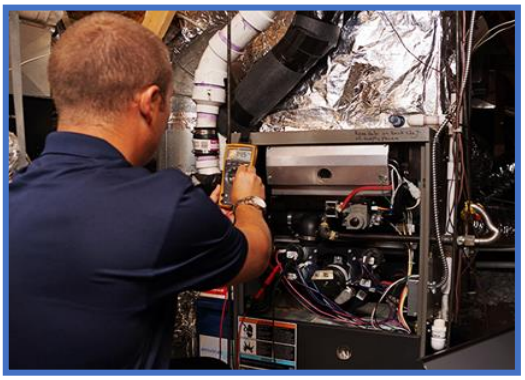
COURSE OVERVIEW ME0150-4D
Advanced Heating, Ventilation & Air-Conditioning Systems (HVAC)
Design, Installation & Maintenance

Course Title
Advanced Heating, Ventilation & Air-Conditioning Systems (HVAC): Design, Installation & Maintenance



Course Date/Venue
October 21-24, 2024/Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey

Course Reference
ME0150-4D

Course Duration/Credits
Four days/2.4 CEUs/24 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt in the class will be applied 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 assist experienced practitioners review and become more familiar with the particular system parts required for the design, installation, and maintenance of heating, ventilation and air-conditioning systems for all types of institutional, commercial, and industrial building envelopes. As the participant progresses through this five-day course, it will also serve as a refresher providing information about HVAC safety requirements, improved healthy indoor air quality, and emission reduction strategies.

During the course, there will be opportunities to practice using the ASHRAE Pocket Guide for Air Conditioning, Heating, Ventilation & Refrigeration. This easily carried reference provides fast, authoritative HVAC&R information on site. It is packed with practical and useful information that; includes properties performance and pipe sizing for new refrigerants, new data on refrigeration safety, ventilation requirements for residential and non-residential occupancies, occupant thermal comfort, more extensive data on sound and vibration control, thermal storage, radiant panel heating and cooling, air-to-air recovery and more. The participants also will receive a summary review of how to source HVAC related, building envelope, electrical, fire protection, ozone depletion protection, back-flow, and cross-connection controls codes and standards.

Slide shows of installed operational energy management systems computer controls and instrumentation will enable a broader understanding of future real time data logger systems. The participant will learn about HVAC utilization of advanced metering infrastructures, automated water meter readings for leak detection of district chilled water loops, and end user consumption. Demand response electricity systems using smart meters controlling; air conditioning, thermal storage systems, lighting, variable speed motors for fans, and pumps. These applications plus studying the re-use of waste-water produced by HVAC systems supplying grey-water, are tools HVAC professionals may add to their portfolio of utilities cost reduction for building operations. Similar to energy management systems demand responsiveness is easier, less expensive, and simpler when the control protocol is incorporated into the original design. Practice work sheets will be made available to prove these systems are capable of tracking emissions reductions, and providing an additional revenue stream for building owners by lowering energy consumption.

In class exercises for selecting correct equipment, loop checking sequence of operations and locating control points for HVAC systems will provide familiarization of the products available on the market today. A particular emphasis will be on understanding the advantages and disadvantages of commonly available types of electric, pneumatic, self-powered; sensors, actuators, valves, dampers, direct drives, analog and digital controls. We will also review the different types of compressors, coils, exchangers, filters, condensers, dryers, chillers, expansion tanks, cooling towers, split-systems, forced air, boilers, associated piping, duct work, insulation, and common trade practices used in HVAC applications today.

An introduction to predictive, preventative, troubleshooting, and emergency repair maintenance tips will be taught along with a re-cap of balancing air, and water systems. How to source information to maintain glycol densities, chemical treatment biocides and corrosion inhibitors, air handler unit ultraviolet lights for continuous coil cleaning, and disinfection, should help ensure the buildings investors realize improved life cycle costs, minimal downtime for equipment servicing, and public health protection, Worker safety will be reviewed to ensure clear communications between building operations and the personnel working on the of equipment. A strong emphasis will be for HVAC professionals to learn how to have a written safety plan detailing procedure for lock-out, and tagging, the importance of following original manufacturer's information for installation, starting up, and shutting down, will be reiterated throughout the course.

The course will finish with examples of emerging dual use technologies such as dedicated fire protection lines as a component of the distribution network for deep lake or seawater district cooling systems, grey-water heat pump systems, types of building roofs, road, and building thermal energy systems. A basic introduction to the application of electricity power producing high temperature fuel cells, internal combustion engine, micro-turbine, distributed electric power co-generators use-able waste heat for domestic hot water, heating, and cooling applications will be presented.

The course is condensed and assumes that the participants have prepared themselves by self-study of the ASHRAE e-book for Air Conditioning, Heating, Ventilation, Refrigeration prior to attending. In addition to the e-book, the delegates should bring their scientific calculators.

Course Objectives

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

- Apply and gain a comprehensive knowledge on advanced HVAC design, installation, maintenance and failure prevention
- Review the fundamentals of HVAC covering thermodynamics and psychrometrics
- Review the current ASHRAE standards covering ASHRAE 62 ventilation for acceptable air quality and ASHRAE standard 90 energy standard for buildings except low rise buildings
- Recognize energy use and part load efficiency that covers fan systems, part load chiller performance and part load performance of direct expansion units
- Carryout computer-based load estimation, energy use calculation and building control
- Illustrate advanced HVAC control systems, build automation and the design of advanced HVAC system
- Identify compressors, coils, exchangers, filters, condensers, dryers, chiller, expansion tanks, cooling towers, split-systems, forced air and boilers
- Employ piping, duct work, insulation and the common trade practices used in HVAC applications today
- Carryout maintenance and troubleshooting, predictive maintenance, preventative maintenance and emergency repair
- Describe balancing air and water systems, glycol densities, chemical treatment biocides, corrosion inhibitors and air handler unit ultraviolet lights for continuous coil cleaning and disinfection
- Employ HVAC systems daily checks, 3-6 months scheduled preventive maintenance procedures and HVAC systems annual scheduled preventive maintenance procedure
- Demonstrate how to pump down, charge and evacuate the HVAC units and discuss ANSI-ASHRAE-ACCA 180-2010 maintenance and inspection standard according to ANSI

Who Should Attend

This course provides a complete and up-to-date overview of advanced heating, ventilation and air-conditioning systems for HVAC, utilities, maintenance and project engineers and other technical staff. Basic knowledge in HVAC is a pre-requisite for attending this advanced course.

Course Fee

US$ 4,500 per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), 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:-

- 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 **2.4 CEUs** (Continuing Education Units) or **24 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.

- 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. 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 **Buried Pipe Modeling**, **Modal Analysis**, **Mechanical Vibration**, **Pipe Stress Analysis**, **Relief Valve**, **HVAC** Basics, **HVAC&R**, **Air Conditioning & Refrigeration** Technology, **HVAC Design**, **Chillers**, **KOTZA**, **Fault Finding**, **Piping Stress** Analysis, **Pipeline** Operation, Optimization & Problem Solving, **Vibration** Analysis, **Piping Vibration**, **Vibration** Monitoring, **Pump** Technology, **Pump** Selection & Installation, **Centrifugal Pumps & Troubleshooting**, **Reciprocating & Centrifugal Compressors**, **Compressor** Control & Protection, Modern **Valve** Technology, **Bearings & Lubrication**, Advanced **Machinery Dynamics**, Modern Heating, **Pumps & Valves** Maintenance & Troubleshooting, Ventilation, Air-Conditioning (**HVAC**) & Refrigeration Systems, **Pump & Compressors** Maintenance & Troubleshooting, **Compressors & Turbines** Troubleshooting, New Emergency **Air Compressors**, **Boiler** Maintenance & Inspection, **Hydraulic** System Design & Troubleshooting, **Gas Conditioning & Processing**, **Process Plant** Optimization, Effective Production Operations in the Oil & Gas Fields, **Gas & Steam Turbines**, **Turbine** Operations, **Gas Turbine** Technology, **Gas Turbine** Erection & Commissioning (GE 9FA & GE9FB Units), Large Scale **Natural Gas Combined Cycle Power Plant** Projects (GE Equipment), Large Scale **Natural Gas Cogeneration** Plant Projects (GE & Siemens Equipment), **Gas Turbine** Condition Monitoring & Fault Diagnosis, Control & Operations of **Industrial Gas Turbines**, **Gas Turbine** Auxiliary System, **Gas & Steam Turbines**, **Turbine** Operations, **Gas Turbine** Technology, **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, Process Safety Management (**PSM**), **HAZMAT & HAZCOM**, Laboratory Information Management System (**LIMS**) and Laboratory Quality Management (**ISO 17025**). 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**, **Project Manager**, **GE 9FB Units Materials Manager**, **Field Engineer**, **Preventive Maintenance Engineer**, **Gas Turbine & Erection 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's** degree 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**), a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) 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.

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: ***Monday, 21st of October 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introductions*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Review of Fundamentals*** *Thermodynamics • Psychrometrics*
0930 – 0945	*Break*
0945 - 1100	***Psychrometrics & HVAC Process Simulation*** *Software • Practical Exercises With Software*
1100 – 1230	***Current ASHRAE Standards*** *ASHRAE 62 Ventilation for Acceptable Air Quality • ASHRAE Standard 90 Energy Standard For Buildings Except Low Rise Buildings • What Makes a "Good" Design*
1230 – 1245	*Break*
1245 – 1420	***Energy Use & Part Load Efficiency*** *Fan Systems • Part Load Chiller Performance • Part Load Performance of Direct Expansion Units*
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: ***Tuesday, 22nd of October 2024***

0730 – 0930	***Computer Based Load Estimation & Energy Use Calculation***
0930 – 0945	*Break*
0945 – 1100	***Building Control*** *Fundamentals • Types of Control for Reheat, VAV, Single Zone, Humitity Control*
1100 – 1230	***Advanced HVAC Control Systems*** *Selecting Correct Equipment • Loop Checking • Sequence of Operations • Locating Control Points • Advantages and Disadvantages of Commonly Available Types of Electric, Pneumatic, Self-Powered; Sensors, Actuators, Valves, Dampers, Direct Drives, Analog and Digital Controls*
1230 – 1245	*Break*

1245 – 1420	***Building Automation*** *Technology • Smart Meters Controlling • Energy Savings • Lighting*
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: Wednesday, 23rd of October 2024

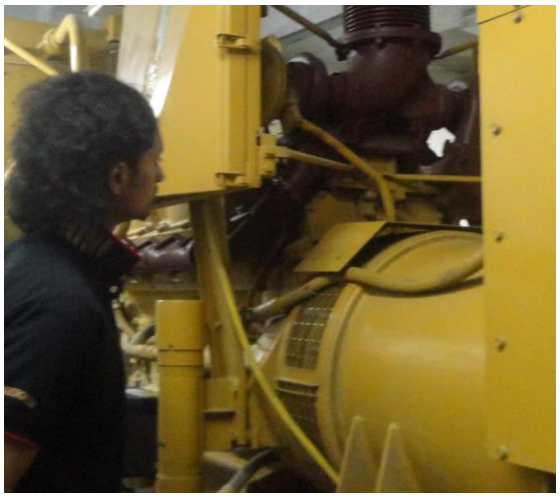
0730 – 0930	***Design of Advanced HVAC System*** *Compressors • Coils • Exchangers • Filters • Condensers • Dryers • Chillers • Expansion Tanks • Cooling Towers • Split-Systems • Forced Air • Boilers • Piping • Duct Work • Insulation • Common Trade Practices Used in HVAC Applications Today*
0930 – 0945	*Break*
0945 – 1100	***Maintenance & Troubleshooting*** *Predictive Maintenance • Preventative Maintenance • Troubleshooting • Emergency Repair • Maintenance Tips • Balancing Air and Water Systems • Glycol Densities • Chemical Treatment Biocides • Corrosion Inhibitors • Air Handler Unit Ultraviolet Lights for Continuous Coil Cleaning and Disinfection*
1100 – 1230	***HVAC Systems Daily Checks***
1230 – 1245	*Break*
1245 – 1420	***HVAC Systems 3 Months Scheduled Preventive Maintenance Procedures***
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: Thursday, 24th of October 2024

0730 – 0930	***HVAC Systems 6 Months Scheduled Preventive Maintenance Procedures***
0930 – 0945	*Break*
0945 – 1100	***HVAC Systems Annual Scheduled Preventive Maintenance Procedure***
1100 – 1230	***How to Pump Down, Charge & Evacuate the HVAC Units***
1230 – 1245	*Break*
1245 – 1345	***ANSI-ASHRAE-ACCA 180-2010 Maintenance & Inspection Standard According to American National Standard Institute (ANSI), American Society of Heating, Refrigerating & Air Conditioning Engineers (ASHRAE) & Air Conditioning Contractors of America (ACCA)***
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions/Site Visit

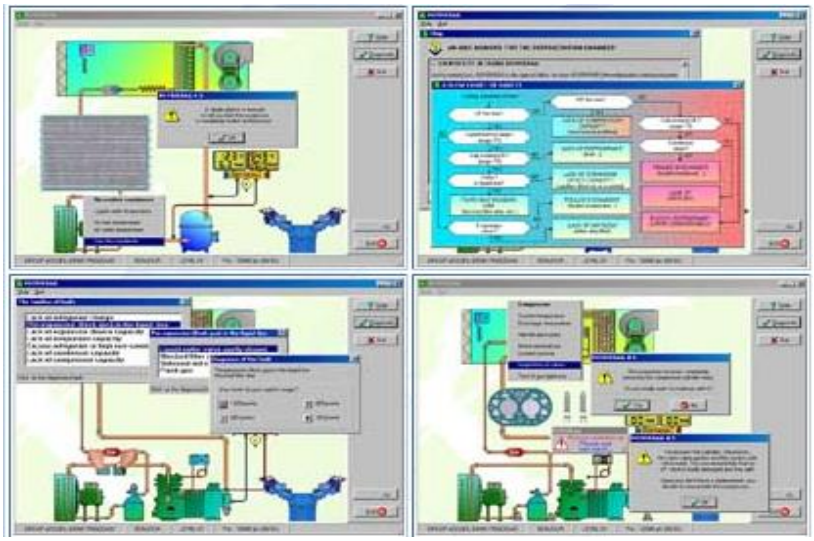
Site visit will be organized during the course for delegates to practice the theory learnt:-



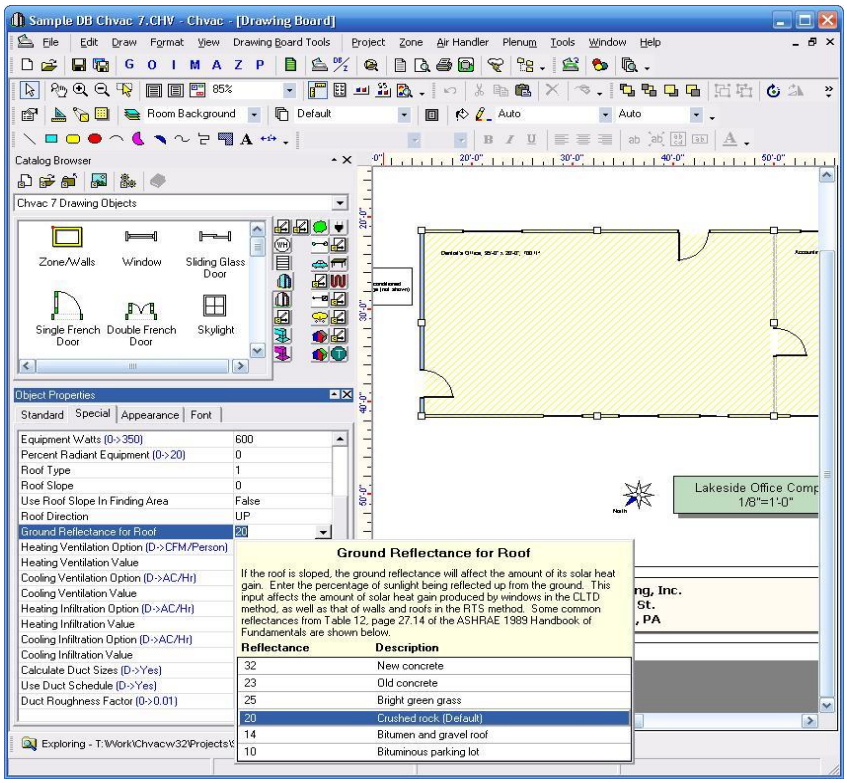



Simulator (Hands-on Practical Sessions)

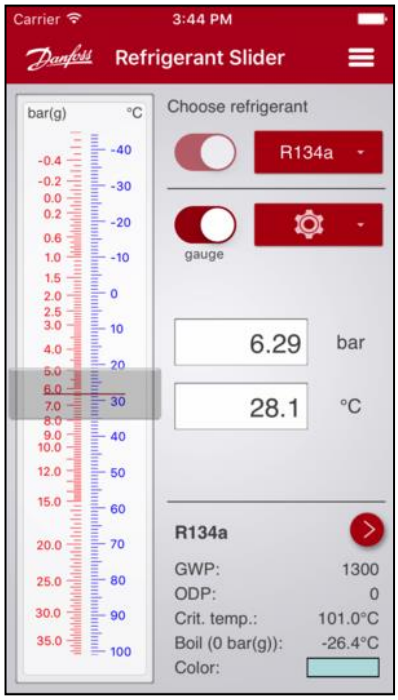
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators “KOTZA HVAC Simulator”, “Elite CHVAC Simulator”, “Danfoss Refrigerant Slider App”,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



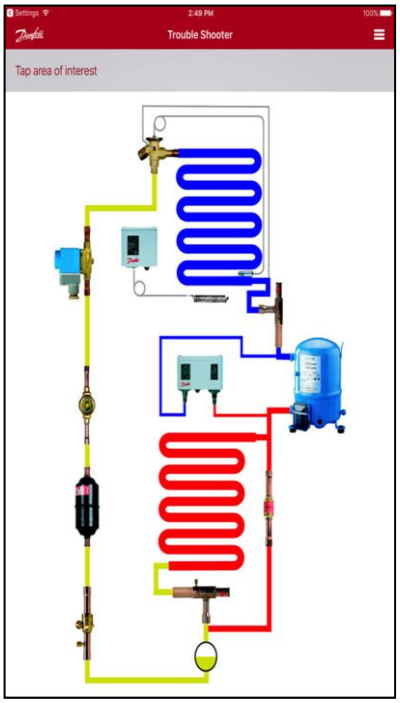
KOTZA HVAC Simulator



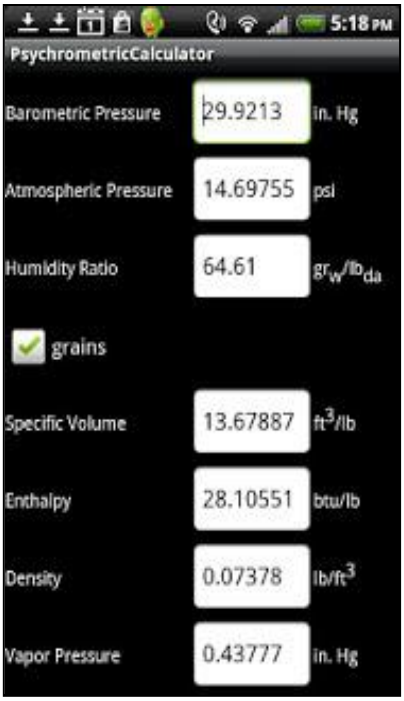
Elite CHVAC Simulator



Danfoss Refrigerant Slider App



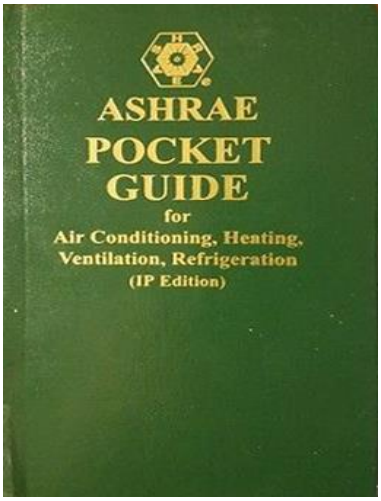
Danfoss Trouble Shooter App



Air Lite Psychrometric Calcs

Book(s)

As part of the course kit, the following e-book will be given to all participants:



Title	:	ASHRAE Pocket Guide for Air Conditioning, Heating, Ventilation, Refrigeration
Edition	:	IP Edition
ISBN	:	9781931862783
Author	:	ASHRAE
Publisher	:	ASHRAE

Course Coordinator

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