COURSE OVERVIEW ME0509

Advanced Technology in Design, Installation & Maintenance Aspects of Vapour Absorption Chiller (VAM) Plant

Course Title

Advanced Technology in Design, Installation & Maintenance Aspects of Vapour Absorption Chiller (VAM) Plant

Course Date/Venue

August 24-28, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

ME0509

Course Duration/Credits

Five days/3.0 CEUs/30 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.

This course introduces vapour absorption refrigeration systems and explains the principles of vapour absorption refrigeration system. At the same time, it compares vapour compression refrigeration systems with continuous vapour absorption refrigeration systems. Further, it provides expression for maximum COP of ideal absorption refrigeration system. Properties of ideal and real refrigerant-absorbent mixtures will be discussed during the course.

A thorough description of a single stage vapour absorption refrigeration system with solution heat exchanger is provided. Finally, a discussion over the desirable properties of refrigerant-absorbent pairs for vapour absorption refrigeration systems and the commonly used working fluids will be covered in this course.

Course Objectives

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

- Apply and gain an advanced knowledge on the design, installation and maintenance aspects of vapour absorption chiller (VAM) plants and technology
- Identify the refrigeration machines, determine chilled water supply temperature and establish temperature range
- Configure chillers using one-pump parallel, multi-pump parallel, primary-secondary parallel and variable primary flow parallel configuration
- Carryout chiller design and application and enumerate the elements of chilled water system
- Illustrate chilled water system control and performance
- Recognize cooling thermal energy storage including the economics and available technologies
- Determine special chiller considerations for noise and vibration, electrical service and chiller heat recovery
- Employ proper chiller operation and maintenance including commissioning, maintenance and performance troubleshooting
- Define chiller performance requirements and perform economic evaluation of chiller systems in buying a chiller

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 conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of vapour absorption chiller for those who are involved in the design, installation and maintenance of such equipment and technology. Mechanical & electrical engineers, maintenance managers & supervisors, procurement supervisors & engineers, HVAC maintenance services and HVAC technical staff will definitely benefit from this course.

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.

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.

- 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 **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. 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 **Pipe Stress Analysis** using **CAESAR II**, **CAESAR II** Application, **Piping Dynamic**, **Static & Other Special Analysis** using **CAESAR II**, **Expansion Joints** Design & Analysis, **Impact Load** Analysis, **Piping** Systems, **Piping Codes** Used in **CAESAR II**, **RFP Pipe** Maintenance & Repair, **Relief Valve** Analysis, Safety **Relief Valve**, **Tanks & Tank Farms**, **Seismic Loads**, **Tank Shell**, **Tank Failure**, **Vacuum Tanks**, **Tank Design & Engineering**, **Tank Contractions**, **Material Cataloguing**, **Maintenance Planning & Scheduling**, Reliability Centered Maintenance (**RCM**), **Reliability Maintenance**, **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, **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 Termina**l Safety & Integrity Management, **Process Piping** Design, Construction & **Mechanical Integrity**, **Stack & Noise** Monitoring, **HVAC & Refrigeration** Systems, BPV Code, Section VIII, Division 2, **Facility Planning & Energy** Management, Hoist - Remote & Basic **Rigging & Slinging**, **Mobile Equipment** Operation & Inspection, **Heat Exchanger**, **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**, **Deputy Officer**, **Instructor**, **Construction Manager**, **Construction Engineer**, **Consultant Engineer**, **Mechanical Engineer** and **CAESAR II Application Consultant** 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's** degree in **Energy System** from the **International Hellenic University, School of Science & Technology** and a **Bachelor's** 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.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Refrigeration Machines*** *Vapor Compression Refrigeration • Refrigeration Cycle • Refrigerants Absorption • Refrigeration Absorption • Refrigerants Vapor*
0930 – 0945	*Break*
0945 – 1100	***Refrigeration Machines (cont'd)*** *Compression Cycle • Water Chillers • Scroll Compressors • Rotary Screw and Centrifugal Compressors • Electric-Drive Chillers • Engine-Drive Chillers • Condensing Medium • Absorption Chillers Establishing the Temperature Range*
1100 – 1215	***Refrigeration Machines (cont'd)*** *Lithium Bromide Absorption Chillers • Ammonia Absorption Chillers • Chilled Water for HVAC Applications*
1215 – 1230	*Break*
1230 – 1340	***Refrigeration Machines (cont'd)*** *Determining the Chilled Water Supply Temperature • Establishing the Temperature Range*
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 – 0930	***Chiller Configurations*** *The Single-Chiller System • Multichiller Systems • One-Pump Parallel Configuration Multiple-Pump Parallel*
0930 – 0945	*Break*
0945 – 1100	***Chiller Configurations (cont'd)*** *Primary–Secondary Parallel Configuration*
1100 – 1215	***Chiller Configurations (cont'd)*** *Variable Primary Flow Parallel Configuration • System Peak Cooling Load and Load Profile • Selecting Water Chillers • Basic Chiller Requirements*
1215 – 1230	*Break*
1230 – 1420	***Chiller Configurations (cont'd)*** *Part Load Efficiency Load versus Capacity • Atmospheric Impacts • Mixed Energy Source • Chiller Systems*
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 – 0930	***Chiller Design & Application, Chilled Water System Elements*** *Chiller Placement and Installation • Chilled Water Piping • Piping Materials and Insulation Requirements*
0930 – 0945	*Break*
0945 – 1100	***Chiller Design & Application, Chilled Water System Elements (cont'd)*** *Water Expansion and Air Removal • Water Treatment • Pump Selection and Piping • Pump Basics • Pump Head and Horsepower • Variable Flow Pumping*
1100 – 1215	***Chilled Water System Control & Performance*** *Start-Up Control • Capacity Control • Refrigerant Flow Control • Sequencing Multiple Chillers*
1215 – 1230	*Break*
1230 – 1320	***Chilled Water System Control & Performance (cont'd)*** *Optimizing Chilled Water Supply Temperature • Variable Flow Pumping Control*
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 – 0930	***Cooling Thermal Energy Storage*** *Economics of Thermal Energy Storage • Available Technologies • Chilled Water Storage Systems • Ice Storage • Phase Change Materials Storage Systems • Application of TES*
0930 – 0945	*Break*
0945 – 1100	***Special Chiller Considerations*** *Noise and Vibration • Electrical Service • Chiller Heat Recovery •*

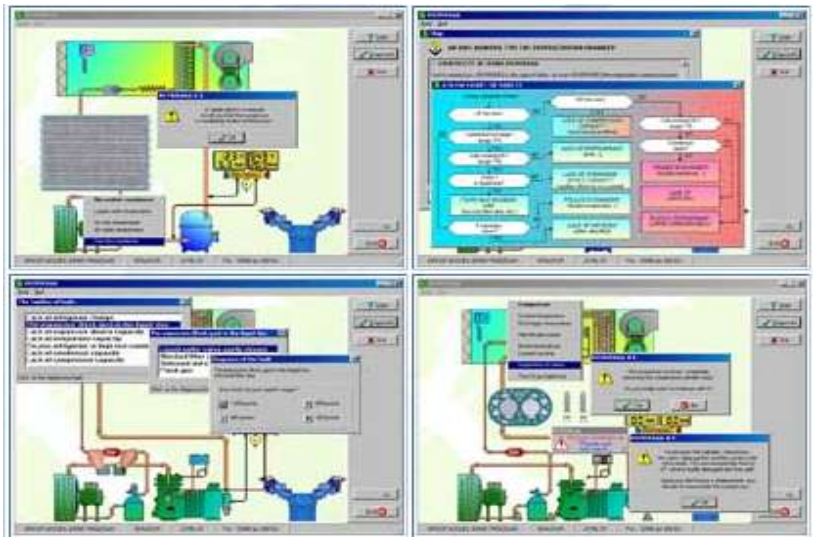
1100 – 1215	***Chiller Operation & Maintenance*** *Chiller Commissioning • Chiller Maintenance • Chiller Performance Troubleshooting*
1215 – 1230	*Break*
1230 – 1420	***Chiller Operation & Maintenance (cont'd)*** *Selection or Design Problems • Installation Problems • Refrigerant Management Program*
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

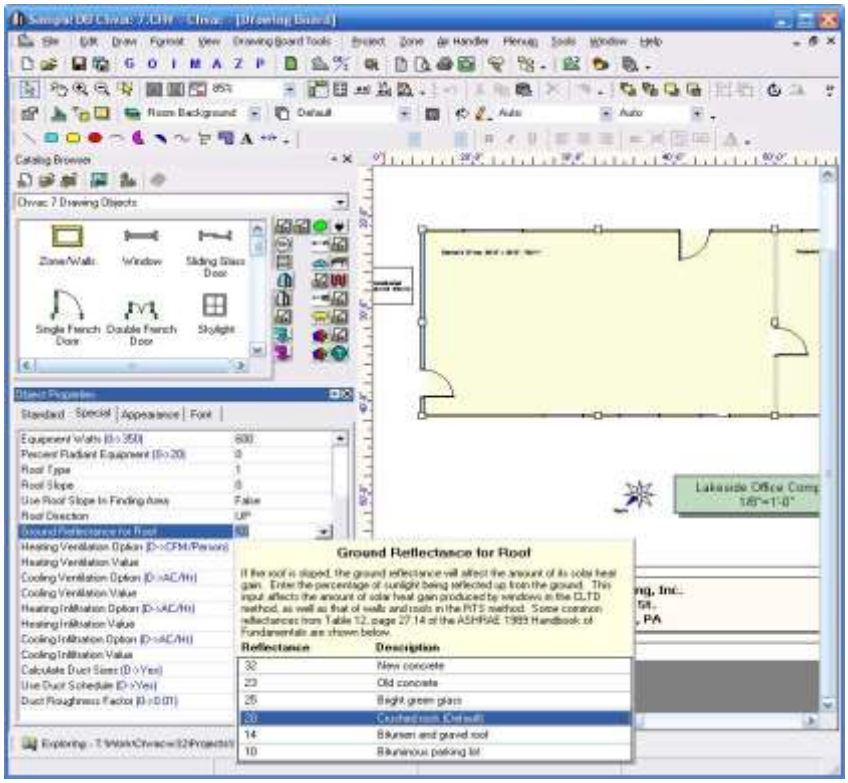
0730 – 0830	***Buying a Chiller*** *Defining Chiller Performance Requirements • Economic Evaluation of Chiller Systems*
0930 – 0945	*Break*
0945 – 1100	***Buying a Chiller (cont'd)*** *First Costs • Annual Recurring Costs*
1100 – 1215	***Buying a Chiller (cont'd)*** *Nonrecurring Repair and Replacement Costs*
1215 – 1230	*Break*
1230 – 1345	***Buying a Chiller (cont'd)*** *Total Owning and Operating Cost Comparison • Procurement Specification*
1330 – 1345	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1345 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions/Site Visit

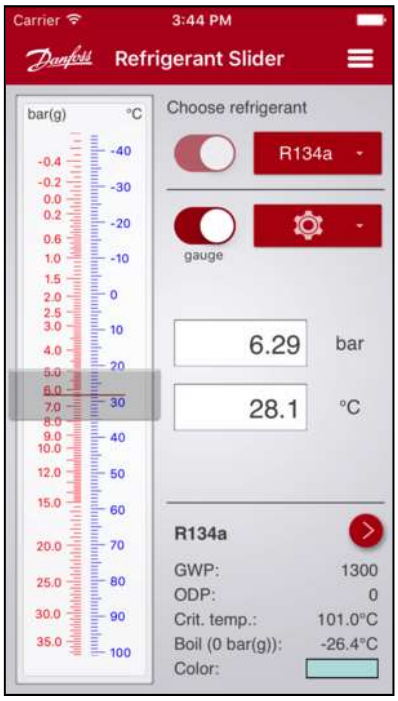
Simulator (Hands-on Practical Sessions)



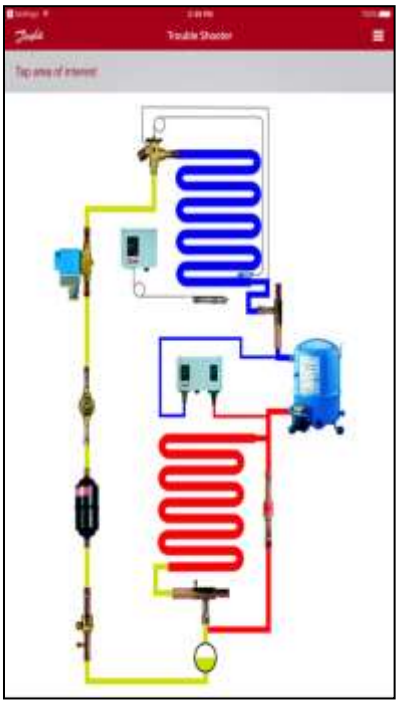
KOTZA HVAC Simulator



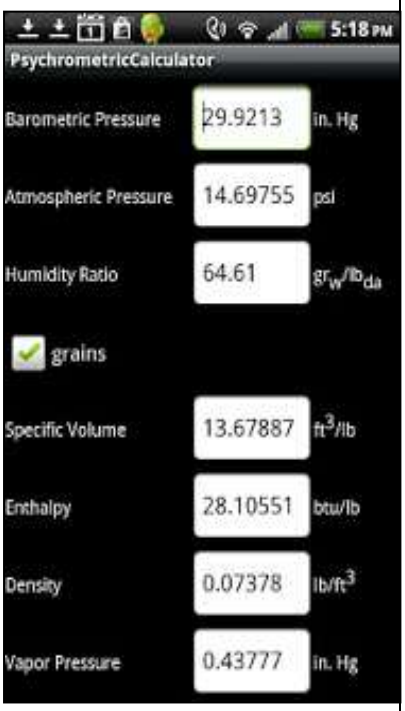
Elite CHVAC Simulator



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