



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 or 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 combustible 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 combustible 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 combustible 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 combustible 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.
- 3) In order to properly classify the areas it is possible to refer to the harmonized technical norms specific for each sectors such as:
EN 60079-10 areas with potentially explosive atmosphere due to the presence of gases;
EN 50281-3 areas with potentially explosive atmosphere due to the presence of combustible dust

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-energized 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





VALVES AND SOLENOIDVALVES “TECNO-ECO” SERIES X4T8 (Series T488 ATEX)

Valves and solenoidvalves series X4T8				II 2GD IIB c T6 T77°C -5°C ≤ Ta ≤ +50°C	
Series	Connections	Function	Versions	Coils	
X4T8	G1/8	3/2 5/2 5/3	Pneumatic - Spring Pneumatic - Differential Pneumatic - Pneumatic Solenoid - Spring Solenoid - Differential Solenoid - Solenoid	B0..= XMB.. (CAT 3) X0..= XME.. (CAT 2)	
Ambient temperature : -5°C + +50°C					Accessories: Collectors, Closing Plate
ORDERING CODE					
PNEUMATIC VALVES			SOLENOIDVALVES		
X4T8.①.11.②		X4T8.53.①.11.11		X4T8.①.0.②.③	
① TYPE	32 = 3 ways 52 = 5 ways	① TYPE	31 = Closed centres 32 = Open centres 33 = Pressured centres	① TYPE	31 = Closed centres 32 = Open centres 33 = Pressured centres
② FUNCTION	1 = Pneumatic-Spring 11 = Pneumatic-Pneumatic 12 = Pneumatic-External differential		② FUNCTION	1 = Solenoid-Spring 1E = Sol.-Spring (External pilot) 12 = Sol.-Differential 12E = Sol.-Differential (External Pilot) 0 = Solenoid-Solenoid 0E = Solenoid-Solenoid (External Pilot)	③ COILS
					M2 = Without Coil (Cat.2) B04 = XMB4 (Cat. 3) B05 = XMB5 (Cat. 3) B56 = XMB56 (Cat. 3) B57 = XMB57 (Cat. 3) B58 = XMB58 (Cat. 3) X05 = XME5 (Cat. 2) X55 = XME55 (Cat. 2) X56 = XME56 (Cat. 2) X57 = XME57 (Cat. 2) X58 = XME58 (Cat. 2)

VALVES AND SOLENOIDVALVES “Tecno228” SERIES X2T8 (Series T228 ATEX)

Valves and solenoidvalves series X2T8				II 2GD IIB c T5 T96°C -5°C ≤ Ta ≤ +50°C	
Series	Connections	Function	Versions	Coils	
X2T8	G1/8	3/2 5/2 5/3	Mechanical actuated valves Pneumatic - Spring Pneumatic - Differential Pneumatic - Pneumatic	B0..= XMB.. (CAT 3) X0..= XME.. (CAT 2)	
Ambient temperature : -5°C + +50°C					
ORDERING CODE					
PNEUMATIC ACTUATED VALVES			MECHANICAL ACTUATED VALVES		
X2T8.①.11.②		X2T8.53.①.11.11		X2T8.	
① TYPE	32 = 3 ways 52 = 5 ways	① TYPE	31 = Closed centres 32 = Open centres 33 = Pressured centres	For the ordering code of the mechanical valves available versions please refer to the Pneumax General catalogue Section 1 - Serie T228	
② FUNCTION	1 = Pneum.- Spring 11 = Pneumatic-Pneumatic 12 = Pneumatic-External differential 12/1= Pneumatic-Differential Int. Pilot				



VALVES AND SOLENOIDVALVES "TECNO-ECO" SERIES X4T4 (Series T424 ATEX)

Valves and solenoidvalves series X4T4				II 2GD IIB c T6 T85°C -5°C ≤ Ta ≤ 50°C	
Series	Connections	Function	Versions	Coils	
X4T4	G1/4	3/2 5/2 5/3	Pneumatic - Spring Pneumatic - Differential Pneumatic - Penumatic Solenoid - Spring Solenoid - Differential Solenoid - Solenoid	B0..= XMB.. (CAT 3) X0..= XME.. (CAT 2)	
Ambient temperature : -5°C + +50°C				Accessories: Collectors, Closing Plate	
ORDERING CODE					
SOLENOID VALVES					
X4T4.①.0.②.③		X4T4.53.①.0.0.③		COIL	
①	TYPE 32 = 3 ways 52 = 5 ways	①	TYPE 31 = Closed centres 32 = Open centres 33 = Pressured centres	M2 = Without Coil (Cat.2) B04 = XMB4 (Cat. 3) B05 = XMB5 (Cat. 3) B56 = XMB56 (Cat. 3) B57 = XMB57 (Cat. 3) B58 = XMB58 (Cat. 3) X05 = XME5 (Cat. 2) X55 = XME55 (Cat. 2) X56 = XME56 (Cat. 2) X57 = XME57 (Cat. 2) X58 = XME58 (Cat. 2)	
②	FUNCTION 1 = Solenoid-Spring 1E = Solenoid-Spring (External pilot) 12 = Solenoid-Differential 12E = Sol.-Differential (External pilot) 0 = Solenoid-Solenoid 0E = Sol.-Sol. (External pilot)	③			



VALVES AND SOLENOIDVALVES "TECNO-ECO" SERIES X2T4 (Series T224 ATEX)

Valves and solenoidvalves series X2T4				II 2GD IIB c T6 T75°C -5°C ≤ Ta ≤ 50°C	
Series	Connections	Function	Versions	Coils	
X2T4	G1/4	3/2 5/2 5/3	Mechanical actuated valves Pneumatic - Spring Pneumatic - Differential Pneumatic - Pneumatic Solenoid - Spring Solenoid - Differential Solenoid - Solenoid	B0..= XMB.. (CAT 3) X0..= XME.. (CAT 2)	
Ambient temperature : -5°C + +50°C				Accessories: Collectors, Closing Plate	
ORDERING CODE					
PNEUMATIC ACTUATED VALVES			MECHANICAL ACTUATED VALVES		
X2T4.①.11.②		X2T4.53.①.11.11		X2T4.	
①	TYPE 32 = 3 ways 52 = 5 ways	①	TYPE 31 = Closed centres 32 = Open centres 33 = Pressured centres	For the ordering code of the mechanical valves available versions please refer to the Pneumax General catalogue Section 2 - Serie T224	
②	FUNCTION 1 = Pneumatic-Spring 11 = Pneumatic-Pneumatic 12 = Pneumatic-External Differential				





VALVES AND SOLENOIDVALVES “TECNO-NAMUR” SERIES X5T4 (Serie T514 ATEX)

Valves and solenoidvalves series X5T4

II 2GD IIB c T6 T80°C -5°C ≤ Ta ≤ 50°C

Series	Connections	Function	Versions	Coils
X5T4	G1/4	4/2 5/2 9/2 (5/2 - 4/2)	Pneumatic - Spring Pneumatic - Differential Pneumatic - Pneumatic Solenoid - Spring Solenoid - Differential Solenoid - Solenoid	B0..= XMB.. (CAT 3) X0..= XME.. (CAT 2)



Ambient temperature : -5°C + +50°C

ORDERING CODE

VALVES		SOLENOID VALVES	
X5T4.Ⓡ.00.Ⓥ		X5T4.Ⓡ.00.Ⓥ.Ⓩ	
TYPE		COIL	
Ⓡ	42 = 3/2 N.C.	Ⓡ	M2 = Without Coil (Cat.2)
	52 = 5 ways		B04 = XMB4 (Cat. 3)
	92 = 5/2 - 4/2		B05 = XMB5 (Cat. 3)
FUNCTION			B56 = XMB56 (Cat. 3)
	16 = Pneumatic-Differential		B57 = XMB57 (Cat. 3)
Ⓥ	18 = Pneumatic-Pneumatic	Ⓩ	B58 = XMB58 (Cat. 3)
	19 = Pneumatic-Spring		X05 = XME5 (Cat. 2)
			X55 = XME55 (Cat. 2)
			X56 = XME56 (Cat. 2)
			X57 = XME57 (Cat. 2)
			X58 = XME58 (Cat. 2)