

ADVANCED COMMERCIAL GAS TOPICS

This is a series of modules covering a variety of gas topics in more technical detail than standard ACS courses. The methods have been developed exclusively by RAD Training Ltd. and will be useful for senior engineers.

Available topics are:

- Tightness test formulae in IGE/UP/I
- An alternative to leak rate (LR) calculations
- Method for estimating IV of inaccessible pipework
- Tightness testing PE pipework above 1 bar operating pressure (OP)
- A CO/CO₂ action level for unflued commercial appliances
- Controlling ambient CO₂ emissions from unflued appliances
- Pipe sizing by hand – the pressure loss allocation method
- Pipe sizing by app – the Pressure Drop Calculator (PDC)
- Pipe sizing extensions to an existing system
- Theory of fluid flow
- Estimating Air Change Rate (ACR)
- Achieving Zone 2 NE status (ventilation of gas pipework)

Details of each topic are given on the following pages.

Call **0121 544 9142** or email r-price@btconnect.com for further information.

Tightness test formulae in IGE/UP/I

½ day, £ 60

A detailed examination of how the formulae and charts for TTD, TTP and MPLR, together with factors F1, F2 and F3 were derived from the kinetic theory of gases.

The course also includes a thorough review of the assumptions made in deriving the formulae and charts and how these can affect the accuracy of tightness tests in non-standard conditions.

An alternative to leak rate (LR) calculations

½ day, £ 60

An alternative tightness test methodology for large gas systems.

Unlike the method given in IGE/UP/I, this method does not require on-site calculation of leak rate (LR) after each test. Instead, a formula for maximum permissible drop (GM_{MAX}) is calculated *before* the test, bringing several advantages such as automatic generation of tightness test certificates.

Method for estimating IV of inaccessible pipework

¼ day, £ 60

When working on existing systems without a line diagram, it can be difficult to calculate installation volume (IV) of buried or inaccessible pipework accurately. This forces engineers to rely on overestimation or specialist methods. In this module we present a formula that can be used to calculate IV of buried pipework with up to 98 % accuracy.

Tightness testing PE pipework above 1 bar operating pressure (OP)

½ day, £ 60

A new method for tightness testing PE which corrects pressure drops for the effects of creep expansion, removing the need for long soak (stabilisation) times and tightness test pressures above operating pressure (OP).

A CO/CO₂ action level for unflued commercial appliances

½ day, £ 60

The concept of the 'action level' (highest acceptable CO/CO₂ ratio) is extremely useful for assessing the safety of domestic appliances. However, use of CO/CO₂ ratio has not been extended into the commercial sector except in the case of domestic-similar appliances such as boilers.

Here, we develop an action level for appliances not normally combustion tested, including radiant plaque heaters where assessment of flame picture can be difficult.

Controlling ambient CO₂ emissions from unflued appliances

½ day, £ 60

- Calculating the air change rate (ACR) and ventilation extract flow rate needed to limit ambient CO₂ to any desired concentration
- Calculating maximum (equilibrium) CO₂ concentration in a room
- Calculating stabilisation time for air quality tests
- Estimating ACR using CO₂ build-up and decay methods

Pipe sizing by hand

¼ day, £ 60

Using worked examples we go through a complete pipe sizing method for low pressure natural gas installations using the charts in IGEM/UP/2. Includes simplifying complex systems.

Pipe sizing by app

½ day, £ 162

The Pressure Drop Calculator (PDC) is an Excel application developed by RAD Training which can calculate pressure losses in natural gas and LPG systems working at low, medium or high pressure. We go through the use of the app with worked examples. Candidates can bring their own systems to use as a case study if notice is given in advance. Includes a copy of the PDC

Pipe sizing extensions to an existing system

¼ day, £ 60

How to use the PDC to calculate the effect of additional appliances on existing systems and to determine the feasibility of an extension.

Theory of fluid flow

¼ day, £ 60

A detailed look at mathematical modelling gas flow in pipework, focusing on calculating pressure losses at various pressure regimes. Topics covered include friction factor, Moody charts and the Colebrook-White equation.

Includes how to make your own bespoke pipe sizing charts.

Estimating Air Change Rate (ACR)

½ day, £ 60

ACR is used in several commercial standards for the evaluation of appliance ventilation requirements.

A method for estimating ACR in naturally- and mechanically-ventilated situations is presented without the need for specialist air quality measuring equipment.

Achieving Zone 2 NE status (ventilation of gas pipework)

½ day, £ 60

IGEM/UP/2 requires gas pipework installations to include a technical file justifying any Zone 2 NE status, as well as a risk assessment. If Zone 2 NE status is not achieved, the installation will require expensive and limited 'Ex rated' (explosion protected) equipment. Achieving Zone 2 NE status should therefore be one of the main aims of a gas systems designer.

DSEAR (Dangerous Substances Explosive Atmosphere Regulations) requirements are retrospective, so ventilation of pipework is relevant to all gas engineers and companies that work on existing installations.

This module covers solutions for ensuring new and existing gas pipework systems comply with DSEAR ventilation requirements. It utilises a combination of methods from IGEM/UP/16, IGE/UP/1 and other reference standards in order to achieve and maintain Zone 2 NE status.