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 combustable dust in air is present continously, 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.

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).

ATEX

ATEX Products (Directive 94/9/EC)

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 G (gas)	20 D (dust)	1 G (gas)	21 D (dust)	2 G (gas)	22 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 Ex II 3GD EEx nA II T4 T125°C –5°C≤Ta≤70°C

Example of classification for non electrical equipment:

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

ATEX

ATEX Products (Directive 94/9/EC)

Products GROUP II

Solenoid valves 15 mm — II 3GD EEx nA II ...

Series	Voltage
XN3*1..	12 VDC (±10%) 2,3 Watt
XN3*2..	24 VDC (±10%) 2,3 Watt
XN3*5..	24 VAC (±10%) - 50/60 Hz 2,8 VA
XN3*6..	110 VAC (±10%) - 50/60 Hz 2,8 VA
XN3*8..	24 VDC (±10%) 1 Watt

Ambient temperature : -5°C ÷ +50°C

Coils 22 mm — II 2G EEx m II T4

Series	Voltage
XME5	24 VDC (±10%) - 5,4 Watt
XME55	48 VAC (±10%) - 50/60 Hz - 5,3 Watt
XME56	24 VAC (±10%) - 50/60 Hz - 5,3 Watt
XME57	110 VAC (±10%) - 50/60 Hz - 5,3 Watt
XME58	220 VAC (±10%) - 50/60 Hz - 5,3 Watt

Ambient temperature : -20°C ÷ +40°C

Coils 22 mm — II 3GD EEx nA II ...

Series	Voltage
XMB4	12 VDC (±10%) 5,5 Watt
XMB5	24 VDC (±10%) 5,5 Watt
XMB56	24 VAC (±10%) - 50/60 Hz 5,5 VA
XMB57	120 VAC (±10%) - 50/60 Hz 5,5 VA
XMB58	230 VAC (±10%) - 50/60 Hz 5,5 VA

Ambient temperature : -5°C ÷ +50°C

Coils 30 mm — II 3GD EEx nA II ...

Series	Voltage
XMC5	24 VDC (±10%) 4,8 Watt
XMC56	24 VAC (±10%) - 50/60 Hz 7,5 VA
XMC57	110 VAC (±10%) -50/60 Hz 7,5 VA
XMC58	230 VAC (±10%) -50/60 Hz 7,5 VA

Ambient temperature : -5°C ÷ +50°C

Valves series 104 - 105 - 200

Series	Connections	Function	Version	Classification
X104 X105 X200	Tube Ø4 M5 G1/8"-G1/4" -G1/2"-G1"	3/2 - 5/2 - 5/3	Pneumatically, mechanically and manually operated	II 3GD c T5 ... II 2GD (3GD*) c T4 ... 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
X46... X42... X514/N... X48...	G1/8" - G1/4"	3/2 - 5/2 - 5/3	Solenoid - Spring Solenoid - Differential Solenoid - Solenoid	XMB… (CAT 3) XME… (CAT 2)

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... X772... X773... X771...	G3/8" - G1/2" G3/4" - G1"	3/2	Pneumatic - Spring Solenoid - Spring	XMB… (CAT 3) XME… (CAT 2)

Ambient temperature : -5°C ÷ +50°C

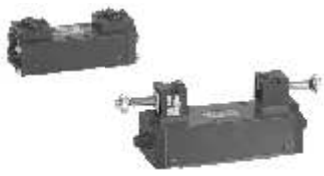
Valves and solenoid valves series 858 — II 2GD c T4 T105 °C –5°C < Ta < 50°C

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

Ambient temperature : -5°C ÷ +50°C Accessories: Modular bases, terminal blocks, diaphgram 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 Pneumatic - Differential Pneumatic - Pneumatic Solenoid - Spring Solenoid - Differential Solenoid - Solenoid	XMB… (CAT 3) XMC… (CAT 3) XME… (CAT 2)



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"	5/2 5/3 2x3/2 (serie 2400)	Pneumatic - Spring Pneumatic - Differential Pneumatic - Pneumatic Solenoid - Spring Solenoid - Differential Solenoid - Solenoid	XN3*....

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 X1281 X1282	Ø8 … Ø32	25 … 500	Basic version, magnetic Adjustable cushioning version 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 X1320 X1321	Ø32 … Ø200	25 …. 1000	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.

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 ... X1561 X1562 X1581 X1582	Ø12 … Ø100	5 …. 500	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.

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 … Ø63	0 …. 6000	Basic version, single feed on one side, ball bearing guide, sliding shoes guide.

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 … Ø63	0 …. 200	Bronze bush guide, Bearing bush guide

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 X6210	Ø10 … Ø32	0 …. 100	Bronze bush guide, Bearing bush guide (only for series X6200)

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 X1580	REED ampulla version (II 3GD EEx nC II T5 IP65 T100°C -5°C<Ta<40°C) 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... X172... X173... X174...	G 1/8” G1/4” G3/8” G1/2“ G3/4” G 1”	Filter, Coalescing Filter, Lubricator and Filter regulator (Size 1 and 4 only). Shut off valve, pressure regulator, Progressive start-up valve*

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