General Information

Light fittings for use in hazardous areas have the following characteristics:

- They are sealed to prevent the ingress of liquid, gas or dust
- They have a protective lens made from robust, impact-resistant material of greater strength than that used for normal commercial fittings
- They have a sealed or a machined face to ensure resistance to liquid, dust or gas, or to quench a flame path.

Light fittings have different grades of protection depending on their construction and intended purpose

Some fittings are classified according to their International degree of Protection (IP) rating as designated.

- The first numeral indicates resistance to solids
- The second numeral indicates resistance to liquids
- The table indicates the actual values of the resistances

IP53 is the lowest acceptable rating for use in the presence of water, vapour, moisture or dust, and corrosive vapours. The preferred rating for the same installation would be IP65 or IP66. Light fittings subject to high pressure hosing would require a higher classification of IP67.

What constitutes a hazardous area?

Hella considers a hazardous area to be an area in which a flammable material, gas or vapour is mixed with the correct proportion of air in the presence of a spark or heat sufficient enough to ignite the mixture.

When light fittings and other electrical apparatus are to be installed in a hazardous area, it is essential that the decision maker takes adequate measures to reduce the likelihood of an explosion. Such measures include:

1. Selecting the correct equipment to be installed in each specific area
2. Ensuring the rating information of all potential gases and vapours is on hand at the time of selecting the equipment. Such information includes ignition temperature, flash point and lower explosive limit.

Classification of Gases and Vapours

Gases are grouped under the following classifications:

Group I, Group IIA, Group IIB and Group IIC

- Methane is classified as Group I
- Hydrogen and Acetylene are classified as Group IIC.

With the introduction of IEC 79 specification, the industry is moving from a Divisional nomenclature to a rating where the following re-classifications apply:

- **Zone 0** (previously Division 0) is an area which is continuously explosive
- **Zone 1** (previously Division 1) is an area which is likely to be explosive under normal working conditions
- **Zone 2** (previously Division 2) is an area which would normally be explosive in unusual situations, such as a failed gland or a joint which leaks or is damaged

An overview of the inclusions in each of the zones applicable to hazardous areas:

- **Zone 1 & 2** - gases, vapours and volatile liquids present in the air
- **Zone 21** - combustible dusts (metallic and non-metallic) and fibres in suspension in the air
- **Zone 22** - dust and easily combustible fibres not normally in suspension in the air, but which are present in sufficient quantities to produce a combustible mixture

Suitable lighting for Hazardous Areas

A large range of lighting equipment is currently available for installation in the various hazardous locations.

The most common type of light fittings available for Zone 1 situations are:

- Flameproof or explosion proof - Ex “d”
- Increased Safety - Ex “e”.

Although both are suitable for use in this type of atmosphere, there are substantial differences in their construction.

A common fault made by the purchaser is not specifying the type of gland required for their specific installation. Glands must be compatible with the type of cable and the core diameters being utilised. There are different glands available for both steel armoured cable and for sheathed cables. Cables should also be flame retardant if being used in an exposed environment and if not covered in sand.

Hazardous Area Classification

Summary of hazardous area classes in which only approved electrical apparatus may be used

Zone	Short description	Risk level
0	Explosive gas/vapour mixture always present	**Very High**
1	Explosive gas/vapour mixture occasionally present under normal conditions	**High**
2	Explosive gas/vapour mixture present under abnormal / fault conditions	**Medium**
21	Combustible dust/fibre in suspension in air under normal conditions	**High**
22	Combustible dust/fibre not normally in suspension in air, deposits of dust may accumulate.	**Medium**

Zone 0, Zone 1 and Zone 2 locations are those in which flammable gases or vapours are or may be present in the air in quantities sufficient to become hazardous.

Zone 0 Locations

These are locations in which flammable gases or vapours are continuously present in concentrations within the lower and upper limits of flammability.

Zone 1 Locations

These are locations

a) in which hazardous concentrations of flammable gases or vapours occur intermittently or periodically under normal operating conditions, or

b) in which hazardous concentrations of flammable gases or vapours may occur frequently because of repair or maintenance operations or leakage, or

c) in which breakdown or faulty operation of equipment or processes, which release dangerous concentrations of flammable gases or vapours, might also cause simultaneous failure of electrical equipment.

NOTE: This classification usually includes locations where volatile flammable liquids or liquified flammable gases are transferred from one container to another; interiors of spray booths and areas in the vicinity of spraying and painting operations where volatile flammable solvents are used; locations containing open tanks or vats of volatile flammable liquids; drying rooms or compartments for the evaporation of flammable solvents; locations containing fat or oil-extraction apparatus using volatile flammable solvents; portions of cleaning and drying plants where flammable liquids are used; gas generator rooms; inadequately ventilated pump rooms for flammable gases or for volatile flammable liquids and all other locations where hazardous concentrations of flammable vapours or gases may occur in the course of normal operations.

Zone 2 Locations

These are locations in which operations concerned with flammable or explosive substances, gases, or vapours or volatile liquids are so well controlled that an explosive or ignitable concentration is only likely to occur under abnormal conditions.

NOTE: The following shall be regarded as the minimum requirements for a location to which this classification is applicable:

a) The area is so well ventilated that, if abnormal conditions arise, ignitable concentrations of the gas or vapour are rapidly dispersed and their possible contact with electrical equipment is of minimum duration.

Zone 21 and Zone 22 locations are those which are hazardous because of the presence of combustible dust and fibres.

NOTE: Locations that house only plant and machinery that become non-operative if they lose their dust-tightness or if their internal pressure ceases to be below atmospheric pressure and locations where combustible dust is stored in dust-tight containers only need not be classified.
The classification of locations where dust is not normally in suspension in the air, but where mechanical failure or abnormal operation of machinery or equipment might cause suspension of dust and might also provide a simultaneous source of ignition through failure of electrical equipment, operation of protective devices, etc., depends on the specific circumstances.

Zone 21 Locations

These are locations

a) in which, under normal operating conditions, combustible dust or fibre is (or is likely to be) in suspension in the air in quantities sufficient to produce an explosive or ignitable mixture

b) in which metallic dusts may be present.

NOTE: This classification usually includes, for example, rooms containing machines such as grinders, pulverizers, cleaners, graders and scrapers that are not provided with suitable dust extraction or exhaust systems, open bins and hoppers, terminal points of open conveyors and spouts in grain processing plants, starch plants, sugar plants, malting plants, hay plants and coal plant. Also includes all working areas where metallic dusts and powders are produced, processed, handled, packed, or stored (except when these are stored in sealed containers).

Zone 22 Locations

These are locations in which combustible dust or fibre will not normally be in suspension in the air, or will not be likely to be thrown into suspension by the normal operation of equipment or apparatus, in quantities sufficient to produce an explosive or ignitable mixture, but where:

a) deposits or accumulations of such dust may be enough to interfere with the safe dissipation of heat from electrical apparatus, or

b) deposits or accumulations of dust in, on, or in the vicinity of electrical apparatus might be ignited by arcs, sparks, or burning materials from such apparatus.

Classification of Hazardous Locations

The descriptions in this section are given in general terms only. In determining the classification of a location and its extent, cognisance should always be taken of the likelihood of explosive conditions arising, of the adequacy and reliability of ventilation, of the quantity and nature of flammable or explosive material that can possibly be released, of the detection and removal of flammable or explosive materials that are released, and of all other pertinent factors.

Piping without valves, checks, meters and similar devices would not normally be deemed to introduce a hazardous conditions even though used for flammable liquids or gases.