# PROTECTING YOUR PROCESS

# MARKING AND MEANING OF ATEX REGULATIONS

## CLASSIFICATION OF EXPLOSION HAZARDOUS ENVIRONMENTS

**IEC/EN 60079-10**
A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapor or mist is ...

| | |
|---|---|
| **ZONE 0** | if present continuously or for long periods or frequently. |
| **ZONE 1** | if likely to occur in normal operation occasionally. |
| **ZONE 2** | if not likely to occur in normal operation but, if it does occur, will persist for a short period only. |

**IEC/EN 61241-10**
A place in which an explosive atmosphere, in the form of a cloud of combustible dust in air, is ...

| | |
|---|---|
| **ZONE 20** | if present continuously, or for long periods or frequently for short periods. |
| **ZONE 21** | if likely to occur occasionally in normal operation. |
| **ZONE 22** | if not likely to occur in normal operation but, if it does occur, will persist for a short period only. |

"The employer or person responsible for safety shall classify places where explosive atmospheres may occur into zones in accordance with Annex I [...]" and "[...] shall ensure that the minimum requirements laid down in Annex II are applied [...] to these zones."

Source: directive 1999/92/EC, article 7

## INSTALLATION AND SELECTION OF APPARATUS

**SELECTION OF ELECTRICAL APPARATUS, PROTECTION FROM DANGEROUS SPARKING, WIRING SYSTEMS AND FURTHER REQUIREMENTS ACCORDING TO IEC/EN 60079-14 (GAS) AND IEC/EN 61241-14 (DUST)**

**Meaning of optional brackets**
**[E Ex ib]**

Corresponding electrical equipment is located in the safe area.
Signal lines lead to the explosion hazardous area.

**Device groups**
Group I comprises equipment which is approved for operation in firedamp endangered mines.

Group II applies to the areas "above-ground", such as chemical/petrochemical plants, refineries and mills (dust). For the ignition protection classes "Intrinsic safety" and "Flameproof enclosure", a further classification is made into the groups IIA to IIC due to the different ignition energies of the different gases.

| CENELEC marking | Typical gas | Ignition engergy µJ |
|---|---|---|
| I | Methane | 280 |
| II A | Propane | > 180 |
| II B | Ethylene | 60...180 |
| II C | Hydrogen | < 60 |

**Temperature classes**
Electrical equipment of group II is divided into temperature classes according to its maximum surface temperature.
In the same manner, the gases are classified on the basis of the different ignition temperatures.
Highest surface temperature at the apparatus:

| | |
|---|---|
| T 1 | 450 °C |
| T 2 | 300 °C |
| T 3 | 200 °C |
| T 4 | 135 °C |
| T 5 | 100 °C |
| T 6 | 85 °C |

**ADDITIONAL MARKING ACCORDING TO DIRECTIVE 94/9/EC (ATEX 95)**

**Certified according to the European CENELEC standard EN 50.../ EN 60079-...**

**Explosion proof**

II 2 G E Ex ib IIC T4

**Design tested according to Directive 94/9/EC**

**Device Group**
**I = Mining Equipment**
**II = Surface Industries**

**Application area**

Equipment that is certified according to the ATEX 95 directive is provided with an additional marking that describes the usage site (or, in the case of corresponding electric equipment, explains to where the signal lines may lead). First the device groups appear, then the category and finally the information concerning the atmosphere (gas and/or dust).
The following category division applies to device group II:

| Category 1 Very high safety measure | Category 2 High safety measure | Category 3 Normal safety measure |
|---|---|---|
| Sufficient safety by means of 2 protective measures / 2 faults | Sufficient safety in the case of frequently occuring equipment faults / 1 fault | Sufficient safety during normal operation |
| For use in Zone 0 20 | For use in Zone 1 21 | For use in Zone 2 22 |
| Atmosphere G D | Atmosphere G D | Atmosphere G D |

G=Gas, D=Dust
For details on dust explosion protection please refer to the Pepperl+Fuchs Explosion Protection Manual.

**MARKING ACCORDING TO IEC/EN 60079**

**MARKING ACCORDING TO EN 50014**

**Types of Protection**

| Marking code | | EEx d | EEx e | EEx p | EEx m | EEx o | EEx q | EEx i | EEx n |
|---|---|---|---|---|---|---|---|---|---|
| **Type of Protection** | General requirements | Flameproof enclosure | Increased safety | Pressurized apparatus | Encapsulation | Oil immersion | Powder filling | Intrinsic safety | **Type of protection "n"** |
| **Protection principle** | | Transmission of an explosion to the outside is excluded | Prevention of sparks and tempera-tures | Ex atmosphere is isolated from the source of ignition | Ex atmosphere is isolated from the source of ignition | Ex atmosphere is isolated from the source of ignition | Transmission of an explosion to the outside is excluded | Energy restriction of sparks and temperatures | Different protection principles for Zone 2 |
| **Application in zone** | | 1 or 2 | 1 or 2 | 1 or 2 | 1 or 2 | 1 or 2 | 1 or 2 | 0,1 or 2**** | 2 |
| **CENELEC* standard** | EN 50014 | EN 50018 | EN 50019 | EN 50016 | EN 50028 | EN 50015 | EN 50017 | EN 50020 | EN 50021 |
| **IEC/EN standard** | IEC 60079-0 | IEC 60079-1 | IEC 60079-7 | IEC 60079-2*** | IEC 60079-18 | IEC 60079-6 | IEC 60079-5 | IEC 60079-11** | IEC 60079-15 |
| **Use** | All applications | Control units, controllers, engines, command & monitoring units, power electronics | Branching and connecting boxes, housings, engines, luminaires, terminals | Control cabinets, engines, measurement and analytical equipment, computers | Relay and engine coils, electronics, solenoid valves, connecting systems | Transformers, relays, start-up controls, switching devices | Transformers, relays, condensors | Measurement, control and regulation technology, instrumentation | All applications for zone 2 |

**nA** Non-sparking equipment (rotating machines, fuses, luminaries, measuring instruments and low power equipment)

**nC** Sparking equipment with hot surfaces (closed switchgear and non-igitable components, hermetically sealed equipment, tightly sealed equipment)

**nR** Equipment protected by a restricted breathing enclosure

**nL** Energy-limited equipment and electric circuits (to be integrated into EEx ic-Standard)

* Cenelec Standards in process of being transferred to IEC/EN Norms.
** Equipment, *** Systems, **** ia used in Zone 0,1 and 2, **** ib used in Zone 1 and 2, **** ic used in Zone 2
For non-electric explosion protection please refer to the Pepperl+Fuchs Explosion Protection Manual.

## INSPECTION AND MAINTENANCE

**DIRECTIVE 1999/92/EC (MINIMUM REQUIREMENTS FOR IMPROVING THE SAFETY AND HEALTH PROTECTION OF WORKERS POTENTIALLY AT RISK FROM EXPLOSIVE ATMOSPHERES), ANNEX II:**

"All necessary measures must be taken to ensure that the workplace, work equipment and any associated connecting device [...] are maintained and operated in such a way as to minimize the risks of an explosion [...]."

The IEC/EN 60079-17 and IEC/EN 61241-17 respectively assists on complying with this legal requirement by describing various items such as the basics of inspection and maintenance with regard to documentation, qualification of personnel, extent and manner of inspections and schedules.
Important: the valid national and regional standards and regulations must be observed.

Are you interested in more detailled information on explosion protection? Please don't hesitate to contact your local Pepperl+Fuchs representative and ask for the comprehensive Explosion Protection Manual and Video-DVD. The manual is also available as free download on **www.pepperl-fuchs.com**.

## PEPPERL+FUCHS AND THE PROCESS AUTOMATION MARKET

Pepperl+Fuchs delivers electronic instrumentation for the automation market. With over 3,400 employees in more than 30 countries to design, produce and distribute products, we are located where our customers need us. The Process Automation Division is the market leader for intrinsic safety interfaces and hazardous location equipment. Our FieldConnex® Fieldbus Installation System provides highest flexibility to modern process automation applications while the BEBCO EPS Purge & Pressurization System offers protection for any type of instrumentation. This comprehensive range of explosion protection systems is complemented by further leading-edge technologies such as EXTEC Visualization+Operation Systems, Separator Alarm Systems, Level and Corrosion Monitoring devices and, of course, our world-wide support services. Pepperl+Fuchs is the recognized expert in our technologies and we have earned this reputation by supplying the world's largest process industry companies with the broadest line of proven components for a diverse range of applications.

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