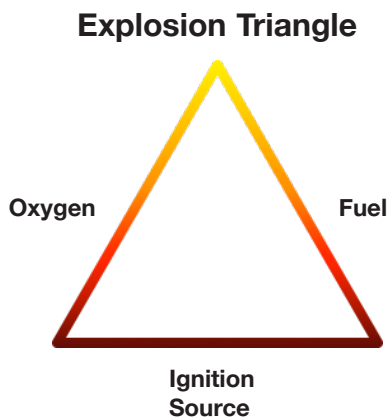


EX-INFORMATION

Information concerning
explosion protected
electrical material.
Marked Ex.



Within the production and process plant industry, there are many processes where hazardous areas with danger of explosions exist. Some examples could be in the pharmaceutical industry, chemical industry and especially offshore on platforms.

In companies, production plants and process facilities explosion hazard may occur during cleaning, refining / distilling, machining, handling and painting etc.

Explosions can be caused by arch, sparks and heat, generated by electrical or mechanical components or from static electrical sparks.

What we basically do as an engineering company and manufacturer of explosion protected products is to take the ignition source away in the explosion triangle, by moulding, encapsulation and heat limitation.

The ATEX standards (European) is made from the IEC standards (International) but is adapted with additional safety to cover the European markets.

There are two EU directives for hazardous areas with potentially explosive atmospheres.

ATEX directive 94/9 – EU

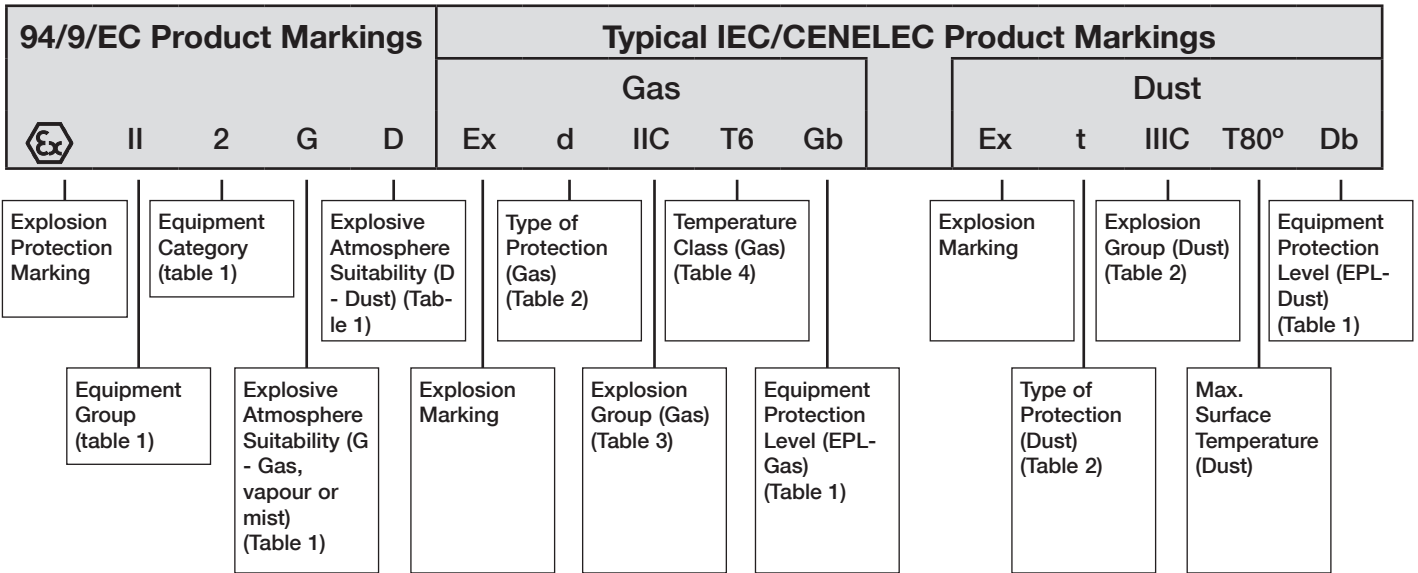
ATEX directive 1999/92/EF (user directive)

ATEX comes from the French words: **AT**mosphères **EX**plosives

IEC Ex standards are based on the worldwide IEC standards and can be accepted all around the world except for areas with own certificate standards.

There are several other Hazardous area standards that apply for explosion protection around the world and many countries have their own type of certification, North America – NEC. Russia – GOST. Brazil – Inmetro Etc.

There can be other directives that may apply for your application contact us for further information.


Table 1. Zone Classification / Equipment Group / Equipment Level

Hazardous mixture	Period of presence of the flammable substances	Zone Classification	Necessary Marking for the Equipment				
			Acc. to 94/9/EC		Acc. to IEC 60079-0		
			Equipment Group	Category	Protection Group	Equipment Protection Level EPL	Protection Level
Gas Mist Vapour	Continuously for long periods or frequently	Zone 0	II	1 G	II	Ga	Very High
	Occasional occurrence	Zone 1	II	2 G	II	Gb	High
	Not likely, but if it does occur, only rarely and for a short period	Zone 2	II	3 G	II	Gc	Increased
Dust	Continuously for long periods or frequently	Zone 20	III	1 D	III	Da	Very High
	Occasional occurrence	Zone 21	III	2 D	III	Db	High
	Not likely, but if it does occur, only rarely and for a short period	Zone 22	III	3 D	III	Dc	Increased
Methane Coal Dust		Mining	I	M1	I	Ma	Very High
		Mining	I	M2	I	Mb	High

Table 2. Method of Explosion Protection

Electrical Type of Protection for Atmospheres made explosive by gases, vapours and mists					
Type of Protection	Type of Protection	Zone	/ ATEX Category	/ EPL	Protection Concept
d	Flameproof enclosure	Zone 1 or 2	/ 2 G	/ Gb	Contain the explosion, prevent the flame propagation
e	Increased safety	Zone 1 or 2	/ 2 G	/ Gb	No arcs, sparks or hot surfaces
ia	Intrinsic safety	Zone 0, 1 or 2	/ 1 G	/ Ga	Limit the energy of the spark and the surface temperature
ib	Intrinsic safety	Zone 1 or 2	/ 2 G	/ Gb	Limit the energy of the spark and the surface temperature
ic	Intrinsic safety	Zone 2	/ 3 G	/ Gc	Limit the energy of the spark and the surface temperature
ma	Encapsulation	Zone 0, 1 or 2	/ 1 G	/ Ga	Exclusion of Ex-atmosphere
mb	Encapsulation	Zone 1 or 2	/ 2 G	/ Gb	Exclusion of Ex-atmosphere
mc	Encapsulation	Zone 2	/ 3 G	/ Gc	Exclusion of Ex-atmosphere
nA	Non-sparking	Zone 2	/ 3 G	/ Gc	No arcs, sparks or hot surfaces
nC	Enclosed break	Zone 2	/ 3 G	/ Gc	Prevent the flame propagation
nR	Restricted breathing	Zone 2	/ 3 G	/ Gc	Protection by enclosure
o	Oil immersion	Zone 1 or 2	/ 2 G	/ Gb	Exclusion of Ex-atmosphere
q	Powder filling	Zone 1 or 2	/ 2 G	/ Gb	Prevent the flame propagation
Electrical Type of Protection for Atmospheres made explosive by dusts					
Type of Protection	Type of Protection	Zone	/ ATEX Category	/ EPL	Protection Concept
ia	Intrinsic safety	Zone 20, 21 or 22	/ 1D	/ Da	Limit the surface temperature
ib	Intrinsic safety	Zone 21 or 22	/ 2D	/ Db	Limit the surface temperature
ic	Intrinsic safety	Zone 22	/ 3D	/ Dc	Limit the surface temperature
ma	Encapsulation	Zone 20, 21 or 22	/ 1D	/ Da	Exclusion of Ex-atmosphere
mb	Encapsulation	Zone 21 or 22	/ 2D	/ Db	Exclusion of Ex-atmosphere
mc	Encapsulation	Zone 22	/ 2D	/ Dc	Exclusion of Ex-atmosphere
p	Pressurized	Zone 22	/ 3D	/ Dc	Exclusion of Ex-atmosphere
t	Protection by enclosure	Zone 20, 21 or 22	/ 1D, 2D, or 3D	/ Da, Db, Dc	Keep the combustible dust out and avoid hot surfaces

Table 3. Gas Groups

Gas Groups	
IIA	Acetone, Ethane, Benzene, Petrol, Butane, Propane, Methane
IIB	Ethylene, Town Gas
IIC	Hydrogen, acetylene

Table 4. Temperature Classes

Temperature class	Maximum Surface Temperature	Maximum Permissible Surface Temperature for Permanent Hot Surfaces
T1	≤ 450°C	440°C
T2	≤ 300°C	290°C
T3	≤ 200°C	195°C
T4	≤ 135°C	130°C
T5	≤ 100°C	95°C
T6	≤ 85°C	80°C

Table 5. IP Protection

IP Protection IEC/EN 60529		
	First digit Degrees of protection against solid foreign objects	Second digit Degrees of protection against water
0	Non-protected	Non-protected
1	Protected against solid foreign objects of 50mm Ø and greater	Protected against vertically falling water drops (condensation)
2	Protected against solid foreign objects of 12.5 mm Ø and greater	Protected against vertically falling water drops when enclosure tilted up to 15°
3	Protected against solid foreign objects of 2.5mm Ø and greater	Protected against spraying water, up to 60° angle
4	Protected against solid foreign objects of 1.0mm Ø and greater	Protected against splashing water from any direction
5	Dust-protected	Protected against water jets from any direction
6	Dust-tight	Protected against powerful water jets from any direction
7		Protected against the effects of temporary immersion into water
8		Protected against the effects of continuous immersion of water

Example: IP 54 dust proof / protected against spraying water from any direction.