COURSE OVERVIEW ME1139
HVAC-System Design & Implementation-New & Retrofit

Course Title
HVAC-System Design & Implementation-New & Retrofit

Course Reference
ME1139

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	May 25-29, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
2	August 11-15, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
3	September 14-18, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
4	November 24-28, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

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 HVAC - System Design and Implementation - New and Retrofit. It covers the HVAC systems, HVAC in refining industry and basic HVAC principles; the types of HVAC systems, HVAC load calculations and system design considerations for new installations; the air handling units (AHU) design, chillers and cooling systems design, ductwork and piping design and ventilation systems design; the temperature and humidity control, energy efficiency in HVAC system design and retrofitting existing HVAC systems; and the energy-efficient retrofits and building management systems (BMS).

During this interactive course, participants will learn the control systems in HVAC retrofit and economic considerations for retrofitting; the installation procedures for HVAC systems, testing and balancing HVAC systems and commissioning of HVAC systems; the startup and shutdown procedures, maintenance planning for new and retrofit systems and documentation and reporting; the common HVAC system failures and troubleshooting airflow problems and cooling and heating issues; the geothermal HVAC systems, renewable energy in HVAC systems and thermal energy storage in HVAC systems; and the ongoing system tuning and adjustment, integrating new technologies for enhanced performance, performance monitoring and energy analytics.

Course Objectives

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

- Apply and gain an in-depth knowledge on HVAC - system design and implementation - new and retrofit
- Discuss HVAC systems, HVAC in refining industry and basic HVAC principles
- Identify the types of HVAC systems and apply HVAC load calculations and system design considerations for new installations
- Illustrate air handling units (AHU) design, chillers and cooling systems design, ductwork and piping design and ventilation systems design
- Carryout temperature and humidity control, energy efficiency in HVAC system design and retrofitting existing HVAC systems
- Discuss energy-efficient retrofits and building management systems (BMS)
- Upgrade HVAC for compliance and apply control systems in HVAC retrofit and economic considerations for retrofitting
- Employ installation procedures for HVAC systems, testing and balancing HVAC systems and commissioning of HVAC systems
- Apply startup and shutdown procedures, maintenance planning for new and retrofit systems and documentation and reporting
- Avoid common HVAC system failures and troubleshoot airflow problems and cooling and heating issues
- Discuss geothermal HVAC systems, use renewable energy in HVAC systems and apply thermal energy storage in HVAC systems
- Apply ongoing system tuning and adjustment, integrating new technologies for enhanced performance and performance monitoring and energy analytics

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-system design and implementation-new and retrofit for HVAC engineers, mechanical engineers, building services engineers, project managers, construction managers, energy managers, facility managers, contractors, technicians, design consultants and other technical staff.

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 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.

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 **30 years** of extensive industrial experience. His wide expertise includes **Compressors** Maintenance & Troubleshooting, **Screw Compressor MK/WRV** Operation Maintenance & Troubleshooting, **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 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	***Overview of HVAC Systems*** *Definition & Importance in Refineries • Components of HVAC Systems • Types of HVAC Systems • System Design Considerations*
0930 – 0945	*Break*
0945 – 1030	***HVAC in Refining Industry*** *Specific Needs of Refineries • Air Quality & Ventilation Standards • Process versus Comfort Heating, Ventilation & Air Conditioning • Regulatory Compliance in Refining Industry*
1030 – 1130	***Basic HVAC Principles*** *Heat Transfer (Conduction, Convection, Radiation) • Psychometrics & Humidity Control • Airflow & Pressure • Thermodynamics in HVAC Systems*
1130 – 1230	***Types of HVAC Systems*** *Centralized versus Decentralized Systems • Air Handling Units (AHU) • Variable Refrigerant Flow (VRF) • Chilled Water Systems*
1230 – 1245	*Break*
1245 – 1330	***HVAC Load Calculations*** *Determining Heating & Cooling Loads • Calculating Ventilation Rates • Heat Gain & Loss Calculations • Load Factor Adjustments*
1330 – 1420	***System Design Considerations for New Installations*** *Site Evaluation & Space Planning • Sizing of Equipment & Ductwork • Safety & Maintenance Accessibility • Integrating HVAC with Other Systems in Refineries*
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 – 0830	***Air Handling Units (AHU) Design*** *AHU Types & Functions • Sizing Ahus for Capacity & Efficiency • Filtration & Airflow Requirements • Selection of Components (Fans, Coils, Dampers)*
0830 – 0930	***Chillers & Cooling Systems Design*** *Types of Chillers (Air-Cooled, Water-Cooled) • Sizing & Selecting Chillers for Refinery Use • Energy Efficiency Considerations • Chilled Water Distribution Systems*
0930 – 0945	*Break*
0945 – 1045	***Ductwork & Piping Design*** *Types of Ductwork (Sheet Metal, Flexible, Insulated) • Sizing Ductwork for Airflow • Pipe Sizing for Hydronic Systems • Integration with Existing Infrastructure*
1045 – 1200	***Ventilation Systems Design*** *General versus Local Exhaust Systems • Ventilation for Hazardous Areas • Smoke Control & Airflow Direction • Compliance with Health & Safety Standards*
1200 – 1215	*Break*
1215 – 1330	***Temperature & Humidity Control*** *Dehumidification Strategies • Precision Temperature Control for Critical Areas • Humidification Systems • Seasonal Variations & Control Techniques*
1330 – 1420	***Energy Efficiency in HVAC System Design*** *HVAC System Performance Metrics • Sustainable Design Practices • Use of Variable Speed Drives (VSD) • Optimization of System Performance*
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 – 0830	***Retrofitting Existing HVAC Systems*** *Challenges in Retrofitting for Refineries • Retrofitting Ahus & Chillers • Optimizing Existing Ductwork & Piping • Integrating New Technologies into Old Systems*
0830 – 0930	***Energy-Efficient Retrofits*** *Energy Audits & System Performance Analysis • Identifying Energy Losses & Areas for Improvement • Retrofitting for Improved Energy Efficiency • Use of Energy Recovery Systems*
0930 - 0945	*Break*
0945 – 1130	***Building Management Systems (BMS)*** *Integration of HVAC with BMS • Benefits of Automated Control Systems • Remote Monitoring & Control • Fault Detection & Diagnostics*
1130 - 1230	***Upgrading HVAC for Compliance*** *New Regulatory Standards & Guidelines • Impact of Aging Equipment on Compliance • Retrofitting for Emission Reduction • Air Quality Control & Monitoring Systems*
1230 - 1245	*Break*
1245 - 1330	***Control Systems in HVAC Retrofit*** *Modern Control Technologies (DCS, PLC) • Retrofitting with Smart Controls • Control Strategies for Efficiency & Comfort • Troubleshooting Common Issues in Retrofits*

1330 - 1420	***Economic Considerations for Retrofitting*** *Cost-Benefit Analysis of Retrofitting versus New Installations • Payback Period Calculations • Financing & Budgeting for HVAC Upgrades • Return on Investment (ROI) for Retrofitted 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 Three*

Day 4

0730 – 0830	***Installation Procedures for HVAC Systems*** *Site Preparation & Setup • Installation of Key HVAC Components • Coordination with Electrical & Plumbing Systems • Quality Assurance & Inspection*
0830 – 0930	***Testing & Balancing HVAC Systems*** *Air & Water Balancing Techniques • Measuring Airflow & Pressure • Ensuring Compliance with Design Specifications • Troubleshooting During Installation*
0930 - 0945	*Break*
0945 – 1130	***Commissioning of HVAC Systems*** *Steps in the Commissioning Process • Calibration & System Adjustments • Performance Testing for New & Retrofit Installations • System Integration with Other Plant Operations*
1130 - 1230	***Startup & Shutdown Procedures*** *Testing Equipment & Control Systems • Sequential Startup of HVAC Equipment • Ensuring Proper System Shutdown Procedures • Safety Measures During Startup & Shutdown*
1230 - 1245	*Break*
1245 - 1330	***Maintenance Planning for New & Retrofit Systems*** *Preventive Maintenance Schedules • Common Maintenance Tasks for HVAC Systems • Spare Parts Management • Predictive Maintenance Technologies*
1330 - 1420	***Documentation & Reporting*** *Recording Test Results & Adjustments • Final System Documentation for Clients • Ongoing Performance Monitoring • Post-Installation Evaluation Reports*
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*

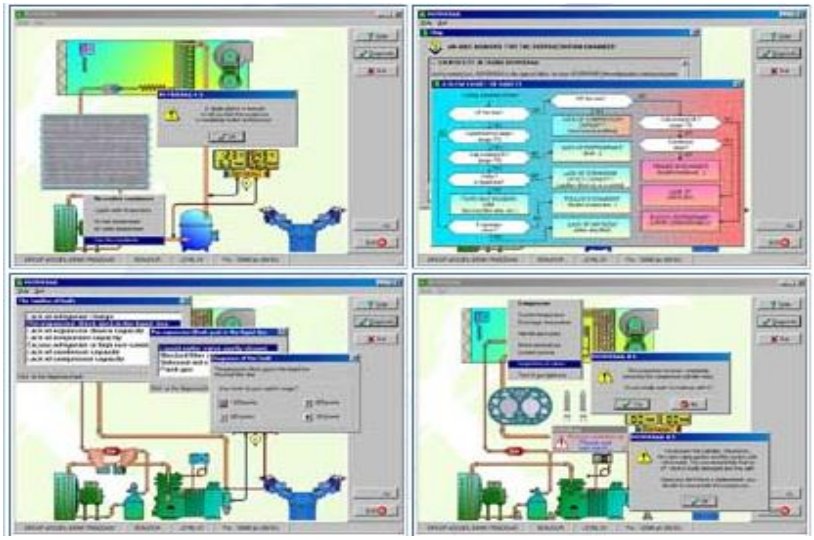
Day 5

0730 – 0830	***Common HVAC System Failures*** *Identifying Common Failures in New & Retrofit Systems • Diagnosing Issues in Ahus, Chillers & Ductwork • Troubleshooting Control Systems • System Failures Due to Poor Design or Sizing*
0830 – 0930	***Troubleshooting Airflow Problems*** *Low Airflow & Pressure Drop • Fan & Ductwork Issues • Airflow Direction & Temperature Imbalances • Noise & Vibration Issues*

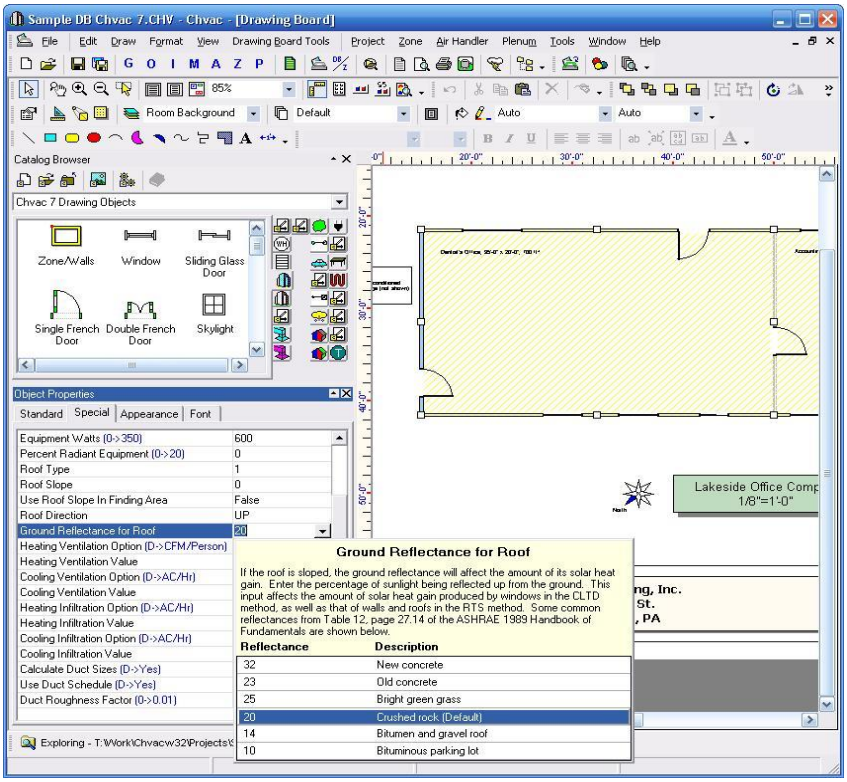
0930 - 0945	*Break*
0945 – 1030	***Troubleshooting Cooling & Heating Issues*** *Inadequate Cooling or Heating Performance • Refrigerant Leaks & Low Refrigerant Charge • Defective Valves or Sensors • Coil & Heat Exchanger Issues*
1030 – 1115	***Advanced HVAC Topics*** *Geothermal HVAC Systems • Use of Renewable Energy in HVAC Systems • Thermal Energy Storage in HVAC Systems • Cutting-Edge HVAC Technologies (AI, IoT Integration)*
1115 - 1200	***Optimization of HVAC Performance*** *Ongoing System Tuning & Adjustment • Integrating New Technologies for Enhanced Performance • Performance Monitoring & Energy Analytics • Improving HVAC System Longevity*
1200 - 1215	*Break*
1215 – 1345	***Future Trends in HVAC Design & Retrofit*** *Emerging Technologies in HVAC • Smart Buildings & Intelligent HVAC Systems • The Role of Artificial Intelligence & Automation in HVAC • Sustainability Trends & Green Building Certifications (e.g., LEED, WELL)*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

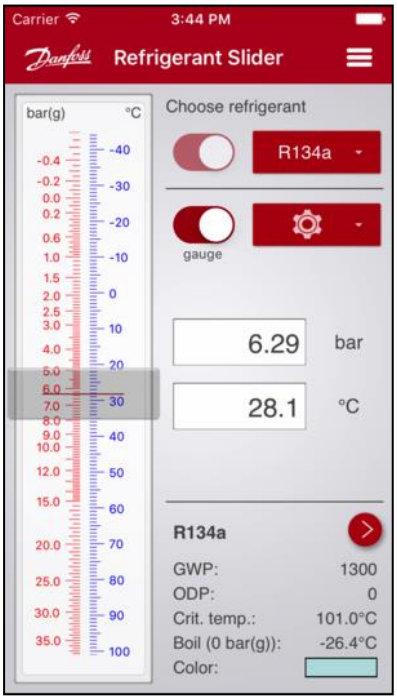
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators “KOTZA HVAC Simulator”, “Elite CHVAC Simulator”, “Danfoss Refrigerant Slider App”,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



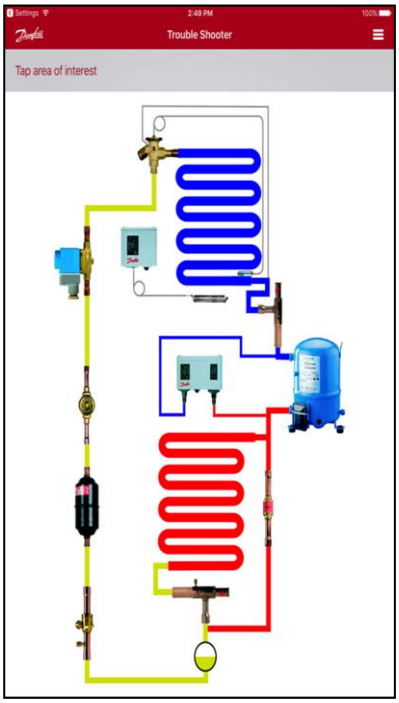
KOTZA HVAC Simulator



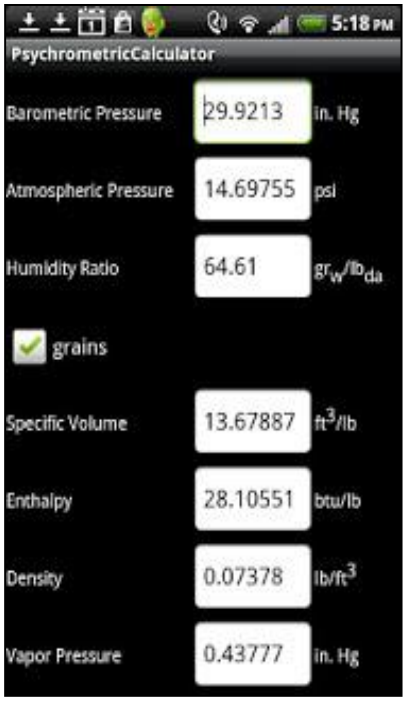
Elite CHVAC Simulator



Danfoss Refrigerant Slider App



Danfoss Trouble Shooter App



Air Lite Psychrometric Calcs

Course Coordinator

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