

COURSE OVERVIEW ME0710

HVAC, Plumbing, Water Supply & Fire Protection
Design, Installation and Maintenance

Course Title

HVAC, Plumbing, Water Supply & Fire Protection: *Design, Installation and Maintenance*

Course Date/ Venue

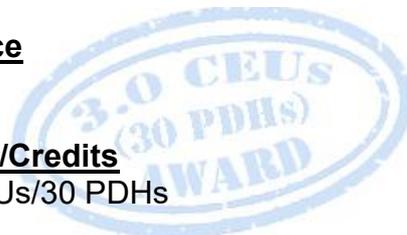
July 05-09, 2026/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Reference

ME0710

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 is designed to provide participants with a detailed and up-to-date overview of HVAC, plumbing water supply and fire protection. It covers the effect of heat and temperature on human comfort; the parameters that must be controlled to achieve human comfort; the principles of thermal balance of buildings; the principles of heat transfer and their impact on heating and cooling load estimates; the HVAC systems for smaller buildings and large buildings; and the comprehensive understanding of hydronic heating, electric heating and familiarization with all-air systems.

During this interactive course, participants will learn the warm air furnaces, air distribution system, air friction in duct systems and duct sizing methods; the different types of HVAC instrumentation & measurement concepts and techniques; the proper HVAC balancing procedures; the various principles of plumbing; the wastewater disposal and drainage design principles; the water supply design; the water supply distribution systems and domestic hot water circulation systems and considerations; and the knowledge on fire protection and fire alarm systems.

Course Objectives

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

- Apply and gain good working knowledge on HVAC, plumbing and fire protection
- Explain the effect of heat and temperature on human comfort and the parameters that must be controlled to achieve human comfort
- Analyze the principles of thermal balance of buildings and explain the principles of heat transfer and their impact on heating and cooling load estimates
- Identify HVAC systems for smaller buildings and large buildings
- Gain awareness on hydronic heating, electric heating and become familiar with all-air systems
- Recognize warm air furnaces, air distribution system, air friction in duct systems and duct sizing methods
- Identify the different types of HVAC instrumentation & measurement concepts and techniques and learn the proper HVAC balancing procedures
- Describe the various principles of plumbing
- Carryout wastewater disposal, drainage design principles and water supply design
- Analyze water supply distribution systems and domestic hot water circulation systems and considerations
- Recognize on fire protection and fire alarm 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 conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides an overview of all significant aspects and considerations of HVAC, plumbing water supply and fire protection for engineers, mechanical and maintenance technicians and inspectors responsible for the integrity, design, installation, inspection, maintenance and repair of HVAC, plumbing, water supply and fire protection systems.

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

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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 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 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. Karl Thanasis, PEng, MSc, MBA, BSc, is Senior Mechanical & Maintenance Engineer with over 45 years of extensive industrial experience. His wide expertise includes Boiler Maintenance, Boiler Control, Pressure Vessel Operation, Advanced Pressure Vessel Design, Piping & Pipeline, Maintenance, Repair, Shutdown, Turnaround & Outages, Maintenance & Reliability Management, Mechanical Maintenance Planning, Scheduling & Work Control, Advanced Techniques in Maintenance Management, Predictive & Preventive Maintenance, Maintenance & Operation Cost Reduction Techniques, Reliability Centered Maintenance (RCM), Machinery Failure Analysis, Rotating Equipment Reliability Optimization & Continuous Improvement, Material Cataloguing, Mechanical & Rotating Equipment Troubleshooting & Maintenance, Root Cause Analysis & Reliability Improvement, Condition Monitoring, Root Cause Failure Analysis (RCFA), Steam Generation, Steam Turbines, Power Generator Plants, Gas Turbines, Combined Cycle Plants, Boilers, Process Fired Heaters, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, Heat Exchangers, Heat Transfer, Coolers, Power Plant Performance, Efficiency & Optimization, Storage Tank Design & Fabrication, Thermal Power Plant Management, Boiler & Steam System Management, Pump Operation & Maintenance, Chiller & Chiller Plant Design & Installation, Pressure Vessel, Safety Relief Valve Sizing & Selection, Valve Disassembling & Repair, Pressure Relief Devices (PSV), Hydraulic & Pneumatic Maintenance, Advanced Valve Technology, Pressure Vessel Design & Fabrication, Pumps, Turbo-Generator, Turbine Shaft Alignment, Lubrication, Mechanical Seals, Packing, Blowers, Bearing Installation, Couplings, Clutches and Gears. Further, he is also versed in Wastewater Treatment Technology, Networking System, Water Network Design, Industrial Water Treatment in Refineries & Petrochemical Plants, Piping System, Water Movement, Water Filtering, Mud Pumping, Sludge Treatment and Drying, Aerobic Process of Water Treatment that includes Aeration, Sedimentation and Chlorination Tanks. His strong background also includes Design and Sizing of all Waste Water Treatment Plant Associated Equipment such as Sludge Pumps, Filters, Metering Pumps, Aerators and Sludge Decanters.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager, Plant Manager, Area Manager - Equipment Construction, Construction Superintendent, Project Engineer and Design Engineer.** His duties covered **Plant Preliminary Design, Plant Operation, Write-up of Capital Proposal, Investment Approval, Bid Evaluation, Technical Contract Write-up, Construction and Sub-contractor Follow up, Lab Analysis, Sludge Drying and Management of Sludge Odor and Removal.** He has worked in various companies worldwide in the **USA, Germany, England and Greece.**

Mr. Thanasis is a **Registered Professional Engineer** in the **USA and Greece** and has a **Master's and Bachelor's degree in Mechanical Engineering with Honours** from the **Purdue University and SIU in USA** respectively as well as an **MBA** from the **University of Phoenix in USA.** Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

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 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: Sunday, 05th of July 2026

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Heat & Human Comfort Human Comfort Indoors • Body Temperature Control • Heat and Temperature Sensible Heat and Latent Heat • Properties of Atmospheric Air • Body Heat Balance • Basic Rules of Thermodynamics • Mechanics of Sensible Heat Transfer • Thermal Comfort Criteria • Measurements
0930 – 0945	Break
0945 – 1115	Thermal Balance of Buildings Heat Transfer in Buildings • Conduction • Convection • Radiation • Heat Flow through Air Spaces • Heat Flow through Built-Up Sections • Heat Loss through Surfaces on and Below Grade • Heat Flow through Windows and Doors Heat Loss from Air Infiltration and Ventilation • Heat Loss to Adjacent Unheated Spaces • Summary of Building Heat Losses • Building Heat Loss Calculation Procedure
1130 – 1230	Thermal Balance of Buildings (cont'd) Outside Design Conditions • Evolution of Modern Climate Control Systems • Heating Systems Fuels • Heating Systems • Building Heat Gain Components Residential Heat Gain (Cooling Load) Calculations • Nonresidential Heat Gain Calculation • Cooling Load Calculation Forms • The Psychrometric Chart • Components of the Psychrometric Chart • Basic HVAC Processes on the Psychrometric Chart
1230 – 1245	Break



1245 – 1420	HVAC for Smaller Buildings Review of the Need for Mechanical Equipment • HVAC: Typical Design Processes • Equipment Location and Service Distribution • Controls for Smaller Building Systems • Refrigeration Cycles • Cooling-Only Systems • Heating-Only Systems • Heating/Cooling Systems • Psychrometrics and Refrigeration
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, 06th of July 2026

0730 – 0930	Large Building HVAC Systems HVAC and Building Organization • HVAC System Types • Central Equipment • Air Distribution within Spaces • All-Air HVAC Systems • Air and Water Systems • All-Water Systems • District Heating and Cooling • Cogeneration
0930 – 0945	Break
0945 – 1130	Hydronic Heating Hydronic Systems • Components of a Hydronic Heating System • Hot Water Boilers • Definitions and Basic Equipment Functions • Expansion Tank • Circulator • Terminal Units • Piping Arrangements • Hydronic Heating System Control • Piping Design Factors • Design Procedure • Basic Residential Hydronic Heating System Design • Preliminary Design Considerations • Hydronic Heating Design of a Large Residence • Hydronic Heating Design of an Industrial Building • Miscellaneous Design Considerations
1130 – 1230	Electric Heating Electric Resistance Heating • Resistance Heaters • Resistance Heating Equipment • Residential Electric Heating Design • Nonresidential Electric Heating Design
1230 – 1245	Break
1245 – 1420	All-Air Systems Air System Characteristics • Components of All-Air Systems • Heat-Carrying Capacity of Ducted Air Flow • Air Pressure in Ducts
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, 07th of July 2026

0730 – 0830	Warm Air Furnaces Furnace Components and Arrangements • Furnace Energy and Efficiency Considerations • Furnace Types • Warm Air Furnace Characteristics • Noise Considerations • Warm Air Furnace Blowers • Furnace Accessories
0830 – 0930	Air Distribution System Ducts • Duct Fittings and Air Control Devices • Duct Insulation • Air Distribution Outlets • Outlet Characteristics • Outlet Selection, Location and Application • Outlet Air Patterns
0930 – 0945	Break



0945 – 1130	Air Friction in Duct Systems <i>Air Friction in Straight Duct Sections • Noncircular Ducts • Air Friction in Duct Fittings • Sources of Duct System Pressure Loss</i>
1130 – 1230	Duct Sizing Methods <i>Equal Friction Method • Modified Equal Friction Method • Extended Plenum Method • Semi-Extended Plenum (Reducing Plenum) Method</i>
1230 – 1245	<i>Break</i>
1245 – 1420	HVAC Instrumentation & Measurement <i>Temperature Measurement • Pressure Measurement • Air Velocity Measurements • Velocity Measurement Techniques • Air Flow Measurement</i>
1420 – 1430	Recap <i>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</i>
1430	<i>Lunch & End of Day Three</i>

Day 4: Wednesday, 08th of July 2026

0730 – 0930	HVAC Balancing Procedures <i>Preparation for Balancing an Air System • Balancing an Air System • Preparation for Balancing a Hydronic System • Balancing a Hydronic System</i>
0930 – 0945	<i>Break</i>
0945 – 1130	Principles of Plumbing <i>Basic Principles of Plumbing • Plumbing System Design Constraints • Minimum Plumbing Facilities • Hydraulics • Static Pressure • Pressure Measurement • Liquid Flow • Flow Measurement • Dimensions and Conversions • Plumbing Materials • Piping Materials and Standard Fittings • Piping Installation • Valves • Fixtures • Drawing Presentation</i>
1130 – 1230	Drainage & Wastewater Disposal <i>Sanitary Drainage-General Principles • Sanitary Drainage Piping • Hydraulics of Gravity Flow • Drainage Piping Sizing • Drainage Accessories • Traps • Principles of Venting • Types of Vents • Drainage and Vent Piping Design • Residential Drainage Design • Nonresidential Drainage Design</i>
1230 – 1245	<i>Break</i>
1245 – 1420	Domestic Hot Water <i>General Considerations • Instantaneous Water Heaters • Storage-Type Hot Water Heaters • Hot Water Circulation Systems • Sizing of Hot Water Heaters</i>
1420 – 1430	Recap <i>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</i>
1430	<i>Lunch & End of Day Four</i>

Day 5: Thursday, 09th of July 2026

0730 – 0930	Water Supply Design <i>Valving • Backflow Prevention • Water Hammer Shock Suppression • Residential Water Service Design • Nonresidential Water Supply Design</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Fire Protection <i>Design for Fire Protection • Smoke Management • Water for Fire Suppression • Other Fire Suppression Methods • Lightning Protection</i>



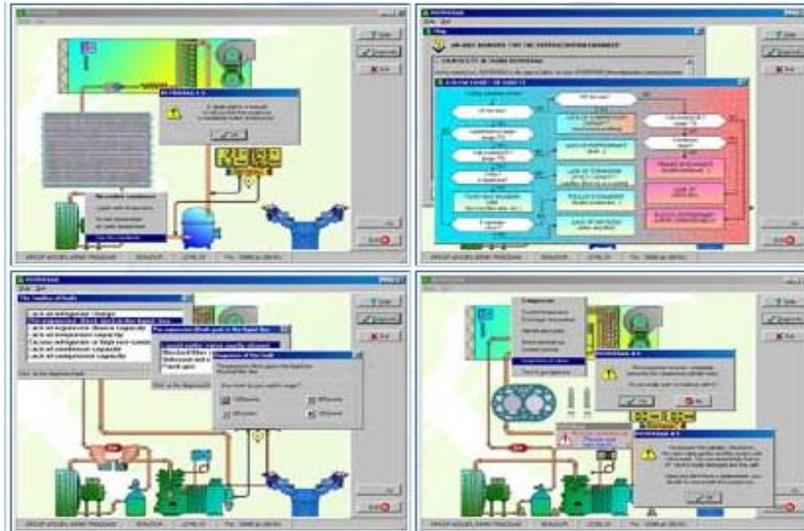
1100 – 1230	Fire Alarm Systems General Considerations • Fire Codes, Authorities and Standards • Fire Alarm Definitions and Terms • Types of Fire Alarm Systems • Circuit Supervision • Conventional Systems • System Coding • Signal Processing • Addressable Fire Alarm Systems • Addressable Analog (Intelligent) Systems • Automatic Fire Detection: Incipient Stage • Automatic Fire Detection: Smoldering Stage • Automatic Fire Detection: Flame Stage
1230 – 1245	Break
1245 – 1345	Fire Alarm Systems (cont'd) Automatic Fire Detection: Heat Stage • Special Types of Fire Detectors • False Alarm Mitigation • Manual Stations • Sprinkler Alarms • Audible and Visual Alarm Devices • General Recommendations • Residential Fire Alarms • Multiple-Dwelling Alarm Systems • Commercial and Institutional Building Alarm Systems • High-Rise Office Building Fire Alarm Systems • Industrial Facilities
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Practical Sessions/Site Visit

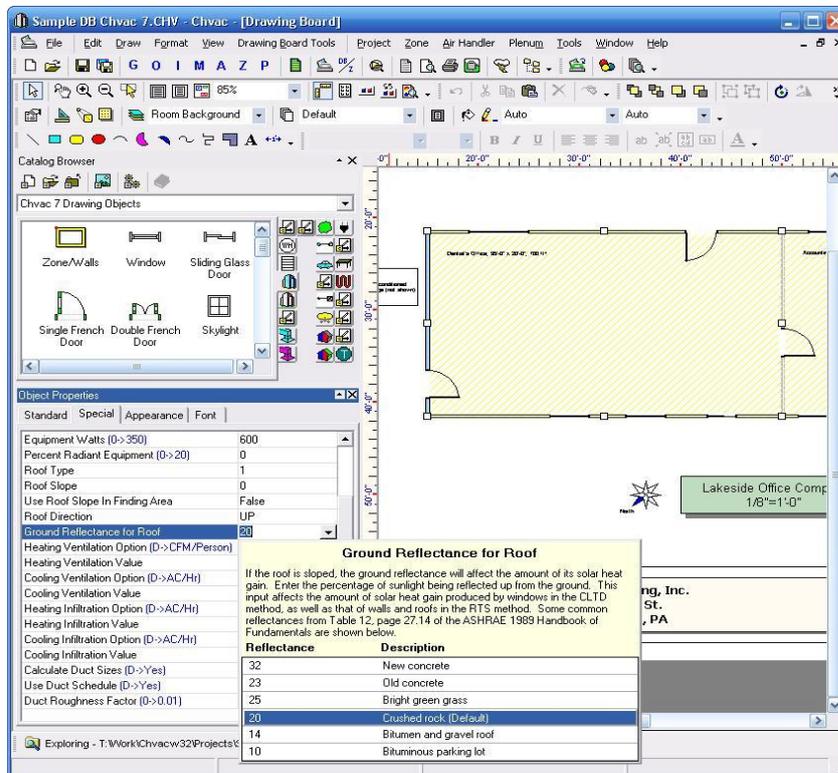


Simulator (Hands-on Practical Sessions)

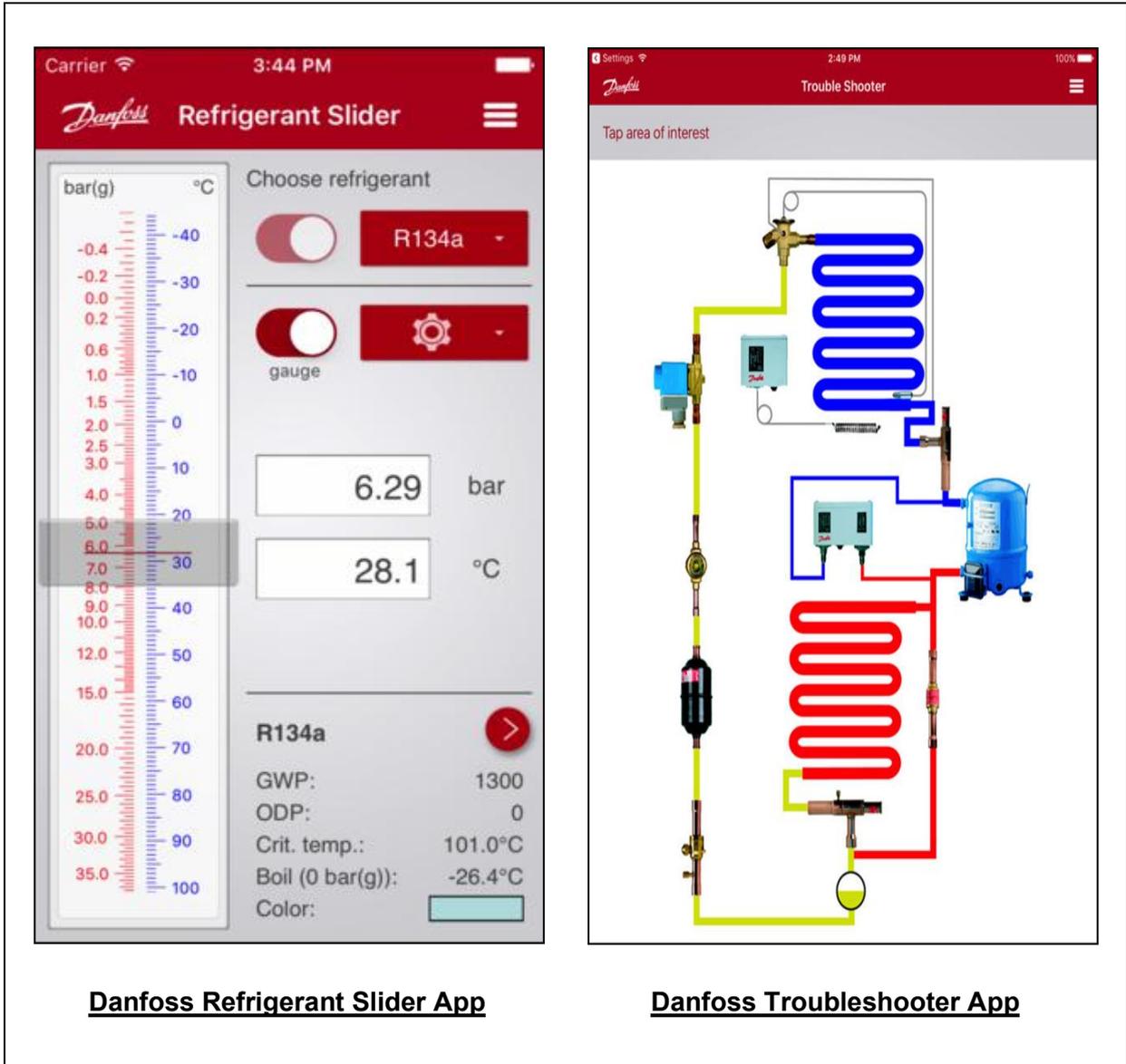
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator “KOTZA HVAC Simulator”, “Elite CHVAC Simulator”, “Danfoss Refrigerant Slider App” and Danfoss Troubleshooter App”.



KOTZA HVAC Simulator



Elite CHVAC Simulator



Danfoss Refrigerant Slider App

Danfoss Troubleshooter App

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org