

# What is a Hazardous Area?



### What is hazardous Area?

An explosive atmosphere is a mixture composed of air and combustible gases, vapours, mist or dust under atmospheric conditions, which once ignited, allows the combustion process to spread and include the entire mixture.



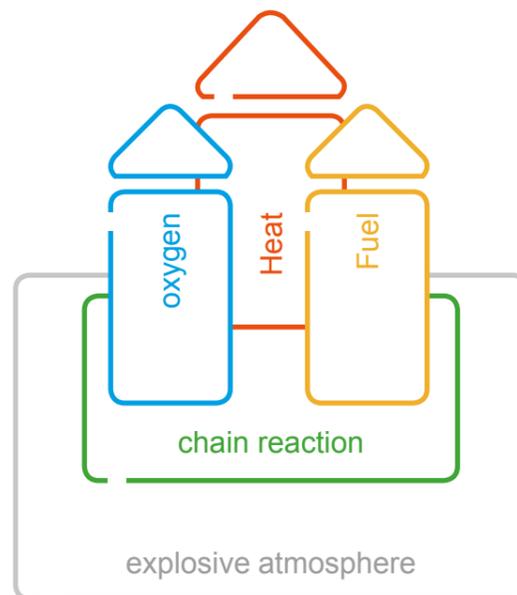
### Explosion

An explosion is a oxidation or decomposition reaction in conjunction with a sudden rise in temperature, pressure or both simultaneously. This generates a sudden expansion of the gas volume and the release of large quantities of energy in a small space.

prerequisite for an explosion to occur:

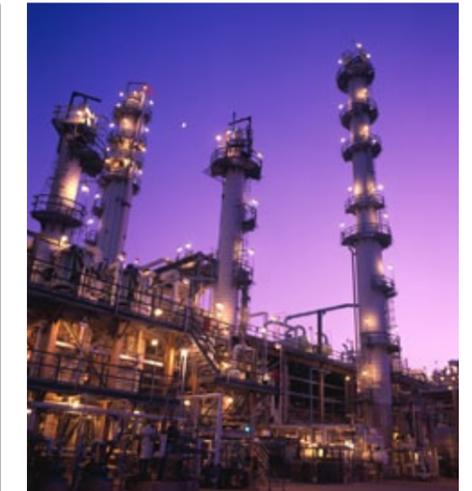
- Combustible material
- Oxygen
- Ignition source

The simultaneous existence of three factors is the



### Electrical equipment for areas susceptible to gas explosions

	EN	IEC
General requirements	EN 60079-0	IEC 60079-0
Flameproof enclosure (d)	EN 60079-1	IEC 60079-1
Pressure-proof enclosure (p)	EN 60079-2	IEC 60079-2
Sand casing (q)	EN 60079-5	IEC 60079-5
Oil casing (o)	EN 60079-6	IEC 60079-6
Increased safety (e)	EN 60079-7	IEC 60079-7
Intrinsic safety (i)	EN 60079-11	IEC 60079-11
Type of protection (n)	EN 60079-15	IEC 60079-15
Moulded encapsulation (m)	EN 60079-18	IEC 60079-18
Intrinsically safe systems	EN 60079-25	IEC 60079-25
Electrical equipment for zone 0	EN 60079-26	IEC 60079-26
Intrinsically safe fieldbus systems	EN 60079-27	IEC 60079-27
Optical radiation (op)	EN 60079-28	IEC 60079-28
Dust explosion (Ex ta, tb, tc)	EN 60079-31	IEC 60079-31



### Electrical equipment for areas subject to combustible dust

	EN	IEC
Protection by the enclosures (t)	EN 60079-31	EN 60079-31
Pressure-proof enclosures (pD)	EN 61241-4	EN 61241-4
Intrinsic safety (iD)	EN 61241-11	EN 61241-11
Moulded encapsulation (mD)	EN 60079-18	EN 60079-18



## Zona Classification

Explosion endangered atmospheres are subdivided into zones reflecting the probability of their occurrence. In accordance with the Ex regulations, the zones are defined as follows:

### Gases and vapours (IEC 60079-10-1):

#### ZONE 0

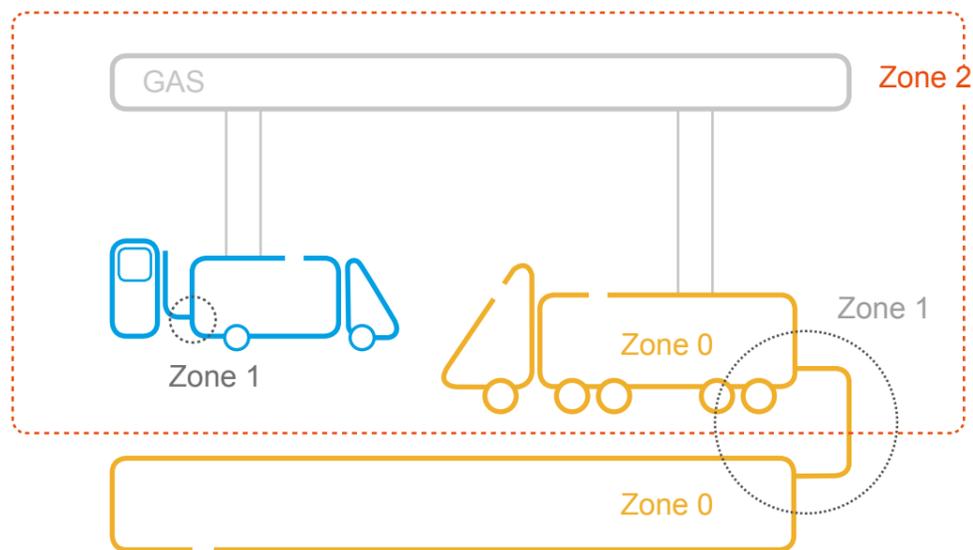
Area subject to permanent, long period or frequent presence of a dangerous explosive gas atmosphere. Typically, these conditions are found inside containers, pipework, apparatus and tanks.

#### ZONE 2

Area not susceptible to a dangerous explosive gas atmosphere during regular operation. It's occurrence, if at all, is only short-period. Zone 2 includes storage rooms exclusively used for storage, areas around disconnectable connection of pipework and, typically, the closer area around zone 1.

#### ZONE 1

Area in which a dangerous explosive gas atmosphere can be occasionally expected during regular operation. This includes the close vicinity to zone 0 as well as close areas around filling and discharging devices.



## II Areas subject to combustible dust (IEC 60079-10-2)

#### ZONE 20

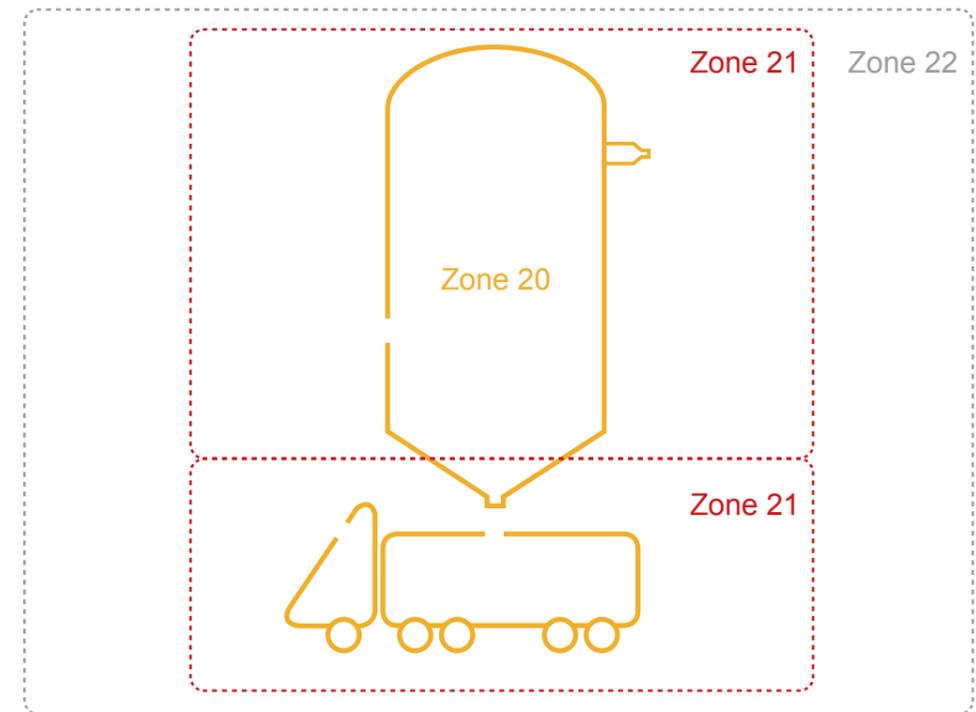
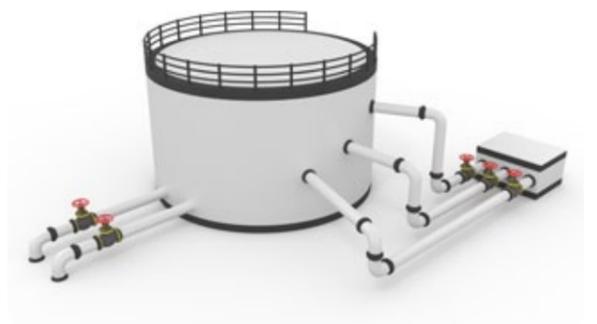
Area subject to constant, long-period or frequent explosive atmosphere consisting of dust/air mixtures.

#### ZONE 22

Area not susceptible to an explosive atmosphere caused by swirled up dust. It's occurrence, if at all, will in all probability be infrequent and short-period.

#### ZONE 21

Area in which an explosive atmosphere consisting of a dust/air mixture can be occasionally expected.



Types of protection in gas atmosphere

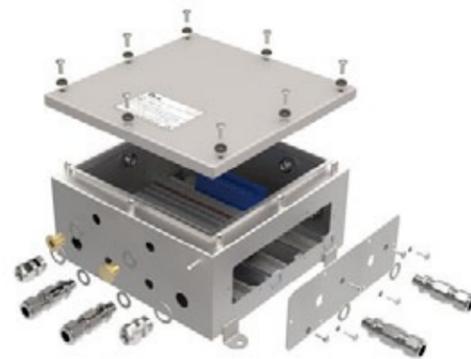
**Ex e.**

**Type of protection “Increased safety” Ex e.**

Type of protection providing measures to prevent the possibility of undue high temperatures developing and the occurrence of sparks or arcs inside or on outer part of electrical equipment, which will not occur during regular operation, by an increased level of safety.

Applications: Terminal boxes, junction boxes for components of other types of protection, such as motors, valves, lamps. Frequently in combination with other types of protection, e.g. connection room of a flameproof enclosure of controls and devices.

Advantage of the type of protection: Simple connection by means of Ex-e approved cable glands.



Atex terminal box TERBOX

**Ex i.**

**Type of protection “Intrinsic safety” Ex i.**

Type of protection allowed by keeping the energy in the current circuit sufficiently low to exclude the generation of ignitable sparks, arcs or temperatures.

Applications: Terminal boxes, sensors, limit switches, interface modules, assembly groups in measuring and control technology.

Subdivision into 3 categories –ia, -ib and –ic. The meaning of the different letters a, b or c is that they reflect the number of technical safety related countable errors until the intrinsic safety expires and the use in the individual zone.



ia (zone 0, 1, 2): Intrinsic safety is still guaranteed if two independent errors occur.

ib (Zone 1, 2): Intrinsic safety is still guaranteed if one error occurs.

ic (Zone 2): Under unfavourable conditions, such as the effect of heat and the <math>10^{-3}</math> probability of an uninterrupted operation and the presence of non-countable errors, intrinsically safe current circuits may not generate an ignition of the explosive environments:

Typically, standard assembly groups are used which are usually identified by the colour blue. Example: Cable glands, terminals.

**Ex o.**

**Type of protection “Oil immersion” Ex o.**

Type of protection safeguarding electrical equipment by immersion in oil to prevent contact between the explosive atmosphere with the potential ignition source.

Applications: Switching devices for the chemical industry, transformers.

HAZARDOUS ATMOSPHERE



**Ex p.**

**Type of protection “Pressurized enclosures” Ex p.**

Type of protection preventing the ingress of explosive atmosphere into an enclosure by creating a permanent overpressure (> 0.5 mbar).

Applications: Switch cabinets, control systems, larger measuring devices, current and voltage converter modules.



Pressurized enclosure Ex p PEPPEX



**Ex d.**

**Type of protection “flameproof enclosure” Ex d.**

Type of protection, accommodating components susceptible to igniting an explosive atmosphere in an enclosure resisting the pressure generated inside by the explosion of a gas mixture. The ignition energy is cooled through the gap and discharged.

Applications: Motors, switching devices with N/O and N/C contacts, command devices, fusing elements, transformers, lamps.

Special feature:

Flameproof enclosed elements are frequently combined with connection boxes of the

“increased safety” type of protection, sparing the installer the necessity to open the flameproof enclosed enclosure. The connection area is subject to Ex E and can be provided with standard conductor lead-ins Ex e.



Flameproof enclosure Atex Ex d BURJ

**Ex m.**

**Type of protection “flameproof enclosure” Ex m.**

Type of protection safeguarding electrical equipment by encapsulation in a moulding compound to prevent the explosive atmosphere coming into contact with the potential ignition source.



Applications: Relay modules, command devices, sensors, display units, valves, fusing elements  
Subdivision into 3 categories Ex ma, Ex mb and Ex mc. The meaning of the different letters a, b or c is that they reflect the number of technical safety related countable errors until the intrinsic safety expires and the use in the individual zone.

ma: Can be used in zone 0, 1, 2.

mb: Can be used in zone 1, 2.

mc: Can be used in zone 2.



**Ex n.**

**Type of protection Ex n.**

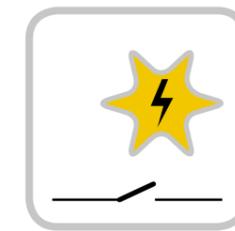
This type of protection only applies to electrical equipment of the 3G category, the intent being that during regular operation and certain abnormal conditions, the potential of this equipment igniting a surrounding explosive atmosphere is eliminated. This type of protection aims at finding an economical compromise between the “normal” industrial standard and the high technical safety requirements of the types of protection for equipment of the 2G category. The following types of protection of the n category exist or the zone 2 area:

- Hermetically sealed “nC”.
- Sealed “nC”.
- Encapsulated “nC”.
- Enclosed “nC”.
- Non spark “nA”.
- Not ignitable “nC”.

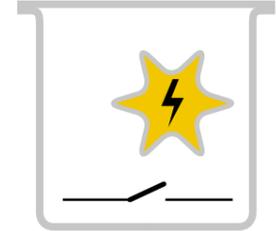
Equipment encompassing a combination of different types of protection are also possible. Affix this information on the type plate when identifying the equipment.

Identification Ex edm.

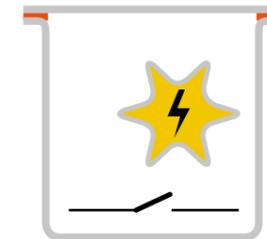
Control station with Ex e approved enclosure, Ex d approved switches and Ex em certified indicator lights.



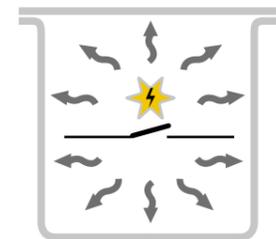
Hermetically sealed “nC”



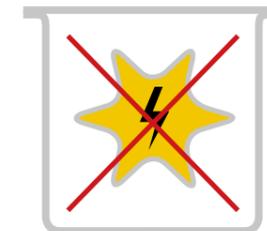
Sealed “nC”



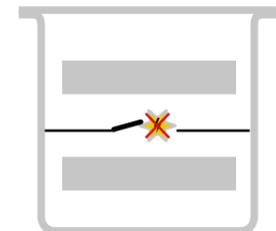
Encapsulated “nC”



Enclosed “nC”



Non spark “nA”



Not ignitable “nC”

Types of protection in combustible dust atmosphere

**Ex t.**

**Type of protection “Protection by enclosures” Ex t.**

The t type protection prevents the ingress of combustible dust into the casing. The casing must provide a minimum protection of IP 6x. The surface temperature of the casing is limited.



Atex junction box GEOEX

**Ex m.**

**Type of protection “Molded encapsulation” Ex m.**

The Ex m type of protection is used to safeguard electrical equipment using an encapsulating moulding compound to prevent the explosive atmosphere from coming into contact with the potential ignition source.

Applications: Relay modules, command devices, sensors, display units, fusing elements.

**Ex pD.**

**Type of protection “Pressure proof enclosure” Ex pD.**

The Ex pD type of protection is used to prevent the ingress of explosive atmosphere into an enclosure by creating a permanent overpressure.

**Ex i.**

**Type of protection “Intrinsic safety”. Ex i.**

With the Ex I type of protection, the energy in the current circuit is kept sufficiently low to prevent ignitable sparks, arcs or temperatures from being generated.

Applications: Interface modules, measuring and control technology modules.

ATEX identification

Our empty cabinets have the following identification label inside the door.



+34 945 601 381  
Paso del Prao 6  
Oyón. 01320 (Spain)  
atex@atexdelvalle.com

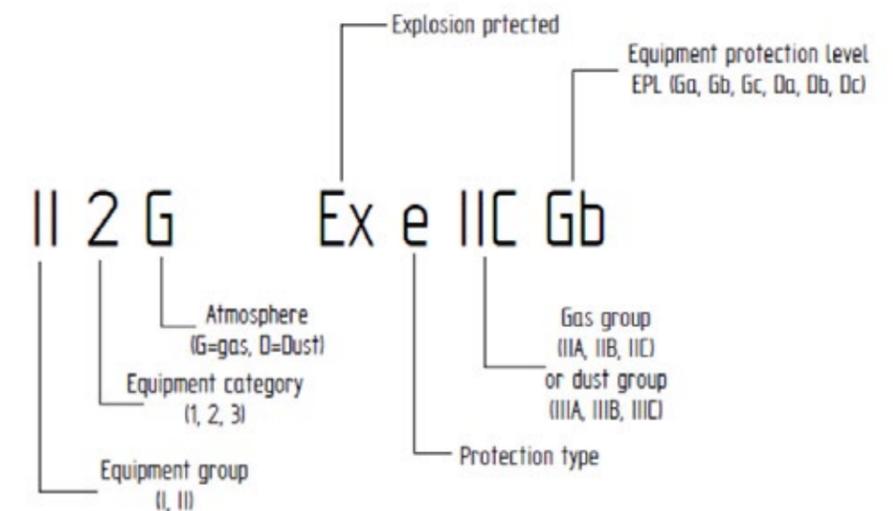
Type: GEOxxxxxxEX  
0163   
II 2G Ex e IIC Gb  
II 2D Ex tb IIIC Db IP66

Serial nr: xxxxxxxx  
Year: 2014  
-25°C < Ta < +60°C  
LOM 14 ATEX 3028U

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Label explained.





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Contact us, we will be available at any time.