Natural Gas Safety			
DIN No	TD5/022	**Issue Date**	2 October 2000
Open Government Status	Fully Open	**Review Date**	12 March 2004

HAZARDOUS AREA CLASSIFICATION AND NATURAL GAS INSTALLATIONS

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New Institution of Gas Engineers code of practice

The old British Gas used hazardous area classification at production and distribution sites as a means to control the introduction of fixed electrical equipment. They developed their own internal code SHA-1, and this has been used up until now by other parties installing natural gas facilities as a basis for good design. With the break-up of the old monopoly, it became necessary for various codes to become publicly available, and the Institution of Gas Engineers have taken on this task. Their first code on hazardous area classification, SR25 was launched in May 2000. TD has made comments on the document during its development. The code covers only natural gas, so plant designers will need to consider other codes, if other flammable materials are present on site, e.g. flammable liquids or odourant stored under pressure.
A single copy of the code is held by the library.

Legal requirements

Hazardous area classification at larger sites has been widely applied at larger sites for many years, and has been considered enforceable under HSW where there is a clear need to control electrical ignition sources systematically. It has become a specific legal requirement under the Dangerous Substances and Explosive Atmospheres Regulations 2002 though there is a transition period for this specific requirement.
Non electrical sources of ignition also fall within the scope of the regulations, and the results of any area classification should be applied to all ignition sources. These could be vehicles or other equipment with internal combustion engines, e.g. a grass cutter, analyser equipment containing a flame ionisation detector, or pneumatically powered grinders. The IGE code itself has no legal status, but there are no alternative up to date sources of advice that give anything like the same detail in use in the UK.

New methodology

This code builds on the international standard available in the UK as BS EN 60079/10, and adopts for instance the same recommended shading patterns on diagrams. The IGE document develops the topic in some important ways that are not found in any other codes from around the world. Particular examples are; a detailed treatment of the way the hazardous areas around a release source depend on the pressure within the system, dispersion modelling which considers wind speeds as low as 0.5m/s, as well as much higher speeds, and the interaction between: the ventilation provided within a building, the expected frequency of gas releases from secondary (unintended) sources (like valve stems or diaphragms on pressure regulators) and the inspection frequency at unmanned plants.

Plant vents

An extensive treatment is given for gas vents in outdoor locations. A distinction is drawn between ideal venting, which are vertical, and subject to other design requirements, and non ideal vents. Greatly extended hazardous areas arise from non ideal vents. Even with ideal vents, at the largest sizes and pressures vertical dispersion distances up to 400m are given. Low flying aircraft could be a risk at such a site during full flow venting. With non ideal vents horizontal wind driven dispersion distances up to 600m are considered possible, and these could spread off site, though not at ground level. Where hazardous areas do spread off site, the site operator needs to consider means to control ignition sources beyond the boundary fence in the event of a major release. Useful equations are given for calculating the flow rate of natural gas through orifices of different sizes, at different temperatures and pressures.

Low pressure gas holders

Recommendations are made for low pressure gas holders of the various types. These do not allow for total loss of contents, but assume that measures described in IGE code SR4 will make this unlikely.

Other sources of release

For secondary sources of release other than vents, the normal maximum hole size considered likely is 0.25mm^2 . This can however increase by a factor of 10 where the equipment works under adverse conditions (e.g. some vibration is expected). There is clearly scope for interpretation about what should be considered as adverse conditions. Even simple flanges, screwed joints and valve glands are considered as secondary sources of release, giving rise to a zone 2 extending 0.5m under normal conditions for pipe at 100mbar pressure.

Application to premises burning natural gas

The IGE code is not intended to apply to domestic installations, and experience shows that adequate standards of safety can be achieved in other ways. It does however indicate that the use of hazardous area classification at industrial and commercial gas burning installations may be considered appropriate in some cases. Up until now this has rarely been done at consumer premises, but the trend towards more pipework within buildings at higher utilisation pressures, and better sealed buildings, with less adventitious ventilation may mean that reassessments are needed. TD would be grateful for information on any consumer sites where area classification this is done, and for information about installation practice at sites utilising gas at pressures above 100mbar, except CHP/CCGT plants where separate guidance is available.

Analyser houses

During the development of the code it was apparent that designs for small, rarely occupied analyser houses are not well established. These of necessity have lighting and heating, and some electrical equipment that is not available in any of the recognised Explosion protected designs. Despite this there were indications that some of these houses might have been considered as zone 0. It is not normally acceptable for anyone to work in a zone 0, except under permit to work conditions with a full risk assessment. TD would welcome information about the designs of analyser houses, the zoning applied, and the equipment installed within the building.

Equipment below ground level

Equipment located below ground in a pit or trench may be poorly ventilated, and examples are known of gas migration over large distances along trenches, even where some ventilation openings were provided. Depending on the arrangement the trench or pit may be zone 0,1 or 2. It is clear that different controls over entry will be needed depending on the zone applied, but it may be difficult for an operator to establish which zone applies. In this context, the requirement in DSEAR for signs at points of entry to hazardous areas to be provided ‘where necessary’ will probably be relevant in due course.

Other IGE codes relevant to health and safety

The IGE publish other codes relevant to health and safety, and a list is available at www.igaseng.com