SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Hazardous zones – class 0,1 and 2

General Principles -Hazardous Area Classification for Flammable Gases and Vapours

- Area classification may be carried out by direct analogy with typical installations described in established codes, or by more quantitative methods that require a more detailed knowledge of the plant. The starting point is to identify sources of release of flammable gas or vapour. These may arise from constant activities; from time to time in normal operation; or as the result of some unplanned event. In addition, inside process equipment may be a hazardous area, if both gas/vapour and air are present, though there is no actual release.
- Catastrophic failures, such as vessel or line rupture are not considered by an area classification study. A hazard identification process such as a Preliminary Hazard Analysis (PHA) or a Hazard and Operability Study (HAZOP) should consider these abnormal events.

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- The most commonly used standard in the UK for determining area extent and classification is BS EN 60079 part 10[1], which has broad applicability. The current version makes clear the direct link between the amounts of flammable vapour that may be released, the ventilation at that location, and the zone number. It contains a simplistic calculation relating the size of zone to a rate of release of gas or vapour, but it is not helpful for liquid releases, where the rate of vaporisation controls the size of the hazardous area.
- Other sources of advice, which describe more sophisticated approaches, are the Institute of Petroleum Model Code of Practice (Area Classification Code for Petroleum Installations, 2002), and the Institution of Gas Engineers Safety Recommendations SR25, (2001). The IP code is for use by refinery and petrochemical type operations. The IGE code addresses specifically transmission, distribution and storage facilities for natural gas, rather than gas utilisation plant, but some of the information will be relevant to larger scale users.

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Zoning

Hazardous areas are defined in DSEAR as "any place in which an explosive atmosphere may occur in quantities such as to require special precautions to protect the safety of workers". In this context, 'special precautions' is best taken as relating to the construction, installation and use of apparatus, as given in BS EN 60079 -10[1].

Area classification is a method of analysing and classifying the environment where explosive gas atmospheres may occur. The main purpose is to facilitate the proper selection and installation of apparatus to be used safely in that environment, taking into account the properties of the flammable materials that will be present. DSEAR specifically extends the original scope of this analysis, to take into account non-electrical sources of ignition, and mobile equipment that creates an ignition risk.

Hazardous areas are classified into zones based on an assessment of the frequency of the occurrence and duration of an explosive gas atmosphere, as follows:

- Zone 0: An area in which an explosive gas atmosphere is present continuously or for long periods;
- Zone 1: An area in which an explosive gas atmosphere is likely to occur in normal operation;
- Zone 2: An area in which an explosive gas atmosphere is not likely to occur in normal operation and, if it occurs, will only exist for a short time.

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Various sources have tried to place time limits on to these zones, but none have been officially adopted. The most common values used are:

- Zone 0: Explosive atmosphere for more than 1000h/yr
- Zone 1: Explosive atmosphere for more than 10, but less than 1000 h/yr
- Zone 2: Explosive atmosphere for less than 10h/yr, but still sufficiently likely as to require controls over ignition sources.

Where people wish to quantify the zone definitions, these values are the most appropriate, but for the majority of situations a purely qualitative approach is adequate.

When the hazardous areas of a plant have been classified, the remainder will be defined as non-hazardous, sometimes referred to as 'safe areas'.

The zone definitions take no account of the consequences of a release. If this aspect is important, it may be addressed by upgrading the specification of equipment or controls over activities allowed within the zone. The alternative of specifying the extent of zones more conservatively is not generally recommended, as it leads to more difficulties with equipment selection, and illogicalities in respect of control over health effects from vapours assumed to be present. Where occupiers choose to define extensive areas as Zone 1, the practical consequences could usefully be discussed during site inspection.

Selection of Equipment

Zone 1	Zone 2	
Category 1	Category 2	Category 3
'ia' intrinsically safe EN 50020, 2002	'd' - Flameproof enclosure EN 50018 2000	Electrical Type 'n' - EN 50021 1999 Non electrical EN 13463-1, 2001
Ex s - Special protection if specifically certified for Zone 0	'p' - Pressurised EN 50016 2002	
	'q' - Powder filling EN 50017, 1998	
	'o' - Oil immersion EN 50015, 1998	
	'e' - Increased safety EN 50019, 2000	
	'ib' - Intrinsic safety EN 50020, 2002	
	'm' - Encapsulation EN 50028, 1987	
	's' - Special protection	

THANK YOU