



COURSE OVERVIEW ME0160-4D

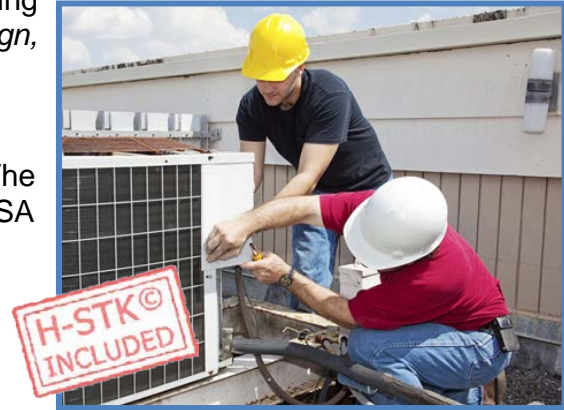
Modern Heating, Ventilation, Air-Conditioning (HVAC) & Refrigeration Systems: Design, Installation, Maintenance & Troubleshooting

Course Title

Modern Heating, Ventilation, Air-Conditioning (HVAC) & Refrigeration Systems: *Design, Installation, Maintenance & Troubleshooting*

Course Date/Venue

Session 1: August 12-15, 2024/Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA
Session 2: November 11-14, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE



Course Reference

ME0160-4D



Course Duration/Credits

Four days/2.4 CEUs/24 PDHs

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt in the class will be applied using the following practical methods:

(1) Industrial Facility Visit: Course participants will be taken to an industrial facility where they will practice testing, maintenance and troubleshooting. In case that this course is organized inside client premises (In-House), then client shall provide access to its HVAC and refrigeration workshop for practical sessions.



(2) HVAC Simulator: Participants will use in the class the state-of-the-art HVAC Simulator to practice some of the skills learnt.



The course is designed for engineers and other technical staff from a wide range of abilities and backgrounds. It will provide the participants with a complete and up-to-date overview of the area of heating, ventilation, air-conditioning (HVAC) and refrigeration. It commences with a review of psychrometric charts and then examines the factors that influence design choices, indoor air quality, load calculations and heating/ventilation and airconditioning systems. Numerous tips and tricks throughout the course make it very practical and topical to your applications.



Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Design, install, maintain and troubleshoot HVAC and refrigeration systems
- Recognize and apply the psychrometric chart
- Design for good air quality
- Perform basic load calculations
- Initiate an effective inspection and maintenance program
- Minimize forced outages and prevent serious damage to HVAC equipment
- Provide an overview of the legislative requirements plus the essential steps and responsibilities for the maintenance and repair of HVAC Systems
- Employ technologies available for the efficient energy management using HVAC systems

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides a complete and up-to-date overview of HVAC & refrigeration systems for HVAC, utilities, maintenance, plant, operation and inspection engineers and other technical staff who are involved in the design, installation, maintenance and troubleshooting of such equipment and system. Further, it is suitable for mechanical, design, electrical and consulting engineers.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US\$ 4,500 per Delegate + VAT. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.




Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course completed a minimum of 80% of the total tuition hours.

Certificate Accreditations


Certificates are accredited by the following international accreditation organizations:-

- 
The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology’s courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **2.4 CEUs** (Continuing Education Units) or **24 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant’s involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant’s CEU and PDH Transcript of Records upon request.

- 
British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.





Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Manuel Dalas MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **25 years** of industrial experience in **Oil, Gas, Refinery, Petrochemical, Power and Nuclear** industries. His wide expertise includes **Advanced Heating, Ventilation and Air-Conditioning Systems (HVAC)**, Air Balancing of **HVAC** System, Design & Installation of **HVAC** System, **HVAC** System Operation and Maintenance, **HVAC** Direct Digital Control (**DDC**), **HVAC & BMS** Controls, **HVAC & Refrigeration** Systems, **Air-Conditioning & Cooling Systems**, Planning & Implementation of **District Cooling** Systems (**DCS**), **Material Cataloguing, Maintenance Planning & Scheduling**, Reliability Centered Maintenance (**RCM**), **Reliability Maintenance, Preventive & Predictive Maintenance, Building & Facilities** Maintenance Management, **Condition Based Maintenance & Condition Monitoring, Asset & Risk Management, Vibration Condition Monitoring & Diagnostics** of Machines, **Vibration & Predictive** Maintenance, Reliability Improvement & Vibration Analysis for Rotating Machinery, Effective Maintenance **Shutdown & Turnaround** Management, **Engineering Codes & Standards, Rotating Equipment** Maintenance, **Mechanical** Troubleshooting, **Static Mechanical Equipment** Maintenance, **Machinery** Failure Analysis, **Machinery Diagnostics & Root Cause Failure** Analysis, **Plant Reliability & Maintenance** Strategies, **Boiler** Operation & Water Treatment, **Pumps** Maintenance & Troubleshooting, **Fans, Blowers & Compressors, Process Control Valves, Piping Systems & Process Equipment, Gas Turbines & Compressors** Troubleshooting, Advanced **Valve** Technology, **Pressure Vessel** Design & Analysis, **Steam & Gas Turbine, High Pressure Boiler** Operation, **FRP Pipe** Maintenance & Repair, **Centrifugal & Positive Displacement Pump** Technology Troubleshooting & Maintenance, **Rotating Machinery** Best Practices, **PD Compressor & Gas Engine** Operation & Troubleshooting, **Hydraulic Tools & Fitting, Mass & Material Balance, Water Distribution & Pump Station, Tank Farm & Tank Terminal** Safety & Integrity Management, **Process Piping** Design, Construction & **Mechanical Integrity, Stack & Noise** Monitoring, , BPV Code, Section VIII, Division 2, **Facility Planning & Energy** Management, Hoist - Remote & Basic **Rigging & Slings**, **Mobile Equipment** Operation & Inspection, **Heat Exchanger, Safety Relief Valve, PRV & POPRV/PORV, Bearing & Lubrication, Voith Coupling** Overhaul, **Pump & Valve** Technology, **Lubrication** Inspection, **Process Plant** Optimization, Rehabilitation, Revamping & Debottlenecking, Engineering Problem Solving and **Process Plant** Performance & Efficiency. Currently, he is the **Technical Consultant** of the **Association of Local Authorities of Greater Thessaloniki** where he is in charge of the mechanical engineering services for piping, pressure vessels fabrications and ironwork.

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager, Project Engineer, Safety Engineer, HVAC Engineer, Air-Conditioning & Cooling Consultant, Deputy Officer, Instructor, Construction Manager, Construction Engineer, Consultant Engineer and Mechanical Engineer** for numerous multi-billion companies including the **Biological Recycling Unit** and the **Department of Supplies of Greece, Alpha Bank Group, EMKE S.A, ASTE LLC** and **Polytechnic College of Evosmos**.

Mr. Dalas has a **Master** degree in **Energy System** from the **International Hellenic University, School of Science & Technology** and a **Bachelor** degree in **Mechanical Engineering** from the **Mechanical Engineering Technical University of Greece** along with a **Diploma** in **Management & Production Engineering** from the **Technical University of Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management (ILM)**, a **Certified Project Manager Professional (PMI-PMP)**, a **Certified Instructor/Trainer**, a **Certified Energy Auditor** for **Buildings, Heating & Climate Systems**, a **Member** of the **Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops internationally.





Course Program

The following program is planned for this course. However, the course instructors) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0915	Introduction Introduction to HVAC Basics • HVAC&R Abbreviations • HVAC Codes and Standards • HVAC&R Definitions • Air Conditioning • Ventilation • Refrigeration • HVAC&R Overview
0915 – 0930	Break
0930 – 1030	Basic Principals of HVAC&R Air Properties • Dry Bulb Temperature • Wet Bulb Temperature • Dew Point • Humidity Ratio • Relative Humidity • Psychrometric Chart Definition • Properties of Psychrometry • Psychrometric Chart • Psychrometric Chart Application
1030 – 1115	Principles of Heat Transfer Heat Transfer • Method of Heat Transfer • Sensible and Latent Heat • Sensible Heat Definition • Latent Heat Definition • First Law of Thermodynamic
1115 – 1215	Design Conditions Outdoor Climate • Indoor Comfort • Solar Orientation • Indoor Air Quality
1215 – 1230	Break
1230 – 1330	Air Purification Methods and Air Motion Comfortable Velocity Ranges • Heat Gain From Occupants
1330 – 1420	Moisture Removal, Design Conditions
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2

0730 – 0815	HVAC Design Criteria Load Calculations • Load Components • Sensible Load • Latent Load • Load Categories • Skin Load • Internal Loads • People Load • Light Load • Equipment Load
0815 – 0900	Room Load Effective Load • Other Loads (Return Air Side Load –Supply Air Side Load) • Other Loads (Ventilation Load) • Grand Load • Refrigeration Load • Summer Air Conditioning System with Return Air (for Example)
0900 – 0945	Air Conditioning (Equipment- Systems) Case Study: Manual Calculations • Design Calculations for Super Market in Egypt – Alexandria City • Load Calculations System • Manual Calculations • Room Load Calculations • Transmission Load • Sun Load Calculation • Persons Load • Light Load • Equipment Load
0945 – 1000	Break





1000 – 1100	Total Room Load Plot Design Conditions on Psychrometric Chart • Sensible Heat Factor • Ventilation (Outside Air Load) Sensible Load Calculation • Ventilation Latent Load Calculation • Coil Load Calculation • Mixing Point • Supply Point • Apparatus Dew Point
1100 – 1200	Duct Design Duct Design Methods • Equal Friction Method • Using Ductlator • Duct Sizer Software • Duct Design Procedures • Duct Types • Diffusers –Grills • Duct Accessories – Case Study • Cooling System Selection
1200 – 1215	Break
1215 – 1330	Duct Insulation Material Selection & Sizing
1330 – 1420	KOTZA System Data Input • Output Report
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3

0730 – 0815	Practical Calculations Case Study • Gymnasium in USA Data Input
0815 – 0900	Refrigeration Definition • Systems • Types • Components • P-H Chart • Calculations • Superheat Degrees • Sub-Cooling Degrees • Refrigerants • COP Calculations • EER Calculations • Water System Calculations • Case Study • Ton of Refrigeration
0900 – 0945	Chillers Chiller Components • Types of Compressors • Reciprocating Compressor • Screw Compressor • Scroll Compressor • Centrifugal Compressor • Air Cooled Condensers • Water Cooled Condensers • Evaporative Condensers
0945 – 1000	Break
1000 – 1100	Comparison Between Air Cooled and Water Cooled Condensers
1100 – 1215	Flooded Evaporators – DX Evaporators
1215 – 1230	Break
1230 – 1330	Absorption Refrigeration Cycle Expansion Devices • Pressure Gages • Test Manifolds • Recovery Units
1330 – 1420	Testing – Maintenance Purging • Pump Down • Leak Test • Adding Oil • Commissioning
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three



Day 4

0730 – 0815	Maintenance <i>Definition • Objectives • Goals • Equipment Life Cycle • Types of Maintenance • Chiller Maintenance</i>
0815 – 0900	Fault Finding <i>Objectives • Introduction • Faults</i>
0900 – 0945	Troubleshooting Skills <i>Troubleshooting Tools • Technical Equipment</i>
0945 – 1000	<i>Break</i>
1000 – 1100	Troubleshooting Procedures <i>Equipment Failure</i>
1100 – 1215	Troubleshooting Analysis
1215 – 1230	<i>Break</i>
1230 – 1345	Maintenance Case Studies
1345 – 1400	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

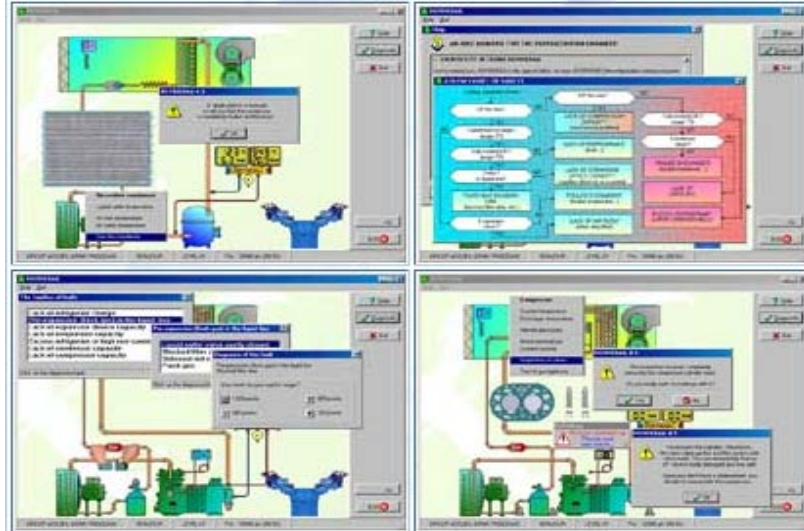


Practical Sessions/Site Visit

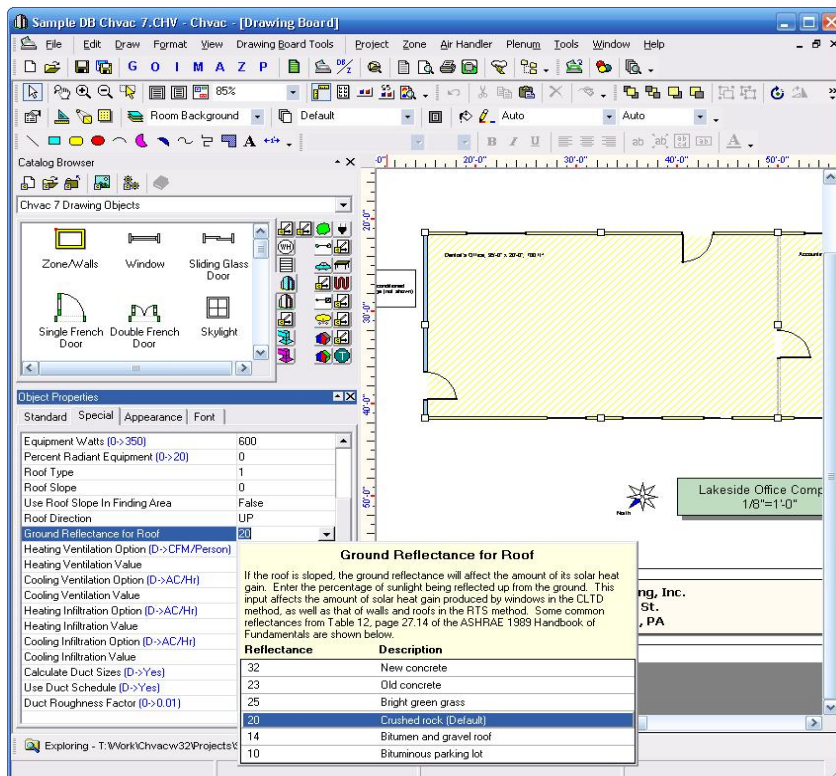




Simulator (Hands-on Practical Sessions)



KOTZA HVAC Simulator

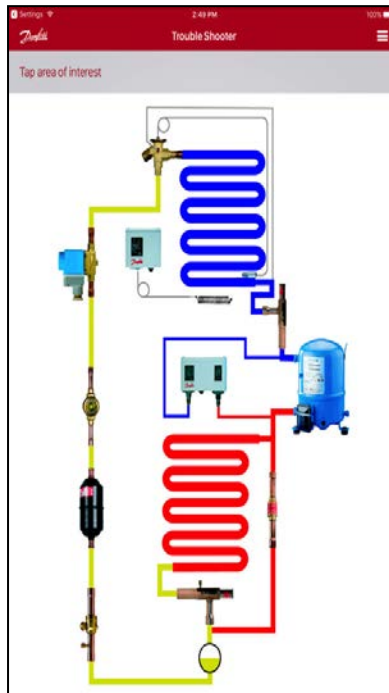


Elite CHVAC Simulator

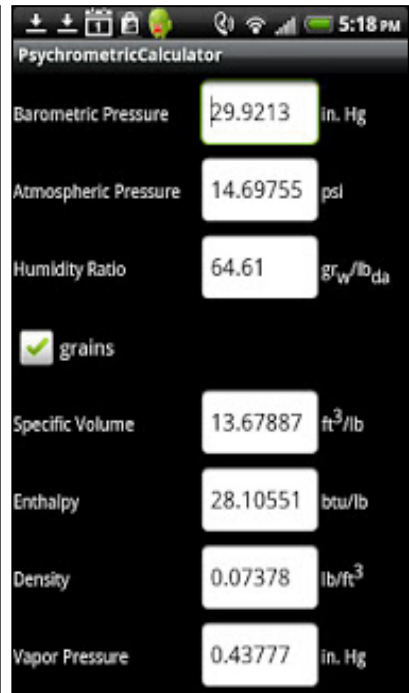




Danfoss Refrigerant Slider App



Danfoss Trouble Shooter App



Air Lite Psychrometric Calcs

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org

