ATEX® ADVANTAGE

Norgren ATEX solutions for explosive atmospheres

New safety requirements for equipment

Norgren ATEX solutions

Explosion Protection Directive 94/9/EC
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 “ATmosphère EXplosible”.

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 This means that all Ex equipment approvals obtained under previous directives are no longer valid – only devices and safety systems that comply with the ATEX Directive may be allowed onto the market.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.
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>
<thead>
<tr>
<th>Hazard</th>
<th>Risk</th>
<th>Zone</th>
<th>Category</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gases, vapours and mists</td>
<td>continuous or long-term or frequent</td>
<td>0</td>
<td>II 1 G</td>
<td>very high level of safety [safe in spite of 2 independent faults]</td>
</tr>
<tr>
<td>Gases, vapours and mists</td>
<td>occasional</td>
<td>1</td>
<td>II 2 G</td>
<td>high level of safety [safe even for normally expected fault]</td>
</tr>
<tr>
<td>Gases, vapours and mists</td>
<td>occasional, then only briefly</td>
<td>2</td>
<td>II 3 G</td>
<td>normal level of safety [safe under normal operation]</td>
</tr>
<tr>
<td>Dusts</td>
<td>continuous or long-term or frequent</td>
<td>20</td>
<td>II 1 D</td>
<td>very high level of safety [safe in spite of 2 independent faults]</td>
</tr>
<tr>
<td>Dusts</td>
<td>occasional</td>
<td>21</td>
<td>II 2 D</td>
<td>high level of safety [safe even for normally expected fault]</td>
</tr>
<tr>
<td>Dusts</td>
<td>occasional, then only briefly</td>
<td>22</td>
<td>II 2 D</td>
<td>high level of safety [safe in spite of normally expected fault]</td>
</tr>
<tr>
<td></td>
<td>conducting dusts</td>
<td></td>
<td>II 3 D</td>
<td>normal level of safety [safe under normal operation]</td>
</tr>
<tr>
<td></td>
<td>non-conducting dusts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Ignition protection categories</th>
<th>Identification can be used in zone</th>
<th>Safety principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased safety</td>
<td>EEx e 1</td>
<td>no arcs, sparks or hot surfaces</td>
</tr>
<tr>
<td>Non-sparking equipment</td>
<td>EEx nA 2</td>
<td>controls an internal explosion and extinguishes the flame</td>
</tr>
<tr>
<td>Pressurised encapsulation</td>
<td>EEx d 1</td>
<td>limits the energy of the sparks and the temperature of the surface</td>
</tr>
<tr>
<td>Sand encapsulation</td>
<td>EEx q 1</td>
<td>separates source of ignition from potentially explosive atmosphere</td>
</tr>
<tr>
<td>Enclosed switching device</td>
<td>EEx nC 2</td>
<td></td>
</tr>
<tr>
<td>Intrinsic safety [special requirements]</td>
<td>EEx ia 0</td>
<td></td>
</tr>
<tr>
<td>Intrinsic safety</td>
<td>EEx ib 1</td>
<td></td>
</tr>
<tr>
<td>Energy-limiting equipment</td>
<td>EEx nL 2</td>
<td></td>
</tr>
<tr>
<td>Encapsulation</td>
<td>EEx m 1</td>
<td></td>
</tr>
<tr>
<td>Oil encapsulation</td>
<td>EEx o 1</td>
<td></td>
</tr>
<tr>
<td>Pressurisation</td>
<td>EEx p 1</td>
<td></td>
</tr>
<tr>
<td>Simplified pressurisation</td>
<td>EEx nP 2</td>
<td></td>
</tr>
<tr>
<td>Vapour-proof housing</td>
<td>EEx nR 2</td>
<td></td>
</tr>
</tbody>
</table>
**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.

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**Table 3**

<table>
<thead>
<tr>
<th>Explosion groups</th>
<th>Temperature classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. surface temperature</td>
<td>T 1</td>
</tr>
<tr>
<td>Acetone</td>
<td>450 °C</td>
</tr>
<tr>
<td>Ammoniac</td>
<td></td>
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<tr>
<td>Benzene</td>
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<tr>
<td>Acetic acid</td>
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<tr>
<td>Ethane</td>
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<tr>
<td>Ethyl acetate</td>
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<tr>
<td>Ethyl chloride</td>
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<tr>
<td>Methanol</td>
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<td>Phenol</td>
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<tr>
<td>Propane</td>
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<td>Acetaldehyde</td>
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<tr>
<td>Gasolines</td>
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<tr>
<td>Diesel fuels</td>
<td></td>
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<tr>
<td>Heating oils</td>
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<tr>
<td>n-Butyl alcohol</td>
<td></td>
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<tr>
<td>n-Butane</td>
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<tr>
<td>i-Amyl acetate</td>
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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.

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**

01

- **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

**PROPORTIONAL VALVES/IP CONVERTER**

02

- **Category**
  - II 3 G, zone 2
  - II 2 G, zone 1, 2
  - II 3 D, zone 22
- **Model**
  - 01
  - 70
  - 100
  - VP 21...
  - VP 23...
  - VP 60...

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

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

Valve Model
15200 83340
21000 84320
21023 84340
21025 85100
23200 85200
24000 85700
24010 91000
24011 95000
26100 95100
25000 96000
25003 97100
26220 97100 (Namur)
26230 97105
26360 97105 (Namur)
70300 98015
80100 98015 (Namur)
80200 98025
82080 98025 (Namur)
82360
82370
82400
82530
82540
82560
82730
82860
82960
84660
84680
85000
85040
85140
85300
82470
83050
83580

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

PRESSURE SWITCH

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

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

FLUID CONTROL VALVES

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

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

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
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)

SWITCH

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

AIRLINE EQUIPMENT

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

Model
- 1002
- 11-004, 11-008
- 11-015, 11-204
- 11-908, 11-918
- 20AG, 20AL
- 40AC
- 61A2, 61B2
- B07, F07, R07, V07
- B38, R38

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

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