



## COURSE OVERVIEW ME0289 Basic of HVAC Maintenance

### Course Title

Basic of HVAC Maintenance

### Course Date/Venue

Session 1: February 25-29, 2024/Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha, Qatar

Session 2: March 03-07, 2024/The Mouna Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

### Course Reference

ME0289

### 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 the basic of HVAC maintenance. It covers the HVAC&R abbreviations and common standards; the air properties for HVAC systems and psychrometric charts for air properties to control air design conditions; the space load types and duct system design; the HVAC&R systems main components; the HVAC&R systems equipment types; the HVAC&R systems refrigerant P-H chart; and the HVAC&R systems coefficient of performance, calculation, improvement and energy efficiency ratio.

During this interactive course, participants will learn the types of refrigerant compressors and refrigeration systems condensers; the HVAC systems, maintenance, troubleshooting and fault finding skills; the HVAC&R systems preventive and predictive maintenance procedures; the HVAC&R systems daily checking including some maintenance and troubleshooting techniques; the HVAC common faults; the HVAC systems fault types and tools for electrical and mechanical; and the equipment log sheets.





### Course Objectives

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

- Apply and gain a basic knowledge of HVAC maintenance
- Define HVAC&R as well as discuss its abbreviations and common standards
- Describe air properties for HVAC systems and review psychrometric charts for air properties to control air design conditions
- Identify space load types and duct system design
- Recognize HVAC&R systems main components covering electrical, mechanical and instrumentation
- List HVAC&R systems equipment types that include window, split, free stand, AHU and chilled water system
- Illustrate HVAC&R systems refrigerant P-H chart
- Carryout HVAC&R systems coefficient of performance, calculation, improvement and energy efficiency ratio
- Recognize the types of refrigerant compressors and refrigeration systems condensers
- Describe HVAC systems and employ maintenance, troubleshooting and fault finding skills
- Implement HVAC&R systems preventive and predictive maintenance procedures
- Apply HVAC&R systems daily checks including some maintenance and troubleshooting techniques
- Identify HVAC common faults covering possible causes, symptoms and required action to solve the problem
- Recognize the HVAC systems fault types and HVAC tools for electrical and mechanical and review equipment log sheets

### 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 a basic overview of HVAC maintenance 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.




**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.

**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. Mustafa Fadel** is a **Senior HVAC Engineer** with over **25 years** of industrial experience in the field. His specialization widely covers **HVAC System, HVAC Equipment Terminology, HVAC System Block Load Calculation, HVAC System Development of Drawings, Air Distribution System, Basic Chiller Water System Design & Selection, Pump Design & Selection, Rotating & Static Equipment, Cooling Tower Design, Boiler Design & Selection, Energy Management & Value Engineering for Mechanical System, Mechanical Ventilation, Smoke Ventilation, Staircase Pressurization, System Design & Development of Drawings, Data Center Design, Precision AC Equipment Selection, Refrigeration Systems, Air Cooler Design, Chillers, Mass & Heat Transfer, Electromechanical, Rotating & Static Equipment including Heat Exchangers, Piping & Pipeline, Pressure Vessels, Valves, Tanks Turbines, Compressors, Motors, Pumps, Evaporators, Condensers, Blowers and Fans, Maintenance Planning & Scheduling, Root Cause Failure Analysis, Performance Calculations, Reliability Maintenance and Corrective & Preventive Maintenance.** Further, he is also well-versed in **HSE Management, KPI's, CMMS and AutoCAD** as well as in various international standards such as the **ASHRAE, API, ASTM, ASME, AMCA, NFPA and SMACNA.** Currently, he is the **HVAC&R Specialist** in **SEGAS LNG Plant** wherein he is responsible for the implementation, construction and maintenance strategy for industrial HVAC&R equipment.

During his career life, Mr. Fadel has gained his practical and field experience through his various significant positions and dedication as the **Section Head, Project Manager, HVAC System Consultant Engineer, Mechanical Engineer, HVAC&R Instructor** and **Senior Technical Consultant** for international companies and universities like the **Foster Wheeler, Technip-Italy, Borner Company, Union FENOSA Gas, Asphalt Bitumen, King Khalid University, Alexandria Petroleum Company, FAWAZ Company, Marium Corporation** and many more.

Mr. Fadel has a **Bachelor's degree in Power Mechanical Engineering.** Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and an active member of the **American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE), USA.** He has further delivered and participated numerous engineering and inspection projects, trainings, courses, seminars and conferences globally.



### 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

Doha	<b>US\$ 6,000</b> per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	<b>US\$ 5,500</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

### 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	<i>Registration &amp; Coffee</i>
0800 – 0815	<i>Welcome &amp; Introduction</i>
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>HVAC&amp;R Definitions &amp; Abbreviations</b>
0930 – 0945	<i>Break</i>
0945 – 1100	<b>HVAC&amp;R Common Standards</b>
1100 – 1215	<b>Air Properties for HVAC Systems</b>
1215 – 1230	<i>Break</i>
1230 – 1420	<b>Psychrometric Charts for Air Properties to Control Air Design Conditions</b>
1420 – 1430	<b>Recap</b>
1430	<i>Lunch &amp; End of Day One</i>

#### **Day 2**

0730 – 0830	<b>Space Load Types &amp; Duct System Design</b>
0830 – 0930	<b>HVAC&amp;R Systems Main Components</b> <i>Electrical • Mechanical • Instrumentation</i>
0930 – 0945	<i>Break</i>
0945 – 1100	<b>HVAC&amp;R Systems Equipment Types</b> <i>Window • Split • Free Stand • AHU • Chilled Water System</i>
1100 – 1215	<b>HVAC&amp;R Systems Refrigerant P-H Chart</b>





1215 – 1230	Break
1230 – 1420	<b>HVAC&amp;R Systems Coefficient of Performance C.O.P (Calculation &amp; Improvement &amp; Energy Efficiency Ratio EER</b>
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Two

**Day 3**

0730 – 0930	<b>Types of Refrigerant Compressors</b> Selection • Performance • Motors • Protections
0930 – 0945	Break
0945 – 1100	<b>Types of Refrigeration Systems Condensers (Water Cooled – Air Cooled) &amp; Selection</b> Types of Evaporators (Selection & Troubleshooting) • Types of Expansion Devices & Selection (Selection & Troubleshooting)
1100 – 1215	<b>HVAC Systems</b> Maintenance • Troubleshooting • Fault Finding Skills
1215 – 1230	Break
1230 – 1420	<b>HVAC Basics Maintenance</b> Types • Definitions • Goals • Objectives)
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Three

**Day 4**

0730 – 0830	<b>HVAC&amp;R Systems Preventive &amp; Predictive Maintenance Procedures</b>
0830 – 0930	<b>HVAC&amp;R Systems Daily Checks</b> 3 Months Scheduled Maintenance • 6 Months Scheduled Maintenance • Annual Scheduled Maintenance
0930 – 0945	Break
0945 – 1100	<b>Some of HVAC&amp;R Systems Maintenance &amp; Troubleshooting Techniques</b> How to Charge Unit • How to Pump Down • How to Evacuate Unit • How to Check & Test Unit for Leakage
1100 – 1215	<b>HVAC Common Faults</b> Possible Causes • Symptoms • Required Action to Solve the Problem
1215 – 1230	Break
1230 – 1420	<b>HVAC Systems Fault Types</b> Electrical • Mechanical
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Four

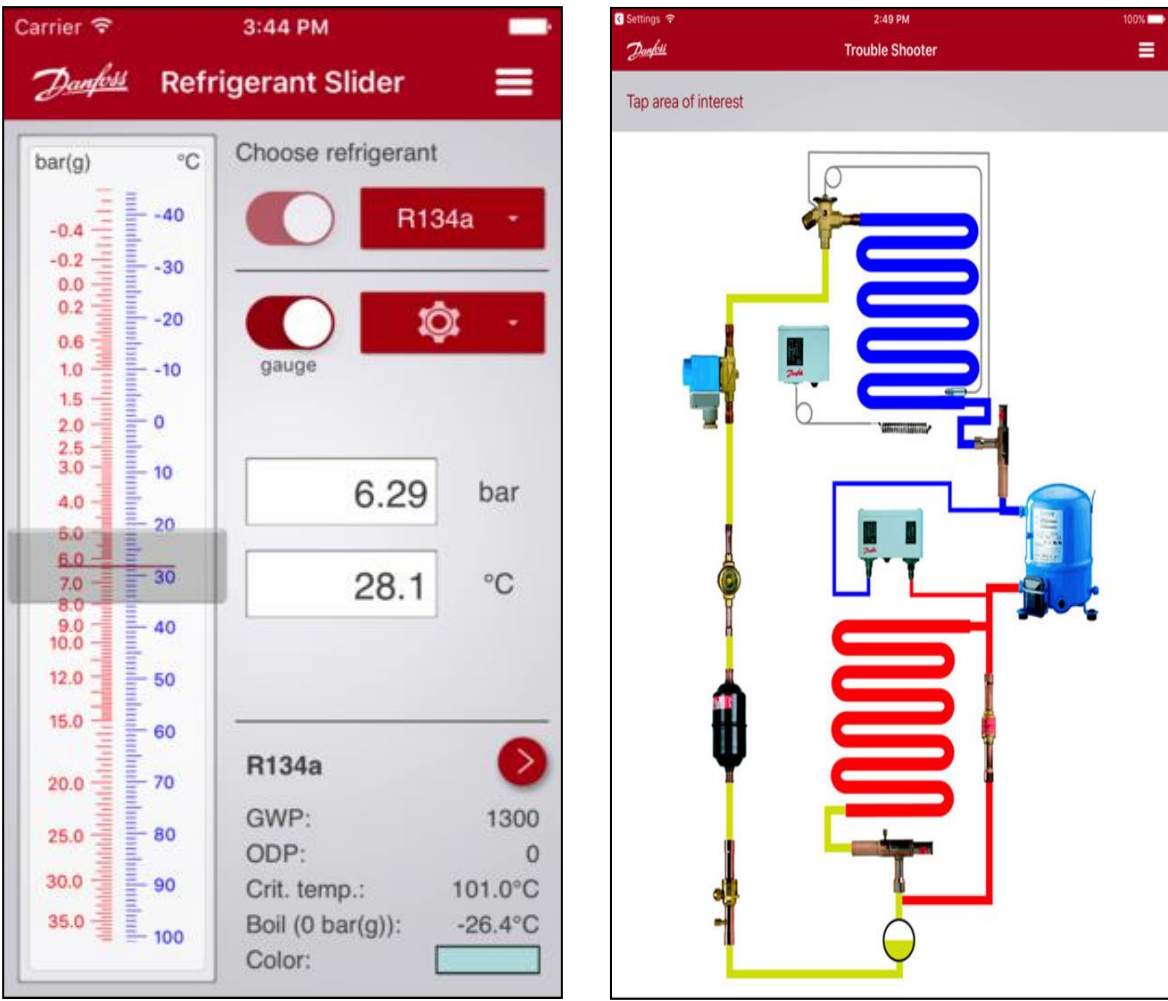
**Day 5**

0730 – 0930	<b>HVAC Tools</b> Electrical • Mechanical
0930 – 0945	Break
0945 – 1100	<b>Case Studies for Different Faults</b>
1100 – 1215	<b>Discussion with Delegates Companies HVAC Troubles &amp; How to Check &amp; Solve it</b>
1215 – 1230	Break
1230 – 1345	<b>Equipment Log Sheets</b>
1345 – 1400	<b>Course Conclusion</b>
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 simulator “Danfoss Refrigerant Slider App” and Danfoss Troubleshooter App”.



The image displays two screenshots of mobile applications. The left screenshot is the 'Danfoss Refrigerant Slider App' interface. It features a vertical pressure gauge on the left with a red-to-blue gradient, showing a reading of 6.29 bar. To the right, there are controls for 'Choose refrigerant' (set to R134a), a 'gauge' toggle, and a temperature display showing 28.1 °C. Below these are technical specifications for R134a: GWP: 1300, ODP: 0, Crit. temp.: 101.0°C, Boil (0 bar(g)):-26.4°C, and Color: light blue. The right screenshot is the 'Danfoss Troubleshooter App' interface, showing a schematic diagram of a refrigeration system with a blue evaporator coil, a red condenser coil, a compressor, and a receiver-drier. A blue water tank is also connected to the system. The interface includes a 'Tap area of interest' label and a settings icon.

**Danfoss Refrigerant Slider App**                      **Danfoss Troubleshooter App**

**Course Coordinator**

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