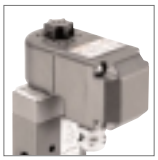


ATEX ADVANTAGE

Explosion Protection Directive 94/9/EC

New safety requirements for equipment and protective systems in potentially explosive atmospheres

Norgren ATEX solutions

NORGREN

ATEX **SOLUTIONS**

Norgren: Your Reliable Partner for Maximum Explosion Protection

Norgren has been the leading partner in explosion protection for many years. The protection of equipment and personnel within potentially explosive atmospheres is of the highest importance to Norgren and we have strongly supported the development of government regulations and technical standards to ensure a high level of safety.

In order to apply a single level for health and safety requirements and to overcome barriers of trade within Europe, national regulations for explosion prevention were harmonised in 1975 with the European Frame Directive 76/117/EEC. The new EC Directive 94/9/EC was established in 1994. This Directive is widely known as "ATEX" – which derives from the original working title "**AT**mosphère **EX**plosible".

Since July 1, 2003 only the ATEX Directive remains binding. This means that all Ex equipment approvals obtained under previous directives are no longer valid – only devices and safety systems that comply with the ATEX Directive may be allowed onto the market. ATEX Directive 94/9/EC expands earlier guidelines by including non-electric components such as pneumatic actuators. These now have to be certified.

Due to these changes, companies have to rely on a number of devices that did not need to be certified before. Norgren offers an extensive range of ATEX certified products and is undertaking great efforts to extend this range even further. No matter which Ex zones are relevant for your business, Norgren will help you to find the right product and support you with extensive documentation and certificates of conformity – which are already available on www.norgren.com/atex/.

In addition to Directive 94/9/EC, which is concerned with the requirements of equipment and protective systems and is sometimes referred to as ATEX 100A or 95, another directive – 1999/92/EC exists. Sometimes referred to as ATEX 118A or 137, this is concerned with the requirements for the erection, installation and operation of systems.

WHAT **CHANGES** WITH ATEX?

The most important points are:

The definition of equipment categories and assignment to the hazardous areas (zones)

The regulation of Ex protection for dust (previously only addressed nationally); also associated with this is the redefinition of the Ex zones for dust (previously zones 10 and 11)

The inclusion of non-electrical equipment into the directive

The creation of an explosion protection document concerning the safety of the workplace and materials by the employer

The requirement for a formal assessment of explosion risks

The conformity evaluation process for the equipment by the manufacturer or by a "notified body" (dependent category)

The production of an EC Declaration of Conformity and affixing the CE mark to the product by the manufacturer and – depending on the category – of an EC Type Examination Certificate (previously Certificate of Conformity) by a "notified body" for all electrical products

The certification of the manufacturer's QA system (DIN EN ISO 9001 is not sufficient).

The provision of a mounting and operating manual with the equipment.

How can explosions occur?

Explosive atmospheres (Ex areas) are prerequisite for an explosion and can be found where a mixture of air, flammable gases, vapours or dusts are being produced, transformed or stored in the presence of oxygen.

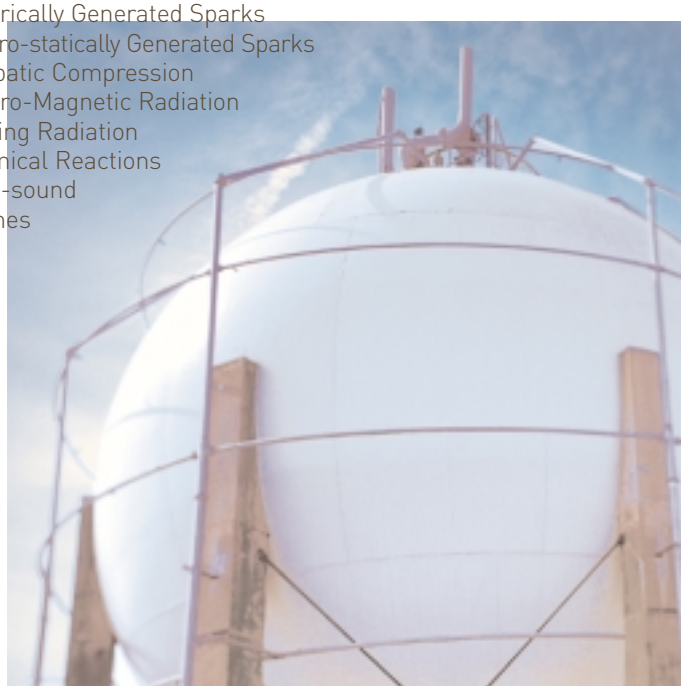
Explosive atmospheres with gases, vapours and mists can usually be found in:
Chemical Facilities
Storage Tanks
Refineries
Water Treatment Facilities
Airports
Power Plants
Paint Facilities
Seaports

Explosive atmospheres with dusts can usually be found in:
Chemical Facilities
Power Plants
Paint Facilities
Grain Mills
Cement Factories
Seaports
Food Factories
Wood Processing Facilities
Plastic Granulate Facilities

Sources of Ignition

Hot Surfaces
Flames and Hot Gases
Mechanically Generated Sparks
Electrically Generated Sparks
Electro-statically Generated Sparks
Adiabatic Compression
Electro-Magnetic Radiation
Ionising Radiation
Chemical Reactions
Ultra-sound
Flashes

... and many other areas
where goods are handled
that form dust and powders



What equipment can be used? – Ex-Zones and Categories

Table 1 shows the zone designations, which are divided firstly into the hazardous areas for gases, vapours and mists and secondly into the hazardous areas for dusts, as well as by their risk categories, i.e. according to the probability of a risk of being present. The categories, which define the degree of equipment safety are assigned.

It can be seen from the table to which category a piece of equipment must be allocated in order to be used in a particular zone. Of course, equipment in a higher category also fulfils the requirements of a lower category.

Table 1

Hazard	Risk	Zone	Category	Equipment
Gases, vapours and mists	continuous or long-term or frequent	0	II 1 G	very high level of safety (safe in spite of 2 independent faults)
Gases, vapours and mists	occasional	1	II 2 G	high level of safety (safe even for normally expected fault)
Gases, vapours and mists	occasional, then only briefly	2	II 3 G	normal level of safety (safe under normal operation)
Dusts	continuous or long-term or frequent	20	II 1 D	very high level of safety (safe in spite of 2 independent faults)
Dusts	occasional	21	II 2 D	high level of safety (safe even for normally expected fault)
Dusts	occasional, then only briefly	22 conducting dusts non-conducting dusts	 II 2 D II 3 D	 high level of safety normal level of safety

How can an explosion be prevented?

Most important is the prevention of the formation of an Ex atmosphere. If this is not possible, potential sources of ignition must be avoided.

Ignition protection categories

For **electrical equipment** for use with gases, vapours and mists special design methods are described in comprehensive works standards and are assigned to "ignition protection categories" (see Table 2). Several ignition protection categories can be combined in one unit.

The methods of protection with Ex dusts concentrate mainly on the sealing of the housing (IP protection).

Principles and requirements for **non-electrical** equipment for use in Ex areas are described in the new EN 13463-1. Standards for appropriate types of ignition protection are currently in preparation.

Measures that can be taken to reliably exclude potential sources of ignition, depend upon the equipment category required. In the foreground is usually the consideration of the permissible light metal alloys, electrostatic charge, possible arcing and heat due to friction.

Table 2

Ignition protection categories	Identification	can be used in zone	Safety principle
Increased safety	EEx e	1	no arcs, sparks or hot surfaces
Non-sparking equipment	EEx nA	2	
Pressurised encapsulation	EEx d	1	controls an internal explosion and extinguishes the flame
Sand encapsulation	EEx q	1	
Enclosed switching device	EEx nC	2	
Intrinsic safety (special requirements)	EEx ia	0	limits the energy of the sparks and the temperature of the surface
Intrinsic safety	EEx ib	1	
Energy-limiting equipment	EEx nL	2	
Encapsulation	EEx m	1	separates source of ignition from potentially explosive atmosphere
Oil encapsulation	EEx o	1	
Pressurisation	EEx p	1	
Simplified pressurisation	EEx nP	2	
Vapour-proof housing	EEx nR	2	

Explosion Groups

While equipment for mining is identified as Group I, Group II is applicable for all remaining areas with potentially explosive atmospheres such as the chemical industry. Only Group II is subdivided into categories using the letters A, B and C, and only then for the pressurised encapsulation and intrinsically safe ignition protection categories in order to be able to classify the differences in the ignitability and the likelihood of flashover of potentially explosive mixtures. The most hazardous are defined in Group IIC; these therefore include IIB and IIA.

Temperature Classes

All devices are differentiated according to its maximum surface temperature that may occur. This must always be less than the ignition temperature of the flammable material.

Gases are divided into T-classes (see Table 3) and the permitted equipment is marked in the same way. Again a higher T-class fulfils the requirements of a lower class. Therefore, equipment with the identification EEx...IIC T6 covers all known gases.
For explosion prevention in dusty atmospheres, the maximum surface temperature is specified in °C.

Table 3

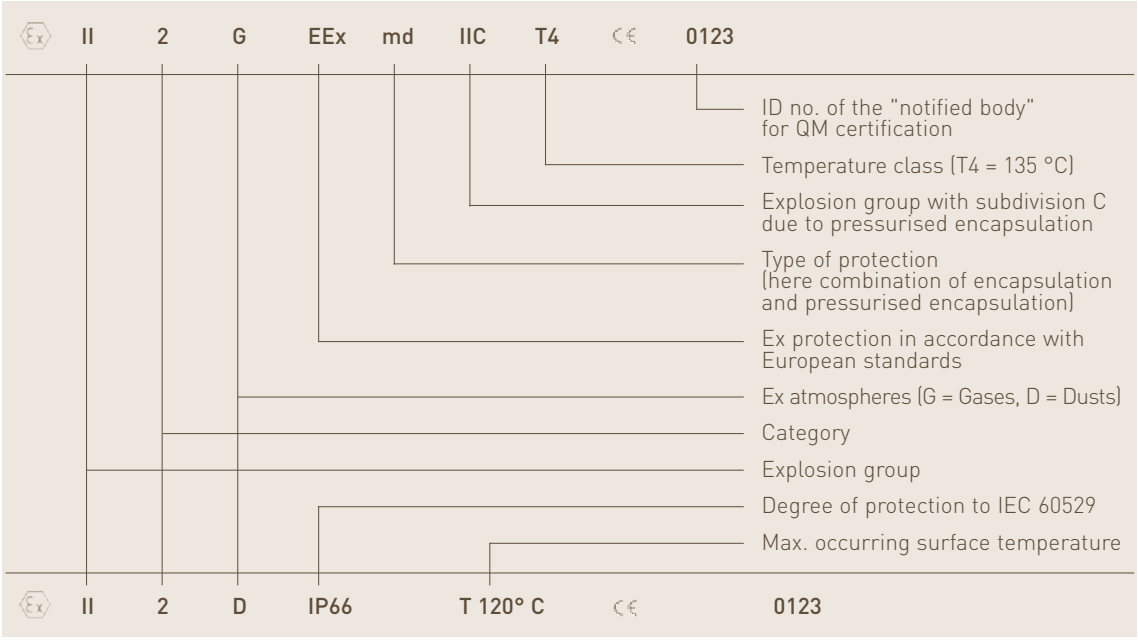
Explosion groups	Temperature classes					
	T 1	T 2	T 3	T 4	T 5	T 6
Max.surface temperature	450 °C	300 °C	200 °C	135 °C	100 °C	85 °C
II A	Acetone Ammoniac Benzene Acetic acid Ethane Ethyl acetate Ethyl chloride Methanol Naphthalene Phenol Propane	i-Amyl acetate n-Butane n-Butyl alcohol	Gasolines Diesel fuels Heating oils n-Hexane	Acetaldehyde		
II B	Town gas (lighting gas)	Ethylene Ethylene oxide	Hydrogen sulphide	Ethylether		
II C	Hydrogen	Acetylene				Carbon disulphide

How is Ex equipment identified?

The Ex identification of a typical Norgren solenoid valve can be found below. The valve may be used in Ex zones 1 and 2 (gases, upper part of the illustration) and 21 and 22 (dusts, lower part) (see also EC Type Test Certificate Fig. 2).

Non-electrical equipment must also be identified with category and gas or dust protection; if relevant, it must also be identified with a suitable ignition protection category and, as a rule, with the highest occurring surface temperature.

All information that is necessary for safe operation of equipment must be provided in the operating manual.



Which certificates are required?

A Declaration of Conformity must be provided by the manufacturer for each product. The Declaration of Conformity explains how the manufacturer fulfils all the relevant safety requirements. The CE mark is subsequently attached to the product.

For electrical equipment in Category 1 and 2, an EC Type Test Certificate issued by a notified body is required. One of the notified bodies is the PTB (Physikalisch Technische Bundesanstalt). For non electrical equipment an EC Type Examination Certificate is only required for Category 1.

These certificates are also obligatory for non-electrical equipment. However, if the risk analysis of explosion hazards show that no potential sources of ignition exist, the item does not fall under the ATEX directive in which case a Declaration of Conformity and Ex marking is not required. This may apply to products used in purely pneumatic systems, i.e. for valves, service units, sound absorbers or manometers.

Fig. 1
EC Declaration of Conformity
for valve solenoids

Fig. 2
EC Type Test certificate
for a solenoid valve series

Fig. 3
Certificate for the Quality
Assurance System

Prevent explosions with Norgren ATEX approved equipment

As a manufacturer of pneumatic equipment, Norgren offers an extensive range of certified devices in Categories 2 and 3 for use in areas with potentially explosive atmospheres containing gases and dusts:

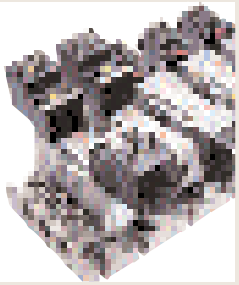
Solenoid valves, solenoids	(Type of protection EEx m, EEx me, EEx md,EEx d, EEx ia, EEx nA)
Pressure switches	(Type of protection EEx de, EEx nAC)
Valves, cylinders	(Type of protection EEx c)

NORGREN **EQUIPMENT** CONFORMING TO ATEX

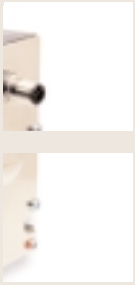
MOTION CONTROL VALVES

PROPORTIONAL VALVES/ IP CONVERTER

01



02



01 MOTION CONTROL VALVES

Category
- II 3 G, zone 2
- II 3 D, zone 22

Model
- 40200
- 40300
- V60 – 63...
- VS18/VS26
- VM series
- ISO*STAR
  - SXE series
- MIDI*STAR
  - SXE series

Category
- II 2 G, zone 1, 2
- II 2 D, zone 22

Model
- ISO*STAR
  - SXE series
  - SXP series
- MIDI*STAR
  - SXE series
  - SXP series
- Mini ISO

02 PROPORTIONAL VALVES/IP CONVERTER

Category
- II 3 G, zone 2
- II 3 D, zone 22

Model
- VP 21...
- VP 23...
- VP 60...

Category
- II 1 G, zone 0

Model
- 100

Category
- II 1 G, zone 0
- II 2 G, zone 1
- II 3 G, zone 2

Model
- 122
- 140

Category
- II 1 G, zone 0
- II 3 G, zone 2

Model
- 422

For further information see ATEX product selector delivery on request or contact our Technical Service

NORGREN **EQUIPMENT** CONFORMING TO ATEX

FLUID CONTROL VALVES

03

03 FLUID CONTROL VALVES

Category
- II 2 G, zone 1, 2
- II 2 D, zone 21, 22

Valve Model

15200
21000
21023
21025
23200
24000
24010
24011
24100
25000
25003
26220
26230
26360
70300
80100
80200
82080
82360
82370
82400
82530
82540
82560
82730
82860
82960
84660
84680
85000
85040
85140
85300
82470
83050
83580
83340
84320
84340
85100
85200
85700
91000
95000
95100
96000
97100
97100 (Namur)
97105
97105 (Namur)
98015
98015 (Namur)
98025
98025 (Namur)

Category
- II 2 G, zone 1, 2
- II 2 D, zone 21, 22

Solenoid Model
- 0290x
- 148x
- 168x
- 2003
- 205x
- 42xx
- 46xx
- 8036-8045
- 8186-8195
- 8336-8345
- 8436-8445
- 8900-8909
- 8920-8929
- 9136-9145
- 9186-9195
- 9336-9345
- 9350-9360
- 9540-9564

Category
- II 2 G, zone 1, 2

Solenoid Model
- 144x
- 157x
- 208x
- 3039
- 306x

Category
- II 3 G, zone 2
- II 3 D, zone 22

Solenoid Model
- 3046, 3047
- 3213 - 3219
- 3713 - 3719,
- 3813 - 3819,
- 8026, 8176,
- 8326, 8426,
- 9116, 9176,
- 9326, 9426,
- 9526

PRESSURE SWITCH

04

04 PRESSURE SWITCH

Category
- II 2 G, zone 1, 2
- II 2 D, zone 21, 22

Model
- 20D series
- 184....
- 185....

Category
- II 3 G, zone 2
- II 3 D, zone 22

Model
- 18D series
- 088..80
- 088..81

FIELDBUS I/O Modules

05

05 FIELDBUS I/O Modules

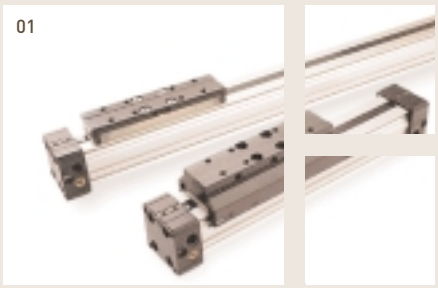
Category
- II 3 G, zone 2
- II 3 D, zone 22

Model
- FD 67 series

For further information see ATEX product selector delivery on request or contact our Technical Service

NORGREN **EQUIPMENT** CONFORMING TO ATEX

ACTUATORS



01 ACTUATORS

Category
- II 2 G, zone 1, 2
- II 2 D, zone 21, 22

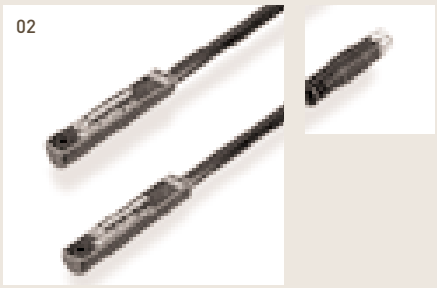
Model
- M/46000/M/EX
- M/46100/M/EX
- M/46200/M/EX
- M/61200/M/EX
- PRA/182000/M/EX
- PVA/182000/EX#

(without magnetic version)

Category
- II 2 G, zone 1, 2
- II 2 D, zone 21, 22

Model
- RA/8000/M/EX
- RM/192000/M/EX
- RM/8000/M/EX
- RM/92000/M/EX
- RT/57200/M/EX

SWITCH

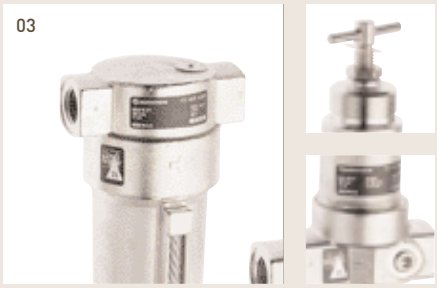


02 SWITCH (MAGNETICALLY OPERATED)

Category
- II 3 D, zone 22

Model
- M/50/EXP/5V

AIRLINE EQUIPMENT



03 AIRLINE EQUIPMENT

Category
- II 2 G, zone 1, 2
- II 2 D, zone 21, 22

Model
- 1002
- 11-004, 11-008,
- 11-018, 11-204,
- 11-808, 11-818,
- 11-908, 11-918
- 20AG, 20AL
- 40AC
- 61A2, 61B2
- B07, F07, R07, V07
- B38, R38

Category
- II 2 G, zone 1, 2
- II 2 D, zone 21, 22

Model
- B64, F64, P64, R64, T64, V64
- B68, F68, P68, R68, T68, V68
- B72, F72, R72, T72, V72
- B73, F73, R73, T73, V73
- B74, F74, R74, T74, V74
- F17, R17
- F18, R18
- F22, R22
- F39
- F47
- R05, V05

FITTINGS

04 FITTINGS

Model
- Ball Valves
- Blow Guns
- BSP and Hose
- Compression
- Pneufit
- Pneufit C
- Push-on
- Quick Release Couplings
- Silencers
- Stainless Steel PIF (S0 Series)
- Tubing
- Weldfit

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