COURSE OVERVIEW ME0510
Maintenance & Fault Finding of Central Air Conditioning Units and Chillers

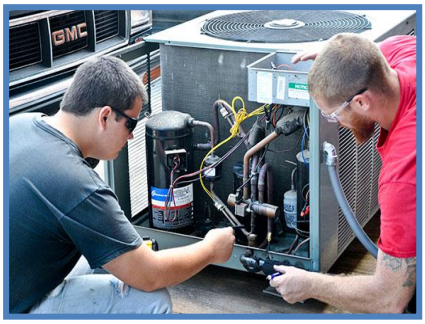
Course Title
Maintenance & Fault Finding of Central Air Conditioning Units and Chillers

Course Date/Venue
June 22-26, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
ME0510

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description



This hands-on, 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.

This course is designed to provide participants with a detailed and an up-to date overview of maintenance and fault finding of central air conditioning units and chillers. It covers the psychometric chart and the requirements of comfort air conditioning; the HVAC systems including air conditioning systems and its arrangement of components; the air conditioning equipment including air filters, humidifiers, dehumidifiers, fans, blowers, grill and registers; the variable air volume (VAV) and refrigeration systems; the various air conditioning, refrigeration tools and instruments; and the water-cooling problems and HVAC control systems.

During this interactive course, participants will learn the servicing and safety operation of central air conditioning units and chillers and its installation, operation, testing and maintenance; the process of fault finding and troubleshooting of central air conditioning units and chillers; the proven methodology of assessing the valve failures in the oil and gas sector and how it affects the maintenance and troubleshooting processes of valves; the plant valve management and regulators that are used in valve technology; the extended valve components, hardide, coatings and composite valves including their design, installation, application and sizing; and the proper procedure for corrosion, galling, water testing and the proper methodology of valve sizing and selection using the various programs and applications.

Course Objectives

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

- Apply systematic techniques, tools and procedures on maintenance and fault finding of central air conditioning units and chillers
- Analyze psychometric chart and identify the requirements of comfort air conditioning
- Discuss HVAC systems including air conditioning systems and its arrangement of components
- Recognize the air conditioning equipments including air filters, humidifiers, dehumidifiers, fans & blowers, and grill & registers
- Identify the variable air volume (VAV) systems and the refrigeration systems
- List and review the various air conditioning and refrigeration tools and instruments and become acquainted with chillers
- Identify and analyze water-cooling problems and recognize the HVAC control systems
- Carryout servicing and safety operation of central air conditioning units and chillers and recognize its installation, operation, testing and maintenance
- Employ the process of fault finding and troubleshooting of central air conditioning units and chillers
- Apply proven methodology of assessing the valve failures in the oil & gas sector and explain how it affects the maintenance and troubleshooting processes of valves
- Acquire an overview of plant valve management and regulators that are used in valve technology and an overview of extended valve components, hardide & coatings and composite valves including their design, installation, application and sizing
- Apply the proper procedure for corrosion, galling and water testing and carryout proper methodology of valve sizing & selection using the various programs and applications

Who Should Attend

This course covers systematic techniques and methodologies on maintenance and fault finding of central air conditioning unit and chillers for HVAC engineers, utilities managers, maintenance/plant managers, mechanical engineers, electrical engineers design engineers, consulting engineers, inspection and repair engineers, operation, maintenance, managers, superintendents, supervisors, foremen and other technical staff.

Course Certificate(s)

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

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- 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.

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association 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 1-2013 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 1-2013 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 Association 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 **3.0 CEUs** (Continuing Education Units) or **30 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.

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, is a **Senior Mechanical Engineer** with extensive industrial experience in **Oil**, **Gas**, **Power** and **Utilities** industries. His expertise includes **Chillers**, **HVAC**, **HVAC Design Criteria**, **Design Conditions**, **Heat Transfer**, **Air Purification Methods and Air Motion**, **Refrigeration**, **Duct Insulation**, **Pump** Technology, **Pump** Selection & Installation, **Centrifugal Pumps & Troubleshooting**, **Reciprocating & Centrifugal Compressors**, **Compressor** Control & Protection, **Gas & Steam Turbines**, **Turbine** Operations, **Gas Turbine** Technology, **Valves**, **Bearings & Lubrication**, Advanced **Machinery Dynamics**, **Rubber Compounding**, **Elastomers**, **Thermoplastic**, **Industrial Rubber Products**, **Rubber** Manufacturing Systems, **Heat Transfer**, **Vulcanization Methods**, **Process Plant Shutdown & Turnaround**, **Maintenance Optimization & Best Practices**, **Maintenance Auditing & Benchmarking**, **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. Further, he is also well-versed in MS project & AutoCAD, EPC Power Plant, Power Generation, Combined Cycle Powerplant, Leadership & Mentoring, Project Management, Strategic Planning/Analysis, Construction Management, Team Formation, Relationship Building, Communication, Reporting and Six Sigma. 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**, **Field Engineer**, **Preventive Maintenance Engineer**, **Researcher**, **Instructor/Trainer**, **Telecom Consultant** and **Consultant** from various companies such as the Podaras Engineering Studies, Metka and Diadikasia, S.A., **Hellenic Petroleum Oil Refinery** and COSMOTE.

Mr. Rovas is a **Chartered Engineer** of the **Technical Chamber** of **Greece**. Further, he has **Master** degrees in **Mechanical Engineering** and **Energy Production & Management** from the **National Technical University of Athens**. Moreover, he is a **Certified Instructor/Trainer**, a **Certified Project Management Professional** (**PMP**) and a **Certified Six Sigma Black Belt**. He is an active member of Project Management Institute (**PMI**), Technical Chamber of Greece and Body of Certified Energy Auditors and has further delivered numerous trainings, seminars, courses, workshops and conferences internationally.

Accommodation

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

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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 Program

The following program is planned for this course. However, the course instructor(s) 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: ***Sunday, 22nd of June 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction*** *Properties of Solids, Gases and Water ● Force, Work, Power, Energy Calculations ● Heat and Temperature ● Change of Phase ● Pressure ● Density, Specific Volume and Mass Flow*
0930 – 0945	*Break*
0945 – 1100	***Psychrometic Chart*** *How it is Developed ● Altitude, Barometric Pressure, Dry and Wet Bulb Temperature, Relative Humidity, Specific Volume, Density, Mass Flow, Humidity Ratio, Dew Point and Enthalpy ● Measurement of Wet and Dry Bulb Temperature of Air ● Calculations to Determine Temperatures of Mixtures, Mass Flow of Air, Amount of Heat/Mass Transfer in Cooling, Heating, Humidification and Dehumidification Processes ● System Design ● Understanding System Operation*
1100 – 1215	***Requirements of Comfort Air Conditioning*** *What is Indoor Air Quality (IAQ)? ● Typical Effects on Occupants ● Basic Investigation Techniques ● Architectural, Engineering and Interior Design Choices for Good IAQ*

1215 – 1230	*Break*
1230 – 1420	***HVAC Systems*** *Air Conditioning Systems-Central Air Conditioning System, Unitary Air Conditioning System, District Air Conditioning System, Self Contained Air Conditioning Units ● Arrangement of Components in an HVAC System*
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: Monday, 23rd of June 2025

0730 – 0930	***Air Conditioning Equipment*** *Air Filters ● Humidifiers ● Dehumidifiers ● Fans and Blowers ● Grills and Registers*
0930 – 0945	*Break*
0945 – 1100	***Variable Air Volume (VAV) Systems*** *System Concept ● Characteristics of VAV Systems*
1100 – 1215	***Variable Air Volume (VAV) Systems (cont'd)*** *Various VAV Systems ● Arrangement of Terminals of VAV Systems*
1215 – 1230	*Break*
1230 – 1420	***Refrigeration Systems*** *What is Refrigeration? ● Vapor-Compressor Refrigeration Systems ● Refrigeration System Components ● Compressors ● Condensers ● Evaporators*
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: Tuesday, 24th of June 2025

0730 – 0930	***Refrigeration Systems*** *Expansion Valve ● Accessories ● Refrigerants ● Cooling Towers ● Piping Arrangement of Refrigeration Systems*
0930 – 0945	*Break*
0945 – 1100	***Air Conditioning & Refrigeration Tools & Instruments*** *Tools and Equipment ● Gages and Instruments ● Thermometers ● Superheat Measurement Instruments ● Halide Leak Detectors ● Electrical Instruments ● Other Instruments ● Service Tools ● Special Tools ● Vacuum Pumps ● Charging Cylinder ● Changing Oil ● Soldering ● Testing for Leaks*
1100 – 1215	***Chillers*** *Types of Chillers ● Vapor-Compression Cycle ● Variable-Speed Drives ● Packaged Air-Cooled Chiller ● Absorption Refrigeration Cycle ● Chilled-Water System Components ● Single-Chiller Systems ● Multiple-Chiller Systems*
1215 – 1230	*Break*

1230 – 1420	***Working with Water-Cooling Problems*** *Introduction ● Scale Control ● Corrosion Control ● Blowdown–Intential Water Loss from Cooling Systems ● Chemical Scale Inhibitor Use ● Biological Control–Biocide Dangers*
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: Wednesday, 25th of June 2025

0730 – 0930	***HVAC Control Systems*** *Understand the Concept of Control ● Types of Control ● Elements of Control ● Methods of Control ● Instrumentation*
0930 – 0945	*Break*
0945 – 1100	***Servicing & Safety*** *Safety and Regulations-Handling Refrigerants, Handling of Pressure Containers ● Changing the Compressor ● Adding Oil to the Compressor ● Replacing the Air Cooled Condenser ● Changing the Evaporator ● Air Purging ● Pump Down of the Refrigeration System ● Leakage Test ● System Check ● Cleaning-Air Cooled Containers, Evaporative Condensers ● Evacuating Procedure*
1100 – 1215	***Installation, Operation, Testing & Maintenance*** *Installation Guidelines ● Commissioning ● Air Volume Measurements ● Balancing Procedures ● Air Balancing ● Commissioning Report ● Maintenance-Coils, Air-Cooled Condensers, Cooling Towers, Fans*
1215 – 1230	*Break*
1230 – 1420	***Preventive Maintenance*** *Inspection Checklist ● Operating Log*
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 Four*

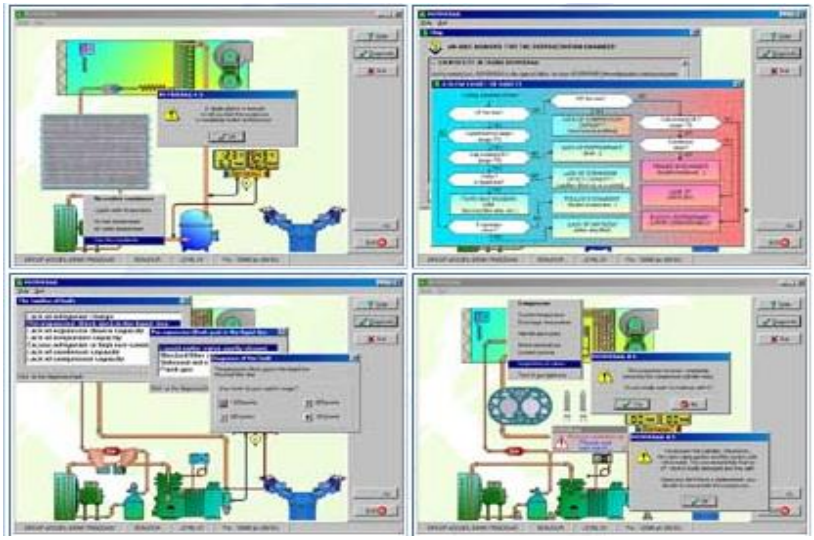
Day 5: Thursday, 26th of June 2025

0730 – 0930	***Fault Finding & Troubleshooting*** *Introduction ● Requirements ● Troubleshooting Procedures-Refrigerant, Plant Layout, Visual Inspection, Measurement*
0930 – 0945	*Break*
0945 – 1100	***Fault Finding & Troubleshooting (cont'd)*** *Faults-Improper Adjustments and Setting, Poor Design and Installation, Equipment Failure, Limitations in Operation ● Troubleshooting Guide to Electrical Faults ● Finding Electrical Faults*
1100 – 1215	***Fault Finding & Troubleshooting (cont'd)*** *Troubleshooting Skills ● Cause and Effect Diagram ● Troubleshooting Tools*
1215 – 1230	*Break*

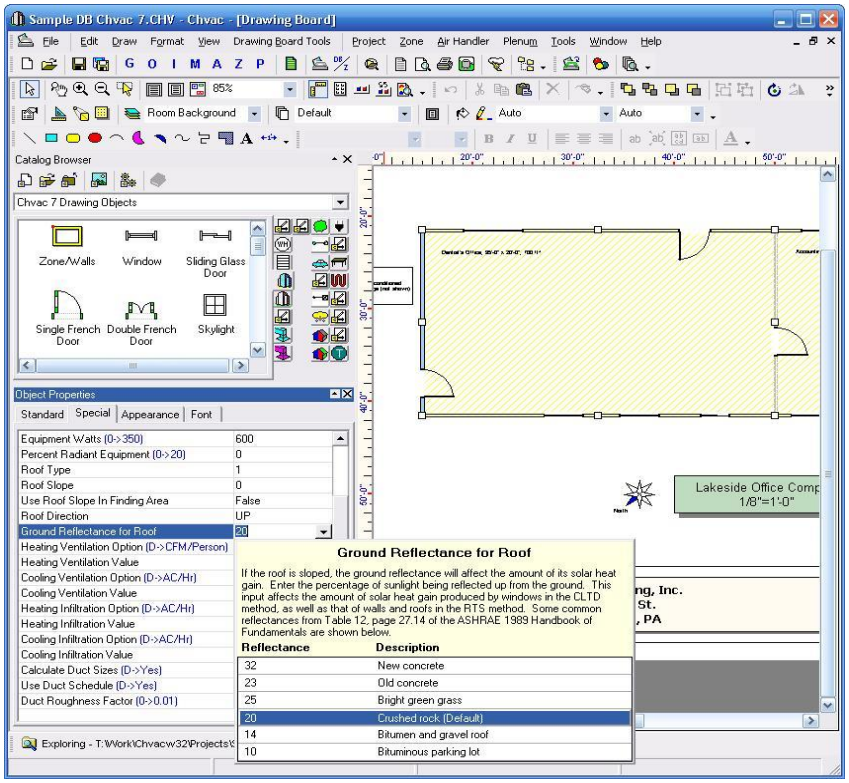
1230 – 1345	***Fault Finding & Troubleshooting (cont'd)*** *Typical Malfunctions and Possible Causes*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions/Site Visit

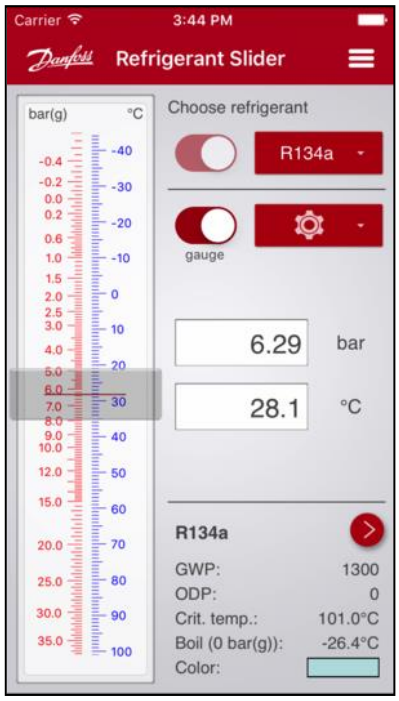
Simulator (Hands-on Practical Sessions)



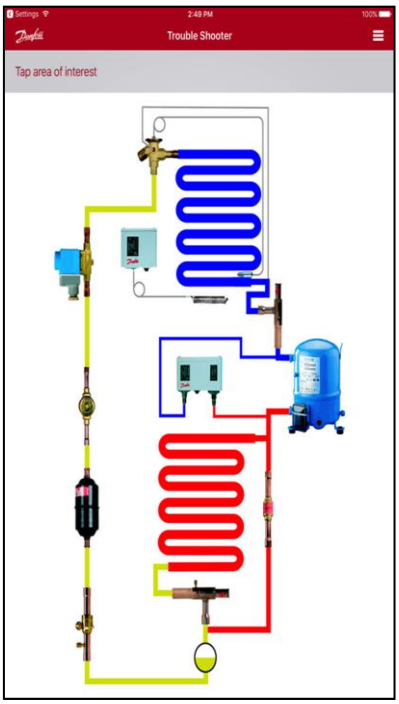
KOTZA HVAC Simulator



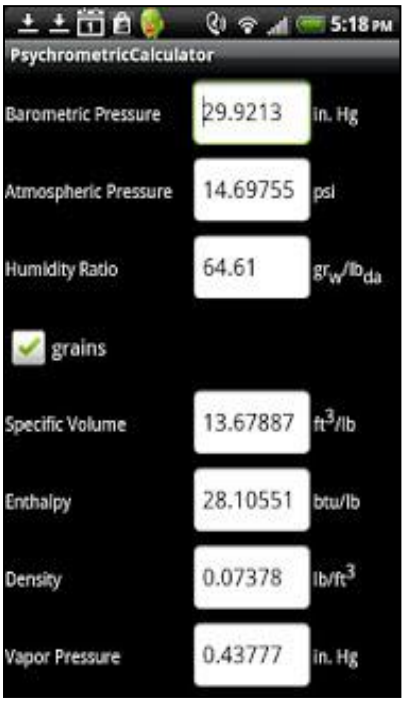
Elite CHVAC Simulator



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