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-term 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-term 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)

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

Meaning of optional brackets [E Ex ib]
Corresponding electrical equipment is located in the safe area.
Signal lines lead to the explosion hazardous area.

Certified according to the European CENELEC standard EN 60079-...

Explosion proof

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, IIB, IIC, due to the different ignition energies of the different gases respectively the Maximum Experimental Save Gap (MESG).

CENELEC marking	Typical gas	Ignition Engergy MESG
I	Methane	high
II A	Propane	
II B	Ethylene	
II C	Hydrogen	low

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

Design tested according to Directive 94/9/EC

Device Group
I = Mining Equipment
II = Surface Industries

Application area

Equipment that is certified according to is provided with an additional marking that describes the usage site. 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:

MARKING ACCORDING TO IEC/EN 60079 (VALID SINCE 2004)

MARKING ACCORDING TO EN 50014 (VALID UNTIL 2007)

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

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

Types of Protection

Marking code		Ex d	Ex e	Ex p	Ex m	Ex o	Ex q	Ex i	Ex 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 excessive temperatures	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	Ex atmosphere is isolated from the source of ignition	Energy restriction of sparks and temperatures	Different protection principles for Zone 2
Application in zone		1 or 2	1 or 2	1 or 2	0, 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 Ex ic-Standard)

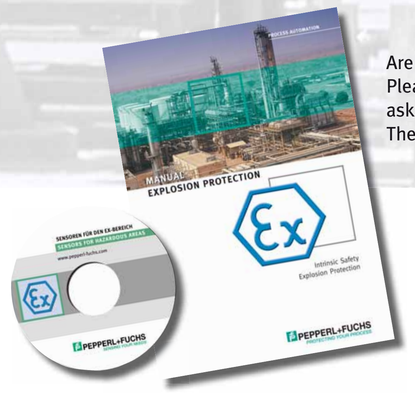
* Cenelec Standards in process of being transferred to IEC/EN Norms.
** Equipment, *** Systems, **** ia used in Zone 0,1 and 2, **** ib used in Zone 1 and 2, **** ic used in Zone 2
For non-electric explosion protection please refer to the Pepperl+Fuchs Explosion Protection Manual.

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. Being present in more than 30 countries to design, produce anddistribute products, we arelocated 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 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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