

Building Controls Industry Technical Training Scheme

The series of training courses in the Building Controls Industry Technical Training Scheme has been organized and arranged to provide the industry with a standard and recognizable level of achievement for its technicians and engineers, and it is believed that the cohesive set of generic training modules will provide a path to controls excellence.

Each course concludes with an examination and therefore a certificate is issued only on the satisfactory passing of the qualification. The modules are arranged such that on gaining a pass in the following :-

- Fundamentals of HVAC & Building Technology
- Measuring & Controls Technology
- Hydraulics in Building Services

a **Building Controls Industry Technical Certificate** is awarded.

On satisfactory completion, again by examination, of the application courses :-

- Control Functions in Heating Plants
- Control of Ventilation & Air Conditioning
- Refrigeration Technology

together with the Technical Certificate, an **Advanced Technical Certificate** is awarded.

The applications based courses are not in themselves of a particularly advanced level, however, combined with the other courses, an advanced status will certainly have been gained.

The courses are organized and administered by the Electrical Contractors Association in partnership with the Building Control Industry Association (BCIA), as the Association itself, does not have an established training department. The courses use the Siemens Building Technologies European Training Booklets and CBT (Computer Based Training) modules, which are customized to suit the qualifications program. They are delivered by independent training consultants from the Building Controls Industry and all are short intensive programs, and come complete with a training booklet suitable for pre-introduction, reference, and further study.

Fundamentals of HVAC & Building Technology

This is a 2 day course, with lectures in a very wide range of topics, which in part covers much of the scope of the rest of the program. A very intense course, it has as much delegate participation as possible, although it is a theory only series of sessions given against the background of a Power Point Slide Presentation. The examination is a multi-choice paper, which is marked before the end of the course and the results / certificates issued. The examination should not be under estimated; it is designed to test a real understanding of the topics covered, and that a good credible level has been attained. (Anyone who does not meet the required standard will be invited to retake the exam at a later date, after an opportunity for some home study).

Measuring Technology

This course has a very short program (max ½ day), and so it has been combined with the Controls Technology course to make an overall 3 day module. The topics (and the exam), although much fewer in number, are on the same basis as the Fundamentals of HVAC & Building Technology.

Controls Technology

As described above, this course is run in conjunction with the Measuring Technology, to make an overall 3 day module. The Controls Technology course itself is a CBT (Computer Based Training) program. This means that individual delegates use an interactive computer program to work through a series of sessions on pure controls technology. This theory of controls technology is very intense and leaves no stone unturned, however, very little in the way of control applications is covered, this being the subject of other courses in the training program. The interactive sessions conducted via the computer monitor and headphones, allow the use of simulations and line graphs of the resultant controls outputs etc. This format provides the full picture of the functioning control, not otherwise possible. The exam is also a CBT session at the end of the course. Like the other courses, the results of the exam are known before the end of the course, and a combined certificate is issued for both the measuring and controls portions, i.e. "Measuring & Controls Technology".

Hydraulics in Building Services

This course covers all the water circuits and systems we are likely to encounter in our building services controls environment. It includes all the necessary mechanical knowledge needed to understand the applications, and covers all aspects of valve sizing and control. It is a CBT (Computer Based Training), module as described for the Controls Technology course, and again is complete with an interactive CBT exam, as well as a valve sizing exercise.

Control Functions in Heating Plants

This course includes a detailed review of all types of heating plants and systems as well as the associated control applications. The sessions are by lectures as described for the Fundamentals of HVAC & Building Technology, and also include a similar multi-choice style examination.

Control of Ventilation & Air Conditioning

Similar to the Control Functions in Heating Plants, this course concentrates on the detailed types of ventilation and air conditioning systems and how to apply the necessary building controls. The course also follows the pattern of lectures and multi-choice style exam as described previously

Refrigeration Technology

This course includes a great deal of detail relating to refrigeration and psychometrics, however, it is in the theory of how refrigeration functions and not a practical step by step course on the path to refrigeration service and repair. Like the other applications courses, it is delivered via lectures to a Power Point Presentation, and concludes with a multi-choice examination paper all as described earlier.

Target Groups

The following is not binding, but a recommendation on the levels of knowledge and experience necessary to gain the most from the learning experience.

Fundamentals of HVAC & Building Technology

For engineers and technicians who have some experience within the industry, probably with a minimum period of some 9 months.

For those new to the industry or with less than 9 months experience, the course “Introduction to Building Controls & HVAC” (BC0), should be considered as a pre-requisite.

Measuring & Controls Technology

Hydraulics in Building Services

For engineers and technicians who have some knowledge and field experience within the industry, probably with a minimum period of one year. It is also recommended that they complete the Fundamentals of HVAC & Building Technology first.

Control Functions in Heating Plants

Control of Ventilation & Air Conditioning

Refrigeration Technology

For engineers and technicians who have a good level of knowledge and experience within the industry, probably with a minimum period of two years. It is also recommended that they complete the “Fundamentals of HVAC & Building Technology” (BC1), first.

The courses can be undertaken in any order; however, there are some benefits in attending the individual courses in the order listed, and it is particularly recommended that the course “Fundamentals of HVAC and building Technology” be undertaken before any others.

Although specifically organized and arranged for Building Controls Technicians and Engineers, all involved in the associated facets of the Building Services Industry would derive considerable benefit from participating in the program. Even delegates with industry experience in excess of 18 years, have commented on how much they have enjoyed the program, and how much they have gained in terms of knowledge.

Course Contents

Fundamentals of HVAC & Building Technology

- *Introduction to building technology*
- *Physical principles*
- *Introduction to heating plants*
- *Introduction to ventilation & air conditioning*
- *Introduction to measuring & control technology*
- *Introduction to fundamental hydraulic circuits*
- *Refrigeration technology*

Measuring Technology

- *Fundamentals of measurement*
- *Measured variables in HVAC*
- *Transmission action*
- *Tolerances and measuring errors*
- *Locating and mounting sensors*
- *Measuring concept / planning*

Controls Technology

- *Introduction to control technology*
- *The controlled system*
- *The different types of controllers and control loops*
- *Direct digital control (DDC)*

Hydraulics in Building Services

- *Introduction*
- *Hydraulic circuits*
- *Hydraulic characteristics*
- *Characteristics of valves and actuators and sizing controlling elements*
- *Troubleshooting*

Control Functions in Heating Plants

- *Control of a heating boiler*
- *Control of a multi-boiler plant*
- *Control and supervision of oil / gas burners*
- *Control of DHWS heating plant*
- *Control of heat pump plant*
- *Control of solar heating plant*

Control of Ventilation & Air Conditioning

- *Temperature control in ventilation plant*
- *Humidity control*
- *Mixing re-circulated air*
- *Control and frost protection of heat recovery equipment*
- *Plant concepts for partial air conditioning plants*
- *Plant concepts for full air conditioning plants with heat recovery*
- *Various control functions*
- *Control of air re-treatment*

Refrigeration Technology

- *Fundamentals of thermodynamics*
- *Refrigerants*
- *The h, log p chart*
- *Mechanical design of compression refrigeration plant*
- *The compression refrigeration circuit in the h, log p chart*
- *The different choices of controlling compression refrigeration plant*
- *Heat pump technology*
- *Refrigeration storage (ice banks)*
- *The absorption refrigeration process*

Introduction to Building Controls & HVAC



As an addition to the Technical Training Scheme Modules, we have now introduced a new Training Course “Introduction to Building Controls & HVAC”. This module is designed to augment the present courses by providing an introductory course for people who are new to the industry and would benefit from a slightly less technical syllabus. The course will also suit those who do not need the in depth technical syllabus with their job role, i.e. Managers, Marketing Personnel; and others who perhaps are not directly part of the Building Controls Industry, example, Facilities and Estates Managers.

Introduction to Building Controls & HVAC covering :~

- *What is a Control System*
Basic Controls, Basic Applications, Types of Control
- *Heating Systems*
Primary Heating Plant, Distribution of Heating, Basic Control of Heating
- *Hot Water Service*
Centralised HWS System
- *Ventilation & Air Conditioning*
Fresh Air, Heating & Cooling with Air Systems
Basic Control of Air Systems
- *Relative Humidity & the Psychometric Chart*
The Concept of Humidity
Basic Use of The Psychometric Chart
Basic Humidity Control
- *Primary Air Plant*
The Air Handling Unit
Multi Zone Systems
- *Air Re-treatment*
Fan Coil Units, Dual Duct, VAV, Induction & Other Local Systems
- *The Refrigeration Cycle*
- *Cooling Plant & Systems*
Chilled Water Plant, Cooling Towers & Air Cooled Condensers
DX Units
- *The Control Loop*
Proportional, P + I, Reverse & Direct Acting
- *Building Management Systems*
Principles and Scope, Energy Management
Facilities Management & Maintenance

Unlike the full Technical Training Programme, the course is not a qualification, and although a certificate is issued, this cannot be used in itself to facilitate registration with the JIB as a Building Controls Engineer.