

REFRIGERATION AND HVAC COURSE

This training course has been developed by OakCAD/NCT to meet the growing need for technician engineers to update or upgrade their HVAC knowledge and skills.

The course has been endorsed under the ABC Awards/Certa Quality Licence Scheme. This means that OakCAD/NCT has undergone an external quality check to ensure that the organisation and the courses it offers, meets defined quality criteria.

At the end of this course successful learners will receive a Certificate of Achievement from ABC Awards/Certa and a Learner Unit Summary (which lists the components the learner has completed as part of the course).

The course content has been developed in consultation with several of our large pharmaceutical and manufacturing clients over many years and can be provided as a tutor lead delivered course, as a distance learning course or flexibly, combining both methods.

This course is in modular form with each module individually assessed and consists of:

- 1 Course notes
- 2 Worked examples
- 3 Trainee self-assessments
- 4 Module assessments

On completion of all modules, there is an end of course and practical assessment.

Companies who are considering the development of their own Apprenticeship Scheme may wish to include this EAL accredited & certificated qualification into their plans.

If required OakCAD can also help develop an effective company scheme.

STUDY TIME

This course has been set at a level equivalent to Level 3 and it is expected that it will take you 20 - 30 hours of delivered time or approximately 60 hours of self-study time (distance learning).

COURSE FEE

The current level of course fees for distance learning courses is displayed on the NCT web site.

For delivered courses, please contact OakCAD.

REQUIREMENTS

To undertake this course, you should have good basic engineering and mathematical knowledge. OakCAD/NCT is able to advise you as to whether you have the necessary background knowledge and experience to undertake this course.

INDUSTRY

Although written for the pharmaceutical industry it is also appropriate for the Petro- chemical industry, Food Manufacture or any industry using automatic production lines and processes or having a modern maintenance requirement.

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Module 1 Basic Thermodynamic Principles

- Heat
- Temperature
- Sensible and latent heat
- Enthalpy
- Pressure temperature relationship
- Primary refrigerants - Properties
- Pressure Enthalpy diagram – Plotting data
- Heat transfer
 - Conduction
 - Convection
 - Radiation
- Secondary refrigerants

Module 2 Basic Psychrometrics

- Properties of air
- Absolute humidity
- Relative humidity
- Dew point
- Wet bulb temperature
- Psychrometric charts – Data plotting

Module 3 Fluid Processes

- Refrigeration vapour compression cycle – Principles
- Basic circuit components
 - Compressor
 - Condenser
 - Evaporator
 - Expansion device
- Simple cycle processes
 - Compression
 - Condensation
 - Evaporation
 - Expansion
- Actual cycle processes
- Plotting actual cycle process
- Cycle calculations

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Module 4 Air Conditioning Processes

- Air flow systems
- Cooling
- Heating
- De-humidification
- Humidification
- Filtration
- Ventilation

Module 5 Heat Gains

- Thermal transmission
- Sensible heat gains from equipment
- Sensible heat gains from lighting
- Sensible and latent heat gains from personnel
- Latent heat gains from equipment
- Sensible and latent heat gains from ventilation

Module 6 Process Application

- Process Calculations
 - Cooling loads
 - Heating loads
 - Ventilation requirements
 - Air volume calculations

Module 7 Heat Pumps – Basic Principles

- Operating principles
- Heat sources
- Components
 - Compressor
 - Condenser (heating mode)
 - Evaporator (heating mode)
 - Expansion device
 - Reversing valves
 - Check valves

- Pressure Enthalpy diagram for heating – Plotting data
- Heating calculations

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Module 8 Engineering Procedures

- Refrigerants
- Evacuation and de-hydration
- Refrigerant recovery
- Refrigerant fluid phases
- Refrigerant charging
- Vacuum and vacuum pumps

Module 9 Systems

- Pressure testing
- Safe de-pressurisation
- Pressure system regulations
- Health and safety

Module 10 Operational Problems

- Partial pressures
- Ingress of moisture
- Effects of moisture contamination
- Effects of air contamination

Module 11 Refrigerant leakage

- Common leak areas
- Leak detection methods
- Instruments
- Legislation

Module 12 Fault finding

- Approaches to fault finding
- Refrigerant flow and control
- Condensing faults
- Load and capacity faults
- Oil return
- System contamination
- Compressor faults

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Module 13 Health and Safety

- Risk assessment
- Personal protection equipment
- Safe handling of refrigerants
- Cylinder safety

Module 14 Practical work

- Working system analysis
- Component identification
- Superheat adjustment
- Fault condition analysis
- Maintenance
- Commissioning

End of Course Assessment

Course discussion period

- Assessment questions
- Technical questions
- Practical questions