

**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: September 02-05, 2024/Nakheel Meeting Room, Royal Rose Hotel, Abu Dhabi, UAE  
Session 2: September 09-12, 2024/Nakheel Meeting Room, Royal Rose 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:-

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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.

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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. Dimitry Rovas, CEng, MSc, PMI-PMP, SMRP-CMRP** is a **Senior Mechanical & Maintenance Engineer** with extensive industrial experience in **Oil, Gas, Power and Utilities** industries. His expertise includes **HVAC System, HVAC Design Criteria, HVAC Codes & Standards, Air Balancing of HVAC System, HVAC & BMS Controls Training, Electrical, HVAC, Instrumentation & Control, Boiler Inspection & Maintenance, Boiler Systems, Boiler instrumentation & Controls, Boiler Start-up & Shutdown, Boiler Operation & Steam System Management, Boiler Water Chemistry & Treatment, Boiler Efficiency & Waste Heat Recovery, Boiler Inspection & Testing,**

**Boiler Maintenance, Boiler Troubleshooting & Safety, Boiler Emissions & Pollution Control, Combustion Analysis & Tuning Procedures, Water Treatment Technology, Heat Recovery Steam Generating (HRSG), Impulse Tube Installation & Inspection, Parker Compression Fittings, Pipes & Fittings, PSV Inspection, Root Cause Failure Analysis, Tank Design & Engineering, Tank Shell, Tanks & Tank Farms, Vacuum Tanks, Gas Turbine Operating & Maintenance, Diesel Engine, Engine Cycles, Governors & Maintenance, Crankshafts & Maintenance, Lubrication System Troubleshooting & Maintenance, Engines/Drivers, Motor Failure Analysis & Testing, Motor Predictive Maintenance, Engine Construction & Maintenance, HP Fuel Pumps & Maintenance, Fired Equipment Maintenance, Combustion Techniques, Process Heaters, Glass Reinforced Epoxy (GRE), Glass Reinforced Pipes (GRP), Glass Reinforced Vent (GRV), Mechanical Pipe Fittings, Flange Joint Assembly, Adhesive Bond Lamination, Butt Jointing, Joint & Spool Production, Isometric Drawings, Flange Assembly Method, Fabrication & Jointing, Jointing & Spool Fabrication, CAESAR, Pipe Stress Analysis, Pipe Cuttings, Flange Bolt Tightening Sequence, Hydro Testing, Pump Technology, Fundamentals of Pumps, Pump Selection & Installation, Centrifugal Pumps & Troubleshooting, Reciprocating & Centrifugal Compressors, Screw Compressor, Compressor Control & Protection, Gas & Steam Turbines, Turbine Operations, Gas Turbine Technology, Valves, Process Control Valves, Bearings & Lubrication, Advanced Machinery Dynamics, Rubber Compounding, Elastomers, Thermoplastic, Industrial Rubber Products, Rubber Manufacturing Systems, Heat Transfer, Vulcanization Methods, Process Plant Shutdown & Turnaround, Professional Maintenance Planner, Advanced Maintenance Management, Maintenance Optimization & Best Practices, Maintenance Auditing & Benchmarking, Material Cataloguing, Reliability Management, Rotating Equipment, Energy Conservation, Energy Loss Management in Electricity Distribution Systems, Energy Saving, Thermal Power Plant Management, Thermal Power Plant Operation & Maintenance, Heat Transfer, Machine Design, Fluid Mechanics, Heating & Cooling Systems, Heat Insulation Systems, Heat Exchanger & Cooling Towers, Mechanical Erection, Heavy Rotating Equipment, Material Unloading & Storage, Commissioning & Start-Up. He is currently the **Project Manager** wherein he is managing, directing and controlling all activities and functions associated with the domestic heating/cooling facilities projects.**

During his life career, Mr. Rovas has gained his practical and field experience through his various significant positions and dedication as the **EPC Project Manager, Maintenance Manager, Mechanical Engineer, Field Engineer, Preventive Maintenance Engineer, Lead Rotating Equipment Commissioning Engineer, Construction Commissioning Engineer, Offshore Lead Maintenance Engineer, Researcher, Instructor/Trainer, Telecom Consultant and Consultant** from various companies such as the Mytilineos Aluminium Group, Podaras Engineering Studies, Metka and Diadikasia, S.A., **Hellenic Petroleum Oil Refinery** and **COSMOTE**.

Mr. Rovas has **Master's** degrees in **Energy Production & Management** and **Mechanical Engineering** from the **National Technical University of Athens (NTUA), Greece**. Further, he is a **Certified Instructor/Trainer**, a **Certified Maintenance and Reliability Professional (CMRP)** from the Society of Maintenance & Reliability Professionals (**SMRP**), **Certified Project Management Professional (PMI-PMP)**, **Certified Six Sigma Black Belt**, **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)**, **Certified Construction Projects Contractor**, **Certified Energy Auditor** and a **Chartered Engineer**. Moreover, he is an active member of **American Society for Quality**, **Project Management Institute (PMI)**, **Body of Certified Energy Auditors** and **Technical Chamber of Greece**. He has further received various recognition and awards and delivered numerous trainings, seminars, courses, workshops and conferences 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	<b>PRE-TEST</b>
0830 – 0915	<b>Introduction</b> 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	<b>Basic Principals of HVAC&amp;R</b> 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	<b>Principles of Heat Transfer</b> Heat Transfer • Method of Heat Transfer • Sensible and Latent Heat • Sensible Heat Definition • Latent Heat Definition • First Law of Thermodynamic
1115 – 1215	<b>Design Conditions</b> Outdoor Climate • Indoor Comfort • Solar Orientation • Indoor Air Quality
1215 – 1230	Break
1230 – 1330	<b>Air Purification Methods and Air Motion</b> Comfortable Velocity Ranges • Heat Gain From Occupants
1330 – 1420	<b>Moisture Removal, Design Conditions</b>
1420 – 1430	<b>Recap</b> 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	<b>HVAC Design Criteria</b> Load Calculations • Load Components • Sensible Load • Latent Load • Load Categories • Skin Load • Internal Loads • People Load • Light Load • Equipment Load
0815 – 0900	<b>Room Load</b> 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	<b>Air Conditioning (Equipment- Systems)</b> 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	<b>Total Room Load</b> 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	<b>Duct Design</b> 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	<b>Duct Insulation Material Selection &amp; Sizing</b>
1330 – 1420	<b>KOTZA</b> System Data Input • Output Report
1420 – 1430	<b>Recap</b> 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	<b>Practical Calculations</b> Case Study • Gymnasium in USA Data Input
0815 – 0900	<b>Refrigeration</b> 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	<b>Chillers</b> 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	<b>Comparison Between Air Cooled and Water Cooled Condensers</b>
1100 – 1215	<b>Flooded Evaporators – DX Evaporators</b>
1215 – 1230	Break
1230 – 1330	<b>Absorption Refrigeration Cycle</b> Expansion Devices • Pressure Gages • Test Manifolds • Recovery Units
1330 – 1420	<b>Testing – Maintenance</b> Purging • Pump Down • Leak Test • Adding Oil • Commissioning
1420 – 1430	<b>Recap</b> 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	<b>Maintenance</b> Definition • Objectives • Goals • Equipment Life Cycle • Types of Maintenance • Chiller Maintenance
0815 – 0900	<b>Fault Finding</b> Objectives • Introduction • Faults
0900 – 0945	<b>Troubleshooting Skills</b> Troubleshooting Tools • Technical Equipment
0945 – 1000	Break
1000 – 1100	<b>Troubleshooting Procedures</b> Equipment Failure
1100 – 1215	<b>Troubleshooting Analysis</b>
1215 – 1230	Break
1230 – 1345	<b>Maintenance Case Studies</b>
1345 – 1400	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

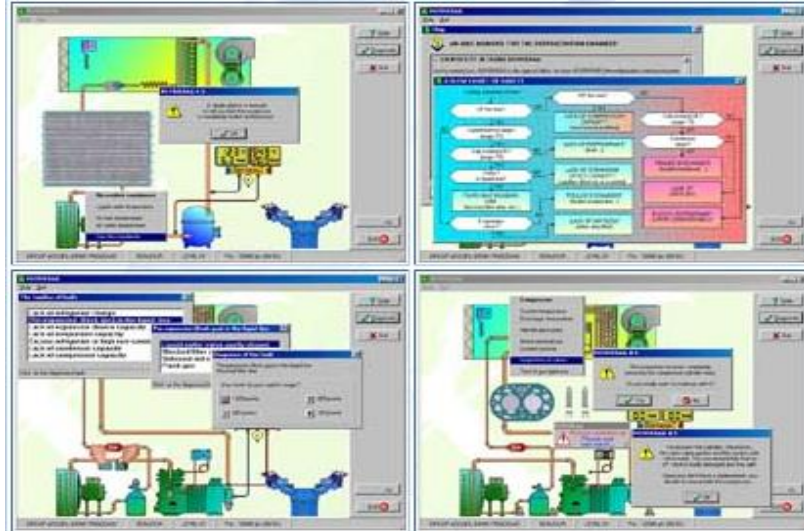
**Practical Sessions/Site Visit**



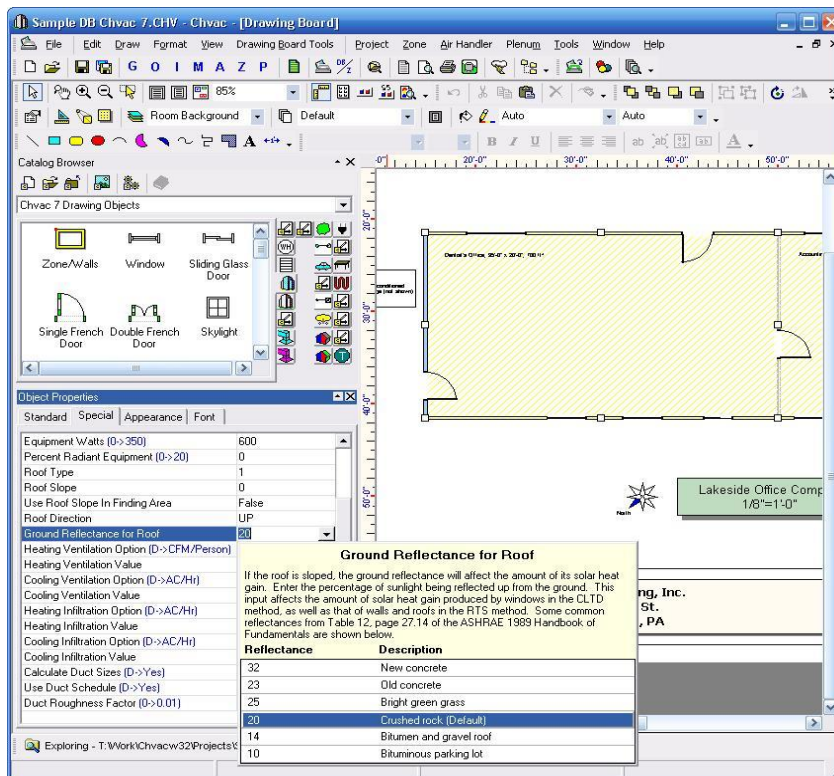




**Simulator (Hands-on Practical Sessions)**



**KOTZA HVAC Simulator**



**Elite CHVAC Simulator**



<b><u>Danfoss Refrigerant Slider App</u></b>	<b><u>Danfoss Trouble Shooter App</u></b>	<b><u>Air Lite Psychrometric Calcs</u></b>

**Course Coordinator**

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