



94/9/EC DIRECTIVE - ATEX (Atmosphères Explosibles)

The Directive 94/9/EC of the European Community (with mandatory on 1st July 2003) covers equipments and protective systems which may be used in potentially explosive atmosphere.

Among innovative aspects of the directive, regarding all kind of explosion risks, electrical or not, are:

introduction of the Essential Health and Safety Requirements (EHSRs), applicability to mining products and surface industry products, classification of equipments into categories according to granted protection level, surveillance on production based on company quality systems.

New Directive considers for the 1st time explosion risk due to mechanical ignition source, e.g. spark due to contact use or overheating of mechanical components and not only electrical.

Other important conditions considered by the directive are referred to installation area, storage and functioning of the machine, in order to have a classification according to explosive atmosphere presence probability.

Scope of the directive:

To grant security and health to people and goods, with regards to risks due to use of equipments and systems in potentially explosive atmospheres.

Explosive atmosphere:

An explosive atmosphere is defined as a "mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture".

Potentially explosive atmosphere:

An atmosphere, which could become explosive due to local and/or operational conditions.

Classification of hazardous places according to 1999/92/EC Directive

Hazardous places are classified in terms of zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere.

Zone 0

A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.

Zone 1

A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.

Zone 2

A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Zone 20

A place in which an explosive atmosphere in the form of a cloud of combustable dust in air is present continuously, or for long periods or frequently.

Zone 21

A place in which an explosive atmosphere in the form of a cloud of combustable dust in air is likely to occur in normal operation occasionally.

Zone 22

A place in which an explosive atmosphere in the form of a cloud of combustable dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Notes:

- 1) Layers, deposits and heaps of combustable dust must be considered as any other source which can form an explosive atmosphere.
- 2) "Normal operation" means the situation when installations are used within their design parameters.



Groups and categories of the equipments

LEVEL OF PROTECTION	CATEGORY		PERFORMANCE OF PROTECTION	INTENDED USE
	GROUP I	GROUP II		
Very high level	M1		Two independent means of protection or safe even when two faults occur independently of each other	Equipment remains energized and functioning when explosive atmosphere is present
Very high level		1	Two independent means of protection or safe even when two faults occur independently of each other	Equipment remains energized and functioning in zones 0,1,2 (G) and/or 20, 21, 22 (D).
High level	M2		Suitable for normal operation and severe operating conditions	These products are intended to be de-energised in the event of an explosive atmosphere in zones 1, 2 (G) and/or 21, 22 (D).
High level		2	Suitable for normal operation and frequently occurring disturbances or equipment where faults are normally taken into account	Equipment remains energized and functioning in zones 1, 2 (G) and/or 21, 22 (D).
Normal level		3	Suitable for normal operation	Equipment remains energized and functioning in zones 2 (G) and/or 22 (D).



GROUP I

Category M 1

Comprises equipment designed and, where necessary, equipped with additional special means of protection to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a very high level of protection.

Equipment in this category is intended for use in underground parts of mines as well as those parts of surface installations of such mines endangered by firedamp and/or combustible dust.

Equipment in this category is required to remain functional, even in the event of rare incidents relating to equipment, with an explosive atmosphere present, and is characterized by means of protection such that:

- either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection,
- or the requisite level of protection is assured in the event of two faults occurring independently of each other.

Category M 2

Comprises equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a high level of protection.

Equipment in this category is intended for use in underground parts of mines as well as those parts of surface installations of such mines likely to be endangered by firedamp and/or combustible dust. This equipment is intended to be de-energized in the event of an explosive atmosphere.

The means of protection relating to equipment in this category assure the requisite level of protection during normal operation and also in the case of more severe operating conditions, in particular those arising from rough handling and changing environmental conditions.

GROUP II

Category 1

Comprises equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a very high level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours or mists or by air/dust mixtures are present continuously, for long periods or frequently.

Equipment in this category must ensure the requisite level of protection, even in the event of rare incidents relating to equipment, and is characterized by means of protection such that:

- either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection,
- or the requisite level of protection is assured in the event of two faults occurring independently of each other.

Category 2

Comprises equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and of ensuring a high level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists or air/dust mixtures are likely to occur.

The means of protection relating to equipment in this category ensure the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account.

Category 3

Comprises equipment designed to be capable of functioning in conformity with the operating parameters established by the manufacturer and ensuring a normal level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by gases, vapours, mists, or air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

Equipment in this category ensures the requisite level of protection during normal operation.

Classification of the maximum surface temperatures (Group IIG)

Temperature class	Max. surface temperature (°C)
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Correspondence between ZONES and CATEGORIES

ZONE	0	20	1	21	2	22
	G (gas)	D (dust)	G (gas)	D (dust)	G (gas)	D (dust)
Explosive atmosphere	High probability, always or frequently		Medium probability, some times		Low probability, very rarely	
CATEGORY According to 94/9/EC directive	1		2		3	


The classification of hazardous atmospheres into zones, in an industrial context, is the responsibility of the end user on whose premises/in the course of whose work such hazards may exist or arise.

Manufacturer must state all information regarding products groups and categories, so that final user can decide in which zone ATEX products may work under security condition, even though manufacturer can not forecast where and how actually product will work.

Example of classification for electrical equipment:

CE  II 3GD EEx nA II T4 T125°C -5°C ≤ Ta ≤ 70°C

Example of classification for non electrical equipment:

CE  II 3GD c T4 T125 °C -5°C ≤ Ta ≤ 70°C





Products GROUP II

Solenoid valves 15 mm		II 3GD EEx nA II ...	Coils 22 mm		II 2GD EEx m II T4
Series	Voltage		Series	Voltage	
XN3*1..	12 VDC (±10%) 2,3 Watt		XME5	24 VDC (±10%) - 5,4 Watt	
XN3*2..	24 VDC (±10%) 2,3 Watt		XME55	48 VAC (±10%) - 50/60 Hz - 5,3 Watt	
XN3*5..	24 VAC (±10%) - 50/60 Hz 2,8 VA		XME56	24 VAC (±10%) - 50/60 Hz - 5,3 Watt	
XN3*6..	110 VAC (±10%) - 50/60 Hz 2,8 VA		XME57	110 VAC (±10%) - 50/60 Hz - 5,3 Watt	
XN3*8..	24 VDC (±10%) 1 Watt	XME58	220 VAC (±10%) - 50/60 Hz - 5,3 Watt		

Ambient temperature : -5°C + +50°C

Ambient temperature : -20°C + +40°C

Coils 22 mm		II 3GD EEx nA II ...	Coils 30 mm		II 3GD EEx nA II ...
Series	Voltage		Series	Voltage	
XMB4	12 VDC (±10%) 5,5 Watt		XMC5	24 VDC (±10%) 4,8 Watt	
XMB5	24 VDC (±10%) 5,5 Watt		XMC56	24 VAC (±10%) - 50/60 Hz 7,5 VA	
XMB56	24 VAC (±10%) - 50/60 Hz 5,5 VA		XMC57	110 VAC (±10%) - 50/60 Hz 7,5 VA	
XMB57	120 VAC (±10%) - 50/60 Hz 5,5 VA		XMC58	230 VAC (±10%) - 50/60 Hz 7,5 VA	
XMB58	230 VAC (±10%) - 50/60 Hz 5,5 VA				

Ambient temperature : -5°C + +50°C

Ambient temperature : -5°C + +50°C

Valves series 104 - 105 - 200

Series	Connections	Function	Version	Classification	
X104	Tube Ø4	3/2 - 5/2 - 5/3	Pneumatically, mechanically and manually operated	II 3GD c T5 ...	
X105	M5			II 2GD (3GD*) c T4 ...	
X200	G1/8"-G1/4"-G1/2"-G1"			II 2GD (3GD*) c T4 ...	

Ambient temperature : -5°C + +70°C

* Handle with valve versions and pedal versions

Accessories: Knobs, Manifolds

Solenoid valves series 400

II 2GD c (IIB) T5 T100 °C -5°C < Ta < 50°C

Series	Connections	Function	Version	Coils	
X468... / X452...	G1/8" - G1/4"	3/2 - 5/2 - 5/3	Solenoid - Spring	XMB... (CAT 3)	
X464... / X412/2...			Solenoid - Differential	XME... (CAT 2)	
X414... / X48...			Solenoid - Solenoid		
X514...					

Ambient temperature : -5°C + +50°C

Accessories: Manifolds, Bases

Poppet valves and poppet solenoid valves series 700

II 2GD c T5 T100 °C -5°C < Ta < 50°C

Series	Connections	Function	Version	Coils	
X779...	G3/8" - G1/2" G3/4" - G1"	3/2	Pneumatic - Spring	XMB... (CAT 3)	
X772...			Solenoid - Spring	XME... (CAT 2)	
X773...					
X771...					

Ambient temperature : -5°C + +50°C

Valves and solenoid valves series 858

II 2GD c T4 T105 °C -5°C < Ta < 50°C

Series	Connections	Function	Version	Coils	
X858/1 X858/2 X858/3	G 1/8"	5/2 5/3	Pneumatic - Spring	XMB... (CAT 3)	
			Pneumatic - Differential	XMC... (CAT 3)	
			Pneumatic - Pneumatic	XME... (CAT 2)	
			Solenoid - Spring		
			Solenoid - Differential		
			Solenoid - Solenoid		

Ambient temperature : -5°C + +50°C

Accessories: Modular bases, terminal blocks, diaphragm plug

Valves and solenoid valves series ISO

II 2GD c (IIB) T5 T100 °C -5°C < Ta < 50°C

Series	Size	Function	Version	Coils	
X1011 X1012 X1013	ISO 1 ISO 2 ISO 3	5/2 5/3	Pneumatic - Spring	XMB... (CAT 3)	
			Pneumatic - Differential	XMC... (CAT 3)	
			Pneumatic - Pneumatic	XME... (CAT 2)	
			Solenoid - Spring		
			Solenoid - Differential		
			Solenoid - Solenoid		

Ambient temperature : -5°C + +50°C

Accessories: modular bases, Terminal blocks, Diaphragm plug

Valves and solenoid valves series 2000

II 3GD c T4 T105 °C -5°C < Ta < 50°C

Series	Connections	Function	Version	Coils	
X2400 X2600	G 1/8" G1/4" G3/8"	2x3/2 (serie 2400)	Pneumatic - Spring	XN3*....	
			Pneumatic - Differential		
			Pneumatic - Pneumatic		
			Solenoid - Spring		
			Solenoid - Differential		
			Solenoid - Solenoid		


Ambient temperature : -5°C + +50°C

Accessories: modular bases, Terminal blocks, Diaphragm plug



Products GROUP II

Microcylinders ISO 6432				II 2GD c T4 T125 °C -5°C < Ta < 70°C
Series	Bore	Stroke	Options	
X1280	Ø8	25	Basic version, magnetic	
X1281	Adjustable cushioning version	
X1282	Ø32	500	HNBR seals version	
Ambient temperature : -5°C + +70°C				Accessories: See catalogue 4 – Cylinders, section 1 (piston rod locking device excluded)
Cylinders ISO 6431				II 2GD c T4 T115 °C -5°C < Ta < 70°C
Series	Bore	Stroke	Options	
X1319	Ø32	25	Basic version, push-pull, single acting, opposed tandem with common rods, tandem with opposed rods, tandem push with common rods, tandem push with independent rods.	
X1320		
X1321	Ø200	1000		
Ambient temperature : -5°C + +70°C				Accessories: See catalogue 4 – Cylinders, section 4 (piston rod locking device excluded)
Europe and short stroke compact cylinders				II 2GD c T4 ...
Series	Bore	Stroke	Options	
X15 ...	Ø12	5	Basic version, push-pull, single acting, male piston rod, female piston rod, bored piston rod, opposed tandem with common rods, tandem with opposed rods, tandem push with common rods, tandem push with independent rods.	
X1561				
X1562		
X1581	Ø100	500		
X1582				
Ambient temperature : -30°C + +80°C (EUROPE) / -5°C + +70°C (short stroke)				Accessories: See catalogue 4 – Cylinders, section 5-6
Rodless cylinders				II 2G c T5 T100 °C -5°C < Ta < 70°C
Series	Bore	Stroke	Options	
X1605	Ø25	0	Basic version, single feed on one side, ball bearing guide, sliding shoes guide.	
		
	Ø63	6000		
Ambient temperature : -5°C + +70°C				Accessories: See catalogue 4 – Cylinders, section 7
Guided Compact Cylinders				II 3GD c T4 T125 °C -5°C < Ta < 70°C
Series	Bore	Stroke	Options	
X6100	Ø20	0	Bronze bush guide, Bearing bush guide	
		
	Ø63	200		
Ambient temperature : -5°C + +70°C				
Twin Rod Slide Units				II 3GD c T4 T125 °C -5°C < Ta < 70°C
Series	Bore	Stroke	Options	
X6200	Ø10	0	Bronze bush guide, Bearing bush guide (only for series X6200)	
X6210		
	Ø32	100		
Ambient temperature : -5°C + +70°C				
Sensors for cylinders				II 3GD EEx nA (nC) II T5 IP65 T100°C -5°C < Ta < 40°C
Series	Options			
X1500	REED ampulla version (II 3GD EEx nC II T5 IP65 T100°C -5°C<Ta<40°C)			
X1580	HALL effect version (II 3GD EEx nA II T5 IP65 T100°C -5°C<Ta<40°C)			
Ambient temperature : -5°C + +40°C				

Air Service Units			II 2GD c (II B) T6 T85°C -5°C < Ta < 50°C
Series	Connections	Products	
X170...	G 1/8"	Filter, Coalescing Filter, Lubricator and Filter regulator (Size 1 and 4 only). Shut off valve, pressure regulator, Progressive start-up valve*	
X172...	G1/4"		
X173...	G3/8"		
X174...	G1/2"		
	G3/4"		
	G 1"		
Ambient temperature : -5°C + +50°C			*The remaining products, including the tecnopolymer version, are classified in category 3GD Accessories: Air intake, manometers, fixing brackets

Pneumatic Accessories for use in zones 1 - 21 and 2 - 22	
Flow control valves, quick exhaust valves, check valves, block valves, manifolds, automatic fittings, standard fittings, compression fittings, quick fittings, tube.	
Note: the products listed below do not fall within the scope of the directive, for the intended use which are designed, because they do not have ignition source in case of use in zones 1 - 21 and 2 - 22.	
Reference catalogue: Catalogue 1, section 4 – Catalogue 5	