

HAZARDOUS AREA CLASSIFICATION

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1. SCOPE

This standard practice covers the design procedure and design considerations to define hazardous area classification for process unit areas, off-site areas, and utility areas of processing plant.

Area classification is a method of analyzing and classifying the environments where explosive gas atmospheres may occur to allow the proper selection of electrical apparatus to be installed in that environment.

The object of the hazardous area classification is to enable electrical apparatus to be operated safely in such environments.

The procedure described here assumes that the facilities are designed, constructed, maintained and operated in accordance with good engineering and industrial practices so as to reduce and maintain release of flammable materials within acceptable limitations.

The area classification is strongly related to the applicable codes and practices specified in respective projects. The design procedure and design considerations described in this practice are based on IP PART 15 and IEC 79-12. The codes and practices frequently referred to in projects are listed in Sect. 6 of this practice.

2. WORK PROCEDURE

2.1 Basic Design Information

The basic design information as mentioned below shall be made available before a hazardous area classification is carried out.

- (1) Codes and practices to be applied to the project.
- (2) Process flow diagram showing operating conditions such as flow, temperature and pressure.
- (3) P&ID
- (4) Physical property of the fluids to be handled such as flash point, ignition temperature and boiling range.
- (5) Plot plan drawing including elevations.
- (6) Equipment List

2.2 Classification of Area

Area classification is defined to classify the areas where electrical apparatus is to be located into hazardous areas or non-hazardous areas, further subdivide the hazardous areas into zones, and assign supplementary codes to electrical apparatus to be located in a hazardous area.

In defining an area, it is not practical to identify all potential sources of hazards, such as sampling points, flanges, vents and drains on a plot plan ; instead, it is recommended that all related equipment items are considered as sources of hazards, since area classification is carried out at an early stage of engineering before piping layout is made available.

2.2.1 Hazardous Area and Non-hazardous Area

Hazardous area is a three-dimensional space in which a flammable atmosphere may exist with such frequency that special precautions in plant design and selection of electrical apparatus are required.

All other areas are referred to as non-hazardous area.

2.2.2 Zone

Hazardous area is further classified into zones based on the frequency of occurrence and the duration of an explosive gas atmosphere as follows:

(1) Zone 0

An area in which an explosive gas atmosphere is present continuously or for long periods.

(2) Zone 1

An area in which an explosive gas atmosphere is likely to occur in normal operation.

(3) Zone 2

An area in which an explosive gas atmosphere is not likely to occur in normal operation, but even if it did, it would exist only for a short period of time.

2.2.3 Extent of Zone

The extent of a zone is the distance in any direction, vertical and horizontal, from the source at which a flammable gas is released to the point where it is diluted by air to a sufficiently safe low level.

The distance depends mainly on the Fluid Category and the Relative Density which are described hereunder.

(1) Fluid Category

Because of the wide range of conditions prevailing in petroleum processing operations, where liquids can be processed at temperatures appreciably above their flash point, it is necessary to extend the general liquid classification based on flash point. For the purposes of Area Classification, flammable petroleum fluids are categorized according to their potential for rapid production of flammable vapour on release to the environment. Four Fluid Categories are distinguished:-

Fluid Category A: A flammable liquid which on release, would vaporize rapidly and substantially. This category includes:-

- any liquefied petroleum gases or lighter flammable liquid, whether under pressure or refrigerated.
- any flammable liquid at a temperature sufficient to produce, on release, more than about 40% wt vaporization with no heat input other than from the surroundings.

Fluid Category B: A flammable liquid, not in Category A, but at a temperature sufficient for boiling to occur on release.

Fluid Category C: A flammable liquid not in Categories A or B, but which can, on release, be at a temperature above its flashpoint.

Fluid Category G: A flammable gas or vapour.