

## COURSE OVERVIEW ME0747 ASHRAE Refrigerant

### Course Title

ASHRAE Refrigerant

### Course Date/Venue

April 06-10, 2025/Boardroom 1, Elite Byblos  
Hotel Al Barsha, Sheikh Zayed Road, Dubai,  
UAE

### Course Reference

ME0747

### Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

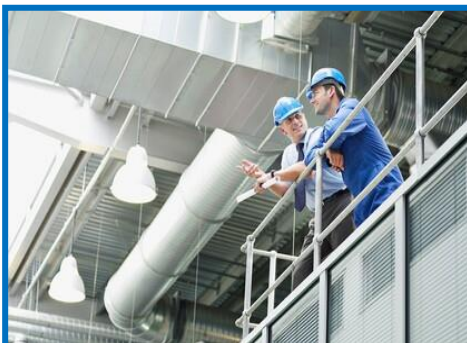
### Course Description



***This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.***



This course is designed to provide participants with a detailed and up-to-date overview of ASHRAE Refrigerant. It covers the types, properties and characteristics of refrigerants; the ASHRAE standards and guidelines including refrigerant classifications and selection criteria for refrigerants; the global regulations and policies and the thermodynamic properties of refrigerants; and the basic refrigeration cycle and advanced cycle configurations.



Further, the course will also discuss the system components and design; the heat exchangers and refrigerant management, refrigerant charge management, leak detection and prevention; the environmental impact of refrigerants including safety standards and practices; the safe handling practices including storage requirements and procedures of refrigerants; and the emergency response and management, refrigerant leaks and spills response and emergency management protocols.



During this interactive course, participants will learn the retrofitting and upgrading systems, sustainable refrigerant options and the emerging technologies and trends; the best practices for installing refrigerant systems, commissioning procedures, routine maintenance and troubleshooting techniques; the methods for recovering refrigerant including recycling and disposal practices; testing system performance and the techniques for optimizing efficiency and advanced refrigeration systems; integrating refrigerant systems with building management systems; the strategies for improving energy efficiency; developing and implementing management programs; and the best practices for ongoing compliance.

### **Course Objectives**

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

- Apply and gain an in-depth knowledge on ASHRAE refrigerant
- Identify the types, properties and characteristics of refrigerants
- Review ASHRAE standards and guidelines including refrigerant classifications and selection criteria for refrigerants
- Discuss the global regulations and policies and the thermodynamic properties of refrigerants
- Illustrate the basic refrigeration cycle and advanced cycle configurations
- Identify system components and design covering compressors, condensers, evaporators and expansion devices
- Carryout heat exchangers and refrigerant management, refrigerant charge management, leak detection and prevention
- Discuss the environmental impact of refrigerants including safety standards and practices
- Employ safe handling practices including storage requirements and procedures of refrigerants
- Apply emergency response and management, refrigerant leaks and spills response and emergency management protocols
- Recognize retrofitting and upgrading systems, sustainable refrigerant options and the emerging technologies and trends
- Carryout best practices for installing refrigerant systems, commissioning procedures, routine maintenance and troubleshooting techniques
- Illustrate methods for recovering refrigerant including recycling and disposal practices
- Apply testing system performance, techniques for optimizing efficiency and advanced refrigeration systems
- Integrate refrigerant systems with building management systems and apply strategies for improving energy efficiency
- Develop and implement management programs and best practices for ongoing compliance





### **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 ASHRAE refrigerant for facility managers, HVAC engineers, service and maintenance professionals, environmental and safety compliance officers, HVAC technicians, consultants and contractors.

### **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\$ 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.

### **Accommodation**

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

### 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:-

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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 **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.

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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.





**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 Root Cause Failure Analysis, Rotating Equipment Maintenance & Failure Analysis, Failure Analysis Methodologies for Mechanical Engineers, Reliability Centered Maintenance & Root Cause Failure Analysis, Machinery Failure Analysis, Prevention & Troubleshooting, Machinery Failure Analysis, Machinery Root Cause Failure Analysis (RCFA), Machinery Diagnostics & Root Cause Failure Analysis, Water Well, Transfer & Network Systems Operation, Water Network Systems & Pumping Stations, Instrument, Control & Protection Systems, Plumbing Network Systems & Building, Water Distribution & Pump Station, Boiler Operation & Water Treatment, Pipeline Simulations, 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, Atmospheric Tanks, 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, Plant Reliability & Maintenance Strategies, Centrifugal 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, Diesel Engine Operations, Maintenance & Troubleshooting, PD Compressor & Gas Engine Operation & Troubleshooting, Hydraulic Tools & Fitting, Mass & Material Balance Tank Farm & Tank Terminal 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 & 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, Deputy Officer, Instructor, Construction Manager, Construction Engineer, Consultant Engineer, Water Network Systems Engineer, Maintenance Engineer and 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.



**Course Program**

The following program is planned for this course. However, the course instructor 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, 06<sup>th</sup> of April 2025**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>Overview of Refrigerants</b> Types of Refrigerants • Properties and Characteristics
0930 – 0945	Break
0945 – 1030	<b>History &amp; Evolution of Refrigerants</b> Timeline of Refrigerant Development • Transition to Environmentally Friendly Options
1030 – 1115	<b>ASHRAE Standards &amp; Guidelines</b> Introduction to ASHRAE Standards (15, 34, 147) • Importance of Compliance
1115 – 1230	<b>Refrigerant Classifications</b> Safety Classifications (A1, A2, A3, B1, B2, B3) • Environmental Impact Classifications (GWP, ODP)
1230 – 1245	Break
1245 – 1330	<b>Selection Criteria for Refrigerants</b> Performance Criteria • Environmental and Safety Considerations
1330 – 1420	<b>Global Regulations &amp; Policies</b> International Protocols (Montreal, Kyoto) • Regional Regulations and Their Impact
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: Monday, 07<sup>th</sup> of April 2025**

0730 – 0830	<b>Thermodynamic Properties of Refrigerants</b> Pressure-Temperature Relationship • Heat Transfer Characteristics
0830 – 0930	<b>Refrigerant Cycle Fundamentals</b> Basic Refrigeration Cycle • Advanced Cycle Configurations
0930 – 0945	Break
0945 – 1100	<b>System Components &amp; Design</b> Compressors, Condensers, Evaporators, Expansion Devices • Design Considerations for District Cooling Systems
1100 – 1230	<b>Heat Exchangers &amp; Refrigerant Management</b> Types of Heat Exchangers • Design and Optimization
1230 – 1245	Break
1245 – 1330	<b>Refrigerant Charge Management</b> Determining Correct Refrigerant Charge • Methods for Charging and Recovering Refrigerant
1330 – 1420	<b>Leak Detection &amp; Prevention</b> Techniques for Detecting Leaks • Preventative Measures and Best Practices
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: Tuesday, 08<sup>th</sup> of April 2025**

0730 – 0830	<b>Environmental Impact of Refrigerants</b> Global Warming Potential (GWP) • Ozone Depletion Potential (ODP)
0830 - 0930	<b>Safety Standards &amp; Practices</b> ASHRAE Standard 15: Safety Standard for Refrigeration Systems • Personal Protective Equipment (PPE) and Safety Protocols
0930 – 0945	Break
0945 – 1100	<b>Handling &amp; Storage of Refrigerants</b> Safe Handling Practices • Storage Requirements and Procedures
1100 – 1230	<b>Emergency Response &amp; Management</b> Responding to Refrigerant Leaks and Spills • Emergency Management Protocols
1230– 1245	Break
1345 – 1330	<b>Retrofitting &amp; Upgrading Systems</b> Challenges and Considerations in Retrofitting • Case Studies on Successful Upgrades
1330 - 1420	<b>Sustainability &amp; Future Trends</b> Sustainable Refrigerant Options • Emerging Technologies and Trends
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: Wednesday, 09<sup>th</sup> of April 2025**

0730 – 0830	<b>System installation &amp; Commissioning</b> Best Practices for installing Refrigerant Systems • Commissioning Procedures
0830 – 0930	<b>Maintenance &amp; Troubleshooting</b> Routine Maintenance Activities • Common Issues and Troubleshooting Techniques
0930 – 0945	Break
0945 – 1100	<b>Refrigerant Recovery &amp; Recycling</b> Methods for Recovering Refrigerant • Recycling and Disposal Practices
1100 – 1230	<b>Performance Testing &amp; Optimization</b> Testing System Performance • Techniques for Optimizing Efficiency
1230 – 1245	Break
1245- 1330	<b>Leak Detection</b> Training in Leak Detection • Using Advanced Detection Tools
1330 - 1420	<b>Refrigerant Charging</b> Proper Charging Techniques • Ensuring Optimal System Performance
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 Four





**Day 5: Thursday, 10<sup>th</sup> of April 2025**

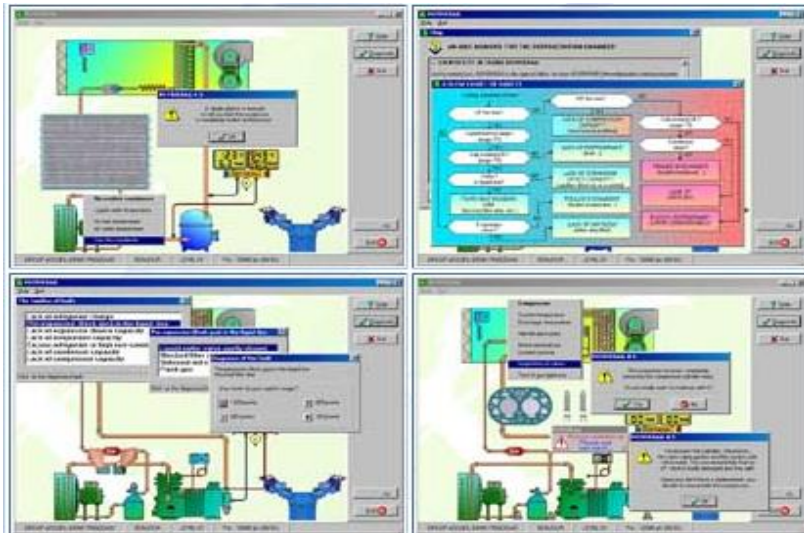
0730 - 0830	<b>Advanced Refrigeration Systems</b> <i>Variable Refrigerant Flow (VRF) Systems • Advanced Cooling Technologies</i>
0830 - 0930	<b>Integration with Building Management Systems</b> <i>Connecting Refrigerant Systems with BMS • Benefits and Challenges</i>
0930 - 0945	Break
0945 - 1130	<b>Energy Efficiency &amp; Optimization</b> <i>Strategies for Improving Energy Efficiency • Case Studies on Energy Optimization</i>
1130 - 1230	<b>Refrigerant Management Programs</b> <i>Developing and Implementing Management Programs • Best Practices for ongoing Compliance</i>
1230 - 1245	Break
1245 - 1345	<b>Regulatory Updates &amp; Future Trends</b> <i>Recent Changes in Regulations and Standards • Preparing for Future Trends</i>
1345 - 1400	<b>Course Conclusion</b> <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 - 1415	<b>POST-TEST</b>
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course



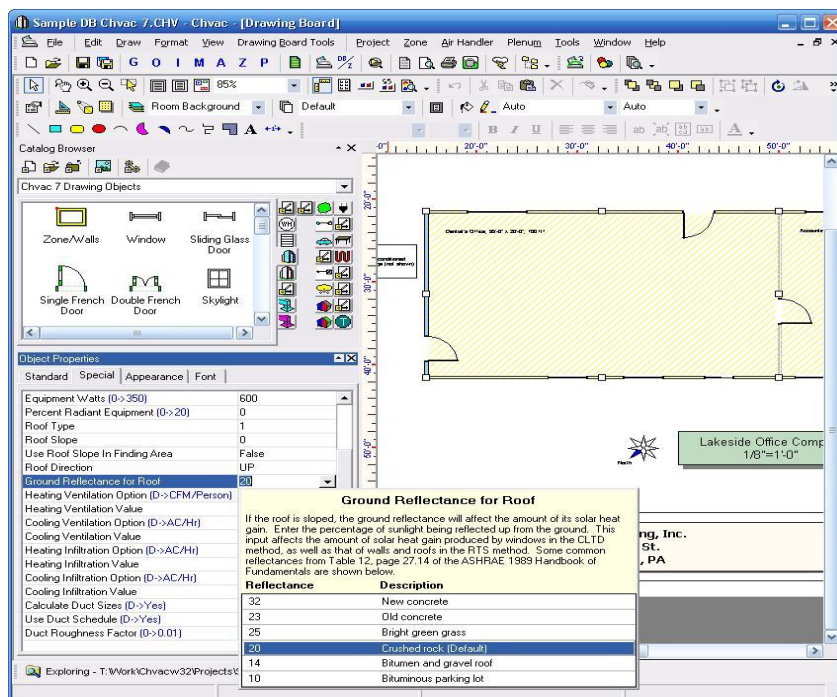


### Simulator (Hands-on Practical Sessions)

Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulators “KOTZA HVAC Simulator”, “Elite CHVAC Simulator”, “Danfoss Refrigerant Slider APP”, “Danfoss Trouble Shooter APP” and “Air Lite Psychrometric Calcs”.

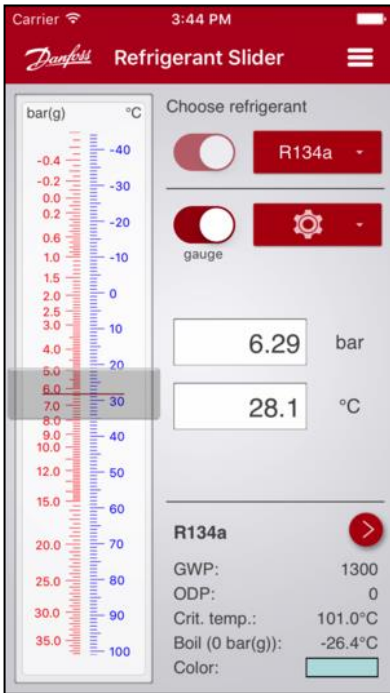


**KOTZA HVAC Simulator**

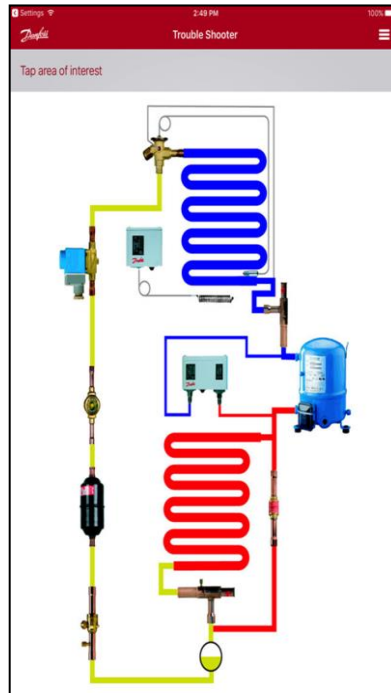


**Elite CHVAC Simulator**

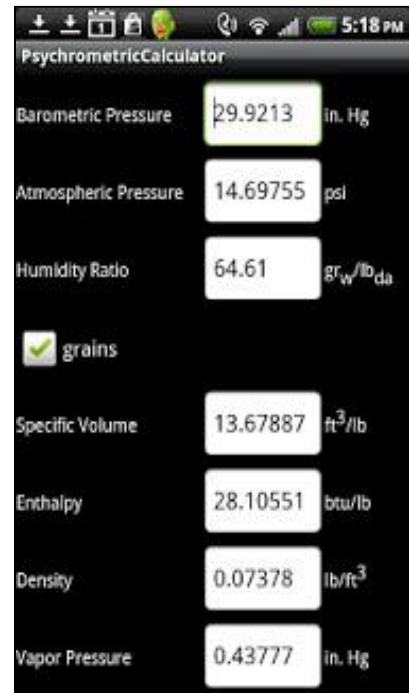




**Danfoss Refrigerant Slider App**



**Danfoss Trouble Shooter App**



**Air Lite Psychrometric Calcs**

**Course Coordinator**

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