27.93	27.67	27.99	27.92	27.88	27.85	28.06	28.20	26.37	25.93	25.68	25.54	24.97	25.05	26.14	25.79	25.73	25.93	25.16	25.09	27.53
3:36	27.91	27.65	27.97	27.90	27.86	27.84	28.04	28.18	26.36	25.91	25.67	25.52	24.96	25.04	26.12	25.78	25.72	25.92	25.15	25.07	27.51
3:39	27.89	27.63	27.96	27.88	27.84	27.82	28.02	28.16	26.33	25.90	25.65	25.51	24.95	25.03	26.11	25.76	25.71	25.91	25.13	25.07	27.50
3:42	27.87	27.61	27.94	27.86	27.82	27.80	28.00	28.15	26.33	25.88	25.64	25.49	24.93	25.01	26.09	25.75	25.69	25.89	25.11	25.05	27.48
3:45	27.85	27.60	27.92	27.84	27.80	27.78	27.98	28.13	26.29	25.87	25.62	25.48	24.93	25.00	26.07	25.73	25.68	25.87	25.10	25.03	27.47
3:48	27.83	27.58	27.90	27.82	27.78	27.76	27.97	28.11	26.27	25.85	25.61	25.46	24.90	24.99	26.06	25.72	25.66	25.86	25.10	25.04	27.44
3:51	27.81	27.56	27.88	27.80	27.76	27.75	27.95	28.09	26.26	25.84	25.59	25.45	24.90	24.98	26.04	25.70	25.65	25.85	25.09	25.02	27.43
3:54	27.79	27.54	27.86	27.78	27.74	27.73	27.93	28.07	26.24	25.82	25.58	25.43	24.89	24.97	26.02	25.69	25.63	25.83	25.07	25.01	27.41
3:57	27.77	27.52	27.84	27.76	27.72	27.71	27.91	28.05	26.23	25.80	25.56	25.42	24.87	24.95	26.01	25.67	25.62	25.82	25.05	24.99	27.40
4:00	27.75	27.51	27.83	27.75	27.70	27.69	27.89	28.03	26.21	25.79	25.55	25.40	24.86	24.93	25.99	25.66	25.60	25.80	25.05	24.99	27.38
4:03	27.73	27.49	27.81	27.73	27.68	27.67	27.87	28.02	26.19	25.77	25.54	25.39	24.84	24.92	25.98	25.64	25.59	25.79	25.03	24.97	27.37

4:06	27.71	27.47	27.79	27.71	27.67	27.66	27.85	28.00	26.17	25.76	25.52	25.37	24.83	24.91	25.96	25.62	25.57	25.77	25.01	24.96	27.34
4:09	27.69	27.45	27.77	27.69	27.65	27.64	27.84	27.98	26.15	25.74	25.50	25.36	24.82	24.90	25.94	25.61	25.56	25.76	25.00	24.94	27.33
4:12	27.67	27.44	27.75	27.67	27.63	27.62	27.82	27.96	26.13	25.73	25.49	25.34	24.81	24.89	25.93	25.59	25.55	25.74	25.00	24.95	27.31
4:15	27.66	27.42	27.73	27.65	27.61	27.60	27.80	27.94	26.13	25.71	25.48	25.33	24.80	24.88	25.91	25.58	25.53	25.73	24.99	24.92	27.30
4:18	27.64	27.40	27.72	27.63	27.59	27.59	27.78	27.93	26.11	25.70	25.46	25.32	24.80	24.87	25.90	25.57	25.52	25.72	24.97	24.91	27.29
4:21	27.62	27.38	27.70	27.62	27.57	27.57	27.76	27.91	26.10	25.69	25.45	25.31	24.80	24.87	25.89	25.55	25.51	25.70	24.96	24.90	27.27
4:24	27.60	27.37	27.68	27.60	27.56	27.55	27.75	27.89	26.08	25.67	25.44	25.29	24.79	24.86	25.87	25.54	25.50	25.69	24.96	24.90	27.26
4:27	27.58	27.35	27.66	27.58	27.54	27.54	27.73	27.87	26.07	25.66	25.43	25.28	24.78	24.85	25.86	25.53	25.49	25.68	24.95	24.89	27.24
4:30	27.56	27.33	27.64	27.56	27.52	27.52	27.71	27.85	26.05	25.65	25.42	25.27	24.77	24.84	25.84	25.52	25.47	25.66	24.94	24.87	27.23
4:33	27.54	27.32	27.63	27.54	27.50	27.50	27.69	27.84	26.03	25.63	25.40	25.26	24.75	24.82	25.83	25.50	25.46	25.65	24.93	24.85	27.22
4:36	27.53	27.30	27.61	27.52	27.48	27.49	27.68	27.82	26.02	25.62	25.39	25.24	24.74	24.82	25.81	25.49	25.44	25.63	24.90	24.83	27.21
4:39	27.51	27.28	27.59	27.51	27.47	27.47	27.66	27.80	26.00	25.60	25.37	25.23	24.73	24.81	25.79	25.47	25.43	25.62	24.89	24.83	27.19
4:42	27.49	27.27	27.57	27.49	27.45	27.45	27.64	27.78	25.98	25.59	25.36	25.21	24.72	24.79	25.78	25.46	25.41	25.60	24.88	24.82	27.16
4:45	27.47	27.25	27.56	27.47	27.43	27.43	27.62	27.77	25.96	25.57	25.35	25.20	24.71	24.79	25.76	25.44	25.40	25.59	24.87	24.81	27.15
4:48	27.45	27.23	27.54	27.45	27.41	27.42	27.60	27.75	25.94	25.56	25.33	25.19	24.70	24.77	25.75	25.43	25.39	25.58	24.86	24.80	27.13
4:51	27.43	27.22	27.52	27.44	27.39	27.40	27.59	27.73	25.93	25.55	25.32	25.17	24.69	24.76	25.74	25.42	25.38	25.56	24.85	24.79	27.13
4:54	27.42	27.20	27.50	27.42	27.38	27.39	27.57	27.71	25.92	25.54	25.31	25.16	24.68	24.76	25.72	25.41	25.37	25.55	24.85	24.79	27.11
4:57	27.40	27.18	27.49	27.40	27.36	27.37	27.55	27.70	25.91	25.52	25.30	25.15	24.68	24.75	25.71	25.40	25.36	25.54	24.84	24.79	27.09
5:00	27.38	27.17	27.47	27.38	27.34	27.35	27.53	27.68	25.89	25.51	25.29	25.14	24.68	24.75	25.70	25.38	25.34	25.53	24.83	24.77	27.08
5:03	27.36	27.15	27.45	27.37	27.32	27.34	27.52	27.66	25.88	25.50	25.28	25.13	24.67	24.74	25.68	25.37	25.33	25.51	24.83	24.77	27.06
5:06	27.34	27.13	27.44	27.35	27.31	27.32	27.50	27.64	25.87	25.49	25.27	25.12	24.67	24.74	25.67	25.37	25.32	25.50	24.84	24.78	27.04
5:09	27.33	27.12	27.42	27.33	27.29	27.30	27.48	27.63	25.86	25.48	25.26	25.11	24.66	24.73	25.66	25.35	25.31	25.49	24.81	24.76	27.03
5:12	27.31	27.10	27.40	27.31	27.27	27.29	27.47	27.61	25.84	25.47	25.25	25.10	24.65	24.72	25.65	25.34	25.30	25.48	24.81	24.76	27.02
5:15	27.29	27.08	27.39	27.30	27.26	27.27	27.45	27.59	25.83	25.46	25.23	25.09	24.64	24.71	25.63	25.33	25.29	25.47	24.80	24.74	27.01
5:18	27.27	27.07	27.37	27.28	27.24	27.25	27.43	27.58	25.81	25.45	25.22	25.08	24.64	24.71	25.62	25.32	25.28	25.46	24.80	24.74	26.99
5:21	27.26	27.05	27.35	27.26	27.22	27.24	27.42	27.56	25.80	25.43	25.21	25.06	24.61	24.69	25.61	25.31	25.26	25.44	24.79	24.72	26.98
5:24	27.24	27.04	27.34	27.24	27.21	27.22	27.40	27.54	25.79	25.42	25.20	25.05	24.61	24.68	25.59	25.29	25.25	25.43	24.78	24.71	26.97
5:27	27.22	27.02	27.32	27.23	27.19	27.21	27.38	27.53	25.76	25.41	25.19	25.04	24.60	24.67	25.58	25.28	25.24	25.42	24.76	24.70	26.95
5:30	27.20	27.01	27.30	27.21	27.17	27.19	27.37	27.51	25.75	25.40	25.18	25.03	24.60	24.67	25.57	25.27	25.23	25.41	24.75	24.69	26.93
5:33	27.19	26.99	27.29	27.19	27.15	27.17	27.35	27.49	25.74	25.38	25.17	25.02	24.58	24.66	25.55	25.26	25.22	25.39	24.74	24.68	26.92
5:36	27.17	26.97	27.27	27.18	27.14	27.16	27.33	27.48	25.72	25.37	25.15	25.01	24.58	24.65	25.54	25.25	25.21	25.38	24.74	24.69	26.90
5:39	27.15	26.96	27.25	27.16	27.12	27.14	27.32	27.46	25.71	25.36	25.15	25.00	24.58	24.65	25.53	25.23	25.20	25.37	24.72	24.67	26.89
5:42	27.14	26.94	27.24	27.15	27.10	27.13	27.30	27.44	25.70	25.35	25.13	24.99	24.58	24.65	25.52	25.22	25.18	25.36	24.72	24.66	26.88
5:45	27.12	26.93	27.22	27.13	27.09	27.11	27.29	27.43	25.68	25.34	25.12	24.97	24.56	24.63	25.50	25.21	25.17	25.35	24.71	24.65	26.87
5:48	27.10	26.91	27.20	27.11	27.07	27.10	27.27	27.41	25.67	25.32	25.11	24.96	24.54	24.61	25.49	25.20	25.16	25.33	24.70	24.64	26.86
5:51	27.08	26.90	27.19	27.10	27.06	27.08	27.25	27.40	25.66	25.31	25.10	24.95	24.53	24.61	25.48	25.19	25.15	25.32	24.68	24.63	26.84
5:54	27.07	26.88	27.17	27.08	27.04	27.07	27.24	27.38	25.65	25.30	25.09	24.94	24.53	24.60	25.46	25.17	25.14	25.31	24.68	24.62	26.83
5:57	27.05	26.87	27.16	27.06	27.02	27.05	27.22	27.36	25.64	25.29	25.08	24.93	24.52	24.59	25.45	25.16	25.12	25.30	24.67	24.61	26.81
6:00	27.03	26.85	27.14	27.05	27.01	27.04	27.21	27.35	25.63	25.28	25.07	24.92	24.52	24.59	25.44	25.15	25.12	25.29	24.66	24.61	26.79
6:03	27.02	26.84	27.13	27.03	26.99	27.02	27.19	27.33	25.62	25.27	25.06	24.91	24.51	24.59	25.43	25.14	25.11	25.28	24.67	24.60	26.78
6:06	27.00	26.82	27.11	27.01	26.98	27.01	27.17	27.32	25.60	25.26	25.05	24.90	24.52	24.59	25.42	25.13	25.10	25.27	24.67	24.61	26.77
6:09	26.99	26.81	27.09	27.00	26.96	26.99	27.16	27.30	25.59	25.25	25.04	24.89	24.51	24.58	25.40	25.12	25.09	25.26	24.65	24.59	26.76
6:12	26.97	26.79	27.08	26.98	26.94	26.98	27.14	27.28	25.57	25.24	25.03	24.88	24.49	24.56	25.39	25.11	25.07	25.24	24.64	24.59	26.74
6:15	26.95	26.78	27.06	26.97	26.93	26.96	27.13	27.27	25.56	25.22	25.02	24.87	24.49	24.56	25.38	25.10	25.06	25.23	24.62	24.56	26.73
6:18	26.94	26.76	27.05	26.95	26.91	26.95	27.11	27.25	25.55	25.21	25.01	24.86	24.48	24.55	25.36	25.08	25.05	25.22	24.62	24.57	26.72
6:21	26.92	26.75	27.03	26.94	26.90	26.93	27.10	27.24	25.53	25.20	24.99	24.85	24.46	24.53	25.35	25.07	25.04	25.21	24.61	24.55	26.70
6:24	26.90	26.73	27.02	26.92	26.88	26.92	27.08	27.22	25.52	25.19	24.98	24.83	24.45	24.52	25.34	25.06	25.03	25.19	24.60	24.55	26.69
6:27	26.89	26.72	27.00	26.90	26.86	26.90	27.06	27.21	25.51	25.17	24.97	24.82	24.44	24.51	25.33	25.05	25.02	25.18	24.58	24.53	26.67

6:30	26.87	26.70	26.99	26.89	26.85	26.89	27.05	27.19	25.50	25.16	24.96	24.81	24.43	24.50	25.31	25.04	25.01	25.17	24.58	24.52	26.66
6:33	26.86	26.69	26.97	26.87	26.83	26.87	27.03	27.18	25.48	25.15	24.95	24.80	24.42	24.49	25.30	25.02	25.00	25.16	24.56	24.50	26.65
6:36	26.84	26.68	26.96	26.86	26.82	26.86	27.02	27.16	25.47	25.14	24.94	24.79	24.42	24.49	25.29	25.02	24.99	25.15	24.56	24.50	26.64
6:39	26.82	26.66	26.94	26.84	26.80	26.84	27.00	27.15	25.46	25.13	24.93	24.78	24.41	24.48	25.28	25.01	24.98	25.14	24.55	24.50	26.63
6:42	26.81	26.65	26.93	26.83	26.79	26.83	26.99	27.13	25.45	25.12	24.92	24.77	24.40	24.47	25.27	25.00	24.97	25.13	24.55	24.49	26.61
6:45	26.79	26.63	26.91	26.81	26.77	26.81	26.97	27.11	25.44	25.11	24.91	24.76	24.40	24.46	25.26	24.99	24.96	25.12	24.54	24.49	26.60
6:48	26.78	26.62	26.90	26.80	26.76	26.80	26.96	27.10	25.42	25.10	24.90	24.75	24.40	24.47	25.25	24.98	24.95	25.11	24.53	24.48	26.59
6:51	26.76	26.60	26.88	26.78	26.74	26.79	26.94	27.08	25.41	25.09	24.89	24.74	24.39	24.46	25.24	24.97	24.94	25.10	24.52	24.47	26.58
6:54	26.75	26.59	26.87	26.77	26.73	26.77	26.93	27.07	25.41	25.08	24.88	24.74	24.40	24.47	25.23	24.96	24.93	25.09	24.52	24.46	26.57
6:57	26.73	26.58	26.85	26.75	26.71	26.76	26.92	27.06	25.40	25.07	24.88	24.73	24.39	24.46	25.22	24.95	24.92	25.08	24.52	24.47	26.55
7:00	26.72	26.56	26.84	26.74	26.70	26.74	26.90	27.04	25.39	25.07	24.88	24.73	24.40	24.46	25.21	24.95	24.92	25.08	24.52	24.47	26.54
7:03	26.70	26.55	26.82	26.72	26.68	26.73	26.88	27.03	25.39	25.07	24.88	24.73	24.39	24.46	25.20	24.94	24.91	25.07	24.51	24.47	26.53
7:06	26.69	26.53	26.81	26.71	26.67	26.72	26.87	27.01	25.39	25.07	24.88	24.73	24.38	24.45	25.20	24.94	24.91	25.06	24.51	24.45	26.52
7:09	26.67	26.52	26.79	26.69	26.65	26.70	26.86	27.00	25.39	25.07	24.89	24.74	24.39	24.45	25.19	24.94	24.91	25.06	24.51	24.45	26.51
7:12	26.66	26.51	26.78	26.68	26.64	26.69	26.84	26.98	25.41	25.08	24.90	24.76	24.39	24.46	25.20	24.95	24.91	25.07	24.52	24.47	26.50
7:15	26.64	26.49	26.77	26.66	26.63	26.68	26.83	26.97	25.43	25.10	24.93	24.80	24.41	24.47	25.20	24.96	24.92	25.07	24.53	24.48	26.49
7:18	26.63	26.48	26.75	26.65	26.61	26.66	26.81	26.95	25.48	25.14	24.98	24.86	24.45	24.51	25.21	24.97	24.94	25.08	24.54	24.49	26.47
7:21	26.61	26.47	26.74	26.64	26.60	26.65	26.80	26.94	25.54	25.18	25.03	24.93	24.47	24.53	25.22	24.99	24.95	25.10	24.55	24.51	26.46
7:24	26.60	26.45	26.72	26.62	26.58	26.63	26.79	26.93	25.60	25.24	25.10	25.02	24.51	24.58	25.24	25.02	24.98	25.12	24.57	24.53	26.45
7:27	26.58	26.44	26.71	26.61	26.57	26.62	26.77	26.91	25.64	25.30	25.17	25.11	24.54	24.61	25.26	25.05	25.00	25.14	24.59	24.55	26.45
7:30	26.57	26.43	26.70	26.59	26.56	26.61	26.76	26.90	25.74	25.37	25.27	25.22	24.59	24.66	25.29	25.08	25.04	25.17	24.61	24.57	26.44
7:33	26.56	26.42	26.68	26.58	26.54	26.60	26.75	26.89	25.89	25.50	25.46	25.42	24.69	24.76	25.32	25.13	25.08	25.21	24.65	24.62	26.43
7:36	26.54	26.40	26.67	26.57	26.53	26.59	26.74	26.87	26.04	25.66	25.68	25.65	24.79	24.85	25.36	25.18	25.12	25.25	24.70	24.68	26.43
7:39	26.53	26.39	26.66	26.56	26.52	26.57	26.72	26.86	26.20	25.83	25.90	25.88	24.87	24.94	25.40	25.23	25.17	25.30	24.74	24.73	26.42
7:42	26.52	26.38	26.65	26.54	26.51	26.56	26.71	26.85	26.35	25.99	26.11	26.11	24.96	25.04	25.45	25.29	25.23	25.35	24.79	24.78	26.42
7:45	26.51	26.37	26.64	26.53	26.50	26.55	26.70	26.84	26.52	26.18	26.34	26.35	25.07	25.14	25.50	25.36	25.29	25.41	24.85	24.85	26.41
7:48	26.49	26.36	26.63	26.52	26.48	26.54	26.69	26.83	26.75	26.40	26.60	26.64	25.17	25.26	25.56	25.43	25.35	25.48	24.91	24.92	26.41
7:51	26.48	26.35	26.62	26.51	26.47	26.53	26.68	26.82	27.00	26.63	26.89	26.96	25.30	25.39	25.62	25.51	25.42	25.54	24.98	25.00	26.41
7:54	26.47	26.35	26.61	26.50	26.46	26.52	26.67	26.80	27.25	26.89	27.21	27.31	25.42	25.51	25.68	25.59	25.50	25.62	25.05	25.07	26.40
7:57	26.46	26.34	26.60	26.49	26.45	26.51	26.67	26.80	27.51	27.13	27.52	27.63	25.54	25.62	25.75	25.67	25.57	25.69	25.11	25.14	26.40
8:00	26.46	26.33	26.59	26.48	26.44	26.51	26.66	26.79	27.72	27.37	27.79	27.95	25.67	25.75	25.81	25.75	25.65	25.77	25.17	25.21	26.41
8:03	26.45	26.33	26.58	26.47	26.44	26.50	26.65	26.78	27.98	27.64	28.13	28.27	25.82	25.91	25.89	25.84	25.73	25.85	25.25	25.30	26.42
8:06	26.44	26.33	26.58	26.46	26.43	26.49	26.65	26.77	28.22	27.89	28.52	28.64	25.93	26.04	25.96	25.93	25.81	25.93	25.32	25.37	26.43
8:09	26.44	26.32	26.57	26.45	26.42	26.49	26.64	26.76	28.46	28.15	28.95	29.04	26.07	26.20	26.03	26.02	25.90	26.02	25.40	25.45	26.44
8:12	26.44	26.33	26.57	26.45	26.42	26.48	26.64	26.76	28.75	28.45	29.46	29.48	26.18	26.36	26.12	26.12	25.99	26.11	25.48	25.54	26.45
8:15	26.44	26.33	26.56	26.44	26.41	26.48	26.64	26.75	29.04	28.74	30.00	29.94	26.34	26.54	26.20	26.22	26.08	26.21	25.55	25.62	26.46
8:18	26.44	26.33	26.56	26.44	26.41	26.47	26.64	26.75	29.28	29.10	30.48	30.39	26.47	26.71	26.28	26.32	26.18	26.30	25.64	25.71	26.47
8:21	26.44	26.34	26.56	26.44	26.41	26.47	26.64	26.75	29.58	29.50	30.89	30.83	26.64	26.89	26.37	26.42	26.28	26.40	25.73	25.79	26.49
8:24	26.45	26.35	26.57	26.44	26.40	26.47	26.64	26.75	29.86	29.89	31.27	31.25	26.77	27.03	26.44	26.52	26.37	26.50	25.81	25.88	26.50
8:27	26.46	26.36	26.57	26.44	26.40	26.47	26.64	26.74	30.14	30.33	31.72	31.72	26.95	27.24	26.53	26.62	26.47	26.59	25.89	25.95	26.52
8:30	26.47	26.38	26.57	26.44	26.40	26.47	26.65	26.74	30.47	30.73	32.16	32.21	27.13	27.40	26.61	26.72	26.57	26.70	25.97	26.03	26.54
8:33	26.48	26.39	26.58	26.45	26.40	26.47	26.65	26.75	30.75	31.07	32.55	32.68	27.25	27.55	26.70	26.82	26.67	26.80	26.06	26.11	26.55
8:36	26.50	26.41	26.59	26.45	26.40	26.47	26.66	26.75	31.05	31.39	33.10	33.18	27.40	27.74	26.79	26.92	26.77	26.90	26.15	26.21	26.57
8:39	26.51	26.44	26.60	26.46	26.41	26.48	26.67	26.75	31.31	31.68	33.61	33.61	27.51	27.89	26.87	27.02	26.86	27.00	26.22	26.29	26.59
8:42	26.53	26.46	26.62	26.47	26.41	26.48	26.68	26.75	31.60	31.99	33.98	33.98	27.63	28.02	26.95	27.12	26.96	27.10	26.31	26.37	26.61
8:45	26.56	26.49	26.63	26.48	26.42	26.48	26.69	26.76	31.92	32.35	34.44	34.43	27.80	28.22	27.04	27.22	27.07	27.21	26.39	26.45	26.63
8:48	26.58	26.52	26.65	26.49	26.42	26.49	26.70	26.77	32.28	32.75	34.88	34.91	27.99	28.41	27.14	27.34	27.18	27.32	26.49	26.55	26.66
8:51	26.61	26.55	26.67	26.51	26.43	26.50	26.71	26.77	32.68	33.24	35.30	35.37	28.19	28.59	27.22	27.44	27.28	27.43	26.56	26.62	26.68

8:54	26.64	26.59	26.69	26.53	26.44	26.50	26.73	26.78	33.05	33.70	35.74	35.81	28.39	28.77	27.32	27.55	27.40	27.55	26.66	26.72	26.70
8:57	26.67	26.63	26.72	26.54	26.45	26.51	26.74	26.79	33.36	34.03	36.08	36.17	28.52	28.90	27.41	27.66	27.51	27.66	26.76	26.81	26.72
9:00	26.71	26.67	26.74	26.57	26.46	26.52	26.76	26.80	33.63	34.38	36.50	36.59	28.69	29.09	27.51	27.78	27.64	27.78	26.86	26.91	26.75
9:03	26.74	26.72	26.77	26.59	26.47	26.53	26.78	26.81	33.92	34.69	36.84	36.94	28.84	29.26	27.61	27.90	27.75	27.90	26.95	27.00	26.78
9:06	26.78	26.77	26.80	26.62	26.48	26.55	26.80	26.83	34.25	35.03	37.24	37.35	29.02	29.42	27.71	28.02	27.88	28.03	27.04	27.09	26.80
9:09	26.83	26.82	26.84	26.64	26.49	26.56	26.82	26.84	34.53	35.37	37.66	37.78	29.17	29.61	27.81	28.14	28.01	28.16	27.16	27.18	26.83
9:12	26.87	26.87	26.87	26.67	26.51	26.57	26.85	26.86	34.79	35.67	38.00	38.13	29.28	29.75	27.91	28.25	28.13	28.28	27.25	27.27	26.86
9:15	26.92	26.93	26.91	26.71	26.52	26.59	26.87	26.88	35.02	35.95	38.37	38.50	29.47	29.94	28.01	28.37	28.24	28.40	27.32	27.34	26.89
9:18	26.97	26.99	26.95	26.74	26.54	26.60	26.90	26.89	35.32	36.29	38.77	38.92	29.63	30.11	28.11	28.49	28.37	28.53	27.41	27.43	26.92
9:21	27.03	27.06	27.00	26.78	26.56	26.62	26.92	26.91	35.61	36.62	39.16	39.33	29.78	30.26	28.22	28.61	28.51	28.66	27.52	27.53	26.95
9:24	27.09	27.12	27.05	26.82	26.58	26.64	26.95	26.93	35.90	36.95	39.52	39.72	29.92	30.39	28.33	28.74	28.64	28.80	27.63	27.64	26.98
9:27	27.15	27.19	27.09	26.86	26.60	26.66	26.98	26.95	36.09	37.20	39.82	40.02	30.02	30.51	28.43	28.86	28.77	28.93	27.74	27.75	27.02
9:30	27.21	27.27	27.15	26.91	26.62	26.68	27.01	26.98	36.26	37.41	40.07	40.28	30.17	30.68	28.53	28.97	28.89	29.05	27.82	27.83	27.05
9:33	27.28	27.34	27.20	26.96	26.64	26.70	27.05	27.00	36.45	37.64	40.39	40.57	30.33	30.81	28.63	29.09	29.01	29.18	27.93	27.93	27.09
9:36	27.34	27.42	27.26	27.01	26.67	26.73	27.08	27.03	36.64	37.84	40.60	40.79	30.38	30.80	28.73	29.21	29.14	29.31	28.02	28.02	27.13
9:39	27.42	27.50	27.31	27.06	26.69	26.75	27.12	27.05	36.79	38.04	40.86	40.97	30.52	30.90	28.83	29.32	29.26	29.43	28.11	28.09	27.17
9:42	27.49	27.58	27.37	27.12	26.72	26.78	27.15	27.08	36.99	38.27	41.12	41.14	30.65	30.99	28.94	29.44	29.39	29.56	28.22	28.21	27.21
9:45	27.57	27.66	27.44	27.17	26.75	26.81	27.19	27.11	37.19	38.51	41.31	41.34	30.73	31.04	29.04	29.55	29.51	29.69	28.31	28.29	27.25
9:48	27.64	27.75	27.50	27.23	26.78	26.83	27.23	27.14	37.41	38.76	41.48	41.58	30.89	31.19	29.14	29.67	29.64	29.82	28.40	28.38	27.29
9:51	27.72	27.84	27.57	27.29	26.81	26.86	27.27	27.17	37.59	38.94	41.61	41.75	31.00	31.24	29.23	29.77	29.76	29.94	28.46	28.43	27.33
9:54	27.80	27.93	27.63	27.35	26.84	26.89	27.31	27.20	37.76	39.16	41.79	41.97	31.12	31.35	29.33	29.88	29.88	30.06	28.57	28.54	27.37
9:57	27.89	28.02	27.70	27.42	26.87	26.92	27.35	27.23	37.89	39.30	41.89	42.10	31.17	31.39	29.42	29.99	30.00	30.18	28.65	28.62	27.41
10:00	27.97	28.11	27.77	27.49	26.90	26.95	27.39	27.27	38.14	39.56	42.07	42.30	31.37	31.50	29.53	30.12	30.14	30.32	28.76	28.73	27.46
10:03	28.06	28.20	27.84	27.55	26.94	26.99	27.43	27.30	38.30	39.75	42.22	42.47	31.46	31.58	29.64	30.24	30.27	30.45	28.84	28.80	27.51
10:06	28.14	28.30	27.92	27.63	26.97	27.02	27.48	27.34	38.37	39.85	42.24	42.52	31.52	31.61	29.73	30.34	30.39	30.57	28.93	28.89	27.56
10:09	28.23	28.39	27.99	27.70	27.01	27.06	27.52	27.37	38.56	40.05	42.37	42.66	31.68	31.70	29.84	30.46	30.52	30.71	29.00	28.96	27.60
10:12	28.32	28.49	28.07	27.77	27.05	27.09	27.57	27.41	38.70	40.21	42.44	42.73	31.73	31.74	29.94	30.58	30.65	30.84	29.10	29.06	27.65
10:15	28.41	28.58	28.14	27.84	27.08	27.13	27.61	27.45	38.83	40.38	42.52	42.83	31.82	31.81	30.04	30.69	30.77	30.96	29.19	29.14	27.69
10:18	28.50	28.68	28.22	27.92	27.12	27.17	27.66	27.49	38.92	40.50	42.59	42.92	31.97	31.90	30.13	30.79	30.89	31.08	29.26	29.21	27.75
10:21	28.60	28.78	28.30	28.00	27.16	27.20	27.71	27.53	39.03	40.60	42.64	42.99	31.98	31.91	30.22	30.90	31.01	31.20	29.36	29.30	27.79
10:24	28.69	28.87	28.38	28.08	27.20	27.24	27.76	27.57	39.15	40.72	42.63	43.01	32.10	31.95	30.33	31.01	31.14	31.33	29.46	29.40	27.85
10:27	28.79	28.97	28.46	28.16	27.24	27.29	27.81	27.61	39.31	40.90	42.73	43.10	32.18	32.02	30.43	31.12	31.27	31.46	29.54	29.47	27.90
10:30	28.88	29.07	28.54	28.24	27.29	27.33	27.86	27.65	39.38	40.96	42.70	43.06	32.25	32.03	30.52	31.23	31.38	31.57	29.60	29.54	27.95
10:33	28.98	29.17	28.62	28.32	27.33	27.37	27.91	27.69	39.50	41.11	42.72	43.12	32.36	32.14	30.62	31.34	31.50	31.70	29.70	29.63	28.00
10:36	29.07	29.27	28.70	28.40	27.37	27.41	27.96	27.74	39.62	41.22	42.78	43.19	32.45	32.21	30.71	31.43	31.62	31.81	29.76	29.68	28.05
10:39	29.17	29.37	28.78	28.48	27.42	27.45	28.01	27.78	39.73	41.35	42.81	43.24	32.56	32.25	30.81	31.55	31.75	31.94	29.87	29.78	28.10
10:42	29.26	29.47	28.86	28.57	27.46	27.50	28.07	27.83	39.89	41.51	42.83	43.29	32.62	32.27	30.93	31.67	31.89	32.08	29.96	29.87	28.16
10:45	29.36	29.57	28.94	28.65	27.51	27.54	28.12	27.87	39.99	41.64	42.84	43.31	32.72	32.29	31.05	31.81	32.04	32.23	30.06	29.97	28.21
10:48	29.46	29.67	29.02	28.74	27.56	27.59	28.18	27.92	39.97	41.62	42.75	43.21	32.73	32.30	31.13	31.90	32.13	32.33	30.12	30.03	28.28
10:51	29.56	29.77	29.11	28.82	27.60	27.63	28.23	27.97	40.04	41.69	42.74	43.21	32.73	32.28	31.23	32.01	32.26	32.45	30.22	30.13	28.33
10:54	29.66	29.87	29.19	28.91	27.65	27.68	28.28	28.02	40.14	41.74	42.74	43.22	32.84	32.37	31.33	32.12	32.38	32.57	30.27	30.18	28.39
10:57	29.75	29.96	29.27	28.99	27.70	27.73	28.34	28.06	40.23	41.75	42.71	43.19	32.90	32.39	31.42	32.23	32.50	32.69	30.36	30.26	28.44
11:00	29.85	30.06	29.35	29.08	27.75	27.77	28.39	28.11	40.21	41.71	42.56	43.04	32.89	32.41	31.51	32.33	32.61	32.80	30.40	30.31	28.49
11:03	29.95	30.16	29.43	29.17	27.80	27.82	28.45	28.16	40.16	41.59	42.39	42.85	32.83	32.36	31.60	32.42	32.72	32.90	30.48	30.37	28.55
11:06	30.04	30.26	29.51	29.25	27.85	27.87	28.51	28.21	40.18	41.52	42.28	42.76	32.79	32.34	31.68	32.50	32.81	33.00	30.53	30.43	28.60
11:09	30.14	30.35	29.59	29.34	27.90	27.92	28.56	28.26	40.25	41.54	42.23	42.72	32.82	32.37	31.78	32.61	32.94	33.13	30.63	30.52	28.66
11:12	30.24	30.45	29.67	29.42	27.95	27.96	28.62	28.31	40.26	41.52	42.16	42.65	32.86	32.43	31.87	32.71	33.05	33.23	30.68	30.56	28.72
11:15	30.33	30.54	29.75	29.51	28.00	28.01	28.68	28.36	40.16	41.42	41.97	42.48	32.83	32.42	31.95	32.80	33.15	33.33	30.74	30.63	28.78

11:18	30.43	30.64	29.82	29.59	28.05	28.06	28.73	28.41	40.21	41.43	41.88	42.39	32.86	32.42	32.05	32.91	33.27	33.45	30.85	30.72	28.83
11:21	30.52	30.73	29.90	29.68	28.11	28.11	28.79	28.46	40.18	41.38	41.79	42.33	32.88	32.43	32.13	32.99	33.37	33.55	30.90	30.77	28.89
11:24	30.62	30.82	29.98	29.76	28.16	28.16	28.84	28.51	40.20	41.39	41.74	42.28	32.87	32.38	32.21	33.08	33.47	33.65	30.95	30.82	28.95
11:27	30.71	30.91	30.05	29.84	28.21	28.21	28.90	28.56	40.19	41.34	41.63	42.15	32.92	32.35	32.29	33.18	33.57	33.75	31.00	30.88	29.00
11:30	30.80	31.00	30.12	29.93	28.27	28.26	28.96	28.61	40.12	41.25	41.51	42.01	32.93	32.34	32.37	33.27	33.67	33.84	31.05	30.93	29.05
11:33	30.89	31.08	30.20	30.01	28.32	28.31	29.01	28.66	40.10	41.22	41.44	41.93	32.98	32.35	32.47	33.38	33.78	33.95	31.13	31.01	29.10
11:36	30.98	31.17	30.27	30.09	28.37	28.36	29.07	28.72	40.07	41.17	41.33	41.78	33.00	32.35	32.54	33.46	33.88	34.04	31.17	31.04	29.15
11:39	31.07	31.25	30.34	30.17	28.42	28.41	29.12	28.77	40.10	41.20	41.19	41.59	33.09	32.33	32.65	33.59	34.01	34.17	31.26	31.13	29.20
11:42	31.16	31.34	30.41	30.25	28.48	28.47	29.18	28.82	40.08	41.19	41.01	41.37	33.16	32.33	32.73	33.68	34.11	34.27	31.30	31.19	29.25
11:45	31.25	31.42	30.48	30.33	28.53	28.52	29.24	28.87	39.95	41.10	40.76	41.08	33.05	32.28	32.81	33.76	34.21	34.36	31.38	31.27	29.30
11:48	31.33	31.49	30.55	30.41	28.59	28.57	29.29	28.93	39.84	41.01	40.48	40.80	33.08	32.29	32.89	33.84	34.29	34.44	31.43	31.31	29.36
11:51	31.42	31.57	30.62	30.48	28.64	28.62	29.35	28.98	39.65	40.82	40.19	40.52	33.03	32.30	32.94	33.90	34.35	34.51	31.48	31.38	29.40
11:54	31.50	31.65	30.68	30.56	28.70	28.67	29.40	29.03	39.52	40.68	39.89	40.28	32.96	32.25	32.98	33.94	34.40	34.56	31.49	31.38	29.45
11:57	31.58	31.72	30.75	30.63	28.75	28.72	29.46	29.08	39.50	40.64	39.73	40.16	33.04	32.33	33.05	34.03	34.49	34.64	31.54	31.43	29.50
12:00	31.66	31.79	30.81	30.71	28.80	28.77	29.51	29.13	39.49	40.61	39.63	40.08	33.05	32.34	33.15	34.13	34.60	34.74	31.61	31.50	29.56
12:03	31.74	31.86	30.87	30.78	28.86	28.83	29.57	29.19	39.40	40.50	39.52	39.99	33.03	32.33	33.24	34.23	34.69	34.83	31.66	31.57	29.61
12:06	31.81	31.93	30.93	30.85	28.91	28.88	29.62	29.24	39.33	40.39	39.43	39.91	33.04	32.37	33.32	34.33	34.78	34.91	31.68	31.59	29.66
12:09	31.89	32.00	30.99	30.92	28.97	28.93	29.68	29.29	39.24	40.29	39.36	39.85	33.03	32.39	33.41	34.43	34.88	35.00	31.76	31.67	29.71
12:12	31.96	32.07	31.05	30.99	29.02	28.98	29.73	29.34	39.25	40.26	39.33	39.83	33.12	32.47	33.51	34.55	34.99	35.11	31.86	31.75	29.76
12:15	32.04	32.13	31.11	31.06	29.08	29.03	29.79	29.39	39.21	40.18	39.28	39.78	33.08	32.48	33.61	34.65	35.09	35.21	31.90	31.81	29.81
12:18	32.11	32.20	31.16	31.12	29.14	29.08	29.84	29.45	39.16	40.10	39.23	39.73	33.08	32.47	33.70	34.75	35.19	35.30	31.94	31.86	29.86
12:21	32.18	32.26	31.21	31.19	29.19	29.14	29.89	29.50	39.10	40.02	39.20	39.71	33.14	32.56	33.77	34.83	35.26	35.38	31.97	31.89	29.91
12:24	32.25	32.32	31.27	31.25	29.24	29.19	29.95	29.55	39.05	39.96	39.16	39.67	33.15	32.59	33.83	34.90	35.34	35.45	32.02	31.93	29.94
12:27	32.31	32.37	31.32	31.31	29.30	29.24	30.00	29.60	38.97	39.85	39.10	39.62	33.13	32.58	33.89	34.98	35.42	35.52	32.05	31.95	29.99
12:30	32.38	32.43	31.37	31.38	29.35	29.29	30.05	29.66	38.85	39.68	39.03	39.54	33.10	32.60	33.94	35.02	35.45	35.56	32.05	31.96	30.03
12:33	32.44	32.49	31.42	31.44	29.41	29.34	30.10	29.71	38.80	39.61	39.00	39.50	33.11	32.62	34.04	35.14	35.56	35.65	32.11	32.03	30.08
12:36	32.50	32.54	31.47	31.50	29.46	29.39	30.15	29.76	38.72	39.49	38.96	39.47	33.08	32.63	34.14	35.24	35.65	35.74	32.17	32.12	30.12
12:39	32.56	32.59	31.52	31.55	29.51	29.44	30.21	29.81	38.68	39.43	38.93	39.44	33.08	32.65	34.23	35.35	35.75	35.84	32.24	32.18	30.17
12:42	32.62	32.64	31.56	31.61	29.57	29.49	30.26	29.86	38.57	39.30	38.87	39.38	33.04	32.64	34.29	35.41	35.80	35.89	32.30	32.24	30.23
12:45	32.67	32.69	31.61	31.67	29.62	29.54	30.31	29.91	38.51	39.21	38.82	39.32	32.99	32.62	34.37	35.49	35.87	35.97	32.36	32.31	30.28
12:48	32.73	32.74	31.66	31.72	29.68	29.60	30.36	29.96	38.44	39.13	38.80	39.30	33.03	32.67	34.43	35.56	35.94	36.03	32.37	32.32	30.32
12:51	32.78	32.78	31.70	31.78	29.73	29.65	30.41	30.01	38.44	39.11	38.78	39.30	33.06	32.71	34.51	35.65	36.02	36.10	32.40	32.36	30.37
12:54	32.83	32.83	31.74	31.83	29.79	29.70	30.46	30.06	38.39	39.02	38.78	39.30	33.08	32.76	34.61	35.76	36.11	36.19	32.47	32.44	30.41
12:57	32.89	32.87	31.79	31.88	29.84	29.75	30.51	30.11	38.34	38.95	38.75	39.27	33.05	32.75	34.68	35.84	36.17	36.25	32.48	32.45	30.45
13:00	32.93	32.91	31.83	31.93	29.89	29.80	30.56	30.16	38.31	38.90	38.75	39.27	33.07	32.78	34.77	35.94	36.27	36.34	32.55	32.53	30.50
13:03	32.98	32.95	31.87	31.98	29.95	29.85	30.61	30.21	38.22	38.79	38.73	39.24	33.07	32.80	34.84	36.01	36.34	36.40	32.59	32.57	30.54
13:06	33.03	32.99	31.91	32.03	30.00	29.90	30.66	30.26	38.13	38.67	38.69	39.20	33.04	32.82	34.89	36.06	36.37	36.44	32.58	32.56	30.57
13:09	33.07	33.03	31.95	32.08	30.05	29.95	30.71	30.31	37.98	38.51	38.62	39.12	32.90	32.74	34.92	36.08	36.39	36.46	32.57	32.57	30.62
13:12	33.12	33.07	31.99	32.13	30.10	30.00	30.76	30.36	37.91	38.39	38.58	39.08	32.93	32.79	34.96	36.14	36.43	36.50	32.61	32.60	30.65
13:15	33.16	33.10	32.03	32.17	30.16	30.04	30.80	30.41	37.86	38.30	38.58	39.08	32.94	32.82	35.05	36.23	36.53	36.59	32.69	32.67	30.69
13:18	33.20	33.14	32.07	32.22	30.21	30.09	30.85	30.46	37.79	38.21	38.55	39.06	32.89	32.79	35.12	36.29	36.60	36.65	32.71	32.70	30.73
13:21	33.24	33.17	32.11	32.27	30.26	30.14	30.90	30.51	37.69	38.09	38.52	39.02	32.86	32.81	35.15	36.33	36.62	36.68	32.68	32.68	30.77
13:24	33.28	33.20	32.15	32.31	30.31	30.19	30.94	30.55	37.57	37.95	38.47	38.97	32.78	32.78	35.19	36.36	36.65	36.71	32.71	32.70	30.81
13:27	33.32	33.23	32.18	32.35	30.36	30.24	30.99	30.60	37.52	37.87	38.44	38.94	32.77	32.81	35.24	36.41	36.69	36.75	32.69	32.68	30.84
13:30	33.35	33.26	32.22	32.39	30.41	30.28	31.03	30.65	37.44	37.78	38.38	38.87	32.69	32.76	35.27	36.44	36.70	36.76	32.70	32.72	30.87
13:33	33.39	33.29	32.25	32.44	30.46	30.33	31.08	30.69	37.40	37.73	38.35	38.84	32.70	32.77	35.35	36.51	36.76	36.82	32.76	32.78	30.91
13:36	33.42	33.31	32.29	32.48	30.51	30.38	31.12	30.74	37.37	37.68	38.31	38.80	32.69	32.77	35.39	36.55	36.80	36.85	32.77	32.79	30.95
13:39	33.45	33.34	32.32	32.52	30.56	30.42	31.16	30.78	37.34	37.64	38.29	38.78	32.73	32.81	35.46	36.62	36.85	36.90	32.80	32.84	30.98

13:42	33.48	33.36	32.35	32.55	30.61	30.47	31.21	30.83	37.31	37.60	38.27	38.75	32.72	32.80	35.56	36.71	36.90	36.94	32.83	32.92	31.01
13:45	33.51	33.39	32.39	32.59	30.66	30.52	31.25	30.87	37.30	37.58	38.26	38.75	32.73	32.80	35.68	36.85	36.96	37.00	32.84	32.96	31.05
13:48	33.54	33.41	32.42	32.63	30.71	30.56	31.29	30.92	37.24	37.52	38.21	38.69	32.70	32.80	35.75	36.92	36.96	37.00	32.84	33.01	31.09
13:51	33.57	33.43	32.45	32.67	30.76	30.61	31.33	30.96	37.20	37.47	38.15	38.63	32.70	32.78	35.83	37.00	36.97	37.02	32.86	33.04	31.12
13:54	33.60	33.45	32.48	32.70	30.81	30.65	31.37	31.00	37.16	37.43	38.11	38.59	32.68	32.78	35.89	37.07	36.98	37.02	32.83	33.04	31.16
13:57	33.62	33.47	32.51	32.74	30.86	30.70	31.41	31.05	37.11	37.39	38.07	38.54	32.67	32.77	35.96	37.15	36.99	37.03	32.84	33.09	31.19
14:00	33.65	33.49	32.54	32.77	30.90	30.74	31.45	31.09	37.06	37.37	38.02	38.49	32.64	32.73	36.08	37.26	37.03	37.06	32.86	33.17	31.21
14:03	33.67	33.50	32.57	32.81	30.95	30.78	31.49	31.13	37.00	37.31	37.96	38.42	32.56	32.68	36.15	37.32	37.02	37.06	32.84	33.16	31.24
14:06	33.69	33.52	32.60	32.84	31.00	30.83	31.53	31.17	36.95	37.25	37.90	38.36	32.57	32.69	36.20	37.38	37.00	37.04	32.82	33.14	31.27
14:09	33.71	33.53	32.63	32.87	31.04	30.87	31.56	31.21	36.92	37.21	37.87	38.32	32.55	32.67	36.26	37.43	37.00	37.04	32.80	33.16	31.30
14:12	33.73	33.55	32.65	32.90	31.09	30.91	31.60	31.25	36.87	37.14	37.81	38.27	32.55	32.67	36.30	37.47	36.97	37.02	32.75	33.12	31.33
14:15	33.75	33.56	32.68	32.93	31.14	30.95	31.64	31.29	36.85	37.13	37.78	38.23	32.52	32.64	36.38	37.56	37.02	37.05	32.80	33.19	31.35
14:18	33.77	33.58	32.71	32.96	31.18	30.99	31.67	31.33	36.81	37.08	37.74	38.19	32.48	32.60	36.45	37.64	37.03	37.06	32.78	33.22	31.37
14:21	33.79	33.59	32.73	32.99	31.23	31.04	31.71	31.37	36.77	37.02	37.69	38.14	32.49	32.62	36.53	37.72	37.03	37.06	32.79	33.26	31.40
14:24	33.81	33.60	32.76	33.02	31.27	31.08	31.74	31.41	36.74	36.98	37.65	38.10	32.46	32.59	36.61	37.82	37.04	37.06	32.75	33.23	31.43
14:27	33.82	33.61	32.78	33.05	31.31	31.12	31.78	31.44	36.70	36.92	37.60	38.04	32.42	32.54	36.62	37.83	37.03	37.06	32.74	33.22	31.45
14:30	33.84	33.63	32.81	33.08	31.36	31.16	31.81	31.48	36.65	36.87	37.55	37.99	32.40	32.54	36.66	37.86	37.01	37.04	32.72	33.21	31.48
14:33	33.86	33.64	32.83	33.10	31.40	31.20	31.84	31.52	36.65	36.84	37.53	37.98	32.41	32.53	36.77	38.01	37.04	37.06	32.74	33.27	31.50
14:36	33.87	33.65	32.85	33.13	31.45	31.24	31.87	31.55	36.65	36.82	37.52	37.96	32.39	32.52	36.93	38.19	37.08	37.10	32.78	33.37	31.54
14:39	33.89	33.66	32.87	33.16	31.49	31.28	31.90	31.59	36.64	36.78	37.50	37.94	32.39	32.52	37.00	38.28	37.09	37.11	32.76	33.33	31.56
14:42	33.90	33.67	32.90	33.18	31.53	31.32	31.94	31.62	36.55	36.69	37.41	37.85	32.35	32.48	36.99	38.29	37.06	37.08	32.75	33.30	31.59
14:45	33.91	33.67	32.92	33.20	31.57	31.36	31.97	31.66	36.52	36.64	37.38	37.81	32.33	32.45	37.07	38.41	37.07	37.09	32.73	33.35	31.60
14:48	33.92	33.68	32.94	33.23	31.62	31.39	32.00	31.69	36.47	36.59	37.34	37.76	32.30	32.44	37.09	38.43	37.06	37.08	32.72	33.34	31.62
14:51	33.94	33.69	32.96	33.25	31.66	31.43	32.03	31.73	36.43	36.54	37.28	37.70	32.28	32.40	37.16	38.52	37.05	37.07	32.70	33.35	31.64
14:54	33.95	33.70	32.98	33.27	31.70	31.47	32.05	31.76	36.40	36.49	37.25	37.67	32.28	32.42	37.27	38.65	37.05	37.06	32.67	33.37	31.67
14:57	33.96	33.70	33.00	33.29	31.74	31.51	32.08	31.79	36.35	36.45	37.20	37.63	32.26	32.39	37.36	38.76	37.05	37.06	32.70	33.43	31.69
15:00	33.97	33.71	33.02	33.32	31.78	31.54	32.11	31.82	36.31	36.41	37.16	37.57	32.22	32.36	37.39	38.82	37.03	37.04	32.66	33.41	31.71
15:03	33.98	33.72	33.03	33.33	31.82	31.58	32.14	31.85	36.27	36.35	37.09	37.51	32.19	32.33	37.42	38.85	37.01	37.02	32.65	33.42	31.72
15:06	33.99	33.72	33.05	33.35	31.86	31.62	32.17	31.89	36.22	36.30	37.04	37.45	32.14	32.29	37.52	38.98	37.01	37.02	32.64	33.44	31.74
15:09	34.00	33.73	33.07	33.37	31.90	31.65	32.19	31.92	36.17	36.24	36.98	37.38	32.10	32.25	37.62	39.11	37.00	37.01	32.67	33.49	31.76
15:12	34.00	33.73	33.09	33.39	31.94	31.69	32.22	31.95	36.10	36.16	36.91	37.31	32.09	32.25	37.65	39.17	36.96	36.98	32.61	33.46	31.78
15:15	34.01	33.73	33.10	33.41	31.98	31.72	32.24	31.98	36.04	36.09	36.84	37.24	32.05	32.21	37.62	39.16	36.91	36.93	32.57	33.44	31.80
15:18	34.02	33.74	33.12	33.43	32.02	31.76	32.27	32.00	35.94	36.00	36.73	37.12	31.98	32.14	37.54	39.03	36.86	36.88	32.55	33.38	31.82
15:21	34.03	33.74	33.13	33.44	32.06	31.79	32.29	32.03	35.88	35.92	36.65	37.04	31.94	32.12	37.53	39.02	36.80	36.82	32.47	33.33	31.84
15:24	34.03	33.74	33.15	33.46	32.10	31.82	32.31	32.06	35.82	35.85	36.58	36.97	31.89	32.06	37.57	39.07	36.75	36.77	32.43	33.33	31.84
15:27	34.04	33.74	33.16	33.47	32.13	31.86	32.34	32.08	35.75	35.78	36.51	36.89	31.83	31.99	37.61	39.12	36.72	36.74	32.46	33.33	31.85
15:30	34.06	33.74	33.17	33.49	32.17	31.89	32.36	32.11	35.69	35.71	36.43	36.81	31.78	31.95	37.58	39.10	36.67	36.69	32.43	33.28	31.87
15:33	34.06	33.74	33.18	33.50	32.21	31.92	32.38	32.13	35.64	35.66	36.38	36.76	31.77	31.96	37.58	39.12	36.65	36.67	32.43	33.30	31.87
15:36	34.06	33.74	33.19	33.51	32.24	31.95	32.40	32.16	35.58	35.59	36.31	36.68	31.70	31.88	37.65	39.16	36.61	36.63	32.40	33.26	31.88
15:39	34.05	33.74	33.20	33.52	32.28	31.98	32.41	32.18	35.53	35.53	36.24	36.61	31.65	31.83	37.71	39.20	36.58	36.59	32.42	33.28	31.88
15:42	34.05	33.75	33.21	33.53	32.31	32.01	32.43	32.20	35.47	35.46	36.16	36.53	31.60	31.78	37.71	39.19	36.54	36.55	32.39	33.23	31.89
15:45	34.05	33.75	33.22	33.54	32.34	32.04	32.45	32.22	35.42	35.39	36.09	36.46	31.56	31.75	37.67	39.10	36.51	36.51	32.38	33.18	31.90
15:48	34.05	33.74	33.23	33.55	32.38	32.07	32.47	32.25	35.39	35.33	36.02	36.38	31.51	31.68	37.73	39.15	36.52	36.49	32.34	33.18	31.91
15:51	34.05	33.74	33.24	33.56	32.41	32.10	32.48	32.27	35.32	35.27	35.96	36.31	31.48	31.67	37.74	39.14	36.59	36.50	32.33	33.16	31.92
15:54	34.05	33.73	33.25	33.57	32.44	32.13	32.50	32.29	35.25	35.19	35.87	36.23	31.43	31.62	37.66	39.01	36.60	36.51	32.30	33.08	31.93
15:57	34.05	33.73	33.25	33.58	32.48	32.15	32.51	32.31	35.15	35.09	35.76	36.10	31.34	31.53	37.54	38.82	36.54	36.48	32.18	32.96	31.93
16:00	34.05	33.72	33.26	33.58	32.51	32.18	32.53	32.33	35.07	35.00	35.66	36.00	31.28	31.49	37.51	38.72	36.53	36.47	32.14	32.87	31.93
16:03	34.05	33.72	33.27	33.59	32.54	32.21	32.54	32.34	35.02	34.93	35.58	35.92	31.25	31.44	37.58	38.76	36.61	36.56	32.18	32.90	31.94

16:06	34.05	33.71	33.27	33.60	32.57	32.24	32.55	32.36	34.92	34.84	35.47	35.80	31.16	31.36	37.46	38.59	36.66	36.60	32.08	32.72	31.94
16:09	34.05	33.70	33.28	33.60	32.60	32.26	32.56	32.38	34.85	34.75	35.39	35.72	31.11	31.31	37.43	38.54	36.71	36.64	32.04	32.65	31.94
16:12	34.04	33.70	33.28	33.60	32.63	32.29	32.57	32.39	34.79	34.69	35.32	35.64	31.08	31.28	37.44	38.53	36.80	36.72	31.99	32.58	31.95
16:15	34.04	33.69	33.28	33.60	32.65	32.31	32.58	32.41	34.73	34.62	35.23	35.56	31.02	31.22	37.42	38.49	36.78	36.72	31.97	32.59	31.95
16:18	34.03	33.68	33.28	33.60	32.68	32.33	32.59	32.42	34.66	34.54	35.14	35.46	30.97	31.16	37.28	38.32	36.81	36.75	31.89	32.42	31.95
16:21	34.02	33.67	33.28	33.60	32.71	32.36	32.60	32.44	34.61	34.47	35.07	35.39	30.90	31.10	37.33	38.38	36.91	36.86	31.90	32.48	31.96
16:24	34.02	33.66	33.28	33.60	32.73	32.38	32.61	32.45	34.55	34.40	35.01	35.32	30.84	31.05	37.41	38.46	37.01	36.95	31.84	32.44	31.96
16:27	34.01	33.65	33.29	33.61	32.76	32.40	32.62	32.46	34.49	34.33	34.92	35.24	30.80	31.00	37.31	38.35	36.97	36.93	31.81	32.36	31.96
16:30	34.00	33.64	33.29	33.61	32.78	32.42	32.63	32.48	34.39	34.23	34.82	35.12	30.71	30.92	37.24	38.23	36.97	36.95	31.77	32.32	31.95
16:33	33.99	33.63	33.28	33.61	32.81	32.44	32.63	32.49	34.32	34.15	34.73	35.02	30.65	30.86	37.17	38.12	37.01	36.98	31.73	32.23	31.93
16:36	33.98	33.61	33.28	33.61	32.83	32.46	32.64	32.50	34.25	34.07	34.62	34.91	30.59	30.79	37.03	37.95	36.93	36.93	31.62	32.11	31.92
16:39	33.97	33.60	33.28	33.61	32.85	32.48	32.65	32.51	34.18	33.98	34.51	34.80	30.53	30.73	36.89	37.78	36.88	36.88	31.54	32.00	31.92
16:42	33.96	33.59	33.28	33.61	32.87	32.49	32.65	32.52	34.11	33.90	34.43	34.71	30.47	30.67	36.85	37.72	36.88	36.88	31.48	31.94	31.92
16:45	33.95	33.57	33.27	33.60	32.89	32.51	32.65	32.53	34.03	33.82	34.34	34.62	30.43	30.62	36.77	37.60	36.84	36.85	31.48	31.90	31.91
16:48	33.94	33.56	33.27	33.60	32.91	32.52	32.65	32.54	33.95	33.74	34.24	34.51	30.35	30.55	36.59	37.39	36.68	36.71	31.39	31.80	31.90
16:51	33.92	33.54	33.26	33.59	32.93	32.54	32.65	32.54	33.88	33.67	34.16	34.43	30.31	30.52	36.56	37.34	36.73	36.74	31.35	31.74	31.89
16:54	33.91	33.52	33.26	33.58	32.95	32.56	32.65	32.55	33.83	33.60	34.08	34.35	30.28	30.48	36.49	37.25	36.77	36.75	31.31	31.64	31.89
16:57	33.90	33.51	33.25	33.58	32.96	32.57	32.65	32.56	33.76	33.53	33.99	34.26	30.21	30.40	36.45	37.21	36.79	36.75	31.29	31.60	31.88
17:00	33.88	33.49	33.25	33.57	32.98	32.58	32.65	32.57	33.68	33.44	33.90	34.15	30.18	30.36	36.36	37.06	36.75	36.70	31.21	31.51	31.88
17:03	33.87	33.47	33.24	33.56	32.99	32.59	32.65	32.58	33.60	33.35	33.79	34.04	30.09	30.29	36.22	36.82	36.63	36.59	31.12	31.36	31.86
17:06	33.85	33.45	33.23	33.55	33.01	32.60	32.65	32.58	33.52	33.26	33.69	33.94	30.02	30.22	36.09	36.62	36.56	36.53	31.09	31.27	31.84
17:09	33.83	33.43	33.22	33.55	33.02	32.61	32.65	32.58	33.47	33.20	33.61	33.86	29.96	30.16	36.05	36.55	36.59	36.54	31.04	31.19	31.84
17:12	33.82	33.41	33.21	33.54	33.03	32.62	32.66	32.59	33.39	33.12	33.52	33.76	29.91	30.12	35.87	36.34	36.47	36.43	31.00	31.13	31.83
17:15	33.80	33.39	33.20	33.53	33.04	32.63	32.66	32.60	33.31	33.03	33.42	33.66	29.84	30.05	35.73	36.14	36.39	36.38	30.94	31.06	31.81
17:18	33.78	33.37	33.19	33.51	33.05	32.63	32.66	32.60	33.21	32.93	33.32	33.54	29.75	29.97	35.64	35.90	36.36	36.36	30.83	30.93	31.79
17:21	33.76	33.35	33.18	33.50	33.06	32.64	32.66	32.60	33.13	32.84	33.22	33.44	29.68	29.89	35.48	35.56	36.26	36.27	30.76	30.82	31.78
17:24	33.74	33.32	33.17	33.49	33.07	32.64	32.65	32.60	33.05	32.76	33.13	33.34	29.61	29.83	35.29	35.32	36.16	36.18	30.65	30.64	31.76
17:27	33.72	33.30	33.15	33.47	33.07	32.64	32.65	32.60	32.98	32.66	33.02	33.24	29.54	29.75	35.04	35.09	36.02	36.07	30.57	30.47	31.74
17:30	33.69	33.28	33.14	33.46	33.07	32.64	32.64	32.61	32.91	32.59	32.94	33.15	29.49	29.70	34.85	34.95	36.00	36.05	30.49	30.37	31.74
17:33	33.67	33.25	33.13	33.45	33.07	32.65	32.64	32.61	32.82	32.51	32.85	33.06	29.45	29.64	34.70	34.80	35.94	36.00	30.44	30.32	31.71
17:36	33.65	33.23	33.11	33.43	33.07	32.65	32.63	32.61	32.77	32.44	32.75	32.96	29.38	29.59	34.63	34.62	35.84	35.93	30.36	30.24	31.69
17:39	33.63	33.20	33.10	33.41	33.08	32.65	32.63	32.61	32.68	32.35	32.66	32.86	29.33	29.55	34.47	34.43	35.63	35.78	30.29	30.16	31.67
17:42	33.60	33.18	33.08	33.40	33.08	32.65	32.62	32.60	32.61	32.27	32.57	32.77	29.27	29.49	34.29	34.30	35.46	35.60	30.22	30.07	31.65
17:45	33.58	33.15	33.06	33.38	33.08	32.64	32.61	32.60	32.54	32.19	32.48	32.67	29.21	29.43	34.03	34.08	35.20	35.37	30.12	29.95	31.63
17:48	33.55	33.12	33.05	33.36	33.08	32.64	32.60	32.60	32.47	32.12	32.39	32.58	29.16	29.38	33.80	33.88	34.95	35.17	30.00	29.82	31.62
17:51	33.53	33.09	33.03	33.34	33.08	32.63	32.60	32.59	32.39	32.03	32.29	32.47	29.09	29.33	33.60	33.62	34.59	34.93	29.87	29.70	31.59
17:54	33.50	33.07	33.01	33.32	33.07	32.63	32.59	32.59	32.31	31.95	32.19	32.38	29.04	29.28	33.44	33.36	34.29	34.67	29.76	29.62	31.57
17:57	33.48	33.04	32.99	33.30	33.07	32.62	32.58	32.59	32.25	31.86	32.10	32.27	28.97	29.21	33.25	33.11	33.99	34.36	29.64	29.52	31.56
18:00	33.45	33.01	32.97	33.28	33.06	32.61	32.57	32.58	32.18	31.78	31.99	32.17	28.93	29.15	33.09	32.90	33.76	34.05	29.55	29.44	31.55
18:03	33.42	32.98	32.95	33.26	33.06	32.61	32.56	32.58	32.12	31.72	31.91	32.09	28.89	29.12	32.95	32.74	33.52	33.79	29.46	29.37	31.53
18:06	33.40	32.95	32.93	33.24	33.05	32.60	32.55	32.57	32.05	31.64	31.82	31.99	28.82	29.05	32.80	32.57	33.32	33.55	29.39	29.30	31.51
18:09	33.37	32.92	32.92	33.22	33.04	32.59	32.54	32.57	31.98	31.57	31.72	31.89	28.79	29.01	32.68	32.43	33.17	33.36	29.32	29.22	31.49
18:12	33.34	32.89	32.89	33.20	33.03	32.58	32.53	32.56	31.91	31.49	31.63	31.80	28.76	28.98	32.56	32.30	33.00	33.18	29.22	29.14	31.47
18:15	33.31	32.86	32.87	33.17	33.02	32.56	32.51	32.55	31.85	31.41	31.54	31.70	28.70	28.92	32.45	32.17	32.85	33.02	29.17	29.08	31.45
18:18	33.28	32.83	32.85	33.15	33.00	32.55	32.50	32.54	31.77	31.33	31.44	31.61	28.64	28.86	32.33	32.03	32.70	32.86	29.09	29.00	31.44
18:21	33.25	32.80	32.83	33.13	32.99	32.54	32.49	32.53	31.72	31.26	31.36	31.51	28.57	28.81	32.22	31.91	32.57	32.72	29.04	28.96	31.42
18:24	33.22	32.77	32.81	33.10	32.97	32.52	32.48	32.52	31.65	31.20	31.27	31.42	28.56	28.78	32.12	31.80	32.45	32.59	29.01	28.91	31.39
18:27	33.19	32.74	32.78	33.08	32.95	32.50	32.46	32.51	31.58	31.12	31.18	31.32	28.51	28.73	32.02	31.68	32.32	32.45	28.93	28.86	31.37

18:30	33.16	32.70	32.76	33.05	32.93	32.48	32.45	32.50	31.53	31.05	31.09	31.24	28.46	28.67	31.92	31.57	32.19	32.33	28.86	28.79	31.35
18:33	33.13	32.67	32.74	33.03	32.91	32.47	32.43	32.49	31.47	30.99	31.01	31.15	28.42	28.63	31.82	31.46	32.07	32.20	28.81	28.72	31.33
18:36	33.10	32.64	32.71	33.00	32.89	32.45	32.42	32.48	31.40	30.92	30.92	31.06	28.37	28.58	31.73	31.35	31.95	32.08	28.76	28.68	31.30
18:39	33.07	32.61	32.69	32.98	32.87	32.43	32.40	32.47	31.33	30.84	30.84	30.97	28.32	28.53	31.64	31.25	31.84	31.96	28.72	28.62	31.28
18:42	33.04	32.57	32.67	32.95	32.85	32.41	32.39	32.45	31.28	30.78	30.76	30.89	28.30	28.51	31.55	31.14	31.72	31.84	28.64	28.54	31.27
18:45	33.00	32.54	32.64	32.92	32.83	32.39	32.37	32.44	31.21	30.71	30.68	30.81	28.23	28.44	31.45	31.04	31.61	31.73	28.57	28.49	31.25
18:48	32.97	32.51	32.61	32.90	32.80	32.36	32.35	32.43	31.15	30.64	30.59	30.72	28.19	28.39	31.37	30.94	31.49	31.62	28.54	28.45	31.22
18:51	32.94	32.47	32.59	32.87	32.78	32.34	32.33	32.41	31.09	30.58	30.52	30.63	28.16	28.35	31.28	30.84	31.38	31.51	28.49	28.41	31.18
18:54	32.91	32.44	32.56	32.84	32.75	32.32	32.32	32.39	31.02	30.51	30.43	30.55	28.10	28.30	31.20	30.75	31.27	31.40	28.43	28.35	31.17
18:57	32.87	32.40	32.54	32.81	32.72	32.29	32.30	32.38	30.95	30.44	30.35	30.46	28.04	28.25	31.11	30.65	31.16	31.28	28.37	28.26	31.14
19:00	32.84	32.37	32.51	32.78	32.70	32.27	32.28	32.36	30.90	30.36	30.26	30.38	28.00	28.20	31.02	30.55	31.05	31.18	28.29	28.18	31.12
19:03	32.81	32.33	32.48	32.75	32.67	32.24	32.26	32.34	30.85	30.30	30.18	30.30	27.96	28.16	30.93	30.46	30.94	31.07	28.24	28.13	31.11
19:06	32.77	32.30	32.45	32.72	32.64	32.22	32.24	32.32	30.79	30.24	30.11	30.21	27.90	28.11	30.85	30.37	30.84	30.97	28.19	28.08	31.09
19:09	32.74	32.26	32.43	32.70	32.61	32.19	32.22	32.30	30.73	30.17	30.03	30.13	27.87	28.07	30.78	30.28	30.74	30.87	28.15	28.04	31.06
19:12	32.70	32.23	32.40	32.66	32.58	32.16	32.20	32.28	30.67	30.10	29.95	30.05	27.82	28.02	30.69	30.18	30.63	30.76	28.07	27.96	31.03
19:15	32.67	32.19	32.37	32.63	32.55	32.14	32.17	32.26	30.60	30.03	29.87	29.97	27.75	27.95	30.61	30.09	30.53	30.66	28.00	27.88	31.02
19:18	32.63	32.16	32.34	32.60	32.52	32.11	32.15	32.24	30.55	29.97	29.79	29.89	27.71	27.91	30.53	30.00	30.43	30.56	27.94	27.82	30.99
19:21	32.60	32.12	32.31	32.57	32.48	32.08	32.13	32.22	30.49	29.91	29.72	29.81	27.67	27.87	30.46	29.92	30.34	30.47	27.90	27.78	30.95
19:24	32.56	32.08	32.28	32.54	32.45	32.05	32.10	32.20	30.44	29.85	29.65	29.74	27.63	27.82	30.39	29.85	30.25	30.39	27.86	27.73	30.93
19:27	32.53	32.05	32.25	32.51	32.42	32.02	32.08	32.17	30.38	29.79	29.59	29.67	27.59	27.78	30.33	29.78	30.17	30.31	27.81	27.70	30.89
19:30	32.49	32.01	32.22	32.47	32.38	31.99	32.06	32.15	30.33	29.73	29.52	29.60	27.53	27.72	30.26	29.71	30.09	30.22	27.76	27.63	30.88
19:33	32.45	31.97	32.19	32.44	32.35	31.96	32.03	32.13	30.27	29.68	29.45	29.54	27.49	27.69	30.20	29.64	30.01	30.14	27.71	27.58	30.85
19:36	32.42	31.94	32.16	32.41	32.32	31.93	32.01	32.10	30.23	29.62	29.39	29.47	27.46	27.65	30.14	29.58	29.93	30.07	27.69	27.55	30.82
19:39	32.38	31.90	32.13	32.37	32.28	31.89	31.98	32.08	30.18	29.57	29.33	29.40	27.41	27.60	30.08	29.51	29.86	30.00	27.64	27.52	30.79
19:42	32.34	31.86	32.10	32.34	32.25	31.86	31.95	32.05	30.14	29.52	29.27	29.34	27.38	27.56	30.03	29.45	29.79	29.93	27.60	27.48	30.76
19:45	32.31	31.82	32.07	32.31	32.21	31.83	31.93	32.03	30.10	29.48	29.22	29.29	27.34	27.53	29.98	29.40	29.72	29.87	27.57	27.45	30.74
19:48	32.27	31.79	32.03	32.27	32.17	31.80	31.90	32.00	30.05	29.43	29.17	29.23	27.33	27.51	29.93	29.35	29.65	29.80	27.54	27.42	30.71
19:51	32.24	31.75	32.00	32.24	32.14	31.77	31.87	31.97	30.02	29.39	29.12	29.18	27.29	27.47	29.88	29.30	29.59	29.75	27.50	27.37	30.70
19:54	32.20	31.71	31.97	32.20	32.11	31.74	31.85	31.95	29.99	29.35	29.07	29.13	27.27	27.45	29.84	29.26	29.54	29.69	27.47	27.35	30.67
19:57	32.16	31.68	31.94	32.17	32.07	31.71	31.82	31.92	29.95	29.31	29.03	29.08	27.24	27.42	29.79	29.21	29.48	29.63	27.46	27.31	30.65
20:00	32.13	31.64	31.91	32.14	32.04	31.68	31.79	31.90	29.91	29.27	28.98	29.03	27.21	27.39	29.75	29.17	29.42	29.58	27.43	27.29	30.63
20:03	32.09	31.60	31.88	32.10	32.00	31.64	31.77	31.87	29.88	29.24	28.93	28.99	27.19	27.37	29.71	29.13	29.37	29.53	27.42	27.29	30.60
20:06	32.05	31.57	31.85	32.07	31.96	31.61	31.74	31.85	29.85	29.20	28.89	28.94	27.17	27.35	29.67	29.09	29.32	29.48	27.38	27.27	30.57
20:09	32.02	31.53	31.82	32.03	31.93	31.58	31.71	31.82	29.81	29.17	28.85	28.90	27.16	27.33	29.62	29.04	29.26	29.42	27.36	27.23	30.55
20:12	31.98	31.49	31.78	32.00	31.89	31.55	31.68	31.79	29.77	29.13	28.81	28.85	27.13	27.30	29.58	29.00	29.21	29.37	27.33	27.22	30.52
20:15	31.94	31.45	31.75	31.96	31.85	31.51	31.65	31.76	29.74	29.09	28.77	28.81	27.11	27.28	29.55	28.96	29.16	29.33	27.32	27.21	30.49
20:18	31.91	31.42	31.72	31.93	31.82	31.48	31.63	31.74	29.69	29.05	28.73	28.76	27.09	27.25	29.51	28.92	29.11	29.28	27.29	27.19	30.47
20:21	31.87	31.38	31.69	31.89	31.78	31.45	31.60	31.71	29.66	29.02	28.69	28.72	27.06	27.22	29.46	28.88	29.06	29.23	27.27	27.16	30.44
20:24	31.83	31.34	31.65	31.86	31.74	31.41	31.57	31.68	29.61	28.98	28.65	28.68	27.04	27.20	29.43	28.84	29.01	29.18	27.24	27.14	30.42
20:27	31.80	31.31	31.62	31.82	31.71	31.38	31.54	31.65	29.59	28.95	28.61	28.63	27.02	27.17	29.39	28.81	28.96	29.14	27.22	27.12	30.40
20:30	31.76	31.27	31.59	31.79	31.67	31.35	31.51	31.63	29.56	28.92	28.57	28.59	27.00	27.16	29.35	28.77	28.91	29.09	27.20	27.11	30.36
20:33	31.72	31.23	31.56	31.75	31.64	31.31	31.48	31.60	29.53	28.88	28.54	28.55	26.97	27.12	29.31	28.74	28.87	29.05	27.18	27.08	30.35
20:36	31.69	31.20	31.52	31.72	31.60	31.28	31.45	31.57	29.50	28.85	28.50	28.52	26.96	27.11	29.28	28.70	28.83	29.01	27.16	27.07	30.33
20:39	31.65	31.16	31.49	31.68	31.56	31.25	31.43	31.54	29.46	28.81	28.46	28.47	26.92	27.07	29.25	28.67	28.78	28.97	27.13	27.04	30.30
20:42	31.62	31.13	31.46	31.65	31.53	31.22	31.40	31.51	29.42	28.78	28.42	28.43	26.91	27.05	29.21	28.63	28.74	28.92	27.10	26.99	30.27
20:45	31.58	31.09	31.43	31.61	31.49	31.18	31.37	31.49	29.39	28.74	28.39	28.39	26.88	27.03	29.17	28.60	28.70	28.88	27.08	26.98	30.25
20:48	31.54	31.06	31.40	31.57	31.46	31.15	31.34	31.46	29.36	28.71	28.35	28.35	26.85	27.00	29.14	28.57	28.65	28.85	27.08	27.00	30.22
20:51	31.51	31.02	31.36	31.54	31.42	31.12	31.31	31.43	29.32	28.67	28.31	28.32	26.82	26.96	29.11	28.53	28.61	28.81	27.05	26.95	30.20

20:54	31.47	30.99	31.33	31.50	31.39	31.09	31.28	31.40	29.30	28.64	28.28	28.28	26.79	26.94	29.07	28.50	28.57	28.77	27.01	26.91	30.19
20:57	31.44	30.95	31.30	31.47	31.35	31.06	31.25	31.37	29.27	28.61	28.25	28.25	26.78	26.94	29.04	28.47	28.53	28.73	27.00	26.89	30.17
21:00	31.40	30.92	31.27	31.43	31.32	31.03	31.22	31.35	29.24	28.59	28.22	28.21	26.76	26.90	29.01	28.44	28.50	28.70	26.98	26.88	30.15
21:03	31.37	30.89	31.24	31.40	31.28	30.99	31.20	31.32	29.21	28.56	28.19	28.18	26.75	26.89	28.98	28.41	28.46	28.67	26.97	26.86	30.12
21:06	31.34	30.85	31.21	31.37	31.25	30.96	31.17	31.29	29.18	28.53	28.16	28.15	26.73	26.87	28.95	28.38	28.42	28.63	26.94	26.84	30.10
21:09	31.30	30.82	31.17	31.33	31.21	30.93	31.14	31.26	29.15	28.50	28.13	28.12	26.73	26.87	28.91	28.35	28.39	28.59	26.93	26.83	30.06
21:12	31.26	30.78	31.14	31.30	31.18	30.90	31.11	31.23	29.12	28.47	28.10	28.09	26.71	26.85	28.89	28.32	28.36	28.56	26.93	26.82	30.04
21:15	31.23	30.75	31.11	31.26	31.14	30.87	31.08	31.20	29.09	28.45	28.07	28.06	26.69	26.83	28.86	28.30	28.32	28.53	26.91	26.80	30.02
21:18	31.20	30.72	31.08	31.23	31.11	30.84	31.05	31.18	29.06	28.42	28.05	28.03	26.68	26.81	28.83	28.27	28.29	28.50	26.89	26.80	29.99
21:21	31.16	30.68	31.05	31.19	31.07	30.80	31.02	31.15	29.03	28.40	28.02	28.00	26.66	26.79	28.80	28.24	28.25	28.46	26.85	26.77	29.97
21:24	31.13	30.65	31.02	31.16	31.04	30.77	30.99	31.12	29.01	28.37	27.99	27.96	26.63	26.77	28.77	28.21	28.22	28.43	26.85	26.75	29.95
21:27	31.09	30.62	30.99	31.12	31.01	30.74	30.97	31.09	28.98	28.34	27.96	27.94	26.63	26.76	28.73	28.18	28.18	28.40	26.83	26.73	29.93
21:30	31.06	30.59	30.95	31.09	30.97	30.71	30.94	31.06	28.95	28.31	27.93	27.91	26.61	26.74	28.70	28.15	28.15	28.37	26.82	26.72	29.91
21:33	31.03	30.55	30.92	31.06	30.94	30.68	30.91	31.04	28.93	28.29	27.91	27.87	26.58	26.71	28.67	28.12	28.12	28.34	26.82	26.73	29.88
21:36	30.99	30.52	30.89	31.02	30.91	30.65	30.88	31.01	28.90	28.26	27.88	27.85	26.57	26.70	28.65	28.10	28.09	28.31	26.80	26.70	29.86
21:39	30.96	30.49	30.86	30.99	30.87	30.62	30.85	30.98	28.87	28.23	27.85	27.82	26.55	26.68	28.62	28.07	28.06	28.28	26.76	26.67	29.84
21:42	30.93	30.46	30.83	30.95	30.84	30.59	30.82	30.95	28.84	28.20	27.82	27.79	26.53	26.66	28.59	28.04	28.03	28.25	26.75	26.64	29.83
21:45	30.90	30.43	30.80	30.92	30.81	30.56	30.80	30.92	28.82	28.17	27.80	27.76	26.51	26.64	28.56	28.02	27.99	28.22	26.73	26.63	29.80
21:48	30.86	30.40	30.77	30.89	30.77	30.53	30.77	30.90	28.79	28.15	27.77	27.73	26.49	26.63	28.53	27.99	27.96	28.19	26.72	26.62	29.78
21:51	30.83	30.36	30.74	30.85	30.74	30.50	30.74	30.87	28.75	28.12	27.74	27.70	26.48	26.61	28.50	27.96	27.93	28.16	26.70	26.60	29.75
21:54	30.80	30.33	30.71	30.82	30.71	30.47	30.71	30.84	28.73	28.09	27.72	27.67	26.47	26.60	28.47	27.93	27.90	28.13	26.69	26.59	29.72
21:57	30.77	30.30	30.68	30.79	30.68	30.44	30.68	30.81	28.70	28.06	27.69	27.65	26.45	26.58	28.45	27.91	27.87	28.11	26.68	26.59	29.69
22:00	30.73	30.27	30.65	30.76	30.65	30.41	30.65	30.78	28.67	28.04	27.67	27.62	26.43	26.56	28.42	27.88	27.84	28.07	26.66	26.55	29.68
22:03	30.70	30.24	30.62	30.72	30.61	30.39	30.63	30.76	28.64	28.01	27.64	27.59	26.40	26.53	28.39	27.85	27.81	28.05	26.62	26.52	29.67
22:06	30.67	30.21	30.59	30.69	30.58	30.36	30.60	30.73	28.62	27.98	27.61	27.56	26.36	26.49	28.36	27.82	27.79	28.02	26.60	26.49	29.64
22:09	30.64	30.18	30.56	30.66	30.55	30.33	30.57	30.70	28.59	27.96	27.59	27.53	26.34	26.47	28.33	27.79	27.75	27.99	26.58	26.48	29.62
22:12	30.61	30.15	30.53	30.63	30.52	30.30	30.54	30.68	28.56	27.93	27.56	27.50	26.33	26.45	28.30	27.77	27.73	27.96	26.57	26.47	29.59
22:15	30.58	30.12	30.50	30.59	30.49	30.27	30.52	30.65	28.53	27.90	27.53	27.48	26.30	26.43	28.27	27.74	27.70	27.93	26.53	26.44	29.58
22:18	30.55	30.09	30.47	30.56	30.46	30.24	30.49	30.62	28.50	27.88	27.51	27.45	26.30	26.43	28.25	27.72	27.67	27.90	26.52	26.43	29.55
22:21	30.52	30.06	30.45	30.53	30.43	30.21	30.46	30.59	28.48	27.85	27.49	27.43	26.29	26.42	28.22	27.69	27.64	27.88	26.50	26.41	29.52
22:24	30.48	30.03	30.42	30.50	30.39	30.19	30.43	30.57	28.46	27.83	27.46	27.40	26.28	26.40	28.19	27.67	27.62	27.85	26.50	26.40	29.50
22:27	30.45	30.00	30.39	30.47	30.36	30.16	30.41	30.54	28.44	27.81	27.44	27.38	26.27	26.39	28.17	27.65	27.59	27.83	26.48	26.39	29.48
22:30	30.42	29.97	30.36	30.44	30.33	30.13	30.38	30.51	28.41	27.79	27.42	27.35	26.25	26.37	28.15	27.63	27.57	27.81	26.48	26.38	29.45
22:33	30.39	29.95	30.33	30.40	30.30	30.10	30.35	30.48	28.38	27.76	27.40	27.33	26.23	26.35	28.12	27.60	27.54	27.78	26.46	26.37	29.42
22:36	30.36	29.92	30.30	30.37	30.27	30.07	30.32	30.46	28.36	27.74	27.38	27.30	26.22	26.33	28.09	27.58	27.52	27.76	26.45	26.37	29.39
22:39	30.33	29.89	30.27	30.34	30.24	30.04	30.30	30.43	28.33	27.71	27.35	27.28	26.20	26.31	28.07	27.55	27.49	27.73	26.43	26.34	29.38
22:42	30.30	29.86	30.25	30.31	30.21	30.02	30.27	30.40	28.32	27.69	27.33	27.26	26.20	26.31	28.05	27.53	27.47	27.71	26.42	26.33	29.36
22:45	30.27	29.83	30.22	30.28	30.18	29.99	30.24	30.38	28.29	27.67	27.31	27.23	26.16	26.28	28.02	27.51	27.44	27.68	26.40	26.30	29.34
22:48	30.24	29.80	30.19	30.25	30.15	29.96	30.22	30.35	28.27	27.65	27.29	27.21	26.16	26.27	28.00	27.49	27.42	27.66	26.39	26.30	29.32
22:51	30.21	29.78	30.16	30.22	30.12	29.94	30.19	30.32	28.24	27.62	27.26	27.19	26.15	26.26	27.98	27.47	27.40	27.64	26.38	26.29	29.30
22:54	30.18	29.75	30.13	30.19	30.10	29.91	30.16	30.30	28.22	27.60	27.24	27.16	26.13	26.25	27.95	27.44	27.38	27.62	26.36	26.27	29.28
22:57	30.15	29.72	30.11	30.16	30.07	29.88	30.14	30.27	28.21	27.58	27.22	27.14	26.13	26.24	27.93	27.42	27.35	27.59	26.35	26.25	29.27
23:00	30.13	29.69	30.08	30.13	30.04	29.86	30.11	30.25	28.17	27.56	27.20	27.12	26.12	26.22	27.90	27.40	27.33	27.57	26.34	26.24	29.24
23:03	30.10	29.67	30.05	30.10	30.01	29.83	30.09	30.22	28.15	27.54	27.18	27.10	26.11	26.22	27.88	27.38	27.31	27.55	26.33	26.23	29.22
23:06	30.07	29.64	30.03	30.07	29.98	29.80	30.06	30.20	28.14	27.52	27.16	27.08	26.09	26.20	27.86	27.36	27.28	27.53	26.31	26.22	29.20
23:09	30.04	29.61	30.00	30.04	29.95	29.78	30.03	30.17	28.12	27.50	27.14	27.06	26.07	26.18	27.83	27.34	27.26	27.51	26.29	26.21	29.17
23:12	30.01	29.59	29.97	30.01	29.92	29.75	30.01	30.14	28.09	27.47	27.12	27.03	26.06	26.17	27.81	27.32	27.24	27.48	26.28	26.19	29.16
23:15	29.98	29.56	29.94	29.98	29.89	29.73	29.98	30.12	28.07	27.45	27.10	27.01	26.03	26.14	27.79	27.30	27.22	27.46	26.27	26.17	29.14

23:18	29.95	29.53	29.92	29.95	29.87	29.70	29.96	30.09	28.04	27.43	27.08	26.99	26.02	26.13	27.76	27.27	27.19	27.44	26.25	26.16	29.12
23:21	29.92	29.51	29.89	29.92	29.84	29.67	29.93	30.07	28.01	27.41	27.06	26.97	26.01	26.12	27.74	27.25	27.17	27.42	26.23	26.14	29.09
23:24	29.90	29.48	29.87	29.90	29.81	29.65	29.91	30.04	27.99	27.39	27.04	26.95	26.00	26.11	27.72	27.23	27.15	27.39	26.22	26.13	29.07
23:27	29.87	29.45	29.84	29.87	29.78	29.63	29.88	30.02	27.97	27.37	27.02	26.93	25.99	26.10	27.69	27.21	27.13	27.37	26.20	26.11	29.06
23:30	29.84	29.43	29.81	29.84	29.76	29.60	29.86	29.99	27.96	27.35	27.00	26.91	25.96	26.07	27.67	27.19	27.11	27.35	26.20	26.11	29.03
23:33	29.81	29.40	29.79	29.81	29.73	29.57	29.83	29.97	27.93	27.33	26.98	26.88	25.96	26.06	27.65	27.17	27.09	27.33	26.18	26.09	29.01
23:36	29.79	29.38	29.76	29.78	29.70	29.55	29.81	29.94	27.91	27.31	26.96	26.87	25.95	26.06	27.63	27.15	27.07	27.31	26.18	26.09	28.99
23:39	29.76	29.35	29.73	29.76	29.67	29.52	29.78	29.92	27.88	27.29	26.94	26.85	25.94	26.04	27.61	27.13	27.05	27.29	26.15	26.06	28.97
23:42	29.73	29.32	29.71	29.73	29.65	29.50	29.76	29.89	27.86	27.26	26.93	26.82	25.92	26.03	27.58	27.11	27.03	27.27	26.14	26.05	28.95
23:45	29.70	29.30	29.68	29.70	29.62	29.47	29.73	29.87	27.85	27.25	26.91	26.81	25.92	26.02	27.56	27.09	27.01	27.25	26.13	26.04	28.93
23:48	29.68	29.27	29.66	29.67	29.59	29.45	29.71	29.84	27.82	27.23	26.89	26.79	25.91	26.01	27.54	27.07	26.99	27.23	26.12	26.03	28.91
23:51	29.65	29.25	29.63	29.64	29.57	29.42	29.68	29.82	27.79	27.21	26.87	26.77	25.89	25.98	27.52	27.05	26.97	27.21	26.10	26.02	28.89
23:54	29.62	29.22	29.61	29.62	29.54	29.40	29.66	29.79	27.77	27.18	26.85	26.74	25.86	25.96	27.49	27.03	26.95	27.19	26.09	26.01	28.87
23:57	29.60	29.20	29.58	29.59	29.51	29.38	29.63	29.77	27.74	27.16	26.83	26.73	25.84	25.94	27.47	27.01	26.93	27.17	26.08	26.00	28.84

APPENDIX D1

At Time 0:03,
The predicted temperatures:

	Nodes					
	0	20	40	60	80	100
Predicted Temperature (^{0}C)	27.31	27.91	28.29	28.66	29.04	29.28

τ = 0.155
k = 0.628 W/mK
h_{out} = 20 W/m^{2}K
h_{in} = 3 W/m^{2}K
Δx = 0.02 m
κ = 0.60

At Node 0,

$$T_0^{i+1} = (1-2\tau-2\tau\frac{h_{out}\Delta x}{k})T_0^i + 2\tau T_1^i + 2\tau\frac{h_{out}\Delta x}{k}T_{out}^i + 2\tau\frac{\kappa q_{solar}^i \Delta x}{k} \tag{8.1}$$

q_{solar}^i = 0 W/m^2
T_{out}^i = 25.80 ^{0}C
T_0^i = 27.54 ^{0}C
T_1^i = 27.91 ^{0}C

$$T_0^{i+1} = [1-(2\times0.155)-(2\times0.155\times\frac{20\times0.02}{0.628})]27.54 + (2\times0.155\times27.91) +$$
$$(2\times0.155\times\frac{20\times0.02}{0.628}\times25.80) + (2\times0.155\times\frac{0.6\times0\times0.02}{0.628})$$

= (1-0.31-0.197)27.54 + 8.652 + 5.094
=27.31 ^{0}C

At Node 20,

$$T_1^{i+1} = \tau(T_0^i + T_2^i) + (1-2\tau)T_1^i \tag{8.2}$$

T_0^i = 27.54 ^{0}C
T_1^i = 27.91 ^{0}C
T_2^i = 28.29 ^{0}C

$$T_1^{i+1} = 0.155(27.54 + 28.29) + [(1-2\times0.155)27.91]$$

= 8.654 + 19.258
= 27.91 ^{0}C

At Node 40,

$$T_2^{i+1} = \tau(T_1^i + T_3^i) + (1-2\tau)T_2^i \tag{8.3}$$

T_1^i = 27.91 ^{0}C
T_2^i = 28.29 ^{0}C
T_3^i = 28.66 ^{0}C

$$T_3^{i+1} = 0.155(27.91 + 28.66) + [(1-2\times 0.155)28.29]$$
$= 8.768 + 19.520$
$= 28.29\ ^0$C

At Node 60,

$$T_3^{i+1} = \tau(T_2^i + T_4^i) + (1-2\tau)T_3^i \tag{8.4}$$

T_2^i = 28.29 ^{0}C
T_3^i = 28.66 ^{0}C
T_4^i = 29.04 ^{0}C

$$T_3^{i+1} = 0.155(28.29 + 29.04) + [(1-2\times 0.155)28.66]$$
$= 8.886 + 19.775$
$= 28.66\ ^0$C

At Node 80,

$$T_4^{i+1} = \tau(T_3^i + T_5^i) + (1-2\tau)T_4^i \tag{8.5}$$

T_3^i = 28.66 ^{0}C
T_4^i = 29.04 ^{0}C
T_5^i = 29.41 ^{0}C

$$T_4^{i+1} = 0.155(28.66 + 29.41) + [(1-2\times 0.155)29.04]$$
$= 9.001 + 20.038$
$= 29.04\ ^0$C

At Node 100,

$$T_5^{i+1} = (1-2\tau-2\tau\frac{h_i\Delta x}{k})T_5^i + 2\tau T_4^i + 2\tau\frac{h_i\Delta x}{k}T_\infty \tag{8.6}$$

T_4^i = 29.04 ^{0}C
T_5^i = 29.41 ^{0}C

T_{∞}^{i} = 28.75 ^{0}C

$$T_5^{i+1} = [(1-2\times 0.155-2\times 0.155\times \frac{3\times 0.02}{0.628})\times 29.41]+(2\times 0.155\times 29.04)$$

$$+(2\times 0.155\times \frac{3\times 0.02}{0.628})\times 28.75$$

= (1-0.31-0.03)29.41 + 9.002 + 0.852

= 29.28 ^{0}C

APPENDIX D2

Time	Observed Temperature (^0C) Inner Surface P1 (In)	Outdoor Air	Outer Surface P1 (Out)	Inner Air	q solar	Temperature Predicted, ^0C (Finite Difference Method) Node (N) 0	20	40	60	80	100
0:00	29.41	25.80	27.54	28.75	0.00	27.54	27.91	28.29	28.66	29.04	29.41
0:03	29.39	25.80	27.51	28.73	0.00	27.31	27.91	28.29	28.66	29.04	29.28
0:06	29.36	25.79	27.49	28.71	0.00	27.20	27.88	28.29	28.66	29.02	29.19
0:09	29.33	25.78	27.48	28.69	0.00	27.13	27.83	28.28	28.66	28.99	29.12
0:12	29.31	25.76	27.46	28.67	0.00	27.08	27.79	28.27	28.65	28.96	29.07
0:15	29.28	25.76	27.44	28.64	0.00	27.04	27.76	28.26	28.64	28.93	29.02
0:18	29.25	25.73	27.41	28.63	0.00	27.01	27.72	28.24	28.62	28.90	28.98
0:21	29.23	25.72	27.39	28.61	0.00	26.98	27.69	28.22	28.61	28.87	28.94
0:24	29.20	25.71	27.38	28.58	0.00	26.95	27.66	28.20	28.59	28.84	28.91
0:27	29.18	25.69	27.35	28.56	0.00	26.93	27.64	28.17	28.57	28.81	28.88
0:30	29.15	25.64	27.34	28.57	0.00	26.90	27.61	28.15	28.54	28.78	28.85
0:33	29.13	25.61	27.30	28.57	0.00	26.87	27.58	28.13	28.52	28.76	28.82
0:36	29.10	25.60	27.29	28.54	0.00	26.84	27.56	28.10	28.50	28.73	28.79
0:39	29.08	25.60	27.28	28.51	0.00	26.82	27.53	28.08	28.47	28.70	28.77
0:42	29.05	25.59	27.26	28.49	0.00	26.80	27.51	28.06	28.45	28.68	28.74
0:45	29.03	25.57	27.24	28.49	0.00	26.78	27.48	28.03	28.42	28.65	28.71
0:48	29.01	25.55	27.22	28.46	0.00	26.76	27.46	28.01	28.40	28.62	28.69
0:51	28.98	25.54	27.20	28.43	0.00	26.74	27.44	27.98	28.37	28.60	28.66
0:54	28.96	25.53	27.18	28.41	0.00	26.72	27.41	27.96	28.35	28.57	28.63
0:57	28.93	25.54	27.15	28.38	0.00	26.70	27.39	27.93	28.32	28.55	28.61
1:00	28.91	25.53	27.14	28.37	0.00	26.68	27.37	27.91	28.30	28.52	28.58
1:03	28.89	25.52	27.11	28.36	0.00	26.67	27.34	27.89	28.27	28.50	28.56
1:06	28.86	25.50	27.11	28.34	0.00	26.65	27.32	27.86	28.25	28.47	28.53
1:09	28.84	25.49	27.08	28.31	0.00	26.63	27.30	27.84	28.22	28.45	28.51
1:12	28.81	25.47	27.06	28.29	0.00	26.61	27.28	27.81	28.20	28.42	28.48
1:15	28.79	25.44	27.05	28.29	0.00	26.59	27.26	27.79	28.17	28.40	28.46
1:18	28.77	25.45	27.02	28.25	0.00	26.57	27.24	27.77	28.15	28.37	28.43

1:21	28.74	25.42	27.00	28.22	0.00	26.56	27.22	27.74	28.12	28.35	28.41
1:24	28.72	25.38	26.97	28.22	0.00	26.54	27.20	27.72	28.10	28.32	28.38
1:27	28.70	25.38	26.96	28.20	0.00	26.51	27.18	27.70	28.08	28.30	28.36
1:30	28.67	25.37	26.94	28.18	0.00	26.50	27.15	27.68	28.05	28.27	28.34
1:33	28.65	25.34	26.92	28.15	0.00	26.48	27.13	27.65	28.03	28.25	28.31
1:36	28.63	25.34	26.88	28.13	0.00	26.46	27.11	27.63	28.00	28.22	28.29
1:39	28.60	25.33	26.87	28.10	0.00	26.44	27.09	27.61	27.98	28.20	28.26
1:42	28.58	25.32	26.85	28.09	0.00	26.42	27.07	27.59	27.96	28.17	28.24
1:45	28.56	25.27	26.83	28.08	0.00	26.40	27.05	27.56	27.93	28.15	28.21
1:48	28.54	25.25	26.81	28.06	0.00	26.38	27.03	27.54	27.91	28.13	28.19
1:51	28.51	25.28	26.79	28.03	0.00	26.36	27.01	27.52	27.89	28.10	28.17
1:54	28.49	25.26	26.77	28.01	0.00	26.35	26.99	27.50	27.86	28.08	28.14
1:57	28.47	25.23	26.75	28.00	0.00	26.33	26.97	27.47	27.84	28.06	28.12
2:00	28.44	25.22	26.73	27.97	0.00	26.31	26.95	27.45	27.82	28.03	28.10
2:03	28.42	25.22	26.71	27.95	0.00	26.29	26.93	27.43	27.79	28.01	28.07
2:06	28.40	25.21	26.69	27.92	0.00	26.28	26.91	27.41	27.77	27.98	28.05
2:09	28.38	25.20	26.68	27.90	0.00	26.26	26.89	27.39	27.75	27.96	28.03
2:12	28.36	25.19	26.66	27.89	0.00	26.25	26.87	27.36	27.72	27.94	28.00
2:15	28.33	25.17	26.65	27.87	0.00	26.23	26.85	27.34	27.70	27.92	27.98
2:18	28.31	25.17	26.62	27.85	0.00	26.21	26.83	27.32	27.68	27.89	27.96
2:21	28.29	25.16	26.60	27.83	0.00	26.20	26.81	27.30	27.66	27.87	27.93
2:24	28.27	25.15	26.59	27.81	0.00	26.18	26.79	27.28	27.63	27.85	27.91
2:27	28.25	25.16	26.58	27.80	0.00	26.17	26.77	27.26	27.61	27.82	27.89
2:30	28.22	25.14	26.56	27.78	0.00	26.16	26.75	27.24	27.59	27.80	27.86
2:33	28.20	25.10	26.54	27.76	0.00	26.14	26.74	27.22	27.57	27.78	27.84
2:36	28.18	25.10	26.53	27.75	0.00	26.12	26.72	27.20	27.55	27.76	27.82
2:39	28.16	25.08	26.50	27.72	0.00	26.10	26.70	27.18	27.52	27.73	27.80
2:42	28.14	25.06	26.48	27.70	0.00	26.09	26.68	27.16	27.50	27.71	27.78
2:45	28.12	25.04	26.46	27.69	0.00	26.07	26.66	27.14	27.48	27.69	27.75
2:48	28.09	25.01	26.45	27.68	0.00	26.05	26.64	27.12	27.46	27.67	27.73
2:51	28.07	25.02	26.43	27.65	0.00	26.03	26.63	27.10	27.44	27.64	27.71
2:54	28.05	25.00	26.42	27.63	0.00	26.02	26.61	27.08	27.42	27.62	27.69
2:57	28.03	25.00	26.41	27.62	0.00	26.00	26.59	27.06	27.40	27.60	27.67

3:00	28.01	24.99	26.38	27.61	0.00	25.98	26.57	27.04	27.38	27.58	27.64
3:03	27.99	24.98	26.36	27.59	0.00	25.97	26.55	27.02	27.35	27.56	27.62
3:06	27.97	24.94	26.35	27.58	0.00	25.95	26.53	27.00	27.33	27.54	27.60
3:09	27.95	24.94	26.33	27.55	0.00	25.93	26.51	26.98	27.31	27.52	27.58
3:12	27.93	24.93	26.31	27.53	0.00	25.92	26.50	26.96	27.29	27.49	27.56
3:15	27.91	24.92	26.30	27.53	0.00	25.90	26.48	26.94	27.27	27.47	27.54
3:18	27.89	24.91	26.28	27.51	0.00	25.89	26.46	26.92	27.25	27.45	27.52
3:21	27.87	24.90	26.26	27.49	0.00	25.87	26.44	26.90	27.23	27.43	27.50
3:24	27.85	24.89	26.25	27.47	0.00	25.86	26.42	26.88	27.21	27.41	27.48
3:27	27.83	24.87	26.24	27.46	0.00	25.84	26.41	26.86	27.19	27.39	27.46
3:30	27.81	24.87	26.22	27.45	0.00	25.82	26.39	26.84	27.17	27.37	27.44
3:33	27.78	24.85	26.21	27.43	0.00	25.81	26.37	26.82	27.15	27.35	27.42
3:36	27.77	24.83	26.19	27.41	0.00	25.80	26.36	26.80	27.13	27.33	27.40
3:39	27.75	24.85	26.17	27.39	0.00	25.78	26.34	26.78	27.11	27.31	27.37
3:42	27.73	24.84	26.16	27.38	0.00	25.77	26.32	26.77	27.09	27.29	27.35
3:45	27.71	24.82	26.14	27.36	0.00	25.76	26.30	26.75	27.07	27.27	27.33
3:48	27.69	24.80	26.13	27.34	0.00	25.74	26.29	26.73	27.05	27.25	27.31
3:51	27.67	24.81	26.11	27.32	0.00	25.73	26.27	26.71	27.03	27.23	27.29
3:54	27.65	24.80	26.10	27.29	0.00	25.71	26.25	26.69	27.01	27.21	27.27
3:57	27.63	24.78	26.07	27.28	0.00	25.70	26.24	26.67	26.99	27.19	27.25
4:00	27.61	24.78	26.04	27.26	0.00	25.69	26.22	26.66	26.97	27.17	27.23
4:03	27.59	24.75	26.01	27.26	0.00	25.67	26.21	26.64	26.95	27.15	27.21
4:06	27.57	24.73	26.00	27.25	0.00	25.66	26.19	26.62	26.94	27.13	27.19
4:09	27.55	24.72	25.98	27.22	0.00	25.64	26.17	26.60	26.92	27.11	27.18
4:12	27.53	24.71	25.97	27.20	0.00	25.62	26.16	26.58	26.90	27.09	27.16
4:15	27.51	24.70	25.97	27.19	0.00	25.61	26.14	26.57	26.88	27.07	27.14
4:18	27.49	24.68	25.94	27.18	0.00	25.59	26.12	26.55	26.86	27.05	27.12
4:21	27.47	24.65	25.92	27.15	0.00	25.58	26.11	26.53	26.84	27.03	27.10
4:24	27.45	24.64	25.91	27.12	0.00	25.56	26.09	26.51	26.82	27.01	27.08
4:27	27.43	24.63	25.90	27.12	0.00	25.54	26.07	26.50	26.80	26.99	27.06
4:30	27.41	24.62	25.88	27.10	0.00	25.53	26.06	26.48	26.79	26.97	27.04
4:33	27.40	24.63	25.86	27.10	0.00	25.51	26.04	26.46	26.77	26.96	27.02
4:36	27.38	24.62	25.85	27.08	0.00	25.50	26.02	26.44	26.75	26.94	27.00

4:39	27.36	24.59	25.84	27.07	0.00	25.49	26.01	26.43	26.73	26.92	26.99
4:42	27.34	24.58	25.83	27.07	0.00	25.47	25.99	26.41	26.71	26.90	26.97
4:45	27.32	24.59	25.82	27.03	0.00	25.46	25.98	26.39	26.69	26.88	26.95
4:48	27.30	24.60	25.80	27.01	0.00	25.45	25.96	26.37	26.68	26.86	26.93
4:51	27.28	24.58	25.78	26.99	0.00	25.44	25.94	26.36	26.66	26.84	26.91
4:54	27.26	24.58	25.76	26.96	0.00	25.43	25.93	26.34	26.64	26.83	26.89
4:57	27.25	24.56	25.74	26.94	0.00	25.42	25.92	26.32	26.62	26.81	26.87
5:00	27.23	24.54	25.73	26.93	0.00	25.40	25.90	26.31	26.60	26.79	26.86
5:03	27.21	24.53	25.71	26.91	0.00	25.39	25.89	26.29	26.59	26.77	26.84
5:06	27.19	24.53	25.69	26.90	0.00	25.37	25.87	26.27	26.57	26.75	26.82
5:09	27.17	24.52	25.68	26.89	0.00	25.36	25.86	26.26	26.55	26.73	26.80
5:12	27.15	24.52	25.66	26.87	0.00	25.35	25.84	26.24	26.53	26.72	26.78
5:15	27.13	24.51	25.65	26.85	0.00	25.34	25.83	26.22	26.52	26.70	26.76
5:18	27.12	24.49	25.64	26.85	0.00	25.33	25.81	26.21	26.50	26.68	26.75
5:21	27.10	24.50	25.62	26.84	0.00	25.31	25.80	26.19	26.48	26.66	26.73
5:24	27.08	24.48	25.61	26.82	0.00	25.30	25.78	26.18	26.47	26.65	26.71
5:27	27.06	24.48	25.59	26.81	0.00	25.29	25.77	26.16	26.45	26.63	26.69
5:30	27.05	24.45	25.58	26.80	0.00	25.28	25.76	26.14	26.43	26.61	26.68
5:33	27.03	24.45	25.57	26.79	0.00	25.26	25.74	26.13	26.41	26.59	26.66
5:36	27.01	24.45	25.56	26.77	0.00	25.25	25.73	26.11	26.40	26.58	26.64
5:39	27.00	24.45	25.54	26.75	0.00	25.24	25.71	26.10	26.38	26.56	26.63
5:42	26.98	24.43	25.52	26.74	0.00	25.23	25.70	26.08	26.37	26.54	26.61
5:45	26.96	24.42	25.51	26.73	0.00	25.22	25.69	26.07	26.35	26.52	26.59
5:48	26.94	24.41	25.49	26.72	0.00	25.21	25.67	26.05	26.33	26.51	26.57
5:51	26.93	24.38	25.48	26.71	0.00	25.19	25.66	26.04	26.32	26.49	26.56
5:54	26.91	24.37	25.47	26.69	0.00	25.18	25.65	26.02	26.30	26.47	26.54
5:57	26.89	24.37	25.45	26.68	0.00	25.16	25.63	26.01	26.28	26.46	26.53
6:00	26.87	24.36	25.44	26.65	0.00	25.15	25.62	25.99	26.27	26.44	26.51
6:03	26.86	24.34	25.41	26.65	0.00	25.14	25.60	25.98	26.25	26.42	26.49
6:06	26.84	24.31	25.40	26.64	0.00	25.13	25.59	25.96	26.24	26.41	26.48
6:09	26.82	24.28	25.39	26.63	0.00	25.11	25.58	25.95	26.22	26.39	26.46
6:12	26.81	24.27	25.37	26.63	0.00	25.09	25.56	25.93	26.20	26.38	26.44
6:15	26.79	24.26	25.36	26.60	0.00	25.07	25.54	25.92	26.19	26.36	26.43

6:18	26.77	24.24	25.33	26.59	0.00	25.06	25.53	25.90	26.17	26.34	26.41
6:21	26.76	24.24	25.31	26.56	0.00	25.04	25.51	25.89	26.16	26.33	26.40
6:24	26.74	24.21	25.29	26.55	0.00	25.03	25.50	25.87	26.14	26.31	26.38
6:27	26.72	24.20	25.29	26.54	0.00	25.01	25.48	25.85	26.13	26.30	26.36
6:30	26.71	24.21	25.29	26.52	0.00	25.00	25.47	25.84	26.11	26.28	26.35
6:33	26.69	24.20	25.27	26.52	0.00	24.99	25.45	25.82	26.09	26.26	26.33
6:36	26.67	24.22	25.26	26.48	0.00	24.98	25.44	25.81	26.08	26.25	26.32
6:39	26.66	24.21	25.24	26.47	0.00	24.97	25.42	25.79	26.06	26.23	26.30
6:42	26.64	24.20	25.23	26.45	0.00	24.96	25.41	25.78	26.05	26.22	26.28
6:45	26.62	24.18	25.22	26.43	0.00	24.95	25.40	25.76	26.03	26.20	26.27
6:48	26.61	24.16	25.20	26.42	0.00	24.94	25.39	25.75	26.02	26.19	26.25
6:51	26.59	24.15	25.19	26.41	0.00	24.92	25.37	25.73	26.00	26.17	26.24
6:54	26.57	24.14	25.19	26.41	0.00	24.91	25.36	25.72	25.99	26.15	26.22
6:57	26.56	24.15	25.18	26.40	0.00	24.90	25.34	25.70	25.97	26.14	26.21
7:00	26.54	24.15	25.17	26.38	5.32	24.89	25.33	25.69	25.96	26.12	26.19
7:03	26.53	24.16	25.16	26.36	5.33	24.91	25.32	25.68	25.94	26.11	26.18
7:06	26.51	24.17	25.16	26.35	5.18	24.92	25.31	25.66	25.92	26.09	26.16
7:09	26.50	24.17	25.17	26.33	5.42	24.92	25.30	25.65	25.91	26.08	26.14
7:12	26.48	24.16	25.18	26.32	5.40	24.92	25.30	25.64	25.90	26.06	26.13
7:15	26.46	24.18	25.20	26.31	6.79	24.92	25.29	25.62	25.88	26.05	26.11
7:18	26.45	24.18	25.23	26.31	10.78	24.93	25.29	25.61	25.87	26.03	26.10
7:21	26.43	24.22	25.31	26.29	14.84	24.96	25.28	25.60	25.85	26.02	26.08
7:24	26.42	24.29	25.44	26.28	19.69	25.00	25.28	25.59	25.84	26.00	26.07
7:27	26.40	24.34	25.56	26.27	22.09	25.06	25.29	25.58	25.83	25.99	26.05
7:30	26.39	24.40	25.69	26.25	29.52	25.12	25.30	25.57	25.81	25.97	26.04
7:33	26.37	24.46	25.88	26.25	44.21	25.21	25.31	25.57	25.80	25.96	26.02
7:36	26.36	24.54	26.08	26.24	54.57	25.35	25.34	25.56	25.79	25.94	26.01
7:39	26.35	24.60	26.26	26.24	64.50	25.51	25.37	25.56	25.78	25.93	26.00
7:42	26.33	24.67	26.41	26.25	72.36	25.67	25.42	25.57	25.77	25.92	25.98
7:45	26.32	24.74	26.53	26.24	83.17	25.83	25.48	25.58	25.76	25.90	25.97
7:48	26.31	24.82	26.70	26.22	97.99	26.00	25.55	25.59	25.75	25.89	25.96
7:51	26.30	24.92	27.09	26.22	112.15	26.21	25.63	25.61	25.75	25.88	25.95
7:54	26.29	25.06	27.40	26.22	126.76	26.44	25.71	25.63	25.75	25.87	25.93

7:57	26.28	25.13	27.60	26.21	138.03	26.69	25.81	25.66	25.75	25.86	25.92
8:00	26.27	25.21	27.95	26.21	146.43	26.93	25.93	25.70	25.75	25.85	25.91
8:03	26.26	25.27	28.11	26.21	161.61	27.15	26.05	25.74	25.76	25.85	25.90
8:06	26.26	25.37	28.36	26.23	174.80	27.39	26.17	25.79	25.77	25.84	25.89
8:09	26.26	25.49	28.63	26.24	190.33	27.65	26.30	25.85	25.79	25.84	25.89
8:12	26.26	25.64	28.91	26.25	210.31	27.93	26.44	25.91	25.80	25.84	25.88
8:15	26.26	25.79	29.22	26.26	227.89	28.26	26.59	25.98	25.83	25.84	25.88
8:18	26.26	25.90	29.52	26.27	242.15	28.61	26.75	26.05	25.85	25.84	25.88
8:21	26.27	25.97	29.68	26.29	257.45	28.93	26.93	26.13	25.88	25.85	25.88
8:24	26.27	26.07	29.75	26.30	269.97	29.25	27.12	26.21	25.91	25.86	25.88
8:27	26.28	26.11	29.78	26.31	289.49	29.56	27.31	26.31	25.95	25.87	25.89
8:30	26.29	26.20	29.89	26.33	306.37	29.90	27.50	26.41	25.99	25.89	25.90
8:33	26.31	26.32	30.19	26.34	315.99	30.24	27.70	26.51	26.04	25.90	25.91
8:36	26.33	26.42	30.42	26.36	335.21	30.55	27.91	26.62	26.09	25.93	25.92
8:39	26.35	26.58	30.72	26.38	344.58	30.90	28.12	26.74	26.15	25.95	25.93
8:42	26.37	26.73	31.08	26.40	353.32	31.23	28.34	26.86	26.21	25.98	25.95
8:45	26.39	26.85	31.29	26.42	372.15	31.54	28.56	26.99	26.28	26.01	25.97
8:48	26.42	26.92	31.48	26.44	389.76	31.89	28.78	27.12	26.35	26.05	26.00
8:51	26.45	27.02	31.66	26.47	408.15	32.25	29.00	27.26	26.42	26.09	26.03
8:54	26.48	27.13	31.82	26.49	422.99	32.63	29.24	27.40	26.50	26.13	26.06
8:57	26.51	27.23	32.03	26.51	425.67	33.00	29.48	27.54	26.58	26.17	26.09
9:00	26.54	27.34	32.29	26.54	438.82	33.29	29.72	27.69	26.67	26.22	26.13
9:03	26.58	27.48	32.52	26.58	444.25	33.61	29.96	27.85	26.76	26.28	26.17
9:06	26.62	27.62	32.81	26.60	459.29	33.90	30.20	28.01	26.85	26.34	26.22
9:09	26.66	27.63	32.83	26.63	470.73	34.23	30.43	28.17	26.95	26.40	26.27
9:12	26.71	27.77	33.00	26.66	474.39	34.54	30.67	28.33	27.05	26.46	26.32
9:15	26.75	27.95	33.34	26.69	482.12	34.81	30.91	28.50	27.16	26.53	26.37
9:18	26.80	28.04	33.58	26.72	497.26	35.10	31.14	28.66	27.27	26.60	26.43
9:21	26.85	28.10	33.72	26.75	507.81	35.42	31.37	28.83	27.38	26.68	26.49
9:24	26.90	28.19	33.91	26.78	516.50	35.73	31.60	29.00	27.50	26.76	26.56
9:27	26.95	28.33	34.21	26.82	515.78	36.02	31.84	29.17	27.62	26.84	26.63
9:30	27.01	28.41	34.30	26.86	515.43	36.26	32.07	29.34	27.74	26.93	26.70
9:33	27.07	28.44	34.45	26.90	522.30	36.47	32.30	29.52	27.86	27.02	26.78

9:36	27.12	28.54	34.54	26.94	520.95	36.68	32.51	29.69	27.99	27.11	26.86
9:39	27.18	28.74	34.66	26.98	523.97	36.87	32.72	29.87	28.12	27.21	26.94
9:42	27.24	28.83	34.78	27.01	528.57	37.08	32.92	30.04	28.25	27.31	27.02
9:45	27.31	28.93	35.04	27.05	531.73	37.30	33.12	30.21	28.38	27.41	27.11
9:48	27.37	29.02	35.17	27.10	537.37	37.50	33.32	30.38	28.51	27.51	27.20
9:51	27.44	29.08	35.28	27.14	534.30	37.71	33.51	30.54	28.65	27.62	27.29
9:54	27.51	29.21	35.52	27.18	540.23	37.87	33.70	30.71	28.78	27.73	27.39
9:57	27.58	29.33	35.65	27.23	533.74	38.07	33.88	30.87	28.92	27.84	27.49
10:00	27.65	29.44	35.85	27.28	547.01	38.21	34.07	31.04	29.05	27.95	27.59
10:03	27.72	29.56	36.04	27.32	543.45	38.43	34.24	31.20	29.19	28.07	27.69
10:06	27.79	29.67	36.25	27.36	532.23	38.60	34.42	31.36	29.33	28.18	27.80
10:09	27.87	29.69	36.45	27.41	541.57	38.69	34.59	31.52	29.46	28.30	27.90
10:12	27.94	29.79	36.72	27.46	537.32	38.85	34.75	31.68	29.60	28.42	28.01
10:15	28.02	29.90	36.97	27.51	537.45	38.97	34.91	31.83	29.74	28.54	28.12
10:18	28.09	30.01	37.21	27.55	534.22	39.11	35.06	31.98	29.88	28.66	28.23
10:21	28.17	30.10	37.41	27.60	530.71	39.22	35.21	32.13	30.02	28.78	28.35
10:24	28.25	30.13	37.46	27.66	526.96	39.32	35.36	32.28	30.15	28.91	28.46
10:27	28.34	30.12	37.61	27.73	533.59	39.40	35.49	32.43	30.29	29.03	28.57
10:30	28.42	30.29	37.76	27.78	519.37	39.52	35.62	32.57	30.43	29.16	28.69
10:33	28.50	30.31	37.83	27.83	524.38	39.56	35.75	32.71	30.56	29.28	28.81
10:36	28.58	30.37	37.93	27.88	523.60	39.66	35.87	32.85	30.70	29.41	28.93
10:39	28.67	30.44	38.11	27.94	522.11	39.76	35.99	32.99	30.83	29.53	29.04
10:42	28.75	30.53	38.17	28.01	523.21	39.84	36.11	33.12	30.96	29.66	29.16
10:45	28.84	30.70	38.39	28.07	518.90	39.95	36.22	33.25	31.09	29.78	29.28
10:48	28.93	30.78	38.35	28.13	501.08	40.04	36.34	33.38	31.22	29.91	29.40
10:51	29.02	30.80	38.35	28.19	503.93	40.03	36.45	33.50	31.35	30.03	29.52
10:54	29.11	30.89	38.47	28.26	502.61	40.09	36.55	33.63	31.48	30.16	29.64
10:57	29.20	30.95	38.48	28.32	496.89	40.15	36.65	33.75	31.61	30.28	29.76
11:00	29.29	31.01	38.53	28.38	478.46	40.19	36.74	33.87	31.74	30.41	29.88
11:03	29.38	30.96	38.31	28.44	463.34	40.14	36.83	33.98	31.86	30.53	30.00
11:06	29.47	30.95	38.21	28.51	462.13	40.05	36.90	34.09	31.98	30.66	30.12
11:09	29.56	31.00	38.19	28.56	463.80	40.01	36.95	34.20	32.10	30.78	30.24
11:12	29.65	31.15	38.34	28.62	455.56	40.03	37.00	34.30	32.22	30.90	30.36

11:15	29.74	31.23	38.38	28.68	435.81	40.04	37.05	34.40	32.34	31.02	30.47
11:18	29.82	31.25	38.31	28.76	440.41	39.95	37.10	34.49	32.45	31.14	30.59
11:21	29.92	31.35	38.30	28.82	431.16	39.96	37.14	34.58	32.57	31.26	30.71
11:24	30.01	31.48	38.35	28.88	431.17	39.94	37.18	34.67	32.68	31.38	30.82
11:27	30.09	31.45	38.21	28.94	421.21	39.97	37.22	34.75	32.78	31.49	30.94
11:30	30.18	31.38	37.87	28.99	410.06	39.93	37.26	34.83	32.89	31.61	31.05
11:33	30.27	31.51	37.76	29.04	408.98	39.84	37.30	34.90	32.99	31.72	31.16
11:36	30.35	31.49	37.64	29.08	399.09	39.83	37.32	34.98	33.09	31.83	31.27
11:39	30.44	31.55	37.59	29.15	395.45	39.77	37.35	35.05	33.19	31.94	31.38
11:42	30.52	31.51	37.35	29.19	383.28	39.74	37.37	35.12	33.28	32.04	31.49
11:45	30.60	31.56	37.26	29.24	363.70	39.65	37.38	35.18	33.37	32.15	31.59
11:48	30.68	31.69	37.37	29.29	351.01	39.50	37.39	35.24	33.46	32.25	31.69
11:51	30.76	31.74	37.16	29.35	331.97	39.39	37.39	35.30	33.55	32.35	31.80
11:54	30.84	31.75	37.02	29.43	320.30	39.22	37.37	35.35	33.64	32.45	31.90
11:57	30.91	31.66	36.77	29.49	326.14	39.07	37.35	35.40	33.72	32.55	32.00
12:00	30.99	31.71	36.71	29.53	323.86	39.00	37.31	35.44	33.80	32.65	32.09
12:03	31.06	31.77	36.63	29.59	314.20	38.96	37.28	35.48	33.87	32.74	32.19
12:06	31.13	31.78	36.46	29.64	309.33	38.88	37.26	35.51	33.95	32.83	32.28
12:09	31.20	31.81	36.45	29.70	304.85	38.81	37.24	35.54	34.02	32.92	32.37
12:12	31.26	31.87	36.52	29.73	307.74	38.75	37.22	35.57	34.08	33.00	32.46
12:15	31.33	31.92	36.48	29.77	299.91	38.74	37.20	35.59	34.14	33.09	32.55
12:18	31.39	31.88	36.42	29.81	295.64	38.69	37.19	35.62	34.21	33.17	32.63
12:21	31.45	31.90	36.36	29.86	293.60	38.63	37.18	35.64	34.26	33.25	32.72
12:24	31.51	31.96	36.39	29.91	289.42	38.59	37.17	35.67	34.32	33.32	32.80
12:27	31.56	32.03	36.42	29.95	281.85	38.56	37.16	35.69	34.37	33.39	32.87
12:30	31.62	32.10	36.43	30.01	272.37	38.50	37.15	35.71	34.43	33.47	32.95
12:33	31.67	32.16	36.42	30.06	273.82	38.43	37.13	35.74	34.48	33.53	33.02
12:36	31.72	32.14	36.43	30.10	267.51	38.41	37.12	35.76	34.53	33.60	33.09
12:39	31.77	32.20	36.41	30.14	266.93	38.36	37.11	35.78	34.57	33.67	33.16
12:42	31.82	32.21	36.38	30.19	256.62	38.33	37.10	35.80	34.62	33.73	33.23
12:45	31.87	32.24	36.38	30.22	254.40	38.26	37.09	35.82	34.66	33.79	33.29
12:48	31.92	32.30	36.39	30.28	252.71	38.22	37.07	35.83	34.71	33.85	33.36
12:51	31.96	32.35	36.41	30.32	254.93	38.19	37.06	35.85	34.75	33.90	33.42

12:54	32.00	32.40	36.35	30.36	250.34	38.20	37.05	35.87	34.79	33.96	33.48
12:57	32.05	32.30	36.30	30.42	245.55	38.18	37.04	35.88	34.83	34.01	33.53
13:00	32.09	32.35	36.30	30.46	246.45	38.12	37.04	35.90	34.86	34.07	33.59
13:03	32.13	32.44	36.34	30.49	238.54	38.10	37.03	35.91	34.90	34.12	33.64
13:06	32.17	32.42	36.30	30.53	232.37	38.07	37.02	35.93	34.94	34.16	33.70
13:09	32.21	32.33	36.22	30.57	221.87	38.00	37.02	35.95	34.97	34.21	33.75
13:12	32.25	32.29	36.15	30.61	224.15	37.89	37.00	35.96	35.00	34.26	33.80
13:15	32.28	32.31	36.11	30.65	223.10	37.84	36.98	35.97	35.04	34.30	33.85
13:18	32.32	32.31	36.05	30.68	218.00	37.80	36.96	35.98	35.07	34.34	33.89
13:21	32.35	32.21	35.97	30.70	212.57	37.75	36.94	35.99	35.10	34.39	33.94
13:24	32.39	32.25	35.99	30.73	206.56	37.66	36.92	36.00	35.13	34.43	33.98
13:27	32.42	32.33	36.01	30.76	208.20	37.59	36.89	36.01	35.15	34.47	34.02
13:30	32.46	32.34	36.03	30.79	202.56	37.56	36.86	36.01	35.18	34.50	34.06
13:33	32.49	32.34	35.96	30.84	204.39	37.51	36.84	36.01	35.20	34.54	34.10
13:36	32.52	32.36	35.98	30.87	201.98	37.49	36.82	36.02	35.23	34.58	34.14
13:39	32.55	32.34	35.93	30.91	201.72	37.47	36.80	36.02	35.25	34.61	34.18
13:42	32.58	32.27	35.86	30.95	199.60	37.44	36.78	36.02	35.27	34.64	34.22
13:45	32.61	32.29	35.89	30.97	200.10	37.40	36.76	36.02	35.29	34.67	34.25
13:48	32.64	32.27	35.81	30.99	193.40	37.38	36.75	36.02	35.31	34.70	34.28
13:51	32.66	32.17	35.72	31.02	190.54	37.32	36.73	36.02	35.32	34.73	34.32
13:54	32.69	32.19	35.73	31.05	189.64	37.25	36.71	36.03	35.34	34.76	34.35
13:57	32.72	32.28	35.81	31.07	187.09	37.21	36.69	36.03	35.36	34.79	34.38
14:00	32.74	32.22	35.77	31.09	185.17	37.18	36.67	36.02	35.37	34.81	34.41
14:03	32.77	32.15	35.72	31.11	180.39	37.14	36.65	36.02	35.39	34.83	34.43
14:06	32.79	32.13	35.64	31.13	179.44	37.07	36.63	36.02	35.40	34.86	34.46
14:09	32.81	32.06	35.54	31.15	178.95	37.02	36.60	36.02	35.41	34.88	34.48
14:12	32.83	32.04	35.49	31.16	175.25	36.97	36.58	36.01	35.42	34.90	34.51
14:15	32.86	32.10	35.47	31.18	177.36	36.91	36.55	36.01	35.43	34.92	34.53
14:18	32.88	32.06	35.44	31.21	173.82	36.90	36.52	36.00	35.44	34.94	34.55
14:21	32.90	32.00	35.36	31.24	171.48	36.86	36.50	36.00	35.45	34.96	34.57
14:24	32.92	31.97	35.30	31.25	170.18	36.80	36.48	35.99	35.46	34.98	34.59
14:27	32.94	31.92	35.22	31.27	167.72	36.76	36.45	35.98	35.47	34.99	34.61
14:30	32.95	31.92	35.14	31.27	165.91	36.70	36.43	35.98	35.47	35.01	34.63

14:33	32.97	31.89	35.10	31.27	168.98	36.65	36.40	35.97	35.48	35.02	34.65
14:36	32.99	31.94	35.07	31.28	168.59	36.64	36.37	35.96	35.48	35.03	34.66
14:39	33.00	31.94	35.06	31.30	165.89	36.63	36.35	35.95	35.49	35.05	34.68
14:42	33.02	31.86	34.98	31.32	156.96	36.60	36.33	35.94	35.49	35.06	34.69
14:45	33.03	31.79	34.93	31.34	159.25	36.51	36.31	35.93	35.49	35.07	34.71
14:48	33.04	31.81	34.88	31.36	157.02	36.46	36.28	35.92	35.50	35.08	34.72
14:51	33.06	31.80	34.83	31.38	154.12	36.42	36.25	35.91	35.50	35.09	34.73
14:54	33.07	31.85	34.81	31.38	154.63	36.37	36.23	35.90	35.50	35.10	34.74
14:57	33.08	31.86	34.81	31.40	151.75	36.35	36.20	35.89	35.50	35.10	34.75
15:00	33.09	31.90	34.82	31.42	148.76	36.32	36.17	35.88	35.50	35.11	34.76
15:03	33.10	31.95	34.90	31.45	146.74	36.28	36.15	35.86	35.50	35.12	34.77
15:06	33.12	31.95	34.90	31.47	144.57	36.25	36.13	35.85	35.49	35.12	34.78
15:09	33.12	31.90	34.87	31.48	142.34	36.22	36.10	35.84	35.49	35.13	34.79
15:12	33.13	31.89	34.83	31.50	137.25	36.17	36.08	35.83	35.49	35.13	34.79
15:15	33.14	31.88	34.80	31.52	134.94	36.11	36.06	35.81	35.49	35.13	34.80
15:18	33.15	31.86	34.76	31.53	127.82	36.06	36.03	35.80	35.48	35.14	34.81
15:21	33.16	31.85	34.72	31.56	127.72	35.98	36.00	35.79	35.48	35.14	34.81
15:24	33.16	31.88	34.65	31.57	126.49	35.92	35.96	35.77	35.47	35.14	34.82
15:27	33.17	31.84	34.59	31.58	124.69	35.89	35.93	35.75	35.47	35.14	34.82
15:30	33.17	31.78	34.51	31.57	121.49	35.84	35.89	35.74	35.46	35.14	34.82
15:33	33.18	31.66	34.43	31.57	122.69	35.77	35.86	35.72	35.45	35.14	34.83
15:36	33.18	31.60	34.43	31.59	118.13	35.71	35.82	35.70	35.45	35.14	34.83
15:39	33.19	31.45	34.34	31.59	117.60	35.64	35.79	35.68	35.44	35.14	34.83
15:42	33.19	31.45	34.24	31.58	114.35	35.55	35.75	35.66	35.43	35.14	34.83
15:45	33.19	31.48	34.23	31.60	113.18	35.48	35.70	35.64	35.42	35.14	34.83
15:48	33.20	31.51	34.22	31.60	112.00	35.43	35.66	35.61	35.41	35.13	34.83
15:51	33.20	31.52	34.19	31.63	110.35	35.39	35.62	35.59	35.40	35.13	34.83
15:54	33.20	31.53	34.13	31.64	105.89	35.35	35.58	35.56	35.39	35.12	34.83
15:57	33.21	31.44	34.10	31.66	99.36	35.29	35.54	35.54	35.37	35.12	34.82
16:00	33.21	31.42	34.08	31.66	100.35	35.20	35.50	35.51	35.36	35.11	34.82
16:03	33.21	31.36	34.03	31.67	100.16	35.14	35.46	35.49	35.34	35.11	34.82
16:06	33.21	31.41	34.03	31.69	92.56	35.09	35.41	35.46	35.33	35.10	34.81
16:09	33.21	31.47	34.03	31.70	94.77	35.01	35.37	35.43	35.31	35.09	34.81

16:12	33.21	31.39	33.97	31.70	94.92	34.98	35.32	35.40	35.30	35.08	34.80
16:15	33.21	31.41	33.95	31.71	92.66	34.94	35.28	35.38	35.28	35.07	34.80
16:18	33.21	31.36	33.89	31.71	89.25	34.90	35.24	35.35	35.26	35.06	34.79
16:21	33.21	31.29	33.83	31.71	90.83	34.84	35.21	35.32	35.24	35.05	34.78
16:24	33.21	31.34	33.81	31.71	89.18	34.79	35.17	35.29	35.23	35.04	34.78
16:27	33.20	31.31	33.76	31.71	86.39	34.75	35.13	35.26	35.21	35.03	34.77
16:30	33.20	31.25	33.70	31.70	81.70	34.70	35.09	35.23	35.19	35.02	34.76
16:33	33.19	31.27	33.70	31.72	80.51	34.62	35.05	35.20	35.17	35.00	34.75
16:36	33.19	31.35	33.68	31.72	78.15	34.57	35.01	35.17	35.15	34.99	34.74
16:39	33.18	31.26	33.63	31.73	76.60	34.53	34.97	35.14	35.13	34.97	34.72
16:42	33.18	31.28	33.60	31.73	76.73	34.47	34.93	35.11	35.11	34.96	34.71
16:45	33.18	31.26	33.56	31.73	74.92	34.44	34.89	35.08	35.08	34.94	34.70
16:48	33.17	31.15	33.45	31.73	71.03	34.39	34.85	35.05	35.06	34.93	34.69
16:51	33.16	31.14	33.42	31.72	72.37	34.31	34.81	35.02	35.04	34.91	34.67
16:54	33.16	31.01	33.39	31.73	71.36	34.27	34.77	34.99	35.02	34.89	34.66
16:57	33.15	30.90	33.32	31.72	68.99	34.20	34.72	34.96	34.99	34.88	34.65
17:00	33.14	30.85	33.26	31.72	66.05	34.12	34.68	34.93	34.97	34.86	34.63
17:03	33.14	30.79	33.20	31.72	63.06	34.04	34.63	34.90	34.95	34.84	34.62
17:06	33.13	30.80	33.18	31.71	62.74	33.96	34.58	34.86	34.92	34.82	34.60
17:09	33.12	30.78	33.14	31.72	63.92	33.90	34.53	34.83	34.90	34.80	34.58
17:12	33.11	30.68	33.07	31.73	60.73	33.86	34.48	34.79	34.87	34.78	34.57
17:15	33.10	30.59	33.00	31.71	58.72	33.78	34.43	34.76	34.85	34.76	34.55
17:18	33.09	30.58	32.95	31.72	54.73	33.70	34.38	34.72	34.82	34.74	34.53
17:21	33.09	30.53	32.92	31.71	54.85	33.62	34.33	34.68	34.79	34.72	34.51
17:24	33.07	30.45	32.82	31.70	54.55	33.55	34.27	34.64	34.76	34.70	34.50
17:27	33.06	30.34	32.73	31.69	53.54	33.49	34.22	34.61	34.74	34.68	34.48
17:30	33.05	30.37	32.70	31.67	55.02	33.41	34.17	34.57	34.71	34.66	34.46
17:33	33.04	30.25	32.62	31.66	53.03	33.37	34.11	34.53	34.68	34.63	34.44
17:36	33.03	30.18	32.55	31.64	52.45	33.30	34.06	34.48	34.65	34.61	34.42
17:39	33.01	30.07	32.47	31.64	49.64	33.23	34.01	34.44	34.62	34.59	34.39
17:42	33.00	29.99	32.39	31.62	49.25	33.14	33.95	34.40	34.58	34.56	34.37
17:45	32.99	29.88	32.32	31.61	47.81	33.06	33.90	34.36	34.55	34.54	34.35
17:48	32.97	29.73	32.22	31.59	47.64	32.98	33.84	34.32	34.52	34.51	34.33

17:51	32.96	29.65	32.14	31.56	45.80	32.89	33.78	34.28	34.49	34.48	34.30
17:54	32.94	29.55	32.05	31.54	45.73	32.80	33.72	34.23	34.45	34.46	34.28
17:57	32.92	29.47	31.98	31.52	45.18	32.71	33.66	34.19	34.42	34.43	34.25
18:00	32.91	29.41	31.95	31.52	44.09	32.63	33.59	34.14	34.38	34.40	34.22
18:03	32.89	29.32	31.88	31.51	44.87	32.55	33.53	34.09	34.35	34.37	34.20
18:06	32.87	29.26	31.80	31.49	42.51	32.48	33.46	34.05	34.31	34.34	34.17
18:09	32.85	29.25	31.75	31.47	42.08	32.40	33.40	34.00	34.28	34.31	34.14
18:12	32.83	29.17	31.71	31.49	40.10	32.34	33.34	33.95	34.24	34.28	34.12
18:15	32.81	29.15	31.63	31.46	39.44	32.26	33.28	33.90	34.20	34.25	34.09
18:18	32.79	29.07	31.57	31.43	37.26	32.19	33.22	33.85	34.16	34.22	34.06
18:21	32.77	29.00	31.51	31.39	37.49	32.11	33.16	33.80	34.12	34.18	34.03
18:24	32.75	28.96	31.44	31.38	36.26	32.05	33.09	33.75	34.08	34.15	34.00
18:27	32.73	28.93	31.39	31.35	33.92	31.98	33.03	33.70	34.04	34.12	33.97
18:30	32.70	28.87	31.33	31.33	33.65	31.90	32.97	33.65	34.00	34.08	33.94
18:33	32.68	28.82	31.26	31.32	32.89	31.84	32.91	33.60	33.96	34.05	33.90
18:36	32.66	28.80	31.20	31.27	31.40	31.77	32.85	33.55	33.92	34.01	33.87
18:39	32.63	28.73	31.13	31.24	29.84	31.70	32.79	33.50	33.87	33.97	33.84
18:42	32.60	28.62	31.04	31.23	29.99	31.63	32.73	33.45	33.83	33.94	33.80
18:45	32.58	28.56	30.97	31.21	28.18	31.55	32.67	33.39	33.79	33.90	33.77
18:48	32.56	28.48	30.90	31.19	27.16	31.48	32.61	33.34	33.74	33.86	33.73
18:51	32.53	28.42	30.84	31.17	26.52	31.40	32.55	33.29	33.70	33.82	33.70
18:54	32.50	28.36	30.76	31.14	24.52	31.32	32.49	33.24	33.66	33.79	33.66
18:57	32.48	28.28	30.69	31.13	23.21	31.24	32.42	33.19	33.61	33.75	33.63
19:00	32.45	28.24	30.64	31.12	23.28	31.16	32.36	33.13	33.57	33.71	33.59
19:03	32.42	28.16	30.56	31.10	23.18	31.09	32.29	33.08	33.52	33.67	33.55
19:06	32.40	28.06	30.49	31.06	21.94	31.02	32.23	33.03	33.48	33.63	33.52
19:09	32.37	28.00	30.42	31.04	21.01	30.94	32.17	32.97	33.43	33.59	33.48
19:12	32.34	27.94	30.33	31.00	19.36	30.87	32.10	32.92	33.38	33.54	33.44
19:15	32.30	27.89	30.27	30.95	18.64	30.79	32.04	32.86	33.34	33.50	33.40
19:18	32.27	27.85	30.21	30.92	18.82	30.71	31.97	32.81	33.29	33.46	33.36
19:21	32.24	27.82	30.15	30.89	18.66	30.65	31.91	32.75	33.24	33.42	33.32
19:24	32.21	27.79	30.10	30.87	17.89	30.59	31.84	32.70	33.19	33.38	33.28
19:27	32.18	27.75	30.05	30.83	17.44	30.53	31.78	32.64	33.14	33.33	33.24

19:30	32.15	27.72	30.01	30.79	16.74	30.47	31.72	32.59	33.10	33.29	33.19
19:33	32.12	27.70	29.98	30.79	0.00	30.42	31.66	32.53	33.05	33.24	33.15
19:36	32.09	27.68	29.94	30.77	0.00	30.26	31.60	32.48	33.00	33.20	33.11
19:39	32.06	27.68	29.91	30.74	0.00	30.17	31.53	32.42	32.95	33.15	33.07
19:42	32.02	27.63	29.87	30.72	0.00	30.10	31.46	32.37	32.90	33.11	33.03
19:45	31.99	27.57	29.83	30.68	0.00	30.03	31.39	32.31	32.85	33.06	32.98
19:48	31.96	27.55	29.80	30.67	0.00	29.97	31.32	32.25	32.80	33.02	32.94
19:51	31.92	27.52	29.77	30.63	0.00	29.91	31.25	32.19	32.75	32.97	32.90
19:54	31.89	27.50	29.73	30.60	0.00	29.86	31.19	32.13	32.70	32.93	32.85
19:57	31.86	27.48	29.70	30.60	0.00	29.80	31.13	32.07	32.64	32.88	32.81
20:00	31.82	27.44	29.68	30.57	0.00	29.76	31.07	32.02	32.59	32.83	32.76
20:03	31.79	27.41	29.65	30.54	0.00	29.71	31.01	31.96	32.54	32.78	32.72
20:06	31.76	27.39	29.62	30.52	0.00	29.66	30.96	31.90	32.49	32.74	32.68
20:09	31.72	27.37	29.58	30.49	0.00	29.61	30.90	31.85	32.44	32.69	32.63
20:12	31.69	27.35	29.55	30.46	0.00	29.57	30.85	31.79	32.38	32.64	32.58
20:15	31.65	27.33	29.51	30.42	0.00	29.53	30.80	31.74	32.33	32.59	32.54
20:18	31.62	27.30	29.46	30.38	0.00	29.49	30.75	31.68	32.28	32.54	32.49
20:21	31.59	27.25	29.42	30.36	0.00	29.45	30.70	31.63	32.23	32.49	32.45
20:24	31.55	27.22	29.38	30.35	0.00	29.40	30.65	31.58	32.18	32.45	32.40
20:27	31.52	27.21	29.36	30.31	0.00	29.36	30.60	31.53	32.13	32.40	32.35
20:30	31.48	27.11	29.33	30.29	0.00	29.32	30.55	31.48	32.07	32.35	32.31
20:33	31.45	27.07	29.29	30.29	0.00	29.26	30.50	31.42	32.02	32.30	32.26
20:36	31.42	27.07	29.27	30.27	0.00	29.22	30.45	31.37	31.97	32.25	32.21
20:39	31.38	27.06	29.24	30.23	0.00	29.18	30.40	31.32	31.92	32.20	32.17
20:42	31.35	27.02	29.20	30.19	0.00	29.14	30.36	31.28	31.87	32.15	32.12
20:45	31.32	26.98	29.17	30.19	0.00	29.10	30.31	31.23	31.82	32.10	32.07
20:48	31.29	26.96	29.15	30.18	0.00	29.06	30.26	31.18	31.78	32.06	32.03
20:51	31.25	26.94	29.12	30.16	0.00	29.02	30.22	31.13	31.73	32.01	31.98
20:54	31.22	26.91	29.08	30.12	0.00	28.98	30.17	31.08	31.68	31.96	31.94
20:57	31.19	26.90	29.05	30.09	0.00	28.94	30.13	31.03	31.63	31.91	31.89
21:00	31.15	26.86	29.02	30.05	0.00	28.91	30.08	30.98	31.58	31.87	31.84
21:03	31.12	26.88	28.99	30.03	0.00	28.87	30.04	30.94	31.53	31.82	31.80
21:06	31.09	26.84	28.96	30.00	0.00	28.84	30.00	30.89	31.48	31.77	31.75

21:09	31.05	26.80	28.92	29.97	0.00	28.80	29.96	30.84	31.44	31.72	31.71
21:12	31.02	26.79	28.88	29.94	0.00	28.76	29.92	30.80	31.39	31.68	31.66
21:15	30.99	26.75	28.85	29.90	0.00	28.73	29.87	30.75	31.34	31.63	31.61
21:18	30.95	26.74	28.82	29.88	0.00	28.69	29.83	30.71	31.30	31.58	31.57
21:21	30.92	26.70	28.80	29.88	0.00	28.66	29.79	30.66	31.25	31.54	31.52
21:24	30.89	26.66	28.78	29.86	0.00	28.63	29.75	30.62	31.20	31.49	31.48
21:27	30.86	26.63	28.74	29.84	0.00	28.59	29.71	30.58	31.16	31.44	31.43
21:30	30.83	26.62	28.72	29.81	0.00	28.55	29.67	30.53	31.11	31.40	31.39
21:33	30.80	26.59	28.70	29.79	0.00	28.52	29.63	30.49	31.07	31.35	31.34
21:36	30.76	26.56	28.67	29.78	0.00	28.48	29.59	30.44	31.02	31.31	31.30
21:39	30.73	26.53	28.64	29.74	0.00	28.45	29.55	30.40	30.98	31.26	31.26
21:42	30.70	26.51	28.62	29.73	0.00	28.41	29.51	30.36	30.93	31.22	31.21
21:45	30.67	26.50	28.59	29.72	0.00	28.38	29.47	30.32	30.89	31.17	31.17
21:48	30.64	26.48	28.57	29.69	0.00	28.35	29.43	30.27	30.84	31.13	31.13
21:51	30.61	26.46	28.54	29.66	0.00	28.32	29.39	30.23	30.80	31.08	31.08
21:54	30.58	26.45	28.52	29.63	0.00	28.28	29.36	30.19	30.75	31.04	31.04
21:57	30.55	26.43	28.49	29.62	0.00	28.26	29.32	30.15	30.71	31.00	31.00
22:00	30.51	26.42	28.47	29.59	0.00	28.22	29.28	30.11	30.67	30.95	30.96
22:03	30.48	26.41	28.43	29.55	0.00	28.20	29.25	30.07	30.62	30.91	30.91
22:06	30.45	26.42	28.38	29.49	0.00	28.17	29.21	30.03	30.58	30.87	30.87
22:09	30.42	26.39	28.34	29.48	0.00	28.15	29.18	29.99	30.54	30.82	30.83
22:12	30.39	26.37	28.31	29.46	0.00	28.12	29.14	29.95	30.50	30.78	30.79
22:15	30.36	26.34	28.29	29.44	0.00	28.09	29.11	29.91	30.46	30.74	30.75
22:18	30.33	26.30	28.27	29.44	0.00	28.06	29.07	29.87	30.41	30.70	30.70
22:21	30.30	26.28	28.23	29.40	0.00	28.03	29.04	29.83	30.37	30.65	30.66
22:24	30.27	26.25	28.19	29.37	0.00	28.00	29.01	29.79	30.33	30.61	30.62
22:27	30.24	26.25	28.17	29.34	0.00	27.97	28.97	29.75	30.29	30.57	30.58
22:30	30.21	26.25	28.14	29.31	0.00	27.94	28.94	29.72	30.25	30.53	30.54
22:33	30.18	26.22	28.12	29.30	0.00	27.91	28.90	29.68	30.21	30.49	30.50
22:36	30.15	26.21	28.10	29.28	0.00	27.89	28.87	29.64	30.17	30.45	30.46
22:39	30.12	26.17	28.07	29.27	0.00	27.86	28.84	29.60	30.13	30.41	30.42
22:42	30.09	26.15	28.06	29.26	0.00	27.83	28.80	29.57	30.09	30.37	30.38
22:45	30.06	26.14	28.05	29.23	0.00	27.80	28.77	29.53	30.05	30.33	30.34

22:48	30.03	26.15	28.03	29.21	0.00	27.77	28.74	29.49	30.01	30.29	30.31
22:51	30.00	26.16	28.01	29.18	0.00	27.75	28.71	29.46	29.98	30.25	30.27
22:54	29.97	26.15	27.98	29.15	0.00	27.73	28.67	29.42	29.94	30.21	30.23
22:57	29.94	26.12	27.97	29.14	0.00	27.71	28.64	29.39	29.90	30.17	30.19
23:00	29.91	26.09	27.94	29.11	0.00	27.69	28.61	29.35	29.86	30.13	30.15
23:03	29.89	26.08	27.91	29.07	0.00	27.66	28.58	29.32	29.82	30.09	30.12
23:06	29.86	26.07	27.89	29.04	0.00	27.63	28.55	29.28	29.79	30.05	30.08
23:09	29.83	26.04	27.88	29.04	0.00	27.61	28.52	29.25	29.75	30.02	30.04
23:12	29.80	26.05	27.85	29.03	0.00	27.58	28.49	29.21	29.71	29.98	30.00
23:15	29.77	26.00	27.83	29.01	0.00	27.56	28.46	29.18	29.68	29.94	29.97
23:18	29.74	26.00	27.80	28.99	0.00	27.53	28.44	29.15	29.64	29.90	29.93
23:21	29.72	25.98	27.78	28.96	0.00	27.51	28.41	29.11	29.61	29.87	29.89
23:24	29.69	25.96	27.76	28.94	0.00	27.49	28.38	29.08	29.57	29.83	29.86
23:27	29.66	25.94	27.74	28.93	0.00	27.46	28.35	29.05	29.53	29.79	29.82
23:30	29.63	25.91	27.72	28.92	0.00	27.43	28.32	29.01	29.50	29.76	29.79
23:33	29.61	25.89	27.71	28.92	0.00	27.41	28.29	28.98	29.46	29.72	29.75
23:36	29.58	25.88	27.68	28.88	0.00	27.38	28.26	28.95	29.43	29.69	29.72
23:39	29.55	25.85	27.65	28.87	0.00	27.36	28.23	28.92	29.39	29.65	29.68
23:42	29.53	25.86	27.63	28.85	0.00	27.33	28.20	28.88	29.36	29.62	29.65
23:45	29.50	25.83	27.61	28.83	0.00	27.31	28.17	28.85	29.33	29.58	29.62
23:48	29.47	25.81	27.58	28.79	0.00	27.28	28.14	28.82	29.29	29.55	29.58
23:51	29.45	25.80	27.56	28.77	0.00	27.26	28.12	28.79	29.26	29.51	29.55
23:54	29.42	25.81	27.54	28.75	0.00	27.24	28.09	28.76	29.23	29.48	29.51
23:57	29.39	25.81	27.52	28.73	0.00	27.22	28.06	28.73	29.19	29.45	29.48

APPENDIX D3

Time	Observed Temperature (^{0}C)					Temperature Predicted, ^{0}C (Modified Finite Difference Method)					
	Inner Surface		Outer Surface			Node (N)					
	P1 (In)	Outdoor Air	P1 (Out)	Inner Air	q solar	0	20	40	60	80	100
0:00	29.41	25.80	27.54	28.75	0.00	27.54	27.91	28.29	28.66	29.04	29.41
0:03	29.39	25.80	27.51	28.73	0.00	27.31	27.91	28.29	28.66	29.04	29.28
0:06	29.36	25.79	27.49	28.71	0.00	27.20	27.88	28.29	28.66	29.02	29.19
0:09	29.33	25.78	27.48	28.69	0.00	27.13	27.83	28.28	28.66	28.99	29.12
0:12	29.31	25.76	27.46	28.67	0.00	27.08	27.79	28.27	28.65	28.96	29.07
0:15	29.28	25.76	27.44	28.64	0.00	27.04	27.76	28.26	28.64	28.93	29.02
0:18	29.25	25.73	27.41	28.63	0.00	27.01	27.72	28.24	28.62	28.90	28.98
0:21	29.23	25.72	27.39	28.61	0.00	26.98	27.69	28.22	28.61	28.87	28.94
0:24	29.20	25.71	27.38	28.58	0.00	26.95	27.66	28.20	28.59	28.84	28.91
0:27	29.18	25.69	27.35	28.56	0.00	26.93	27.64	28.17	28.57	28.81	28.88
0:30	29.15	25.64	27.34	28.57	0.00	26.90	27.61	28.15	28.54	28.78	28.85
0:33	29.13	25.61	27.30	28.57	0.00	26.87	27.58	28.13	28.52	28.76	28.82
0:36	29.10	25.60	27.29	28.54	0.00	26.84	27.56	28.10	28.50	28.73	28.79
0:39	29.08	25.60	27.28	28.51	0.00	26.82	27.53	28.08	28.47	28.70	28.77
0:42	29.05	25.59	27.26	28.49	0.00	26.80	27.51	28.06	28.45	28.68	28.74
0:45	29.03	25.57	27.24	28.49	0.00	26.78	27.48	28.03	28.42	28.65	28.71
0:48	29.01	25.55	27.22	28.46	0.00	26.76	27.46	28.01	28.40	28.62	28.69
0:51	28.98	25.54	27.20	28.43	0.00	26.74	27.44	27.98	28.37	28.60	28.66
0:54	28.96	25.53	27.18	28.41	0.00	26.72	27.41	27.96	28.35	28.57	28.63
0:57	28.93	25.54	27.15	28.38	0.00	26.70	27.39	27.93	28.32	28.55	28.61
1:00	28.91	25.53	27.14	28.37	0.00	26.68	27.37	27.91	28.30	28.52	28.58
1:03	28.89	25.52	27.11	28.36	0.00	26.67	27.34	27.89	28.27	28.50	28.56
1:06	28.86	25.50	27.11	28.34	0.00	26.65	27.32	27.86	28.25	28.47	28.53
1:09	28.84	25.49	27.08	28.31	0.00	26.63	27.30	27.84	28.22	28.45	28.51
1:12	28.81	25.47	27.06	28.29	0.00	26.61	27.28	27.81	28.20	28.42	28.48
1:15	28.79	25.44	27.05	28.29	0.00	26.59	27.26	27.79	28.17	28.40	28.46
1:18	28.77	25.45	27.02	28.25	0.00	26.57	27.24	27.77	28.15	28.37	28.43

1:21	28.74	25.42	27.00	28.22	0.00	26.56	27.22	27.74	28.12	28.35	28.41
1:24	28.72	25.38	26.97	28.22	0.00	26.54	27.20	27.72	28.10	28.32	28.38
1:27	28.70	25.38	26.96	28.20	0.00	26.51	27.18	27.70	28.08	28.30	28.36
1:30	28.67	25.37	26.94	28.18	0.00	26.50	27.15	27.68	28.05	28.27	28.34
1:33	28.65	25.34	26.92	28.15	0.00	26.48	27.13	27.65	28.03	28.25	28.31
1:36	28.63	25.34	26.88	28.13	0.00	26.46	27.11	27.63	28.00	28.22	28.29
1:39	28.60	25.33	26.87	28.10	0.00	26.44	27.09	27.61	27.98	28.20	28.26
1:42	28.58	25.32	26.85	28.09	0.00	26.42	27.07	27.59	27.96	28.17	28.24
1:45	28.56	25.27	26.83	28.08	0.00	26.40	27.05	27.56	27.93	28.15	28.21
1:48	28.54	25.25	26.81	28.06	0.00	26.38	27.03	27.54	27.91	28.13	28.19
1:51	28.51	25.28	26.79	28.03	0.00	26.36	27.01	27.52	27.89	28.10	28.17
1:54	28.49	25.26	26.77	28.01	0.00	26.35	26.99	27.50	27.86	28.08	28.14
1:57	28.47	25.23	26.75	28.00	0.00	26.33	26.97	27.47	27.84	28.06	28.12
2:00	28.44	25.22	26.73	27.97	0.00	26.31	26.95	27.45	27.82	28.03	28.10
2:03	28.42	25.22	26.71	27.95	0.00	26.29	26.93	27.43	27.79	28.01	28.07
2:06	28.40	25.21	26.69	27.92	0.00	26.28	26.91	27.41	27.77	27.98	28.05
2:09	28.38	25.20	26.68	27.90	0.00	26.26	26.89	27.39	27.75	27.96	28.03
2:12	28.36	25.19	26.66	27.89	0.00	26.25	26.87	27.36	27.72	27.94	28.00
2:15	28.33	25.17	26.65	27.87	0.00	26.23	26.85	27.34	27.70	27.92	27.98
2:18	28.31	25.17	26.62	27.85	0.00	26.21	26.83	27.32	27.68	27.89	27.96
2:21	28.29	25.16	26.60	27.83	0.00	26.20	26.81	27.30	27.66	27.87	27.93
2:24	28.27	25.15	26.59	27.81	0.00	26.18	26.79	27.28	27.63	27.85	27.91
2:27	28.25	25.16	26.58	27.80	0.00	26.17	26.77	27.26	27.61	27.82	27.89
2:30	28.22	25.14	26.56	27.78	0.00	26.16	26.75	27.24	27.59	27.80	27.86
2:33	28.20	25.10	26.54	27.76	0.00	26.14	26.74	27.22	27.57	27.78	27.84
2:36	28.18	25.10	26.53	27.75	0.00	26.12	26.72	27.20	27.55	27.76	27.82
2:39	28.16	25.08	26.50	27.72	0.00	26.10	26.70	27.18	27.52	27.73	27.80
2:42	28.14	25.06	26.48	27.70	0.00	26.09	26.68	27.16	27.50	27.71	27.78
2:45	28.12	25.04	26.46	27.69	0.00	26.07	26.66	27.14	27.48	27.69	27.75
2:48	28.09	25.01	26.45	27.68	0.00	26.05	26.64	27.12	27.46	27.67	27.73
2:51	28.07	25.02	26.43	27.65	0.00	26.03	26.63	27.10	27.44	27.64	27.71
2:54	28.05	25.00	26.42	27.63	0.00	26.02	26.61	27.08	27.42	27.62	27.69
2:57	28.03	25.00	26.41	27.62	0.00	26.00	26.59	27.06	27.40	27.60	27.67

3:00	28.01	24.99	26.38	27.61	0.00	25.98	26.57	27.04	27.38	27.58	27.64
3:03	27.99	24.98	26.36	27.59	0.00	25.97	26.55	27.02	27.35	27.56	27.62
3:06	27.97	24.94	26.35	27.58	0.00	25.95	26.53	27.00	27.33	27.54	27.60
3:09	27.95	24.94	26.33	27.55	0.00	25.93	26.51	26.98	27.31	27.52	27.58
3:12	27.93	24.93	26.31	27.53	0.00	25.92	26.50	26.96	27.29	27.49	27.56
3:15	27.91	24.92	26.30	27.53	0.00	25.90	26.48	26.94	27.27	27.47	27.54
3:18	27.89	24.91	26.28	27.51	0.00	25.89	26.46	26.92	27.25	27.45	27.52
3:21	27.87	24.90	26.26	27.49	0.00	25.87	26.44	26.90	27.23	27.43	27.50
3:24	27.85	24.89	26.25	27.47	0.00	25.86	26.42	26.88	27.21	27.41	27.48
3:27	27.83	24.87	26.24	27.46	0.00	25.84	26.41	26.86	27.19	27.39	27.46
3:30	27.81	24.87	26.22	27.45	0.00	25.82	26.39	26.84	27.17	27.37	27.44
3:33	27.78	24.85	26.21	27.43	0.00	25.81	26.37	26.82	27.15	27.35	27.42
3:36	27.77	24.83	26.19	27.41	0.00	25.80	26.36	26.80	27.13	27.33	27.40
3:39	27.75	24.85	26.17	27.39	0.00	25.78	26.34	26.78	27.11	27.31	27.37
3:42	27.73	24.84	26.16	27.38	0.00	25.77	26.32	26.77	27.09	27.29	27.35
3:45	27.71	24.82	26.14	27.36	0.00	25.76	26.30	26.75	27.07	27.27	27.33
3:48	27.69	24.80	26.13	27.34	0.00	25.74	26.29	26.73	27.05	27.25	27.31
3:51	27.67	24.81	26.11	27.32	0.00	25.73	26.27	26.71	27.03	27.23	27.29
3:54	27.65	24.80	26.10	27.29	0.00	25.71	26.25	26.69	27.01	27.21	27.27
3:57	27.63	24.78	26.07	27.28	0.00	25.70	26.24	26.67	26.99	27.19	27.25
4:00	27.61	24.78	26.04	27.26	0.00	25.69	26.22	26.66	26.97	27.17	27.23
4:03	27.59	24.75	26.01	27.26	0.00	25.67	26.21	26.64	26.95	27.15	27.21
4:06	27.57	24.73	26.00	27.25	0.00	25.66	26.19	26.62	26.94	27.13	27.19
4:09	27.55	24.72	25.98	27.22	0.00	25.64	26.17	26.60	26.92	27.11	27.18
4:12	27.53	24.71	25.97	27.20	0.00	25.62	26.16	26.58	26.90	27.09	27.16
4:15	27.51	24.70	25.97	27.19	0.00	25.61	26.14	26.57	26.88	27.07	27.14
4:18	27.49	24.68	25.94	27.18	0.00	25.59	26.12	26.55	26.86	27.05	27.12
4:21	27.47	24.65	25.92	27.15	0.00	25.58	26.11	26.53	26.84	27.03	27.10
4:24	27.45	24.64	25.91	27.12	0.00	25.56	26.09	26.51	26.82	27.01	27.08
4:27	27.43	24.63	25.90	27.12	0.00	25.54	26.07	26.50	26.80	26.99	27.06
4:30	27.41	24.62	25.88	27.10	0.00	25.53	26.06	26.48	26.79	26.97	27.04
4:33	27.40	24.63	25.86	27.10	0.00	25.51	26.04	26.46	26.77	26.96	27.02
4:36	27.38	24.62	25.85	27.08	0.00	25.50	26.02	26.44	26.75	26.94	27.00

4:39	27.36	24.59	25.84	27.07	0.00	25.49	26.01	26.43	26.73	26.92	26.99
4:42	27.34	24.58	25.83	27.07	0.00	25.47	25.99	26.41	26.71	26.90	26.97
4:45	27.32	24.59	25.82	27.03	0.00	25.46	25.98	26.39	26.69	26.88	26.95
4:48	27.30	24.60	25.80	27.01	0.00	25.45	25.96	26.37	26.68	26.86	26.93
4:51	27.28	24.58	25.78	26.99	0.00	25.44	25.94	26.36	26.66	26.84	26.91
4:54	27.26	24.58	25.76	26.96	0.00	25.43	25.93	26.34	26.64	26.83	26.89
4:57	27.25	24.56	25.74	26.94	0.00	25.42	25.92	26.32	26.62	26.81	26.87
5:00	27.23	24.54	25.73	26.93	0.00	25.40	25.90	26.31	26.60	26.79	26.86
5:03	27.21	24.53	25.71	26.91	0.00	25.39	25.89	26.29	26.59	26.77	26.84
5:06	27.19	24.53	25.69	26.90	0.00	25.37	25.87	26.27	26.57	26.75	26.82
5:09	27.17	24.52	25.68	26.89	0.00	25.36	25.86	26.26	26.55	26.73	26.80
5:12	27.15	24.52	25.66	26.87	0.00	25.35	25.84	26.24	26.53	26.72	26.78
5:15	27.13	24.51	25.65	26.85	0.00	25.34	25.83	26.22	26.52	26.70	26.76
5:18	27.12	24.49	25.64	26.85	0.00	25.33	25.81	26.21	26.50	26.68	26.75
5:21	27.10	24.50	25.62	26.84	0.00	25.31	25.80	26.19	26.48	26.66	26.73
5:24	27.08	24.48	25.61	26.82	0.00	25.30	25.78	26.18	26.47	26.65	26.71
5:27	27.06	24.48	25.59	26.81	0.00	25.29	25.77	26.16	26.45	26.63	26.69
5:30	27.05	24.45	25.58	26.80	0.00	25.28	25.76	26.14	26.43	26.61	26.68
5:33	27.03	24.45	25.57	26.79	0.00	25.26	25.74	26.13	26.41	26.59	26.66
5:36	27.01	24.45	25.56	26.77	0.00	25.25	25.73	26.11	26.40	26.58	26.64
5:39	27.00	24.45	25.54	26.75	0.00	25.24	25.71	26.10	26.38	26.56	26.63
5:42	26.98	24.43	25.52	26.74	0.00	25.23	25.70	26.08	26.37	26.54	26.61
5:45	26.96	24.42	25.51	26.73	0.00	25.22	25.69	26.07	26.35	26.52	26.59
5:48	26.94	24.41	25.49	26.72	0.00	25.21	25.67	26.05	26.33	26.51	26.57
5:51	26.93	24.38	25.48	26.71	0.00	25.19	25.66	26.04	26.32	26.49	26.56
5:54	26.91	24.37	25.47	26.69	0.00	25.18	25.65	26.02	26.30	26.47	26.54
5:57	26.89	24.37	25.45	26.68	0.00	25.16	25.63	26.01	26.28	26.46	26.53
6:00	26.87	24.36	25.44	26.65	0.00	25.15	25.62	25.99	26.27	26.44	26.51
6:03	26.86	24.34	25.41	26.65	0.00	25.14	25.60	25.98	26.25	26.42	26.49
6:06	26.84	24.31	25.40	26.64	0.00	25.13	25.59	25.96	26.24	26.41	26.48
6:09	26.82	24.28	25.39	26.63	0.00	25.11	25.58	25.95	26.22	26.39	26.46
6:12	26.81	24.27	25.37	26.63	0.00	25.09	25.56	25.93	26.20	26.38	26.44
6:15	26.79	24.26	25.36	26.60	0.00	25.07	25.54	25.92	26.19	26.36	26.43

6:18	26.77	24.24	25.33	26.59	0.00	25.06	25.53	25.90	26.17	26.34	26.41
6:21	26.76	24.24	25.31	26.56	0.00	25.04	25.51	25.89	26.16	26.33	26.40
6:24	26.74	24.21	25.29	26.55	0.00	25.03	25.50	25.87	26.14	26.31	26.38
6:27	26.72	24.20	25.29	26.54	0.00	25.01	25.48	25.85	26.13	26.30	26.36
6:30	26.71	24.21	25.29	26.52	0.00	25.00	25.47	25.84	26.11	26.28	26.35
6:33	26.69	24.20	25.27	26.52	0.00	24.99	25.45	25.82	26.09	26.26	26.33
6:36	26.67	24.22	25.26	26.48	0.00	24.98	25.44	25.81	26.08	26.25	26.32
6:39	26.66	24.21	25.24	26.47	0.00	24.97	25.42	25.79	26.06	26.23	26.30
6:42	26.64	24.20	25.23	26.45	0.00	24.96	25.41	25.78	26.05	26.22	26.28
6:45	26.62	24.18	25.22	26.43	0.00	24.95	25.40	25.76	26.03	26.20	26.27
6:48	26.61	24.16	25.20	26.42	0.00	24.94	25.39	25.75	26.02	26.19	26.25
6:51	26.59	24.15	25.19	26.41	0.00	24.92	25.37	25.73	26.00	26.17	26.24
6:54	26.57	24.14	25.19	26.41	0.00	24.91	25.36	25.72	25.99	26.15	26.22
6:57	26.56	24.15	25.18	26.40	0.00	24.90	25.34	25.70	25.97	26.14	26.21
7:00	26.54	24.15	25.17	26.38	5.32	24.78	25.33	25.69	25.96	26.12	26.19
7:03	26.53	24.16	25.16	26.36	5.33	24.75	25.30	25.68	25.94	26.11	26.18
7:06	26.51	24.17	25.16	26.35	5.18	24.72	25.27	25.66	25.92	26.09	26.16
7:09	26.50	24.17	25.17	26.33	5.42	24.69	25.25	25.64	25.91	26.08	26.14
7:12	26.48	24.16	25.18	26.32	5.40	24.67	25.22	25.62	25.89	26.06	26.13
7:15	26.46	24.18	25.20	26.31	6.79	24.64	25.20	25.60	25.88	26.05	26.11
7:18	26.45	24.18	25.23	26.31	10.78	24.63	25.17	25.58	25.86	26.03	26.10
7:21	26.43	24.22	25.31	26.29	14.84	24.63	25.15	25.56	25.84	26.01	26.08
7:24	26.42	24.29	25.44	26.28	19.69	24.65	25.13	25.54	25.83	26.00	26.07
7:27	26.40	24.34	25.56	26.27	22.09	24.69	25.12	25.52	25.81	25.98	26.05
7:30	26.39	24.40	25.69	26.25	29.52	24.73	25.12	25.51	25.79	25.97	26.04
7:33	26.37	24.46	25.88	26.25	44.21	24.79	25.12	25.49	25.77	25.95	26.02
7:36	26.36	24.54	26.08	26.24	54.57	24.92	25.12	25.48	25.76	25.93	26.01
7:39	26.35	24.60	26.26	26.24	64.50	25.05	25.15	25.47	25.74	25.92	25.99
7:42	26.33	24.67	26.41	26.25	72.36	25.19	25.18	25.46	25.73	25.90	25.98
7:45	26.32	24.74	26.53	26.24	83.17	25.33	25.23	25.46	25.71	25.89	25.96
7:48	26.31	24.82	26.70	26.22	97.99	25.48	25.28	25.46	25.70	25.87	25.95
7:51	26.30	24.92	27.09	26.22	112.15	25.67	25.34	25.47	25.69	25.86	25.93
7:54	26.29	25.06	27.40	26.22	126.76	25.88	25.41	25.48	25.68	25.84	25.92

7:57	26.28	25.13	27.60	26.21	138.03	26.11	25.49	25.50	25.68	25.83	25.90
8:00	26.27	25.21	27.95	26.21	146.43	26.33	25.59	25.53	25.67	25.82	25.89
8:03	26.26	25.27	28.11	26.21	161.61	26.52	25.69	25.56	25.67	25.80	25.88
8:06	26.26	25.37	28.36	26.23	174.80	26.75	25.80	25.60	25.68	25.80	25.86
8:09	26.26	25.49	28.63	26.24	190.33	26.99	25.92	25.64	25.68	25.79	25.85
8:12	26.26	25.64	28.91	26.25	210.31	27.25	26.04	25.69	25.69	25.78	25.84
8:15	26.26	25.79	29.22	26.26	227.89	27.56	26.17	25.74	25.71	25.78	25.84
8:18	26.26	25.90	29.52	26.27	242.15	27.88	26.32	25.81	25.72	25.78	25.83
8:21	26.27	25.97	29.68	26.29	257.45	28.18	26.48	25.87	25.74	25.78	25.83
8:24	26.27	26.07	29.75	26.30	269.97	28.48	26.65	25.95	25.77	25.78	25.82
8:27	26.28	26.11	29.78	26.31	289.49	28.77	26.83	26.03	25.80	25.78	25.82
8:30	26.29	26.20	29.89	26.33	306.37	29.09	27.00	26.12	25.83	25.79	25.83
8:33	26.31	26.32	30.19	26.34	315.99	29.41	27.19	26.21	25.87	25.80	25.83
8:36	26.33	26.42	30.42	26.36	335.21	29.70	27.38	26.31	25.91	25.82	25.84
8:39	26.35	26.58	30.72	26.38	344.58	30.03	27.58	26.41	25.96	25.84	25.85
8:42	26.37	26.73	31.08	26.40	353.32	30.34	27.78	26.52	26.01	25.86	25.86
8:45	26.39	26.85	31.29	26.42	372.15	30.63	27.98	26.64	26.07	25.88	25.87
8:48	26.42	26.92	31.48	26.44	389.76	30.96	28.18	26.76	26.13	25.91	25.89
8:51	26.45	27.02	31.66	26.47	408.15	31.30	28.39	26.88	26.19	25.94	25.91
8:54	26.48	27.13	31.82	26.49	422.99	31.66	28.61	27.01	26.26	25.97	25.94
8:57	26.51	27.23	32.03	26.51	425.67	32.00	28.83	27.14	26.33	26.01	25.97
9:00	26.54	27.34	32.29	26.54	438.82	32.28	29.06	27.28	26.41	26.05	26.00
9:03	26.58	27.48	32.52	26.58	444.25	32.57	29.28	27.42	26.49	26.10	26.03
9:06	26.62	27.62	32.81	26.60	459.29	32.84	29.50	27.56	26.57	26.15	26.07
9:09	26.66	27.63	32.83	26.63	470.73	33.16	29.72	27.71	26.66	26.20	26.11
9:12	26.71	27.77	33.00	26.66	474.39	33.45	29.94	27.86	26.75	26.26	26.15
9:15	26.75	27.95	33.34	26.69	482.12	33.70	30.16	28.01	26.85	26.32	26.20
9:18	26.80	28.04	33.58	26.72	497.26	33.97	30.38	28.16	26.95	26.38	26.25
9:21	26.85	28.10	33.72	26.75	507.81	34.27	30.59	28.32	27.05	26.45	26.31
9:24	26.90	28.19	33.91	26.78	516.50	34.56	30.81	28.47	27.15	26.52	26.36
9:27	26.95	28.33	34.21	26.82	515.78	34.83	31.03	28.63	27.26	26.59	26.42
9:30	27.01	28.41	34.30	26.86	515.43	35.05	31.25	28.79	27.37	26.67	26.49
9:33	27.07	28.44	34.45	26.90	522.30	35.23	31.45	28.95	27.48	26.75	26.56

9:36	27.12	28.54	34.54	26.94	520.95	35.43	31.65	29.11	27.59	26.83	26.63
9:39	27.18	28.74	34.66	26.98	523.97	35.60	31.84	29.27	27.71	26.92	26.70
9:42	27.24	28.83	34.78	27.01	528.57	35.79	32.03	29.43	27.83	27.01	26.78
9:45	27.31	28.93	35.04	27.05	531.73	35.98	32.21	29.58	27.95	27.10	26.86
9:48	27.37	29.02	35.17	27.10	537.37	36.17	32.39	29.74	28.07	27.19	26.94
9:51	27.44	29.08	35.28	27.14	534.30	36.36	32.56	29.89	28.19	27.29	27.02
9:54	27.51	29.21	35.52	27.18	540.23	36.50	32.74	30.04	28.32	27.39	27.11
9:57	27.58	29.33	35.65	27.23	533.74	36.68	32.90	30.19	28.44	27.49	27.20
10:00	27.65	29.44	35.85	27.28	547.01	36.80	33.07	30.34	28.56	27.59	27.29
10:03	27.72	29.56	36.04	27.32	543.45	37.00	33.22	30.49	28.69	27.69	27.38
10:06	27.79	29.67	36.25	27.36	532.23	37.15	33.38	30.63	28.81	27.80	27.48
10:09	27.87	29.69	36.45	27.41	541.57	37.23	33.54	30.78	28.94	27.91	27.57
10:12	27.94	29.79	36.72	27.46	537.32	37.37	33.68	30.92	29.06	28.02	27.67
10:15	28.02	29.90	36.97	27.51	537.45	37.48	33.83	31.06	29.19	28.12	27.77
10:18	28.09	30.01	37.21	27.55	534.22	37.60	33.96	31.20	29.31	28.23	27.87
10:21	28.17	30.10	37.41	27.60	530.71	37.70	34.10	31.34	29.44	28.35	27.98
10:24	28.25	30.13	37.46	27.66	526.96	37.78	34.23	31.47	29.56	28.46	28.08
10:27	28.34	30.12	37.61	27.73	533.59	37.85	34.35	31.60	29.69	28.57	28.18
10:30	28.42	30.29	37.76	27.78	519.37	37.95	34.47	31.73	29.81	28.68	28.29
10:33	28.50	30.31	37.83	27.83	524.38	37.99	34.58	31.86	29.93	28.80	28.40
10:36	28.58	30.37	37.93	27.88	523.60	38.07	34.69	31.98	30.06	28.91	28.51
10:39	28.67	30.44	38.11	27.94	522.11	38.15	34.79	32.10	30.18	29.03	28.61
10:42	28.75	30.53	38.17	28.01	523.21	38.22	34.90	32.22	30.30	29.14	28.72
10:45	28.84	30.70	38.39	28.07	518.90	38.32	35.00	32.34	30.42	29.25	28.83
10:48	28.93	30.78	38.35	28.13	501.08	38.40	35.10	32.45	30.53	29.37	28.94
10:51	29.02	30.80	38.35	28.19	503.93	38.38	35.20	32.57	30.65	29.48	29.05
10:54	29.11	30.89	38.47	28.26	502.61	38.42	35.28	32.68	30.77	29.60	29.16
10:57	29.20	30.95	38.48	28.32	496.89	38.47	35.37	32.78	30.88	29.71	29.27
11:00	29.29	31.01	38.53	28.38	478.46	38.50	35.45	32.89	30.99	29.82	29.38
11:03	29.38	30.96	38.31	28.44	463.34	38.44	35.52	32.99	31.11	29.94	29.49
11:06	29.47	30.95	38.21	28.51	462.13	38.33	35.58	33.09	31.22	30.05	29.59
11:09	29.56	31.00	38.19	28.56	463.80	38.28	35.62	33.19	31.33	30.16	29.70
11:12	29.65	31.15	38.34	28.62	455.56	38.29	35.66	33.28	31.43	30.27	29.81

11:15	29.74	31.23	38.38	28.68	435.81	38.28	35.70	33.36	31.54	30.38	29.92
11:18	29.82	31.25	38.31	28.76	440.41	38.19	35.73	33.44	31.64	30.49	30.02
11:21	29.92	31.35	38.30	28.82	431.16	38.18	35.76	33.52	31.74	30.59	30.13
11:24	30.01	31.48	38.35	28.88	431.17	38.15	35.79	33.59	31.84	30.70	30.23
11:27	30.09	31.45	38.21	28.94	421.21	38.17	35.81	33.66	31.93	30.80	30.34
11:30	30.18	31.38	37.87	28.99	410.06	38.11	35.84	33.72	32.03	30.91	30.44
11:33	30.27	31.51	37.76	29.04	408.98	38.02	35.87	33.79	32.12	31.01	30.54
11:36	30.35	31.49	37.64	29.08	399.09	37.99	35.88	33.85	32.20	31.11	30.64
11:39	30.44	31.55	37.59	29.15	395.45	37.92	35.89	33.91	32.29	31.21	30.74
11:42	30.52	31.51	37.35	29.19	383.28	37.88	35.90	33.97	32.37	31.30	30.84
11:45	30.60	31.56	37.26	29.24	363.70	37.77	35.91	34.02	32.45	31.40	30.93
11:48	30.68	31.69	37.37	29.29	351.01	37.62	35.90	34.07	32.53	31.49	31.03
11:51	30.76	31.74	37.16	29.35	331.97	37.49	35.88	34.12	32.61	31.58	31.12
11:54	30.84	31.75	37.02	29.43	320.30	37.31	35.86	34.16	32.68	31.67	31.21
11:57	30.91	31.66	36.77	29.49	326.14	37.15	35.82	34.19	32.75	31.75	31.30
12:00	30.99	31.71	36.71	29.53	323.86	37.59	35.77	34.22	32.82	31.84	31.38
12:03	31.06	31.77	36.63	29.59	314.20	37.78	35.81	34.24	32.89	31.92	31.47
12:06	31.13	31.78	36.46	29.64	309.33	37.85	35.88	34.28	32.95	32.00	31.55
12:09	31.20	31.81	36.45	29.70	304.85	37.87	35.93	34.32	33.01	32.08	31.64
12:12	31.26	31.87	36.52	29.73	307.74	37.88	35.98	34.37	33.07	32.15	31.72
12:15	31.33	31.92	36.48	29.77	299.91	37.93	36.03	34.41	33.13	32.23	31.79
12:18	31.39	31.88	36.42	29.81	295.64	37.93	36.07	34.46	33.19	32.30	31.87
12:21	31.45	31.90	36.36	29.86	293.60	37.91	36.11	34.52	33.25	32.37	31.94
12:24	31.51	31.96	36.39	29.91	289.42	37.91	36.14	34.57	33.31	32.44	32.01
12:27	31.56	32.03	36.42	29.95	281.85	37.90	36.17	34.62	33.37	32.51	32.08
12:30	31.62	32.10	36.43	30.01	272.37	37.88	36.20	34.66	33.43	32.57	32.15
12:33	31.67	32.16	36.42	30.06	273.82	37.83	36.22	34.71	33.49	32.64	32.22
12:36	31.72	32.14	36.43	30.10	267.51	37.83	36.24	34.75	33.55	32.71	32.29
12:39	31.77	32.20	36.41	30.14	266.93	37.80	36.25	34.80	33.60	32.77	32.35
12:42	31.82	32.21	36.38	30.19	256.62	37.79	36.27	34.84	33.66	32.84	32.42
12:45	31.87	32.24	36.38	30.22	254.40	37.74	36.28	34.88	33.71	32.90	32.48
12:48	31.92	32.30	36.39	30.28	252.71	37.71	36.29	34.91	33.77	32.96	32.54
12:51	31.96	32.35	36.41	30.32	254.93	37.70	36.30	34.95	33.82	33.02	32.60

12:54	32.00	32.40	36.35	30.36	250.34	37.72	36.30	34.98	33.87	33.08	32.67
12:57	32.05	32.30	36.30	30.42	245.55	37.71	36.32	35.02	33.92	33.14	32.73
13:00	32.09	32.35	36.30	30.46	246.45	37.67	36.33	35.05	33.97	33.20	32.79
13:03	32.13	32.44	36.34	30.49	238.54	37.66	36.34	35.08	34.02	33.25	32.84
13:06	32.17	32.42	36.30	30.53	232.37	37.64	36.35	35.11	34.06	33.31	32.90
13:09	32.21	32.33	36.22	30.57	221.87	37.58	36.36	35.14	34.11	33.36	32.96
13:12	32.25	32.29	36.15	30.61	224.15	37.48	36.36	35.17	34.15	33.41	33.01
13:15	32.28	32.31	36.11	30.65	223.10	37.44	36.35	35.20	34.20	33.47	33.07
13:18	32.32	32.31	36.05	30.68	218.00	37.41	36.34	35.22	34.24	33.52	33.12
13:21	32.35	32.21	35.97	30.70	212.57	37.36	36.33	35.24	34.28	33.57	33.17
13:24	32.39	32.25	35.99	30.73	206.56	37.28	36.32	35.26	34.32	33.62	33.22
13:27	32.42	32.33	36.01	30.76	208.20	37.22	36.31	35.28	34.35	33.66	33.27
13:30	32.46	32.34	36.03	30.79	202.56	37.20	36.29	35.29	34.39	33.71	33.32
13:33	32.49	32.34	35.96	30.84	204.39	37.16	36.28	35.31	34.42	33.75	33.36
13:36	32.52	32.36	35.98	30.87	201.98	37.14	36.26	35.32	34.46	33.80	33.41
13:39	32.55	32.34	35.93	30.91	201.72	37.12	36.25	35.33	34.49	33.84	33.45
13:42	32.58	32.27	35.86	30.95	199.60	37.10	36.25	35.34	34.52	33.88	33.50
13:45	32.61	32.29	35.89	30.97	200.10	37.07	36.24	35.36	34.55	33.92	33.54
13:48	32.64	32.27	35.81	30.99	193.40	37.05	36.23	35.37	34.58	33.96	33.58
13:51	32.66	32.17	35.72	31.02	190.54	37.00	36.22	35.38	34.60	34.00	33.62
13:54	32.69	32.19	35.73	31.05	189.64	36.93	36.21	35.39	34.63	34.03	33.66
13:57	32.72	32.28	35.81	31.07	187.09	36.90	36.20	35.40	34.65	34.07	33.70
14:00	32.74	32.22	35.77	31.09	185.17	36.88	36.18	35.41	34.68	34.10	33.74
14:03	32.77	32.15	35.72	31.11	180.39	36.84	36.17	35.41	34.70	34.13	33.77
14:06	32.79	32.13	35.64	31.13	179.44	36.77	36.16	35.42	34.72	34.17	33.80
14:09	32.81	32.06	35.54	31.15	178.95	36.73	36.14	35.43	34.75	34.20	33.84
14:12	32.83	32.04	35.49	31.16	175.25	36.68	36.12	35.43	34.77	34.23	33.87
14:15	32.86	32.10	35.47	31.18	177.36	36.63	36.10	35.44	34.79	34.25	33.90
14:18	32.88	32.06	35.44	31.21	173.82	36.62	36.08	35.44	34.80	34.28	33.93
14:21	32.90	32.00	35.36	31.24	171.48	36.58	36.06	35.44	34.82	34.31	33.96
14:24	32.92	31.97	35.30	31.25	170.18	36.53	36.05	35.44	34.84	34.33	33.99
14:27	32.94	31.92	35.22	31.27	167.72	36.49	36.03	35.44	34.85	34.36	34.01
14:30	32.95	31.92	35.14	31.27	165.91	36.44	36.01	35.44	34.87	34.38	34.04

14:33	32.97	31.89	35.10	31.27	168.98	36.40	35.99	35.44	34.88	34.40	34.06
14:36	32.99	31.94	35.07	31.28	168.59	36.38	35.97	35.44	34.89	34.42	34.09
14:39	33.00	31.94	35.06	31.30	165.89	36.37	35.95	35.44	34.91	34.44	34.11
14:42	33.02	31.86	34.98	31.32	156.96	36.35	35.93	35.43	34.92	34.46	34.13
14:45	33.03	31.79	34.93	31.34	159.25	36.26	35.92	35.43	34.93	34.48	34.15
14:48	33.04	31.81	34.88	31.36	157.02	36.22	35.90	35.43	34.94	34.50	34.17
14:51	33.06	31.80	34.83	31.38	154.12	36.18	35.87	35.42	34.94	34.52	34.19
14:54	33.07	31.85	34.81	31.38	154.63	36.13	35.85	35.42	34.95	34.53	34.21
14:57	33.08	31.86	34.81	31.40	151.75	36.12	35.83	35.41	34.96	34.55	34.22
15:00	33.09	31.90	34.82	31.42	148.76	36.09	35.81	35.41	34.97	34.56	34.24
15:03	33.10	31.95	34.90	31.45	146.74	36.05	35.79	35.40	34.97	34.57	34.26
15:06	33.12	31.95	34.90	31.47	144.57	36.03	35.77	35.40	34.98	34.59	34.27
15:09	33.12	31.90	34.87	31.48	142.34	36.00	35.75	35.39	34.98	34.60	34.29
15:12	33.13	31.89	34.83	31.50	137.25	35.96	35.73	35.38	34.98	34.61	34.30
15:15	33.14	31.88	34.80	31.52	134.94	35.90	35.71	35.38	34.99	34.62	34.31
15:18	33.15	31.86	34.76	31.53	127.82	35.85	35.69	35.37	34.99	34.63	34.32
15:21	33.16	31.85	34.72	31.56	127.72	35.77	35.67	35.36	34.99	34.64	34.34
15:24	33.16	31.88	34.65	31.57	126.49	35.72	35.63	35.35	34.99	34.65	34.35
15:27	33.17	31.84	34.59	31.58	124.69	35.68	35.60	35.34	35.00	34.65	34.36
15:30	33.17	31.78	34.51	31.57	121.49	35.64	35.57	35.33	35.00	34.66	34.37
15:33	33.18	31.66	34.43	31.57	122.69	35.58	35.55	35.31	35.00	34.67	34.38
15:36	33.18	31.60	34.43	31.59	118.13	35.52	35.51	35.30	34.99	34.67	34.38
15:39	33.19	31.45	34.34	31.59	117.60	35.44	35.48	35.29	34.99	34.68	34.39
15:42	33.19	31.45	34.24	31.58	114.35	35.36	35.45	35.27	34.99	34.68	34.40
15:45	33.19	31.48	34.23	31.60	113.18	35.29	35.41	35.25	34.98	34.69	34.40
15:48	33.20	31.51	34.22	31.60	112.00	35.25	35.37	35.24	34.98	34.69	34.41
15:51	33.20	31.52	34.19	31.63	110.35	35.21	35.33	35.22	34.97	34.69	34.41
15:54	33.20	31.53	34.13	31.64	105.89	35.17	35.29	35.20	34.97	34.69	34.41
15:57	33.21	31.44	34.10	31.66	99.36	35.12	35.26	35.18	34.96	34.69	34.42
16:00	33.21	31.42	34.08	31.66	100.35	35.02	35.22	35.15	34.95	34.69	34.42
16:03	33.21	31.36	34.03	31.67	100.16	34.97	35.18	35.13	34.94	34.69	34.42
16:06	33.21	31.41	34.03	31.69	92.56	34.92	35.14	35.11	34.93	34.69	34.42
16:09	33.21	31.47	34.03	31.70	94.77	34.84	35.10	35.09	34.92	34.68	34.42

16:12	33.21	31.39	33.97	31.70	94.92	34.82	35.06	35.06	34.91	34.68	34.42
16:15	33.21	31.41	33.95	31.71	92.66	34.78	35.02	35.04	34.90	34.68	34.42
16:18	33.21	31.36	33.89	31.71	89.25	34.74	34.99	35.02	34.89	34.67	34.42
16:21	33.21	31.29	33.83	31.71	90.83	34.68	34.95	34.99	34.87	34.67	34.42
16:24	33.21	31.34	33.81	31.71	89.18	34.63	34.92	34.97	34.86	34.66	34.42
16:27	33.20	31.31	33.76	31.71	86.39	34.60	34.88	34.94	34.85	34.65	34.41
16:30	33.20	31.25	33.70	31.70	81.70	34.55	34.85	34.92	34.83	34.65	34.41
16:33	33.19	31.27	33.70	31.72	80.51	34.47	34.81	34.89	34.82	34.64	34.40
16:36	33.19	31.35	33.68	31.72	78.15	34.42	34.77	34.87	34.80	34.63	34.39
16:39	33.18	31.26	33.63	31.73	76.60	34.39	34.73	34.84	34.78	34.62	34.39
16:42	33.18	31.28	33.60	31.73	76.73	34.33	34.70	34.82	34.77	34.61	34.38
16:45	33.18	31.26	33.56	31.73	74.92	34.30	34.66	34.79	34.75	34.60	34.37
16:48	33.17	31.15	33.45	31.73	71.03	34.25	34.62	34.76	34.73	34.59	34.36
16:51	33.16	31.14	33.42	31.72	72.37	34.17	34.59	34.74	34.71	34.57	34.35
16:54	33.16	31.01	33.39	31.73	71.36	34.13	34.55	34.71	34.70	34.56	34.34
16:57	33.15	30.90	33.32	31.72	68.99	34.07	34.51	34.68	34.68	34.55	34.33
17:00	33.14	30.85	33.26	31.72	66.05	33.99	34.47	34.65	34.66	34.54	34.32
17:03	33.14	30.79	33.20	31.72	63.06	33.91	34.42	34.63	34.64	34.52	34.31
17:06	33.13	30.80	33.18	31.71	62.74	33.83	34.37	34.60	34.62	34.51	34.30
17:09	33.12	30.78	33.14	31.72	63.92	33.77	34.32	34.57	34.60	34.49	34.29
17:12	33.11	30.68	33.07	31.73	60.73	33.73	34.27	34.53	34.58	34.48	34.28
17:15	33.10	30.59	33.00	31.71	58.72	33.66	34.23	34.50	34.55	34.46	34.26
17:18	33.09	30.58	32.95	31.72	54.73	33.58	34.18	34.47	34.53	34.45	34.25
17:21	33.09	30.53	32.92	31.71	54.85	33.50	34.13	34.43	34.51	34.43	34.23
17:24	33.07	30.45	32.82	31.70	54.55	33.43	34.08	34.40	34.48	34.41	34.22
17:27	33.06	30.34	32.73	31.69	53.54	33.37	34.03	34.36	34.46	34.39	34.20
17:30	33.05	30.37	32.70	31.67	55.02	33.29	33.98	34.33	34.43	34.37	34.19
17:33	33.04	30.25	32.62	31.66	53.03	33.25	33.93	34.29	34.41	34.35	34.17
17:36	33.03	30.18	32.55	31.64	52.45	33.18	33.88	34.25	34.38	34.33	34.15
17:39	33.01	30.07	32.47	31.64	49.64	33.12	33.83	34.21	34.35	34.31	34.14
17:42	33.00	29.99	32.39	31.62	49.25	33.03	33.78	34.18	34.33	34.29	34.12
17:45	32.99	29.88	32.32	31.61	47.81	32.95	33.72	34.14	34.30	34.27	34.10
17:48	32.97	29.73	32.22	31.59	47.64	32.87	33.67	34.10	34.27	34.25	34.08

17:51	32.96	29.65	32.14	31.56	45.80	32.78	33.61	34.06	34.24	34.22	34.06
17:54	32.94	29.55	32.05	31.54	45.73	32.69	33.55	34.02	34.21	34.20	34.03
17:57	32.92	29.47	31.98	31.52	45.18	32.61	33.49	33.97	34.18	34.18	34.01
18:00	32.91	29.41	31.95	31.52	44.09	32.53	33.43	33.93	34.15	34.15	33.99
18:03	32.89	29.32	31.88	31.51	44.87	32.45	33.37	33.89	34.11	34.12	33.97
18:06	32.87	29.26	31.80	31.49	42.51	32.38	33.31	33.84	34.08	34.10	33.94
18:09	32.85	29.25	31.75	31.47	42.08	32.30	33.25	33.79	34.05	34.07	33.92
18:12	32.83	29.17	31.71	31.49	40.10	32.24	33.18	33.75	34.01	34.04	33.89
18:15	32.81	29.15	31.63	31.46	39.44	32.16	33.13	33.70	33.98	34.02	33.87
18:18	32.79	29.07	31.57	31.43	37.26	32.10	33.07	33.65	33.94	33.99	33.84
18:21	32.77	29.00	31.51	31.39	37.49	32.02	33.01	33.61	33.90	33.96	33.82
18:24	32.75	28.96	31.44	31.38	36.26	31.95	32.95	33.56	33.86	33.93	33.79
18:27	32.73	28.93	31.39	31.35	33.92	31.89	32.89	33.51	33.83	33.90	33.76
18:30	32.70	28.87	31.33	31.33	33.65	31.81	32.83	33.46	33.79	33.86	33.73
18:33	32.68	28.82	31.26	31.32	32.89	31.75	32.77	33.42	33.75	33.83	33.70
18:36	32.66	28.80	31.20	31.27	31.40	31.68	32.71	33.37	33.71	33.80	33.67
18:39	32.63	28.73	31.13	31.24	29.84	31.62	32.65	33.32	33.67	33.77	33.64
18:42	32.60	28.62	31.04	31.23	29.99	31.55	32.60	33.27	33.63	33.73	33.61
18:45	32.58	28.56	30.97	31.21	28.18	31.47	32.54	33.22	33.59	33.70	33.58
18:48	32.56	28.48	30.90	31.19	27.16	31.39	32.48	33.17	33.55	33.66	33.54
18:51	32.53	28.42	30.84	31.17	26.52	31.32	32.42	33.12	33.51	33.63	33.51
18:54	32.50	28.36	30.76	31.14	24.52	31.24	32.36	33.07	33.47	33.59	33.48
18:57	32.48	28.28	30.69	31.13	23.21	31.16	32.30	33.02	33.43	33.55	33.44
19:00	32.45	28.24	30.64	31.12	23.28	31.08	32.23	32.97	33.38	33.52	33.41
19:03	32.42	28.16	30.56	31.10	23.18	31.02	32.17	32.92	33.34	33.48	33.37
19:06	32.40	28.06	30.49	31.06	21.94	30.95	32.11	32.87	33.30	33.44	33.34
19:09	32.37	28.00	30.42	31.04	21.01	30.87	32.05	32.82	33.25	33.40	33.30
19:12	32.34	27.94	30.33	31.00	19.36	30.79	31.98	32.77	33.21	33.36	33.27
19:15	32.30	27.89	30.27	30.95	18.64	30.71	31.92	32.71	33.16	33.33	33.23
19:18	32.27	27.85	30.21	30.92	18.82	30.64	31.86	32.66	33.12	33.29	33.19
19:21	32.24	27.82	30.15	30.89	18.66	30.58	31.79	32.61	33.07	33.25	33.15
19:24	32.21	27.79	30.10	30.87	17.89	30.52	31.73	32.55	33.03	33.20	33.12
19:27	32.18	27.75	30.05	30.83	17.44	30.46	31.67	32.50	32.98	33.16	33.08

19:30	32.15	27.72	30.01	30.79	16.74	30.40	31.61	32.45	32.93	33.12	33.04
19:33	32.12	27.70	29.98	30.79	0.00	30.35	31.55	32.39	32.89	33.08	33.00
19:36	32.09	27.68	29.94	30.77	0.00	30.20	31.50	32.34	32.84	33.04	32.96
19:39	32.06	27.68	29.91	30.74	0.00	30.10	31.43	32.29	32.79	32.99	32.92
19:42	32.02	27.63	29.87	30.72	0.00	30.03	31.35	32.23	32.75	32.95	32.88
19:45	31.99	27.57	29.83	30.68	0.00	29.97	31.29	32.18	32.70	32.91	32.84
19:48	31.96	27.55	29.80	30.67	0.00	29.90	31.22	32.12	32.65	32.86	32.79
19:51	31.92	27.52	29.77	30.63	0.00	29.85	31.15	32.06	32.60	32.82	32.75
19:54	31.89	27.50	29.73	30.60	0.00	29.79	31.09	32.00	32.55	32.78	32.71
19:57	31.86	27.48	29.70	30.60	0.00	29.74	31.03	31.95	32.50	32.73	32.67
20:00	31.82	27.44	29.68	30.57	0.00	29.70	30.97	31.89	32.45	32.69	32.63
20:03	31.79	27.41	29.65	30.54	0.00	29.65	30.92	31.84	32.40	32.64	32.58
20:06	31.76	27.39	29.62	30.52	0.00	29.60	30.86	31.78	32.35	32.59	32.54
20:09	31.72	27.37	29.58	30.49	0.00	29.56	30.81	31.73	32.30	32.55	32.50
20:12	31.69	27.35	29.55	30.46	0.00	29.51	30.76	31.67	32.25	32.50	32.45
20:15	31.65	27.33	29.51	30.42	0.00	29.47	30.71	31.62	32.20	32.46	32.41
20:18	31.62	27.30	29.46	30.38	0.00	29.43	30.66	31.57	32.15	32.41	32.36
20:21	31.59	27.25	29.42	30.36	0.00	29.39	30.61	31.52	32.10	32.36	32.32
20:24	31.55	27.22	29.38	30.35	0.00	29.35	30.56	31.47	32.05	32.31	32.27
20:27	31.52	27.21	29.36	30.31	0.00	29.30	30.51	31.42	32.00	32.27	32.23
20:30	31.48	27.11	29.33	30.29	0.00	29.27	30.47	31.37	31.95	32.22	32.18
20:33	31.45	27.07	29.29	30.29	0.00	29.21	30.42	31.32	31.90	32.17	32.14
20:36	31.42	27.07	29.27	30.27	0.00	29.16	30.37	31.27	31.85	32.13	32.10
20:39	31.38	27.06	29.24	30.23	0.00	29.13	30.32	31.22	31.81	32.08	32.05
20:42	31.35	27.02	29.20	30.19	0.00	29.09	30.28	31.17	31.76	32.03	32.01
20:45	31.32	26.98	29.17	30.19	0.00	29.05	30.23	31.12	31.71	31.99	31.96
20:48	31.29	26.96	29.15	30.18	0.00	29.01	30.19	31.08	31.66	31.94	31.92
20:51	31.25	26.94	29.12	30.16	0.00	28.97	30.14	31.03	31.61	31.89	31.87
20:54	31.22	26.91	29.08	30.12	0.00	28.93	30.10	30.98	31.57	31.85	31.83
20:57	31.19	26.90	29.05	30.09	0.00	28.89	30.05	30.94	31.52	31.80	31.78
21:00	31.15	26.86	29.02	30.05	0.00	28.86	30.01	30.89	31.47	31.75	31.74
21:03	31.12	26.88	28.99	30.03	0.00	28.82	29.97	30.84	31.43	31.71	31.69
21:06	31.09	26.84	28.96	30.00	0.00	28.79	29.93	30.80	31.38	31.66	31.65

21:09	31.05	26.80	28.92	29.97	0.00	28.76	29.89	30.75	31.33	31.62	31.60
21:12	31.02	26.79	28.88	29.94	0.00	28.72	29.85	30.71	31.29	31.57	31.56
21:15	30.99	26.75	28.85	29.90	0.00	28.69	29.81	30.66	31.24	31.52	31.51
21:18	30.95	26.74	28.82	29.88	0.00	28.65	29.76	30.62	31.20	31.48	31.47
21:21	30.92	26.70	28.80	29.88	0.00	28.62	29.73	30.58	31.15	31.43	31.43
21:24	30.89	26.66	28.78	29.86	0.00	28.58	29.69	30.53	31.11	31.39	31.38
21:27	30.86	26.63	28.74	29.84	0.00	28.55	29.65	30.49	31.06	31.34	31.34
21:30	30.83	26.62	28.72	29.81	0.00	28.51	29.61	30.45	31.02	31.30	31.30
21:33	30.80	26.59	28.70	29.79	0.00	28.48	29.57	30.41	30.97	31.25	31.25
21:36	30.76	26.56	28.67	29.78	0.00	28.44	29.53	30.36	30.93	31.21	31.21
21:39	30.73	26.53	28.64	29.74	0.00	28.41	29.49	30.32	30.88	31.17	31.17
21:42	30.70	26.51	28.62	29.73	0.00	28.37	29.45	30.28	30.84	31.12	31.13
21:45	30.67	26.50	28.59	29.72	0.00	28.34	29.41	30.24	30.80	31.08	31.08
21:48	30.64	26.48	28.57	29.69	0.00	28.31	29.37	30.20	30.75	31.04	31.04
21:51	30.61	26.46	28.54	29.66	0.00	28.28	29.34	30.16	30.71	30.99	31.00
21:54	30.58	26.45	28.52	29.63	0.00	28.25	29.30	30.11	30.67	30.95	30.96
21:57	30.55	26.43	28.49	29.62	0.00	28.22	29.26	30.07	30.63	30.91	30.92
22:00	30.51	26.42	28.47	29.59	0.00	28.19	29.23	30.03	30.59	30.87	30.88
22:03	30.48	26.41	28.43	29.55	0.00	28.16	29.19	29.99	30.54	30.82	30.83
22:06	30.45	26.42	28.38	29.49	0.00	28.13	29.16	29.95	30.50	30.78	30.79
22:09	30.42	26.39	28.34	29.48	0.00	28.11	29.12	29.92	30.46	30.74	30.75
22:12	30.39	26.37	28.31	29.46	0.00	28.09	29.09	29.88	30.42	30.70	30.71
22:15	30.36	26.34	28.29	29.44	0.00	28.06	29.06	29.84	30.38	30.66	30.67
22:18	30.33	26.30	28.27	29.44	0.00	28.03	29.02	29.80	30.34	30.62	30.63
22:21	30.30	26.28	28.23	29.40	0.00	28.00	28.99	29.76	30.30	30.57	30.59
22:24	30.27	26.25	28.19	29.37	0.00	27.96	28.96	29.73	30.26	30.53	30.55
22:27	30.24	26.25	28.17	29.34	0.00	27.93	28.92	29.69	30.22	30.49	30.51
22:30	30.21	26.25	28.14	29.31	0.00	27.91	28.89	29.65	30.18	30.45	30.47
22:33	30.18	26.22	28.12	29.30	0.00	27.88	28.85	29.62	30.14	30.41	30.43
22:36	30.15	26.21	28.10	29.28	0.00	27.86	28.82	29.58	30.10	30.37	30.39
22:39	30.12	26.17	28.07	29.27	0.00	27.83	28.79	29.54	30.06	30.33	30.35
22:42	30.09	26.15	28.06	29.26	0.00	27.80	28.76	29.51	30.02	30.30	30.32
22:45	30.06	26.14	28.05	29.23	0.00	27.77	28.72	29.47	29.99	30.26	30.28

22:48	30.03	26.15	28.03	29.21	0.00	27.75	28.69	29.43	29.95	30.22	30.24
22:51	30.00	26.16	28.01	29.18	0.00	27.72	28.66	29.40	29.91	30.18	30.20
22:54	29.97	26.15	27.98	29.15	0.00	27.70	28.63	29.36	29.87	30.14	30.17
22:57	29.94	26.12	27.97	29.14	0.00	27.68	28.60	29.33	29.84	30.10	30.13
23:00	29.91	26.09	27.94	29.11	0.00	27.66	28.57	29.29	29.80	30.07	30.09
23:03	29.89	26.08	27.91	29.07	0.00	27.63	28.54	29.26	29.76	30.03	30.05
23:06	29.86	26.07	27.89	29.04	0.00	27.61	28.51	29.23	29.73	29.99	30.02
23:09	29.83	26.04	27.88	29.04	0.00	27.58	28.48	29.19	29.69	29.95	29.98
23:12	29.80	26.05	27.85	29.03	0.00	27.56	28.45	29.16	29.65	29.92	29.94
23:15	29.77	26.00	27.83	29.01	0.00	27.54	28.42	29.13	29.62	29.88	29.91
23:18	29.74	26.00	27.80	28.99	0.00	27.51	28.40	29.09	29.58	29.84	29.87
23:21	29.72	25.98	27.78	28.96	0.00	27.49	28.37	29.06	29.55	29.81	29.84
23:24	29.69	25.96	27.76	28.94	0.00	27.46	28.34	29.03	29.51	29.77	29.80
23:27	29.66	25.94	27.74	28.93	0.00	27.44	28.31	29.00	29.48	29.74	29.77
23:30	29.63	25.91	27.72	28.92	0.00	27.41	28.28	28.96	29.44	29.70	29.73
23:33	29.61	25.89	27.71	28.92	0.00	27.38	28.25	28.93	29.41	29.67	29.70
23:36	29.58	25.88	27.68	28.88	0.00	27.36	28.22	28.90	29.38	29.63	29.67
23:39	29.55	25.85	27.65	28.87	0.00	27.33	28.19	28.87	29.34	29.60	29.63
23:42	29.53	25.86	27.63	28.85	0.00	27.31	28.17	28.84	29.31	29.56	29.60
23:45	29.50	25.83	27.61	28.83	0.00	27.29	28.14	28.81	29.27	29.53	29.57
23:48	29.47	25.81	27.58	28.79	0.00	27.26	28.11	28.78	29.24	29.50	29.53
23:51	29.45	25.80	27.56	28.77	0.00	27.24	28.08	28.74	29.21	29.46	29.50
23:54	29.42	25.81	27.54	28.75	0.00	27.22	28.05	28.71	29.18	29.43	29.47
23:57	29.39	25.81	27.52	28.73	0.00	27.20	28.03	28.68	29.14	29.39	29.43

APPENDIX D4

Time	Observed Temperature (^{0}C) Inner Surface P1 (In)	Outer Surface P1 (Out)	Inner Air	Temperature Predicted, ^{0}C (Finite Difference Method) Node (N) 0	20	40	60	80	100
00:00	29.55	27.71	28.80	27.71	28.08	28.45	28.82	29.18	29.55
00:03	29.52	27.69	28.79	27.69	28.08	28.45	28.82	29.18	29.41
00:06	29.50	27.66	28.76	27.66	28.08	28.45	28.82	29.16	29.32
00:09	29.47	27.64	28.74	27.64	28.07	28.45	28.81	29.13	29.26
00:12	29.44	27.62	28.72	27.62	28.06	28.45	28.80	29.10	29.20
00:15	29.42	27.60	28.70	27.60	28.05	28.44	28.80	29.07	29.16
00:18	29.39	27.57	28.68	27.57	28.04	28.44	28.78	29.04	29.12
00:21	29.37	27.55	28.67	27.55	28.03	28.43	28.77	29.01	29.08
00:24	29.34	27.54	28.65	27.54	28.02	28.42	28.75	28.99	29.05
00:27	29.32	27.52	28.63	27.52	28.01	28.41	28.74	28.96	29.02
00:30	29.29	27.49	28.61	27.49	27.99	28.40	28.72	28.93	28.99
00:33	29.27	27.47	28.59	27.47	27.98	28.39	28.70	28.91	28.96
00:36	29.24	27.45	28.57	27.45	27.96	28.37	28.69	28.89	28.93
00:39	29.22	27.43	28.54	27.43	27.95	28.36	28.67	28.86	28.91
00:42	29.19	27.41	28.52	27.41	27.93	28.34	28.65	28.84	28.88
00:45	29.17	27.41	28.50	27.41	27.91	28.33	28.63	28.82	28.86
00:48	29.14	27.38	28.49	27.38	27.90	28.31	28.61	28.79	28.84
00:51	29.12	27.38	28.48	27.38	27.88	28.29	28.59	28.77	28.81
00:54	29.09	27.35	28.46	27.35	27.87	28.28	28.58	28.75	28.79
00:57	29.07	27.33	28.43	27.33	27.85	28.26	28.56	28.73	28.77
01:00	29.04	27.31	28.41	27.31	27.83	28.24	28.54	28.71	28.75
01:03	29.02	27.30	28.38	27.30	27.81	28.22	28.52	28.69	28.72
01:06	28.99	27.26	28.36	27.26	27.80	28.21	28.50	28.67	28.70
01:09	28.97	27.24	28.35	27.24	27.78	28.19	28.48	28.65	28.68
01:12	28.94	27.22	28.33	27.22	27.76	28.17	28.46	28.63	28.66
01:15	28.92	27.20	28.31	27.20	27.74	28.15	28.44	28.61	28.64
01:18	28.90	27.18	28.30	27.18	27.72	28.13	28.42	28.59	28.62

01:21	28.88	27.16	28.30	27.16	27.70	28.11	28.40	28.57	28.60
01:24	28.85	27.16	28.27	27.16	27.68	28.09	28.38	28.55	28.58
01:27	28.83	27.13	28.25	27.13	27.66	28.07	28.36	28.53	28.56
01:30	28.81	27.11	28.23	27.11	27.64	28.06	28.34	28.51	28.54
01:33	28.78	27.09	28.21	27.09	27.63	28.04	28.32	28.49	28.52
01:36	28.76	27.07	28.19	27.07	27.61	28.02	28.30	28.47	28.50
01:39	28.74	27.05	28.17	27.05	27.59	28.00	28.29	28.45	28.48
01:42	28.71	27.03	28.16	27.03	27.57	27.98	28.27	28.43	28.46
01:45	28.69	27.01	28.13	27.01	27.55	27.96	28.25	28.41	28.44
01:48	28.67	26.99	28.12	26.99	27.53	27.94	28.23	28.39	28.42
01:51	28.65	26.98	28.10	26.98	27.51	27.92	28.21	28.37	28.40
01:54	28.62	26.95	28.08	26.95	27.49	27.90	28.19	28.35	28.38
01:57	28.60	26.93	28.06	26.93	27.47	27.88	28.17	28.33	28.36
02:00	28.58	26.92	28.05	26.92	27.45	27.86	28.15	28.31	28.34
02:03	28.56	26.90	28.03	26.90	27.43	27.84	28.13	28.29	28.32
02:06	28.53	26.87	28.01	26.87	27.41	27.82	28.11	28.27	28.30
02:09	28.51	26.86	27.99	26.86	27.39	27.80	28.09	28.25	28.29
02:12	28.49	26.84	27.98	26.84	27.37	27.78	28.07	28.23	28.27
02:15	28.47	26.82	27.97	26.82	27.35	27.77	28.05	28.21	28.25
02:18	28.45	26.80	27.94	26.80	27.34	27.75	28.03	28.19	28.23
02:21	28.42	26.78	27.92	26.78	27.32	27.73	28.01	28.17	28.21
02:24	28.40	26.76	27.90	26.76	27.30	27.71	27.99	28.15	28.19
02:27	28.38	26.75	27.89	26.75	27.28	27.69	27.97	28.13	28.17
02:30	28.36	26.73	27.88	26.73	27.26	27.67	27.95	28.11	28.15
02:33	28.34	26.70	27.86	26.70	27.24	27.65	27.93	28.10	28.13
02:36	28.32	26.69	27.85	26.69	27.22	27.63	27.92	28.08	28.11
02:39	28.30	26.68	27.82	26.68	27.20	27.61	27.90	28.06	28.09
02:42	28.27	26.67	27.80	26.67	27.18	27.59	27.88	28.04	28.07
02:45	28.25	26.64	27.79	26.64	27.17	27.57	27.86	28.02	28.05
02:48	28.23	26.62	27.77	26.62	27.15	27.55	27.84	28.00	28.04
02:51	28.21	26.60	27.76	26.60	27.13	27.54	27.82	27.98	28.02
02:54	28.19	26.58	27.75	26.58	27.11	27.52	27.80	27.96	28.00
02:57	28.17	26.57	27.73	26.57	27.09	27.50	27.78	27.94	27.98

03:00	28.15	26.55	27.72	26.55	27.07	27.48	27.76	27.92	27.96
03:03	28.13	26.53	27.70	26.53	27.05	27.46	27.74	27.90	27.94
03:06	28.11	26.51	27.68	26.51	27.04	27.44	27.72	27.88	27.92
03:09	28.09	26.50	27.66	26.50	27.02	27.42	27.70	27.87	27.90
03:12	28.07	26.48	27.65	26.48	27.00	27.40	27.69	27.85	27.88
03:15	28.05	26.47	27.63	26.47	26.98	27.38	27.67	27.83	27.87
03:18	28.03	26.45	27.61	26.45	26.97	27.37	27.65	27.81	27.85
03:21	28.01	26.44	27.60	26.44	26.95	27.35	27.63	27.79	27.83
03:24	27.99	26.42	27.58	26.42	26.93	27.33	27.61	27.77	27.81
03:27	27.97	26.40	27.56	26.40	26.91	27.31	27.59	27.75	27.79
03:30	27.95	26.39	27.55	26.39	26.90	27.29	27.57	27.73	27.77
03:33	27.93	26.37	27.53	26.37	26.88	27.27	27.55	27.71	27.75
03:36	27.91	26.36	27.51	26.36	26.86	27.26	27.54	27.70	27.73
03:39	27.89	26.33	27.50	26.33	26.85	27.24	27.52	27.68	27.72
03:42	27.87	26.33	27.48	26.33	26.83	27.22	27.50	27.66	27.70
03:45	27.85	26.29	27.47	26.29	26.81	27.20	27.48	27.64	27.68
03:48	27.83	26.27	27.44	26.27	26.79	27.18	27.46	27.62	27.66
03:51	27.81	26.26	27.43	26.26	26.77	27.17	27.44	27.60	27.64
03:54	27.79	26.24	27.41	26.24	26.75	27.15	27.43	27.58	27.62
03:57	27.77	26.23	27.40	26.23	26.73	27.13	27.41	27.57	27.60
04:00	27.75	26.21	27.38	26.21	26.72	27.11	27.39	27.55	27.59
04:03	27.73	26.19	27.37	26.19	26.70	27.09	27.37	27.53	27.57
04:06	27.71	26.17	27.34	26.17	26.68	27.08	27.35	27.51	27.55
04:09	27.69	26.15	27.33	26.15	26.66	27.06	27.33	27.49	27.53
04:12	27.67	26.13	27.31	26.13	26.64	27.04	27.32	27.47	27.51
04:15	27.66	26.13	27.30	26.13	26.63	27.02	27.30	27.45	27.49
04:18	27.64	26.11	27.29	26.11	26.61	27.00	27.28	27.44	27.48
04:21	27.62	26.10	27.27	26.10	26.59	26.98	27.26	27.42	27.46
04:24	27.60	26.08	27.26	26.08	26.58	26.97	27.24	27.40	27.44
04:27	27.58	26.07	27.24	26.07	26.56	26.95	27.22	27.38	27.42
04:30	27.56	26.05	27.23	26.05	26.55	26.93	27.21	27.36	27.40
04:33	27.54	26.03	27.22	26.03	26.53	26.91	27.19	27.35	27.39
04:36	27.53	26.02	27.21	26.02	26.51	26.90	27.17	27.33	27.37

04:39	27.51	26.00	27.19	26.00	26.49	26.88	27.15	27.31	27.35
04:42	27.49	25.98	27.16	25.98	26.48	26.86	27.13	27.29	27.33
04:45	27.47	25.96	27.15	25.96	26.46	26.84	27.12	27.27	27.32
04:48	27.45	25.94	27.13	25.94	26.44	26.83	27.10	27.26	27.30
04:51	27.43	25.93	27.13	25.93	26.42	26.81	27.08	27.24	27.28
04:54	27.42	25.92	27.11	25.92	26.41	26.79	27.06	27.22	27.26
04:57	27.40	25.91	27.09	25.91	26.39	26.77	27.05	27.20	27.24
05:00	27.38	25.89	27.08	25.89	26.37	26.76	27.03	27.18	27.23
05:03	27.36	25.88	27.06	25.88	26.36	26.74	27.01	27.17	27.21
05:06	27.34	25.87	27.04	25.87	26.34	26.72	26.99	27.15	27.19
05:09	27.33	25.86	27.03	25.86	26.33	26.71	26.97	27.13	27.17
05:12	27.31	25.84	27.02	25.84	26.31	26.69	26.96	27.11	27.16
05:15	27.29	25.83	27.01	25.83	26.30	26.67	26.94	27.10	27.14
05:18	27.27	25.81	26.99	25.81	26.28	26.66	26.92	27.08	27.12
05:21	27.26	25.80	26.98	25.80	26.27	26.64	26.91	27.06	27.10
05:24	27.24	25.79	26.97	25.79	26.25	26.62	26.89	27.04	27.09
05:27	27.22	25.76	26.95	25.76	26.24	26.61	26.87	27.03	27.07
05:30	27.20	25.75	26.93	25.75	26.22	26.59	26.85	27.01	27.05
05:33	27.19	25.74	26.92	25.74	26.21	26.57	26.84	26.99	27.04
05:36	27.17	25.72	26.90	25.72	26.19	26.56	26.82	26.97	27.02
05:39	27.15	25.71	26.89	25.71	26.18	26.54	26.80	26.96	27.00
05:42	27.14	25.70	26.88	25.70	26.16	26.53	26.79	26.94	26.98
05:45	27.12	25.68	26.87	25.68	26.14	26.51	26.77	26.92	26.97
05:48	27.10	25.67	26.86	25.67	26.13	26.49	26.75	26.91	26.95
05:51	27.08	25.66	26.84	25.66	26.11	26.48	26.74	26.89	26.93
05:54	27.07	25.65	26.83	25.65	26.10	26.46	26.72	26.87	26.92
05:57	27.05	25.64	26.81	25.64	26.09	26.45	26.70	26.86	26.90
06:00	27.03	25.63	26.79	25.63	26.07	26.43	26.69	26.84	26.88
06:03	27.02	25.62	26.78	25.62	26.06	26.41	26.67	26.82	26.87
06:06	27.00	25.60	26.77	25.60	26.05	26.40	26.66	26.81	26.85
06:09	26.99	25.59	26.76	25.59	26.03	26.38	26.64	26.79	26.84
06:12	26.97	25.57	26.74	25.57	26.02	26.37	26.62	26.77	26.82
06:15	26.95	25.56	26.73	25.56	26.00	26.35	26.61	26.76	26.80

06:18	26.94	25.55	26.72	25.55	25.99	26.34	26.59	26.74	26.79
06:21	26.92	25.53	26.70	25.53	25.98	26.32	26.58	26.72	26.77
06:24	26.90	25.52	26.69	25.52	25.96	26.31	26.56	26.71	26.75
06:27	26.89	25.51	26.67	25.51	25.95	26.29	26.54	26.69	26.74
06:30	26.87	25.50	26.66	25.50	25.93	26.28	26.53	26.68	26.72
06:33	26.86	25.48	26.65	25.48	25.92	26.26	26.51	26.66	26.71
06:36	26.84	25.47	26.64	25.47	25.90	26.25	26.50	26.64	26.69
06:39	26.82	25.46	26.63	25.46	25.89	26.23	26.48	26.63	26.67
06:42	26.81	25.45	26.61	25.45	25.88	26.22	26.47	26.61	26.66
06:45	26.79	25.44	26.60	25.44	25.86	26.20	26.45	26.60	26.64
06:48	26.78	25.42	26.59	25.42	25.85	26.19	26.44	26.58	26.63
06:51	26.76	25.41	26.58	25.41	25.84	26.18	26.42	26.57	26.61
06:54	26.75	25.41	26.57	25.41	25.82	26.16	26.40	26.55	26.60
06:57	26.73	25.40	26.55	25.40	25.81	26.15	26.39	26.54	26.58
07:00	26.72	25.39	26.54	25.39	25.80	26.13	26.37	26.52	26.57
07:03	26.70	25.39	26.53	25.39	25.79	26.12	26.36	26.50	26.55
07:06	26.69	25.39	26.52	25.39	25.78	26.10	26.34	26.49	26.54
07:09	26.67	25.39	26.51	25.39	25.77	26.09	26.33	26.47	26.52
07:12	26.66	25.41	26.50	25.41	25.76	26.08	26.32	26.46	26.51
07:15	26.64	25.43	26.49	25.43	25.75	26.07	26.30	26.44	26.49
07:18	26.63	25.48	26.47	25.48	25.75	26.05	26.29	26.43	26.48
07:21	26.61	25.54	26.46	25.54	25.76	26.04	26.27	26.41	26.46
07:24	26.60	25.60	26.45	25.60	25.77	26.03	26.26	26.40	26.45
07:27	26.58	25.64	26.45	25.64	25.78	26.03	26.25	26.39	26.43
07:30	26.57	25.74	26.44	25.74	25.80	26.02	26.23	26.37	26.42
07:33	26.56	25.89	26.43	25.89	25.82	26.02	26.22	26.36	26.40
07:36	26.54	26.04	26.43	26.04	25.87	26.02	26.21	26.34	26.39
07:39	26.53	26.20	26.42	26.20	25.92	26.03	26.20	26.33	26.38
07:42	26.52	26.35	26.42	26.35	25.98	26.04	26.20	26.32	26.36
07:45	26.51	26.52	26.41	26.52	26.04	26.05	26.19	26.31	26.35
07:48	26.49	26.75	26.41	26.75	26.12	26.07	26.19	26.29	26.34
07:51	26.48	27.00	26.41	27.00	26.21	26.10	26.19	26.29	26.33
07:54	26.47	27.25	26.40	27.25	26.32	26.13	26.19	26.28	26.32

07:57	26.46	27.51	26.40	27.51	26.43	26.17	26.19	26.27	26.31
08:00	26.46	27.72	26.41	27.72	26.56	26.21	26.20	26.26	26.30
08:03	26.45	27.98	26.42	27.98	26.68	26.26	26.21	26.26	26.29
08:06	26.44	28.22	26.43	28.22	26.82	26.32	26.23	26.26	26.28
08:09	26.44	28.46	26.44	28.46	26.96	26.38	26.25	26.26	26.28
08:12	26.44	28.75	26.45	28.75	27.10	26.45	26.27	26.26	26.28
08:15	26.44	29.04	26.46	29.04	27.26	26.52	26.30	26.26	26.28
08:18	26.44	29.28	26.47	29.28	27.42	26.60	26.33	26.27	26.28
08:21	26.44	29.58	26.49	29.58	27.58	26.69	26.36	26.28	26.28
08:24	26.45	29.86	26.50	29.86	27.75	26.77	26.40	26.29	26.29
08:27	26.46	30.14	26.52	30.14	27.93	26.87	26.44	26.31	26.29
08:30	26.47	30.47	26.54	30.47	28.11	26.97	26.49	26.33	26.31
08:33	26.48	30.75	26.55	30.75	28.30	27.07	26.54	26.35	26.32
08:36	26.50	31.05	26.57	31.05	28.49	27.18	26.59	26.37	26.33
08:39	26.51	31.31	26.59	31.31	28.68	27.29	26.65	26.40	26.35
08:42	26.53	31.60	26.61	31.60	28.87	27.40	26.71	26.43	26.37
08:45	26.56	31.92	26.63	31.92	29.07	27.52	26.77	26.47	26.40
08:48	26.58	32.28	26.66	32.28	29.27	27.65	26.84	26.50	26.43
08:51	26.61	32.68	26.68	32.68	29.48	27.77	26.91	26.54	26.46
08:54	26.64	33.05	26.70	33.05	29.72	27.91	26.99	26.59	26.49
08:57	26.67	33.36	26.72	33.36	29.95	28.04	27.07	26.63	26.53
09:00	26.71	33.63	26.75	33.63	30.18	28.19	27.15	26.69	26.57
09:03	26.74	33.92	26.78	33.92	30.41	28.34	27.24	26.74	26.61
09:06	26.78	34.25	26.80	34.25	30.63	28.49	27.33	26.80	26.65
09:09	26.83	34.53	26.83	34.53	30.86	28.64	27.43	26.86	26.70
09:12	26.87	34.79	26.86	34.79	31.09	28.80	27.53	26.92	26.75
09:15	26.92	35.02	26.89	35.02	31.31	28.96	27.63	26.99	26.81
09:18	26.97	35.32	26.92	35.32	31.52	29.11	27.74	27.06	26.87
09:21	27.03	35.61	26.95	35.61	31.73	29.27	27.85	27.14	26.93
09:24	27.09	35.90	26.98	35.90	31.95	29.43	27.96	27.21	26.99
09:27	27.15	36.09	27.02	36.09	32.17	29.60	28.07	27.30	27.06
09:30	27.21	36.26	27.05	36.26	32.38	29.76	28.19	27.38	27.13
09:33	27.28	36.45	27.09	36.45	32.58	29.92	28.31	27.47	27.21

09:36	27.34	36.64	27.13	36.64	32.76	30.08	28.43	27.56	27.28
09:39	27.42	36.79	27.17	36.79	32.95	30.24	28.55	27.65	27.36
09:42	27.49	36.99	27.21	36.99	33.13	30.40	28.67	27.74	27.45
09:45	27.57	37.19	27.25	37.19	33.30	30.55	28.80	27.84	27.53
09:48	27.64	37.41	27.29	37.41	33.48	30.71	28.92	27.94	27.62
09:51	27.72	37.59	27.33	37.59	33.66	30.86	29.05	28.04	27.71
09:54	27.80	37.76	27.37	37.76	33.83	31.01	29.17	28.15	27.80
09:57	27.89	37.89	27.41	37.89	34.01	31.16	29.30	28.25	27.90
10:00	27.97	38.14	27.46	38.14	34.17	31.32	29.42	28.36	27.99
10:03	28.06	38.30	27.51	38.30	34.34	31.46	29.55	28.47	28.09
10:06	28.14	38.37	27.56	38.37	34.51	31.61	29.68	28.58	28.19
10:09	28.23	38.56	27.60	38.56	34.66	31.76	29.81	28.69	28.29
10:12	28.32	38.70	27.65	38.70	34.82	31.91	29.94	28.80	28.39
10:15	28.41	38.83	27.69	38.83	34.97	32.05	30.07	28.91	28.50
10:18	28.50	38.92	27.75	38.92	35.11	32.20	30.20	29.03	28.60
10:21	28.60	39.03	27.79	39.03	35.25	32.34	30.33	29.14	28.71
10:24	28.69	39.15	27.85	39.15	35.39	32.48	30.45	29.26	28.82
10:27	28.79	39.31	27.90	39.31	35.52	32.62	30.58	29.38	28.93
10:30	28.88	39.38	27.95	39.38	35.66	32.75	30.71	29.49	29.03
10:33	28.98	39.50	28.00	39.50	35.78	32.89	30.84	29.61	29.14
10:36	29.07	39.62	28.05	39.62	35.91	33.02	30.97	29.73	29.26
10:39	29.17	39.73	28.10	39.73	36.04	33.15	31.09	29.85	29.37
10:42	29.26	39.89	28.16	39.89	36.16	33.28	31.22	29.97	29.48
10:45	29.36	39.99	28.21	39.99	36.29	33.40	31.34	30.08	29.59
10:48	29.46	39.97	28.28	39.97	36.42	33.53	31.47	30.20	29.70
10:51	29.56	40.04	28.33	40.04	36.52	33.66	31.59	30.32	29.82
10:54	29.66	40.14	28.39	40.14	36.62	33.78	31.72	30.44	29.93
10:57	29.75	40.23	28.44	40.23	36.73	33.90	31.84	30.56	30.04
11:00	29.85	40.21	28.49	40.21	36.83	34.02	31.96	30.68	30.15
11:03	29.95	40.16	28.55	40.16	36.92	34.14	32.08	30.79	30.27
11:06	30.04	40.18	28.60	40.18	36.99	34.25	32.20	30.91	30.38
11:09	30.14	40.26	28.66	40.24	37.06	34.36	32.32	31.03	30.49
11:12	30.24	40.26	28.72	40.26	37.14	34.46	32.43	31.15	30.60

11:15	30.33	40.16	28.78	40.16	37.20	34.56	32.55	31.26	30.72
11:18	30.43	40.21	28.83	40.21	37.25	34.66	32.66	31.38	30.83
11:21	30.52	40.18	28.89	40.18	37.31	34.75	32.77	31.49	30.94
11:24	30.62	40.20	28.95	40.20	37.36	34.84	32.88	31.60	31.05
11:27	30.71	40.19	29.00	40.19	37.41	34.93	32.99	31.72	31.16
11:30	30.80	40.12	29.05	40.12	37.46	35.01	33.09	31.83	31.27
11:33	30.89	40.10	29.10	40.10	37.49	35.09	33.19	31.94	31.37
11:36	30.98	40.07	29.15	40.07	37.52	35.17	33.29	32.04	31.48
11:39	31.07	40.10	29.20	40.10	37.55	35.24	33.39	32.15	31.59
11:42	31.16	40.08	29.25	40.08	37.59	35.31	33.48	32.25	31.69
11:45	31.25	39.95	29.30	39.95	37.62	35.38	33.58	32.36	31.79
11:48	31.33	39.84	29.36	39.84	37.64	35.45	33.67	32.46	31.89
11:51	31.42	39.65	29.40	39.65	37.64	35.51	33.76	32.56	31.99
11:54	31.50	39.52	29.45	39.52	37.62	35.57	33.84	32.66	32.09
11:57	31.58	39.50	29.50	39.50	37.60	35.62	33.93	32.75	32.19
12:00	31.66	39.49	29.56	39.49	37.59	35.66	34.01	32.85	32.28
12:03	31.74	39.40	29.61	39.40	37.58	35.71	34.08	32.94	32.38
12:06	31.81	39.33	29.66	39.33	37.57	35.75	34.16	33.03	32.47
12:09	31.89	39.24	29.71	39.24	37.56	35.78	34.23	33.12	32.56
12:12	31.96	39.25	29.76	39.25	37.55	35.82	34.30	33.20	32.65
12:15	32.04	39.21	29.81	39.21	37.54	35.85	34.36	33.29	32.74
12:18	32.11	39.16	29.86	39.16	37.54	35.88	34.43	33.37	32.82
12:21	32.18	39.10	29.91	39.10	37.53	35.91	34.49	33.45	32.90
12:24	32.25	39.05	29.94	39.05	37.52	35.94	34.55	33.52	32.98
12:27	32.31	38.97	29.99	38.97	37.52	35.97	34.61	33.60	33.06
12:30	32.38	38.85	30.03	38.85	37.50	36.00	34.66	33.67	33.14
12:33	32.44	38.80	30.08	38.80	37.48	36.03	34.72	33.74	33.21
12:36	32.50	38.72	30.12	38.72	37.46	36.05	34.77	33.81	33.28
12:39	32.56	38.68	30.17	38.68	37.43	36.07	34.82	33.88	33.35
12:42	32.62	38.57	30.23	38.57	37.41	36.09	34.87	33.94	33.42
12:45	32.67	38.51	30.28	38.51	37.39	36.10	34.91	34.00	33.49
12:48	32.73	38.44	30.32	38.44	37.36	36.12	34.96	34.07	33.55
12:51	32.78	38.44	30.37	38.44	37.34	36.13	35.00	34.12	33.62

12:54	32.83	38.39	30.41	38.39	37.32	36.14	35.04	34.18	33.68
12:57	32.89	38.34	30.45	38.34	37.30	36.15	35.08	34.24	33.74
13:00	32.93	38.31	30.50	38.31	37.29	36.16	35.11	34.29	33.79
13:03	32.98	38.22	30.54	38.22	37.27	36.18	35.15	34.34	33.85
13:06	33.03	38.13	30.57	38.13	37.25	36.19	35.18	34.39	33.90
13:09	33.07	37.98	30.62	37.98	37.22	36.20	35.21	34.44	33.96
13:12	33.12	37.91	30.65	37.91	37.18	36.20	35.25	34.48	34.01
13:15	33.16	37.86	30.69	37.86	37.14	36.21	35.28	34.53	34.05
13:18	33.20	37.79	30.73	37.79	37.11	36.21	35.30	34.57	34.10
13:21	33.24	37.69	30.77	37.69	37.07	36.21	35.33	34.61	34.15
13:24	33.28	37.57	30.81	37.57	37.04	36.21	35.35	34.65	34.19
13:27	33.32	37.52	30.84	37.52	36.99	36.20	35.38	34.69	34.23
13:30	33.35	37.44	30.87	37.44	36.95	36.20	35.40	34.72	34.27
13:33	33.39	37.40	30.91	37.40	36.91	36.19	35.42	34.76	34.31
13:36	33.42	37.37	30.95	37.37	36.87	36.18	35.44	34.79	34.35
13:39	33.45	37.34	30.98	37.34	36.84	36.17	35.45	34.82	34.39
13:42	33.48	37.31	31.01	37.31	36.82	36.17	35.47	34.85	34.42
13:45	33.51	37.30	31.05	37.30	36.79	36.16	35.48	34.88	34.45
13:48	33.54	37.24	31.09	37.24	36.77	36.15	35.49	34.91	34.49
13:51	33.57	37.20	31.12	37.20	36.75	36.15	35.50	34.93	34.52
13:54	33.60	37.16	31.16	37.16	36.73	36.14	35.51	34.96	34.54
13:57	33.62	37.11	31.19	37.11	36.70	36.13	35.52	34.98	34.57
14:00	33.65	37.06	31.21	37.06	36.68	36.13	35.53	35.00	34.60
14:03	33.67	37.00	31.24	37.00	36.65	36.12	35.54	35.02	34.62
14:06	33.69	36.95	31.27	36.95	36.62	36.11	35.55	35.04	34.65
14:09	33.71	36.92	31.30	36.92	36.60	36.11	35.56	35.06	34.67
14:12	33.73	36.87	31.33	36.87	36.57	36.10	35.57	35.08	34.69
14:15	33.75	36.85	31.35	36.85	36.54	36.09	35.57	35.09	34.71
14:18	33.77	36.81	31.37	36.81	36.52	36.08	35.58	35.11	34.73
14:21	33.79	36.77	31.40	36.77	36.50	36.07	35.58	35.12	34.75
14:24	33.81	36.74	31.43	36.74	36.47	36.06	35.59	35.13	34.76
14:27	33.82	36.70	31.45	36.70	36.45	36.05	35.59	35.15	34.78
14:30	33.84	36.65	31.48	36.65	36.43	36.04	35.59	35.16	34.80

14:33	33.86	36.65	31.50	36.65	36.40	36.03	35.59	35.17	34.81
14:36	33.87	36.65	31.54	36.65	36.38	36.02	35.60	35.18	34.82
14:39	33.89	36.64	31.56	36.64	36.37	36.01	35.60	35.19	34.84
14:42	33.90	36.55	31.59	36.55	36.36	36.00	35.60	35.20	34.85
14:45	33.91	36.52	31.60	36.52	36.33	36.00	35.60	35.21	34.86
14:48	33.92	36.47	31.62	36.47	36.31	35.99	35.60	35.21	34.87
14:51	33.94	36.43	31.64	36.43	36.28	35.98	35.60	35.22	34.88
14:54	33.95	36.40	31.67	36.40	36.26	35.97	35.60	35.23	34.89
14:57	33.96	36.35	31.69	36.35	36.24	35.95	35.60	35.23	34.90
15:00	33.97	36.31	31.71	36.31	36.21	35.94	35.60	35.24	34.91
15:03	33.98	36.27	31.72	36.27	36.18	35.93	35.59	35.24	34.91
15:06	33.99	36.22	31.74	36.22	36.16	35.92	35.59	35.25	34.92
15:09	34.00	36.17	31.76	36.17	36.13	35.90	35.59	35.25	34.93
15:12	34.00	36.10	31.78	36.10	36.10	35.89	35.58	35.25	34.93
15:15	34.01	36.04	31.80	36.04	36.07	35.88	35.58	35.25	34.94
15:18	34.02	35.94	31.82	35.94	36.03	35.86	35.58	35.26	34.94
15:21	34.03	35.88	31.84	35.88	35.99	35.84	35.57	35.26	34.95
15:24	34.03	35.82	31.84	35.82	35.95	35.82	35.56	35.26	34.95
15:27	34.04	35.75	31.85	35.75	35.91	35.80	35.56	35.26	34.95
15:30	34.06	35.69	31.87	35.69	35.87	35.78	35.55	35.26	34.96
15:33	34.06	35.64	31.87	35.64	35.83	35.76	35.54	35.26	34.96
15:36	34.06	35.58	31.88	35.58	35.79	35.74	35.53	35.25	34.96
15:39	34.05	35.53	31.88	35.53	35.75	35.71	35.52	35.25	34.96
15:42	34.05	35.47	31.89	35.47	35.71	35.69	35.51	35.25	34.96
15:45	34.05	35.42	31.90	35.42	35.67	35.66	35.49	35.24	34.96
15:48	34.05	35.39	31.91	35.39	35.63	35.64	35.48	35.24	34.96
15:51	34.05	35.32	31.92	35.32	35.59	35.61	35.47	35.23	34.95
15:54	34.05	35.25	31.93	35.25	35.55	35.59	35.45	35.23	34.95
15:57	34.05	35.15	31.93	35.15	35.51	35.56	35.44	35.22	34.95
16:00	34.05	35.07	31.93	35.07	35.46	35.53	35.42	35.21	34.94
16:03	34.05	35.02	31.94	35.02	35.41	35.51	35.41	35.20	34.93
16:06	34.05	34.92	31.94	34.92	35.37	35.48	35.39	35.19	34.93
16:09	34.05	34.85	31.94	34.85	35.31	35.45	35.37	35.18	34.92

16:12	34.04	34.79	31.95	34.79	35.26	35.41	35.36	35.17	34.91
16:15	34.04	34.73	31.95	34.73	35.21	35.38	35.34	35.16	34.91
16:18	34.03	34.66	31.95	34.66	35.16	35.35	35.32	35.15	34.90
16:21	34.02	34.61	31.96	34.61	35.12	35.31	35.29	35.13	34.89
16:24	34.02	34.55	31.96	34.55	35.07	35.28	35.27	35.12	34.88
16:27	34.01	34.49	31.96	34.49	35.02	35.25	35.25	35.11	34.87
16:30	34.00	34.39	31.95	34.39	34.97	35.21	35.23	35.09	34.85
16:33	33.99	34.32	31.93	34.32	34.92	35.18	35.20	35.08	34.84
16:36	33.98	34.25	31.92	34.25	34.87	35.14	35.18	35.06	34.83
16:39	33.97	34.18	31.92	34.18	34.81	35.11	35.16	35.04	34.81
16:42	33.96	34.11	31.92	34.11	34.76	35.07	35.13	35.02	34.80
16:45	33.95	34.03	31.91	34.03	34.71	35.03	35.10	35.01	34.78
16:48	33.94	33.95	31.90	33.95	34.65	34.99	35.08	34.99	34.77
16:51	33.92	33.88	31.89	33.88	34.60	34.95	35.05	34.97	34.75
16:54	33.91	33.83	31.89	33.83	34.54	34.91	35.02	34.95	34.73
16:57	33.90	33.76	31.88	33.76	34.49	34.87	34.99	34.93	34.72
17:00	33.88	33.68	31.88	33.68	34.43	34.83	34.96	34.90	34.70
17:03	33.87	33.60	31.86	33.60	34.38	34.79	34.93	34.88	34.68
17:06	33.85	33.52	31.84	33.52	34.32	34.75	34.90	34.86	34.66
17:09	33.83	33.47	31.84	33.47	34.26	34.71	34.87	34.83	34.64
17:12	33.82	33.39	31.83	33.39	34.21	34.66	34.84	34.81	34.61
17:15	33.80	33.31	31.81	33.31	34.15	34.62	34.81	34.78	34.59
17:18	33.78	33.21	31.79	33.21	34.09	34.58	34.78	34.76	34.57
17:21	33.76	33.13	31.78	33.13	34.03	34.53	34.74	34.73	34.55
17:24	33.74	33.05	31.76	33.05	33.97	34.49	34.71	34.70	34.52
17:27	33.72	32.98	31.74	32.98	33.91	34.44	34.67	34.68	34.50
17:30	33.69	32.91	31.74	32.91	33.85	34.39	34.64	34.65	34.47
17:33	33.67	32.82	31.71	32.82	33.79	34.35	34.60	34.62	34.44
17:36	33.65	32.77	31.69	32.77	33.72	34.30	34.56	34.59	34.42
17:39	33.63	32.68	31.67	32.68	33.67	34.25	34.53	34.56	34.39
17:42	33.60	32.61	31.65	32.61	33.60	34.20	34.49	34.53	34.36
17:45	33.58	32.54	31.63	32.54	33.54	34.15	34.45	34.50	34.33
17:48	33.55	32.47	31.62	32.47	33.48	34.11	34.41	34.46	34.30

17:51	33.53	32.39	31.59	32.39	33.42	34.06	34.37	34.43	34.27
17:54	33.50	32.31	31.57	32.31	33.36	34.01	34.33	34.40	34.24
17:57	33.48	32.25	31.56	32.25	33.30	33.96	34.29	34.36	34.21
18:00	33.45	32.18	31.55	32.18	33.24	33.91	34.25	34.33	34.18
18:03	33.42	32.12	31.53	32.12	33.18	33.86	34.21	34.29	34.15
18:06	33.40	32.05	31.51	32.05	33.12	33.81	34.17	34.26	34.12
18:09	33.37	31.98	31.49	31.98	33.06	33.76	34.13	34.22	34.08
18:12	33.34	31.91	31.47	31.91	33.00	33.71	34.08	34.19	34.05
18:15	33.31	31.85	31.45	31.85	32.94	33.65	34.04	34.15	34.02
18:18	33.28	31.77	31.44	31.77	32.88	33.60	34.00	34.11	33.98
18:21	33.25	31.72	31.42	31.72	32.82	33.55	33.95	34.07	33.95
18:24	33.22	31.65	31.39	31.65	32.76	33.50	33.91	34.04	33.91
18:27	33.19	31.58	31.37	31.58	32.71	33.45	33.87	34.00	33.87
18:30	33.16	31.53	31.35	31.53	32.65	33.40	33.82	33.96	33.84
18:33	33.13	31.47	31.33	31.47	32.59	33.35	33.78	33.92	33.80
18:36	33.10	31.40	31.30	31.40	32.53	33.30	33.73	33.88	33.76
18:39	33.07	31.33	31.28	31.33	32.48	33.25	33.69	33.84	33.73
18:42	33.04	31.28	31.27	31.28	32.42	33.20	33.64	33.80	33.69
18:45	33.00	31.21	31.25	31.21	32.36	33.14	33.60	33.76	33.65
18:48	32.97	31.15	31.22	31.15	32.31	33.09	33.55	33.72	33.61
18:51	32.94	31.09	31.18	31.09	32.25	33.04	33.51	33.67	33.57
18:54	32.91	31.02	31.17	31.02	32.19	32.99	33.46	33.63	33.53
18:57	32.87	30.95	31.14	30.95	32.14	32.94	33.41	33.59	33.49
19:00	32.84	30.90	31.12	30.90	32.08	32.89	33.37	33.55	33.45
19:03	32.81	30.85	31.11	30.85	32.02	32.84	33.32	33.51	33.41
19:06	32.77	30.79	31.09	30.79	31.97	32.79	33.28	33.46	33.37
19:09	32.74	30.73	31.06	30.73	31.91	32.73	33.23	33.42	33.33
19:12	32.70	30.67	31.03	30.67	31.86	32.68	33.18	33.38	33.29
19:15	32.67	30.60	31.02	30.60	31.80	32.63	33.13	33.33	33.25
19:18	32.63	30.55	30.99	30.55	31.74	32.58	33.09	33.29	33.21
19:21	32.60	30.49	30.95	30.49	31.69	32.53	33.04	33.25	33.17
19:24	32.56	30.44	30.93	30.44	31.63	32.48	32.99	33.20	33.13
19:27	32.53	30.38	30.89	30.38	31.58	32.43	32.95	33.16	33.09

19:30	32.49	30.33	30.88	30.33	31.52	32.38	32.90	33.11	33.04
19:33	32.45	30.27	30.85	30.27	31.47	32.33	32.85	33.07	33.00
19:36	32.42	30.23	30.82	30.23	31.42	32.27	32.80	33.03	32.96
19:39	32.38	30.18	30.79	30.18	31.37	32.22	32.76	32.98	32.92
19:42	32.34	30.14	30.76	30.14	31.32	32.17	32.71	32.94	32.87
19:45	32.31	30.10	30.74	30.10	31.27	32.12	32.66	32.89	32.83
19:48	32.27	30.05	30.71	30.05	31.22	32.07	32.61	32.85	32.79
19:51	32.24	30.02	30.70	30.02	31.17	32.02	32.57	32.80	32.74
19:54	32.20	29.99	30.67	29.99	31.12	31.98	32.52	32.76	32.70
19:57	32.16	29.95	30.65	29.95	31.08	31.93	32.47	32.71	32.66
20:00	32.13	29.91	30.63	29.91	31.04	31.88	32.42	32.67	32.61
20:03	32.09	29.88	30.60	29.88	30.99	31.83	32.38	32.62	32.57
20:06	32.05	29.85	30.57	29.85	30.95	31.79	32.33	32.57	32.53
20:09	32.02	29.81	30.55	29.81	30.91	31.74	32.28	32.53	32.48
20:12	31.98	29.77	30.52	29.77	30.87	31.70	32.24	32.48	32.44
20:15	31.94	29.74	30.49	29.74	30.83	31.65	32.19	32.44	32.40
20:18	31.91	29.69	30.47	29.69	30.79	31.61	32.15	32.40	32.35
20:21	31.87	29.66	30.44	29.66	30.74	31.56	32.10	32.35	32.31
20:24	31.83	29.61	30.42	29.61	30.70	31.52	32.06	32.31	32.27
20:27	31.80	29.59	30.40	29.59	30.66	31.48	32.01	32.26	32.23
20:30	31.76	29.56	30.36	29.56	30.62	31.43	31.97	32.22	32.18
20:33	31.72	29.53	30.35	29.53	30.58	31.39	31.92	32.17	32.14
20:36	31.69	29.50	30.33	29.50	30.54	31.35	31.88	32.13	32.10
20:39	31.65	29.46	30.30	29.46	30.51	31.31	31.84	32.09	32.05
20:42	31.62	29.42	30.27	29.42	30.47	31.26	31.79	32.04	32.01
20:45	31.58	29.39	30.25	29.39	30.43	31.22	31.75	32.00	31.97
20:48	31.54	29.36	30.22	29.36	30.39	31.18	31.71	31.96	31.93
20:51	31.51	29.32	30.20	29.32	30.35	31.14	31.66	31.91	31.89
20:54	31.47	29.30	30.19	29.30	30.32	31.10	31.62	31.87	31.84
20:57	31.44	29.27	30.17	29.27	30.28	31.06	31.58	31.83	31.80
21:00	31.40	29.24	30.15	29.24	30.24	31.02	31.54	31.79	31.76
21:03	31.37	29.21	30.12	29.21	30.21	30.98	31.49	31.74	31.72
21:06	31.34	29.18	30.10	29.18	30.17	30.94	31.45	31.70	31.68

21:09	31.30	29.15	30.06	29.15	30.14	30.90	31.41	31.66	31.64
21:12	31.26	29.12	30.04	29.12	30.10	30.86	31.37	31.62	31.60
21:15	31.23	29.09	30.02	29.09	30.07	30.82	31.33	31.58	31.56
21:18	31.20	29.06	29.99	29.06	30.03	30.78	31.29	31.54	31.52
21:21	31.16	29.03	29.97	29.03	30.00	30.75	31.25	31.50	31.48
21:24	31.13	29.01	29.95	29.01	29.97	30.71	31.21	31.45	31.44
21:27	31.09	28.98	29.93	28.98	29.93	30.67	31.17	31.41	31.40
21:30	31.06	28.95	29.91	28.95	29.90	30.63	31.13	31.37	31.36
21:33	31.03	28.93	29.88	28.93	29.87	30.60	31.09	31.33	31.32
21:36	30.99	28.90	29.86	28.90	29.83	30.56	31.05	31.29	31.28
21:39	30.96	28.87	29.84	28.87	29.80	30.52	31.01	31.26	31.24
21:42	30.93	28.84	29.83	28.84	29.77	30.49	30.98	31.22	31.21
21:45	30.90	28.82	29.80	28.82	29.74	30.45	30.94	31.18	31.17
21:48	30.86	28.79	29.78	28.79	29.71	30.42	30.90	31.14	31.13
21:51	30.83	28.75	29.75	28.75	29.67	30.38	30.86	31.10	31.09
21:54	30.80	28.73	29.72	28.73	29.64	30.35	30.82	31.06	31.06
21:57	30.77	28.70	29.69	28.70	29.61	30.31	30.79	31.02	31.02
22:00	30.73	28.67	29.68	28.67	29.58	30.28	30.75	30.99	30.98
22:03	30.70	28.64	29.67	28.64	29.54	30.24	30.71	30.95	30.94
22:06	30.67	28.62	29.64	28.62	29.51	30.21	30.68	30.91	30.91
22:09	30.64	28.59	29.62	28.59	29.48	30.17	30.64	30.87	30.87
22:12	30.61	28.56	29.59	28.56	29.45	30.14	30.60	30.84	30.84
22:15	30.58	28.53	29.58	28.53	29.42	30.10	30.57	30.80	30.80
22:18	30.55	28.50	29.55	28.50	29.39	30.07	30.53	30.76	30.76
22:21	30.52	28.48	29.52	28.48	29.36	30.04	30.50	30.73	30.73
22:24	30.48	28.46	29.50	28.46	29.33	30.00	30.46	30.69	30.69
22:27	30.45	28.44	29.48	28.44	29.30	29.97	30.43	30.66	30.66
22:30	30.42	28.41	29.45	28.41	29.27	29.93	30.39	30.62	30.62
22:33	30.39	28.38	29.42	28.38	29.24	29.90	30.36	30.59	30.59
22:36	30.36	28.36	29.39	28.36	29.21	29.87	30.32	30.55	30.55
22:39	30.33	28.33	29.38	28.33	29.18	29.84	30.29	30.51	30.52
22:42	30.30	28.32	29.36	28.32	29.15	29.80	30.25	30.48	30.48
22:45	30.27	28.29	29.34	28.29	29.12	29.77	30.22	30.44	30.45

22:48	30.24	28.27	29.32	28.27	29.09	29.74	30.18	30.41	30.41
22:51	30.21	28.24	29.30	28.24	29.07	29.71	30.15	30.38	30.38
22:54	30.18	28.22	29.28	28.22	29.04	29.68	30.12	30.34	30.35
22:57	30.15	28.21	29.27	28.21	29.01	29.65	30.08	30.31	30.31
23:00	30.13	28.17	29.24	28.17	28.98	29.62	30.05	30.27	30.28
23:03	30.10	28.15	29.22	28.15	28.96	29.59	30.02	30.24	30.25
23:06	30.07	28.14	29.20	28.14	28.93	29.55	29.99	30.21	30.21
23:09	30.04	28.12	29.17	28.12	28.90	29.52	29.95	30.17	30.18
23:12	30.01	28.09	29.16	28.09	28.88	29.49	29.92	30.14	30.15
23:15	29.98	28.07	29.14	28.07	28.85	29.47	29.89	30.11	30.12
23:18	29.95	28.04	29.12	28.04	28.83	29.44	29.86	30.08	30.09
23:21	29.92	28.01	29.09	28.01	28.80	29.41	29.83	30.04	30.05
23:24	29.90	27.99	29.07	27.99	28.77	29.38	29.79	30.01	30.02
23:27	29.87	27.97	29.06	27.97	28.74	29.35	29.76	29.98	29.99
23:30	29.84	27.96	29.03	27.96	28.72	29.32	29.73	29.95	29.96
23:33	29.81	27.93	29.01	27.93	28.69	29.29	29.70	29.92	29.93
23:36	29.79	27.91	28.99	27.91	28.67	29.26	29.67	29.88	29.90
23:39	29.76	27.88	28.97	27.88	28.64	29.23	29.64	29.85	29.87
23:42	29.73	27.86	28.95	27.86	28.62	29.20	29.61	29.82	29.84
23:45	29.70	27.85	28.93	27.85	28.59	29.18	29.58	29.79	29.81
23:48	29.68	27.82	28.91	27.82	28.57	29.15	29.55	29.76	29.78
23:51	29.65	27.79	28.89	27.79	28.54	29.12	29.52	29.73	29.75
23:54	29.62	27.77	28.87	27.77	28.51	29.09	29.49	29.70	29.72
23:57	29.60	27.74	28.84	27.74	28.49	29.06	29.46	29.67	29.69

PUBLICATIONS AND ACHIEVEMENTS

PUBLICATIONS

Journals

Ng, S.C and Low, K.S. (2010) Thermal conductivity of newspaper sandwiched aerated lightweight concrete panel. Energy and Buildings. 42(12), 2452-2456. (Listed in ISI Citation Index, Impact Factor: 2.041)

Ng, S.C., Low, K.S. and Tioh, N.H. (2011) Thermal insulation property of newspaper membrane encased soil-based aerated lightweight concrete panels. International Journal of Advanced Materials Research. 261-263, 783-787. (Listed in SCOPUS)

Ng, S.C., Low, K.S. and Tioh, N.H. (2011) Newspaper Sandwiched Aerated Lightweight Concrete Wall Panels - Thermal Inertia, Transient Thermal Behavior and Surface Temperature Prediction. Energy and Buildings. 43(7), 1636-1645. (Listed in ISI Citation Index, Impact Factor: 2.041). **Selected and listed in Renewable Energy Global Innovations Series.**

Ng, S.C., Low, K.S. and Lim, S.K. (2011) Thermal insulation property of aerated lightweight concrete. Proceedings of the Institution of Civil Engineers: Construction Materials. 164(4), 181-189. (Listed in SCOPUS)

Ng, S.C., Low, K.S. and Tioh, N.H. (2011) Thermal inertia of newspaper sandwiched aerated lightweight concrete wall panels: Experimental study. Energy and Buildings. 43(10), 2956-2960. (Listed in ISI Citation Index, Impact Factor: 2.041)

Ng, S.C., Low, K.S. and Tioh, N.H. "Potential use of clayey soil in aerated lightweight concrete". Korean Society of Civil Engineers: Journal of Civil Engineering. Accepted (Listed in ISI Citation Index, Impact Factor: 0.45)

Journal Article Under Review

Ng, S.C., Low, K.S. and Tioh, N.H. "Thermal conductivity of soil-based newspaper sandwiched aerated lightweight concrete panel". Korean Society of Civil Engineers: Journal of Civil Engineering.

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Conference Proceedings

Ng, S.C. and Low, K.S. (2008) Mechanical and Physical Properties of Aerated Lightweight Concrete for Energy Efficient Construction. International Conference of Civil Engineering 2008 (ICCE-08), 12-14 May, Kuantan, Malaysia.

Ng, S.C. and Low, K.S. (2008) The Role of Sandwiched Membrane in Aerated Lightweight Concrete for Energy Efficient Construction, United Kingdom Malaysia Engineering Conference 2008 (UKMEC 2008), 14-15 July, London, United Kingdom.

Low, K.S. and Ng, S.C. (2008) The Role of Aerated Lightweight Concrete for Energy Efficient Building Construction. 8th International Symposium on Utilization of High-Strength and High-Performance Concrete, 27-29 October, Tokyo, Japan.

Poster

Ng, S.C. and Low, K.S. (2008) Investigation on the thermal insulation property of aerated lightweight concrete panels: Sand and Soil. 5th International Trade fair and Conference on Building with Earth (LEHM 2008), 9-12 October, Koblenz, Germany.

Ng, S.C. (2011) Potential use of aerated lightweight concrete for energy efficient construction. Akedemi Kepimpinan Pengajian Tinggi (AKEPT) 1st Annual Young Researchers International Conference and Exhibition, 19-20 December, Kuala Lumpur.

ACHIEVEMENTS

Patent

Membrane encased lightweight concrete or mortar panel and block

(Patent Pending: PI 2011000928)

Research Grant

U-CIP150 Cradle Fund – Amount: RM150,000.00

Awards

Silver Award – ITEX 2011

National Finalist – James Dyson Award 2011

UTAR Innovation Excellence Award 2011