Equipment for Hazardous Areas

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Places where a dangerous, potentially explosive atmosphere may occur are classified into zones. The zone classification provides information on the frequency and duration of such an atmosphere. The following tables show how potentially explosive gas and dust atmospheres are defined and how they relate to the device classification according to Directive 2014/34/EU and IEC or EN 60079-...:

Zone		Definition
Gas	Dust	
0	20	Area in which a dangerous potentially explosive atmosphere is constantly, persistently, or frequently present
1	21	Area in which a dangerous potentially explosive atmosphere can occasionally form during normal operation
2	22	Area in which a dangerous potentially explosive atmosphere does not usually arise during normal operation and, if so, only rarely and for a short period of time

ATEX	IEC/EN 60079-...	Use
Group I	Group I	Mining
Group II ... G	Group II A, B, C	Above ground, gas hazardous area
Group II ... D	Group III A, B, C	Above ground, dust hazardous areas

Gas hazardous areas

Dust hazardous areas

Marking	II 1 G	II (1) G	II 1/2 G	
Special features (examples)	Device for use in explosion-protected area (e.g., terminal box, control station, motor, light, etc.)	Appliance for use outside the hazardous area (e.g., intrinsically safe isolating amplifier or transmitter power supply)	Device for installation in separation wall between two zones (e.g., level measurement or temperature probe)	Protective systems for use in hazardous area, usually without a category (e.g., bursting disk)

Directive 2014/34/EU

Legal marking

Gas hazardous areas				Dust hazardous areas			
Ex	II	2	G	Ex	II	2	D
Explosion protection	Area of application	Degree of safety	Type of potentially explosive atmosphere	Explosion protection	Area of application	Degree of safety	Type of potentially explosive atmosphere
	Device group I Mining areas II Other areas	**Equipment category** M1 Very high degree of safety M2 High degree of safety 1 Very high degree of safety 2 High degree of safety 3 Normal degree of safety	Gas, vapor, mist		**Device group** I Mining areas II Other areas	**Equipment category** M1 Very high degree of safety M2 High degree of safety 1 Very high degree of safety 2 High degree of safety 3 Normal degree of safety	Dust

Basis for equipment selection: zone classification (user's responsibility) Application in gas hazardous area		Equipment categories for gas hazardous area (ATEX)			Typical EPL (IEC or EN 60079-...)	
Zone	A place in which a potentially explosive atmosphere as a mixture of air and combustible gases, vapors, or mists ...	Zone	Group	Category	Additional	Zone	EPL
0	... is constantly, persistently, or frequently present.	0	II	1	G	0	Ga
1	... can occasionally form during normal operation.	1	II	2	G	1	Gb
2	... does not usually arise during normal operation and, if so, only rarely and for a short period of time.	2	II	3	G	2	Gc

Basis for equipment selection: zone classification (user's responsibility) Application in dust hazardous area		Equipment categories for dust hazardous areas (ATEX)			Typical EPL (IEC or EN 60079-...)	
Zone	Area in which a dangerous potentially explosive atmosphere in the form of combustible dust contained in the air ...	Zone	Group	Category	Additional	Zone	EPL
20	... is constantly, persistently, or frequently present.	20	II	1	D	20	Da
21	... can occasionally form during normal operation.	21	II	2	D	21	Db
22	... does not usually arise during normal operation and, if so, only rarely and for a short period of time.	22	II	3	D	22	Dc

IEC or EN 60079-...

Technical marking

Ex	eb	IIC	T6	Gb
Explosion protection	Type of protection	Device group	Temperature class	Equipment protection level
Ex Explosion protection	da db dc Flameproof enclosure eb ec Increased safety ia ib ic Intrinsic safety ma mb mc Encapsulation nA nC nR Equipment for Zone 2 ob oc Oil immersion op pr op sh op is Optical Explosion protection pxb pyb pzc Purge and pressurization q Powder filling	I Mining areas Depending on the dimension of the flameproof joint, the spark energy or the material properties of the enclosure (light metals, static electricity) IIA Low requirements IIB Average requirements IIC High requirements	T1 < 450 °C T2 < 300 °C T3 < 200 °C T4 < 135 °C T5 < 100 °C T6 < 85 °C Note: Safety margins have already been taken into account by the manufacturer for the temperature class specification.	Ga Very high level of protection Gb High level of protection Gc Enhanced level of protection

Ex	tb	IIIC	T80°C	Db
Explosion protection	Type of protection	Device group	Temperature	Equipment protection level
Ex Explosion protection	ta tb tc Protection by enclosures ia ib ic Intrinsic safety ma mb mc Encapsulation p Purge and pressurization q Powder filling	IIIA Combustible fibers IIIB Non-conductive dusts IIIC Conductive dusts	Actual surface temperature in °C Note: The surface temperature specification does not include safety margins. The user must take this into account.	Da Very high level of protection Db High level of protection Dc Enhanced level of protection

Marking	Ex d	Ex e	Ex i	Ex m	Ex nA	Ex nC	Ex nR	Ex o	Ex op	Ex p	Ex q	Ex t
Protection principle	Transmission of an explosion to the outside is excluded	Prevention of sparks and impermissible high temperatures	Energy limitation of sparks and temperatures	Potentially explosive atmosphere is isolated from the ignition source	Non-sparking electrical equipment	Sparking equipment protected	Potentially explosive atmosphere is sufficiently isolated from ignition source	Potentially explosive atmosphere is isolated from the ignition source	Radiation energy is limited (op is), or avoided, (op pr) or shut off (op sh)	Potentially explosive atmosphere is isolated from the ignition source	Potentially explosive atmosphere is isolated from the ignition source	Potentially explosive atmosphere is isolated from the ignition source
Category and EPL	1, 2, or 3 Ga, Gb, or Gc	2 or 3 Gb or Gc	1, 2, or 3 Ga, Gb, or Gc Da, Db, or Dc	1, 2, or 3 Ga, Gb, or Gc Da, Db, or Dc	3 Gc	3 Gc	3 Gc	2 or 3 Gb or Gc	1, 2, or 3 Ga, Gb, or Gc	2 or 3 Gb or Gc Db or Dc	2 Gb	1, 2, or 3 Da, Db, or Dc

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