

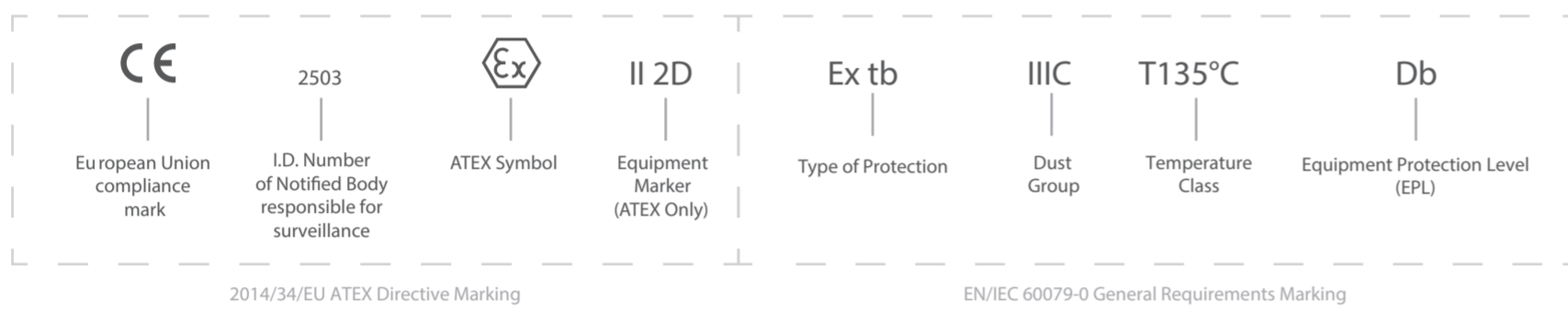


HAZARDOUS AREA GUIDE for ATEX & IECEx (Zones/Groups)

Typical Equipment Marking for Gas Atmospheres



Typical Equipment Marking for Dust Atmospheres



Gas Zones	Definition	ATEX Category	EPL	Required Protection
Methane	Mines with methane and dust. Equipment remains energised in explosive atmosphere	M1	Ma	Two Faults
Methane	Mines with methane and dust. Equipment is de-energised in explosive atmosphere	M2	Mb	Severe Normal Operation
Zone 0	Explosive atmosphere present continuously or for long periods, frequently	1G	Ga	Two Faults
Zone 1	Explosive atmosphere is likely to occur under normal conditions, occasionally	2G	Gb	One Fault
Zone 2	Explosive atmosphere is unlikely to occur under normal conditions, short periods	3G	Gc	Normal Operation

Dust Zones	Definition	ATEX Category	EPL	Required Protection
Zone 20	Explosive atmosphere present continuously or for long periods, frequently	1D	Da	Two Faults
Zone 21	Explosive atmosphere is likely to occur under normal conditions, occasionally	2D	Db	One Fault
Zone 22	Explosive atmosphere is unlikely to occur under normal conditions, short periods	3D	Dc	Normal Operation

Enclosure Ingress Protection (IP) Level	
Enclosure Ingress Protection (IP) Level: To EN/IEC 60529	
First Number (Solid objects / dust)	Second Number (Water)
0 No protection	0 No protection
1 Objects > Ø50 mm	1 Vertically dripping water
2 Objects > Ø12.5 mm	2 Vertically dripping water with enclosure tilted by 15°
3 Objects > Ø2.5 mm	3 Sprayed water up to 60° from the vertical
4 Objects > Ø1.0 mm	4 Sprayed water from all directions
5 Dust protected	5 Water jets
6 Dust tight	6 Powered water jets
-	7 Temporary submersion < 1m depth
-	8 Extended submersion > 1m depth

Ambient Temperature Range (T amb)	
T amb =	Temperature relating to the immediate surroundings of the equipment (assumed to be -20°C to +40°C, unless stated)

Protection Concept - Electrical - Gas	
Type of Protection (electrical - gas)	Reference
General Requirements	EN/IEC 60079-0
Flameproof - Ex d / da / db / dc	EN/IEC 60079-0
Purge/Pressurised - Ex p / pxb / pyb / pzc	IEC 60079-2
Quartz/Sand Filled - Ex q / qb / qc	EN/IEC 60079-5
Oil Immersion - Ex o / ob / oc	EN/IEC 60079-6
Increased Safety - Ex e / eb / ec	EN/IEC 60079-7
Intrinsic Safety - Ex i / ia / ib / ic	EN/IEC 60079-11
Non Sparking - Ex nA / nC / nL	EN/IEC 60079-15
Encapsulation - Ex m / ma / mb / mc	EN/IEC 60079-18
Optical Radiation - Ex op is / op sh / op pr	EN/IEC 60079-28
Trace Heating Systems - Ex e / Ex 60079-30-1	EN/IEC 60079-30-1
Special Protection Ex s	EN/IEC 60079-33
Caplights	EN/IEC 60079-35-1
Controlled Spark Duration Power-i	TS 60079-39
Process Sealing	TS 60079-40
Flame Arresters	EN 16852
Diesel Engines	EN 1834-1,2,3

Protection Concept - Electrical - Dust	
Type of Protection (electrical - dust)	Reference
General Requirements	EN/IEC 60079-0
Flameproof - Ex d / da / db / dc	EN/IEC 60079-31
Purge/Pressurised - Ex p / pxb / pyb / pzc	EN/IEC 60079-2
Quartz/Sand Filled - Ex q / qb / qc	EN/IEC 60079-11
Oil Immersion - Ex o / ob / oc	EN/IEC 60079-18

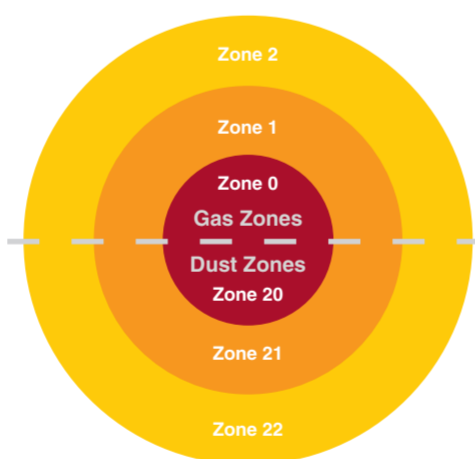
Protection Concept - Electrical - Non-Electrical		
Type of Protection (non-electrical) (gas & dust)	Reference (ATEX only)	IECEx
General Requirements	EN 80079-36	IEC / ISO 80079-36
Flow Restricting Enclosure - fr	EN 13463-2	-
Flameproof - d	EN 13463-3	-
Constructional Safety - c / h	EN 80079-37	IEC / ISO 80079-37
Control of Ignition - b / h	EN 80079-37	IEC / ISO 80079-37
Pressurisation - p	EN 60079-2	-
Liquid Immersion - k / h	EN 80079-37	IEC / ISO 80079-37

Suitable for Zone 0, 1 & 2
ATEX Group & Category: II 1G
IECEx Equipment Protection Level: Ga
Types of protection (electrical): ia, da, ma, op is
Types of protection (non-electrical, ATEX): c, b, p, k
Types of protection (non-electrical, IECEx): h

Suitable for Zone 1 & 2
ATEX Group & Category: II 2G
IECEx Equipment Protection Level: Gb
Types of protection (electrical): db, eb, ib, mb, ob, pxb, pyb, qb, op is, op pr, op sh
Types of protection (non-electrical, ATEX): d, c, b, p, k, h
Types of protection (non-electrical, IECEx): d, p, h

Suitable for Zone 2 only
ATEX Group & Category: II 3Gr
IECEx Equipment Protection Level: Gc
Types of protection (electrical): dc, ec, ic, mc, nA, nC, nR, oc, pzc, qc
Types of protection (non-electrical, ATEX): fr, d, c, b, p, k, h
Types of protection (non-electrical, IECEx): fr, d, p, h

Zones of Use Explosive Atmospheres



Suitable for Zone 20, 21 & 22:
ATEX Group & Category: II 1D
IECEx Equipment Protection Level: Da
Types of protection (electrical): ta, ia
Types of protection (non-electrical, ATEX): c, b, k, h
Types of protection (non-electrical, IECEx): fr, d, p, hr

Suitable for Zone 21 & 22:
ATEX Group & Category: II 2D
IECEx Equipment Protection Level: Db
Types of protection (electrical): tb, ib, mb
Types of protection (non-electrical, ATEX): d, c, b, p, k, hr
Types of protection (non-electrical, IECEx): d, h

Suitable for Zone 22 only:
ATEX Group & Category: II 3D
IECEx Equipment Protection Level: Dc
Types of protection (electrical): tc, ic, mc
Types of protection (non-electrical, ATEX): fr, d, c, b, p, k, h
Types of protection (non-electrical, IECEx): hr



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Equipment Groups	
Equipment Group	Definition
Group I	Electrical equipment intended for use in mines susceptible to fire damp
Group II	Electrical equipment intended for use in explosive gas atmospheres
Group III	Electrical equipment intended for use in explosive dust atmospheres

Temperature Class (T Class)	
Temperature Class (T Class)	Highest temperature achieved under the most adverse equipment rating and heating conditions. (Flashpoint temperature of some gases)
T1: 450°C	Ammonia (630°C), Hydrogen (560°C), Methane (537°C), Propane (470°C)
T2: 300°C	Ethylene (425°C), Butane (372°C), Acetylene (305°C)
T3: 200°C	Cyclohexane (259°C), Keosene (210°C)
T4: 135°C	Di-ethyl Ether (160°C)
T5: 100°C	-
T6: 85°C	Carbon Disulphate (95°C)