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2-Day Course on 'HVAC Design: Cooling Capacity Calculation & Psychrometrics' by Ir. Chua Keng Seng

Date: 03 & 04 August 2020
Venue: Wisma IEM, 2nd Floor, Petaling Jaya, Selangor
Time: 9.00 a.m – 5.00 p.m
Organized by: IEM Training Centre Sdn Bhd

HRDF Claimable

PROFILE OF COURSE FACILITATOR

Ir. Chua Keng Seng, B.E.(Hons), MIEM, P.Eng., MASHRAE, MIMM, CCP, graduated from the University of Malaya in 1974. Qualified as a Professional Engineer, he worked with Carrier Malaysia Sdn. Bhd., first as the Service Manager and then as Engineering Manager for about 10 years. During the next 25 years, he operated his own companies in contracting, maintenance and also in consultancy business. He has wide experience in the design, installation, trouble shooting on various types of systems and also in project management. He was in the design and project management team which implemented the Putrajaya Precinct 2 District Cooling Plant which has a capacity of 30,000 cooling tons.

Ir. Chua has also been involved in many training programmes. He lectured air conditioning design in the Mechanical Faculty of University Malaya between 1978 to 1984 and in Monash University for the last 3 years. Besides he had been invited to deliver lectures and presentations in the University Technology Malaysia, University Technology Petronas, The Institution of Engineers, Malaysia and conducted in-house training for some Corporate Companies.

INTRODUCTION

Cooling capacity calculation is the most fundamental requirement for any air conditioning system design. The application of psychrometric principles is often regarded as an area of mystery to many air conditioning engineers. However, it is the key for solving many air conditioning problems such as condensations, humidity problems, non-performance at part-load operations etc

OBJECTIVES

The objective of this course is to enable participants to calculate the cooling capacity required for a particular air conditioning system. Furthermore, the participants will understand the practical applications of psychrometric in air conditioning, design for humidity controlled systems and problem solving using psychrometric chart.

TOPICS

A. HEAT LOAD CALCULATION

An overview: heat loads and cooling capacities, temperature as a state of equilibrium | Methods of cooling load estimation | Heat load calculation using E20 method | Some short-cut methods | Some pitfalls: under-sizing, over sizing

B. FUNDAMENTAL PSYCHROMETRICS

A study of the properties of the moist air | Dry bulb and wet bulb temperatures | Humidity: Relative humidity and moisture contents | Dew point temperature

C. UNDERSTANDING PSYCHROMETRIC CHARTS

Properties of moist air | Temperatures, humidity, enthalpy, density

D. FUNDAMENTAL THERMODYNAMIC PROCESSES

Cooling, heating, humidification, dehumidification | Understand condensation

E. PSYCHROMETRIC CALCULATIONS

Concept of bypass factor | Effective sensible and latent loads | Sensible heat factor | Mixing of air | Concept of apparatus dew point temperature | Calculation of air flow quantities | Calculation of on-coil and off-coil temperatures

F. HUMIDITY CONTROL

Types of dehumidification methods: chemical & refrigeration | Advantages and disadvantages of both methods | Reheating | Moisture control at source | Energy consumption analysis and conversation

2-Day Course on 'HVAC Design: Air Distribution & VAV Design' by Ir. Chua Keng Seng

Date: 19 & 20 October 2020
Venue: C&S Room, Wisma IEM, 2nd Floor, Petaling Jaya, Selangor
Time: 9.00 a.m – 5.00 p.m
Organized by: IEM Training Centre Sdn Bhd

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TOPICS

- Comfort factors: temperature, relative humidity, air movement, noise level, cleanliness. How does air distribution system affects comfort
- Air Distribution Performance Index:
  Air diffusion: draft, stagnant air and the ideal air movement. The induction ratio, Air diffusion Performance Index (ADPI) | Types of air grilles and their performances | Design of air distribution layout
- Choosing the supply air temperature: Effects on the Diffusion Temperature, air quantity, air velocity, space Relative Humidity, economics of the refrigeration system, economics for the fan operation, cost of ducting system, compactness of equipment.
- The noise level consideration: sound power, sound pressure and room effects:
  Type of air noise: high frequency and low frequency noises. | Effects of air velocity, discharge velocity, duct construction, acoustic treatment.
- Recommended air velocities: initial duct velocity, terminal velocity and return air grille velocity.
- Types of air ducts: rectangular, round and oval. Classifications and constructions.
- Effects of Aspect Ratio of the air duct: frictional loses, installed cost, operating cost.
- Methods of duct design: Velocity Reduction, Equal Friction, Static Regain.
- Hand-on tutorial using equal friction method.
- Pressure loss of system components: coils, filters, grilles, louvers.
- What is VAV system? VAV verses Constant Air Volume.
- Types of VAV system: true VAV, bypass or dump system, fan powered system.
- Features of VAV system: zone control, diversity and energy savings.
- VAV box: construction, dedicated controls.
- VAV control systems: static pressure control, variable fan control, supply air temperature control.
- Work example of a VAV design

2-Day Course on 'HVAC Design: Pumping System and Pipe Sizing' by Ir. Chua Keng Seng

Date: 05 & 06 October 2020
Venue: Wisma IEM, 2nd Floor, Petaling Jaya, Selangor
Time: 9.00 a.m – 5.00 p.m
Organized by: IEM Training Centre Sdn Bhd

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TOPICS

1.0 SECONDARY REFRIGERANT: WATER & BRINE
Water as secondary refrigerant and heat transfer medium | Glycol system: operation and performance

2.0 HYDRONIC SYSTEM IN AIR CONDITIONING SYSTEM
Energy consumption of pumping system in HVAC | Constant flow and variable flow systems | Pump performance under variable flow: Pump Affinity Laws | Piping system under variable flow: system curve | Chilled water circuit design: Single loop, Main pipe by-pass, Primary secondary circuit, Variable Chiller Flow

3.0 ENERGY SAVING STRATEGIES IN CHILLED WATER SYSTEM
Comparative study on the various Control Strategies for secondary pump | Optimization of chilled water operating temperatures | Chillers in parallel and in series operation

4.0 PUMPING SYSTEM DESIGN
Closed circuit and open circuit design | Multiple chiller circuiting for chilled water | Multiple chiller circuiting for condenser water

5.0 PIPING SYSTEM
Pipe materials for different services | Pipe insulation – condensation prevention

6.0 PIPE SIZING CRITERIA
Frictional loss and Erosion | Pipe velocity limitation | The Darcy-Weisbach Equation for pipe friction calculation | Frictional Loss Charts for different pipe materials

7.0 PIPE SIZING USING CHARTS
Pipe sizing using Charts | Chilled Water pipe sizing example

8.0 FRICTIONAL LOSS CALCULATION
The function, construction and pressure losses of various valves & fittings:
Gate valve, globe valve, butterfly valve, strainers, elbows | Tees and so on | Calculation of pipe system losses | Condenser Water pipe sizing example

9.0 CHILLED WATER PIPE SIZING TUTORIAL

2-Day Course on 'Energy Efficient Design, Operation and Control of the Air and Chilled Water Systems in HVAC' by Ir. Chua Keng Seng

Date: 09 & 10 November 2020
Venue: Wisma IEM, 2nd Floor, Petaling Jaya, Selangor
Time: 9.00 a.m – 5.00 p.m
Organized by: IEM Training Centre Sdn Bhd

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TOPICS

Introduction
- Can the Chiller Plant be operated independently to achieve the desired high efficiency?
- Understanding the inter-relationship between the Chiller Plant, Chilled Water Distribution System and the Air-side System from the formula : Q = K x F x dT.
- What are the implications on the performance of the entire Air Conditioning System with the new trend of improving the Chiller Plant efficiencies by increasing the Supply Chilled Water Temperature and increasing the delta T of the chilled water system?
- What are the common causes for moulds and fungi to grow on surfaces in an air conditioned space?

Understanding the performance of chilled water cooling coil
- Fundamental understanding about the air flow capacity and cooling capacity of the coil
- Increasing Chiller Plant efficiencies using high Chilled Water Supply Temperatures and high Delta T can affect the performance of the AHU and Indoor Air Quality
- How the non-performance of cooling coil relating to low delta-T affects system efficiency
- The low delta T problems with the Cooling Coil: design, selection, operation and control aspects

How the Water-side performance of Air Handling Units affect the energy efficiency of the entire system
- Constant flow and variable flow in chilled water system design
- Modulating control valve issues: selection and sizing
- Modulating control valve issues: operation and control
- Pressure Independent Control Valve and Energy Control Valve

How the Air-side performance of Air Handling Units affect the energy efficiency of the entire system
- The miss-match between Chiller Plant and AHU optimization: supply water temperature, delta-T and cfm/ton
- How Constant Air Flow and Variable Air Flow designs affect energy efficiency and energy wastage.
- How the choice of Supply Air Temperature affects chiller plant performance, first cost and operating cost of air-side system and the indoor environmental quality performance.

How Dedicated Outdoor-air System (DOAS) design improves energy efficiency and system performance in humid climate
- Why use DOAS: Demand Control Ventilation
- Why use DOAS: separating the roles of sensible cooling and latent cooling
- DOAS allows higher Supply Chilled Water Temperatures and higher Delta T to be used for better chiller plant efficiency.

Under-floor Air Distribution System design and performance
- The advantages of Under-floor Air distribution System
- How to design with higher Supply Air Temperature without increasing the humidity level in the room space.

Chilled Beam and Chilled Ceiling design and performance
- The advantages of using Chilled Beam and Chilled Ceiling systems
- How to prevent condensation problems in humid climate
- What are the limitations when using Chilled Ceiling System in Malaysian climate.

Designing Chilled Water Distribution System for system efficiency
- The fundamental concepts of constant flow and variable flow in Chilled Water Distribution System
- Constant flow system; variable flow to air-side with by-pass in chiller plant room
- Constant Primary and Variable Secondary flow system
- Variable Primary and Variable Secondary flow system

Energy saving design with Distributed Secondary Pumping System
- Understanding the fundamental pumping energy equation
- Under what circumstances Distributed Secondary Pumping system can save energy
- Variable Primary Pumping with Distributed Secondary Pumping Systems

Energy saving design with Tertiary Pumping System
- Under what situations Tertiary Pumping Systems can save energy
- Comparing Tertiary Pumping and Series Pumping

Efficient Chiller Plant Control System
- Fundamental concepts about flow control and capacity control
- Control philosophies for Secondary Pumping and Primary Pumping systems
- Chiller Capacity Control, Chiller Staging Control and Chiller Minimum Flow Protection

REGISTRATION FORM

Email: **faiza@iem.org.my** webpage: **www.iemtc.com**

Organized by: IEM Training Centre Sdn Bhd

***Online Rate – Please register at our website: www.iemtc.com and fee is inclusive of 6% SST.**

Course Title	Dates	Offline Rate (IEM Member)	Offline Rate (Non-IEM)	* Online Rate (IEM Member)	* Online Rate (Non-IEM)
HVAC Design: Cooling Capacity Calculation & Psychrometrics	☐ 03 & 04 August 2020	☐ RM1,113.00	☐ RM1,643.00	☐ RM1,060.00	☐ RM1,590.00
HVAC Design: Air Distribution & VAV Design	☐ 19 & 20 October 2020	☐ RM1,113.00	☐ RM1,643.00	☐ RM1,060.00	☐ RM1,590.00
HVAC Design:Pumping System and Pipe Sizing	☐ 05 & 06 October 2020	☐ RM1,113.00	☐ RM1,643.00	☐ RM1,060.00	☐ RM1,590.00
Energy Efficient Design, Operation and Control of the Air and Chilled Water Systems in HVAC	☐ 09 & 10 November 2020	☐ RM1,113.00	☐ RM1,643.00	☐ RM1,060.00	☐ RM1,590.00

No	Name(s)	M'ship No.	Grade	Fee (RM)*
1.				
2.				
3.				
			TOTAL PAYABLE	

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NB: Kindly take note that all telegraphic charges to be borne by the participants.

Enclosed herewith a crossed cheque No: _____ for the sum of RM _____ issued in favour of "**IEM Training Centre Sdn Bhd**" and crossed 'A/C payee only'. I/We understand that the fee is not refundable if I/We withdraw after my/our application is accepted by the Organising Committee as stated in the **cancellation term**. If I/We fail to attend the seminar, the paid registration fee will not be refunded.

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Terms & Conditions:

- Closing date: **one week before the event**
- Payment via CASH / CHEQUE / BANK-IN TRANSMISSION / WALK-IN
- FULL PAYMENT must be settled before commencement of the course, otherwise participants will not be allowed to enter the hall. If a place is reserved and the intended participants fail to attend the course, the fee is to be settled in full.
- Fee paid is not refundable. Registration fee includes lecture notes, refreshment.
- **IEM Training Centre reserves the right to cancel, alter, or change the program due to unforeseen circumstances. Every effort will be made to inform the registered participants of any changes. In view of the limited places available, intending participants are advised to send their registrations as early as possible so as to avoid disappointment.**
- **Please be informed that the course will only be carried out if there is sufficient number of participants. The confirmation or cancellation email will be sent to the registered email address one or two weeks before the event dates.**

CANCELLATION POLICY

IEMTC reserves the right to postpone, reschedule, allocate or cancel the course. Full refund less is 30% if cancellation is received in writing more than 7 days before the start of the event. No cancellation will be accepted prior to the date of the event. However, replacement or substitute may be made at any time with prior notification and substitute will be charged according to membership status.