



The Motor Control Warehouse

ATEX Explanation For ATEX Explosion Proof Motors

MCW Hints & Tips 0016

What is ATEX?



ATEX is the term used for the European Unions directive 94/9/EC that concerns equipment and protective systems intended for the use in potentially explosive atmospheres. The purpose of the directive is to facilitate trade within the EU by aligning the laws of the member states regarding the safety requirements for hazardous area products.

The ATEX directive does not cover some areas, these are outlined below:

1. Medical devices intended for use in a medical environment.
2. Equipment and protective systems where the explosion hazard results exclusively from the presence of explosive substances or unstable chemical substances.
3. Equipment intended for use in domestic and non-commercial environments where potentially explosive atmospheres may only rarely be created, solely as a result of the accidental leakage of fuel gas.
4. Personal protective equipment covered by Directive 89/686/EEC.
5. Seagoing vessels and mobile offshore units together with equipment on board such vessels or units. Means of transport, i.e. vehicles and their trailers intended solely for transporting passengers by air, road, rail or water networks, as well as means of transport in so far as such means are designed for transporting goods by air, by public road or rail networks or by water.
6. Vehicles intended for use in a potentially explosive atmosphere shall not be excluded.

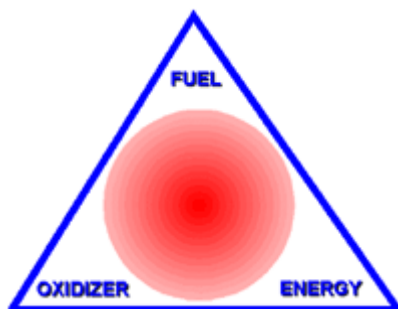


ATEX Symbols + Descriptions

	Under the Old Directive, the "Epsilon x" (shown) symbol indicated conformity with CENELEC requirements. This symbol was allowed to be applied to products which were considered to be final assemblies, NOT empty enclosures or component parts such as terminal blocks, operators, breather drains, etc.
	Under the New Directive, the "Epsilon x" symbol will move into the marking string and be used to indicate explosion protection. The "CE" mark will now indicate conformity to the ATEX Directive. This mark can only be applied to final assemblies and not to empty enclosures or component parts.

Explosion Protection + Description

There are a number of strategies that can be used to protect plant and plant equipment from risk of explosion, due to hazardous gases or dusts.



- 1) Oxidiser (Oxygen/Air)
- 2) Fuel (Gas/Dust)
- 3) Energy (Ignition Source)

If any of the above are removed from the equation then the immediate area is made safer.

Air

Air is naturally occurring all around us so would be difficult to remove.

Fuel (Gas/Dust)

This has to be the right mixture before an explosion will occur. Too much air or too much gas / Dust and the mixture will not ignite.

If the explosive atmosphere is caused by gases, vapours and mists the hazardous area is coded G. If the explosive atmosphere is caused by dusts the hazardous area is coded D.



Energy (Ignition Source)

This can be from a number of sources, these include Naked Flame, A Hot Surface, Mechanically Generated Sparks, Electrically Generated Sparks, or Electrostatic Discharge etc.

The ATEX standards call for the manufacturers of hazardous area electrical equipment to label their products with the following information.

1. Name of manufacturer.
2. Product type code.
3. Address of manufacturer.
4. Year of manufacture.
5. Marking in accordance with directive 94/9/EC II 3 GD – group II location, category 3 equipment, for gas and dust hazards.
6. Marking in accordance with European standards EEx nR II T – built and tested to European standards, type of protection, explosion group, temperature class.
7. CE marking together with notified body registration number.
8. Notified testing body and reference number.
9. Serial number.
10. Technical data.
11. Ingress protection.

Explosion Groups

Explosion protected electrical equipment is classified in terms of the ignition temperature, the ignition capability and flame transmission capacity of the explosive atmosphere in which it is designed to operate.

In the first instance equipment is divided into two groups depending on its location above or below ground.

Group I Electrical equipment for use below ground in areas susceptible to firedamp.

Group II Electrical equipment for all other areas.

Group II equipment is further divided into three sub groups depending on the ignition and flame transmission characteristics of the explosive hazard.

These sub-groups are designated **IIA**, **IIB** and **IIC**.



Zones the probability of an explosive atmosphere occurring.

Zone 0 defines an area in which an explosive atmosphere caused by a mixture of air and gases, vapours and mists is present continuously for long periods or very frequently. (Category 1G under ATEX)

Zone 1 defines areas in which an explosive atmosphere caused by a mixture of air and gases, vapours and mists is expected to occur occasionally. (Category 2G under ATEX)

Zone 2 defines areas in which an explosive atmosphere caused by a mixture of air and gases, vapours and mists is unlikely and if it should occur it will be for a short time and then only rarely. (Category 3G under ATEX)

Zone 20 defines an area in which an explosive atmosphere caused by a cloud of combustible dust and air is present continuously for long periods or very frequently. (Category 1D under ATEX)

Zone 21 defines areas in which an explosive atmosphere caused by a cloud of combustible dust and air is expected to occur occasionally. (Category 2D under ATEX)

Zone 22 defines areas in which an explosive atmosphere caused by a cloud of combustible dust and air is unlikely and if it should occur it will be for a short time and then only rarely. (Category 3D under ATEX)

The main differences within ATEX are that Zones 0, 1 & 2 have now been replaced with Categories 1, 2 & 3, the inclusion of Dusts into Zones, and accounting for Mechanical items in Hazardous areas.



Types of Electrical Equipment Suitable for use in Potentially Explosive Atmospheres

Different techniques are used to prevent electrical equipment from igniting explosive atmospheres. There are restrictions on where these different types of equipment can be used as follows:

	European - Area of use Designation Standard	IEC - Area of use Designation Standard	USA - Area of use Designation Standard
Flameproof Enclosure – An enclosure used to house electrical equipment, which when subjected to an internal explosion will not ignite a surrounding explosive atmosphere.	Zones 1 & 2 EExd EN50018	Zones 1 & 2 Exd IEC60079-1	Class 1 Divisions 1 & 2 UL1203
Intrinsic Safety – A technique whereby electrical energy is limited such that any sparks or heat generated by electrical equipment is sufficiently low as to not ignite an explosive atmosphere.	Zones 0, 1 & 2 EExi EN50020	Zones 1 & 2 Exi IEC60079-11	Class 1 Divisions 1 & 2 UL913
Increased Safety – This equipment is so designed as to eliminate sparks and hot surfaces capable of igniting an explosive atmosphere.	Zones 1 & 2 EExe EN50019	Zones 1 & 2 Exe IEC60079-7	
Purged and Pressurised – Electrical equipment is housed in an enclosure which is initially purged to remove any explosive mixture, then pressurised to prevent ingress of the surrounding atmosphere prior to energisation.	Zones 1 & 2 EExp EN50016	Zones 1 & 2 Exp IEC60079-2	Class 1 Divisions 1 & 2 NFPA496
Encapsulation – A method of exclusion of the explosive atmosphere by fully encapsulating the electrical components in an approved material.	Zones 1 & 2 EExm EN50028	Zones 1 & 2 Exm IEC60079-18	
Oil Immersion – The electrical components are immersed in oil, thus excluding the explosive atmosphere from any sparks or hot surfaces.	Zones 1 & 2 EExo EN50015	Zones 1 & 2 Exo IEC60079-6	Class 1 Division 2 UL698
Powder Filling – Equipment is surrounded with a fine powder, such as quartz, which does not allow the surrounding atmosphere to come into contact with any sparks or hot surfaces.	Zones 1 & 2 EExq EN50017	Zones 1 & 2 Exq IEC60079-5	
Non-sparking – Sparking contacts are sealed against ingress of the surrounding atmosphere, hot surfaces are eliminated.	Zone 2 EExn EN50021	Zone 2 Exn IEC60079-15	
Special Protection – Equipment is certified for use in a Potentially Explosive Atmosphere but does not conform to a type of protection listed above.	Zones 0, 1 & 2 *Exs	Zones 0, 1 & 2 Exs	



Ingress Protection

This is based on two digits that are used to define the protection against foreign objects for that particular apparatus.

Solids		Liquids	
0	No protection.	0	No protection.
1	Protected against solid objects up to 50mm, e.g. hands.	1	Protected against vertically falling drops of water.
2	Protected against solid objects up to 12mm, e.g. fingers.	2	Protected against water spray up to 15 degrees from vertical.
3	Protected against solid objects up to 2.5mm, e.g. tools.	3	Protected against water spray up to 60 degrees from vertical.
4	Protected against solid objects over 1mm, e.g. wires.	4	Protected against water sprays from all directions.
5	Protected against dusts. (No harmful deposits).	5	Protected against water jets from all directions.
6	Totally protected against dust.	6	Protected against strong water jets from all directions, e.g. Offshore.
		7	Protected against immersion between 15cm and 1m in depth.
		8	Protected against long immersion under pressure.

IP54 is the minimum protection allowed for Hazardous Area Equipment, North America practice is to use NEMA standards to describe ingress protection i.e.

NEMA 3 is similar to IP54

NEMA 4 is similar to IP55

NEMA 4x is similar to IP56

NEMA 6 is similar to IP67

Please click the link below for our dedicated guide to ingress protection.

MCW Hints & Tips 0008 Ingress Protection

