

3. TECHNICAL PRINCIPLES

3.2 EQUIPMENT CATEGORIES AND EQUIPMENT PROTECTION LEVEL (EPL)

Different safety requirements are demanded of the equipment used depending on the likelihood of the occurrence of an explosive atmosphere. The equipment protection level is matched to the hazard potential in the different zones.

In Europe explosion-protected equipment is classified into categories by EU Directive 2014/34 (ATEX). At international level the equipment protection level (EPL) was introduced by IEC 60079 in 2007.

Equipment should be designed with explosion protection measures of varying degrees according to its category or equipment protection level.

Equipment categories

Three categories are envisaged for equipment in hazardous areas – with the exception of firedamp-endangered mining works:

Category 1: Equipment in this category is characterised by a **very high degree** of safety. Even in the rare event of equipment faults they must be safe and thus afford explosion protection so that:

- upon the failure of one device protective measure, at least a second separate protective measure will guarantee the necessary safety.
- upon the occurrence of two different faults the necessary safety is afforded.

Category 2: Equipment and systems offer a **high degree** of safety. The device explosion protection measures in this category are ensured in the case of **frequent** equipment faults or fault conditions (which can be typically expected).

Category 3: Equipment in this category affords the **necessary** degree of safety in **normal** operation.

The additional letter **G** or **D** indicates the use of the equipment in gas explosion hazardous areas (G) or areas with combustible dust (D).

Two categories are envisaged for equipment used in firedamp-endangered mining works:

Category M1: Equipment in this category is characterised by a **very high degree** of safety. Even in the **rare** case of equipment faults they must be able to continue operating in the existing explosive atmosphere and thus display explosion protection measures so that:

- upon the failure of one device protective measure, at least a second separate protective measure will guarantee the necessary safety.
- upon the occurrence of two different faults the necessary safety is afforded.

Category M2: Category M2 equipment and systems offer a **high** degree of safety. Upon the occurrence of an explosive atmosphere it must be possible to switch off the equipment. The device explosion protection measures in this category afford the necessary degree of safety in normal operation – even in adverse operating conditions and in particular when exposed to rough handling and fluctuating environmental influences.

Equipment protection level (EPL):

Pursuant to IEC 60079-0 equipment for hazardous areas is classified into three protection levels.

EPL Ga or Da: Equipment with a **very high** protection level for use in hazardous areas. In normal operation this equipment represents no risk of ignition in the event of predictable or rare faults/malfunctions.

EPL Gb or Db: Equipment with a **high** protection level for use in hazardous areas which represents no risk of ignition in normal operation or in the event of predictable faults/malfunctions.

EPL Gc or Dc: Equipment with an **advanced** protection level for use in hazardous areas. There is no risk of ignition during normal operation. The equipment has additional protective measures that ensure no risk of ignition in the event of typically predictable equipment faults.

The letters **G** and **D** denote whether the equipment and systems are suitable for gas explosion hazardous areas (G) or areas with combustible dust (D).

Two protection levels are defined for firedamp-endangered mining works.

EPL Ma: Equipment with a **very high** protection level that affords the necessary degree of safety. The equipment represents no risk of ignition in normal operation or in the event of predictable or rare faults/malfunctions – even if it is still in operation during a gas leak.

EPL Mb: Equipment with a **high** protection level that affords the necessary degree of safety. The equipment represents no risk of ignition in normal operation in the period between the occurrence of the gas leak and switching off the equipment.

Table 8 illustrates the application range for equipment in a specific category or with a specific protection level in the respective danger zones.