European ATEX Guidelines for the Valve Industry

Foreword

These Guidelines are professional ones, they complete or precise those published by the European Commission in July 2005. Their aim is to fix common interpretations within the European Valve Industry for issues that have still not yet been clarified. These points are detailed in Part B of this document, Part A being a reminder of the general ATEX concepts.

In particular, manufacturers are concerned about the possible misunderstanding of the term "Simple Valve". The issue is that a "simple valve" is excluded or said to be excluded from the scope of 94/9/EC Directive, but no clear definition of the term has been given. This major issue has been discussed within the CEIR and lead to a clear definition, stated in the first point of part B (See B.1).

A. General considerations on the ATEX - *ATmosphères EXplosibles* - Directives

1) What is the ATEX Directive 94/9/EC?

The ATEX Directive 94/9/EC, which came into effect on a voluntary basis on 1 March 1996 and became mandatory on 1 July 2003, is a directive adopted by the European Union (EU) to facilitate free trade in the EU by aligning the technical and legal requirements in the Member Sates for **products intended for use in potentially explosive atmospheres**. The full text of the Directive was published in the Official Journal of the European Communities No L 100, dated 19 April 1994.

From 1 July 2003, it has been necessary for all products placed on the market or put into use in potentially explosive atmospheres, to comply with the ATEX Directive, even if they are only intended for use in their country of origin.

What products are covered by the ATEX Directive?

First of all, the Directive 94/9/CE covers equipment and protective systems, which are intended to be used in areas endangered by an ATEX.
An ATEX is defined as a mixture :

- Of flammable substances in the form of flammable gases, vapour, mists or dusts ;
- With air ;
- Under atmospheric conditions ([-20°C ; +60°C] & [0.8bar ; 1.1bar]) ;
- And in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

“Equipment” is any item which contains or constitutes a potential ignition source and which requires special measures to be incorporated in its design and/or its installation in order to prevent the ignition source from initiating an explosion in the surrounding atmosphere. Also included in the term “equipment” are safety or control devices installed outside the hazardous area but having an explosion protection function. A wide range of products comes within the definition of equipment, including valves, actuators and ancillary equipment, which will include mechanical, electrical & electro/mechanical equipment.

Equipment intended for use in domestic and non-commercial environments where potentially explosive atmospheres may rarely be created solely as the result of an accidental leakage of fuel gas, is explicitly excluded from the scope of the Directive.

Please note that the ATEX directive also applies to non-electrical equipment such as valves, pneumatic and hydraulic actuators and gearboxes.

Protective systems intended for use in potentially explosive atmospheres, defined as design units, which are intended to halt incipient explosions immediately and/or to limit the effective range of explosions flames and explosion pressures. Protective systems may be integrated into equipment or separately placed on the market for use as autonomous systems.

See also B.1 - Scope of ATEX 94/9/CE Directive

Complimentary Directives ATEX 94/9/EC and 99/92/EC

ATEX Directive 94/9/EC covers products intended for use in potentially hazardous areas – duties are placed on the manufacturer of the product.

Worker Protection Directive 99/92/EC intended to compliment ATEX 94/9/EC covers Health and Safety protection of workers in hazardous areas, duties are placed on the employers to ensure that workers have a minimum level of protection.

These two Directives are intended to compliment each other ; they cover different areas and are intended to achieve different objectives. Manufacturers of products intended for use in potentially explosive areas must comply with ATEX 94/9/EC.

What must I do to comply with the ATEX Directive ?

If your products come within the scope of the Directive and you wish to sell them or have them put into service in the EU, you must ensure that they comply with the essential requirements specified in the Directive and mark them with the CE Marking.

2) What is Explosion Protection ?

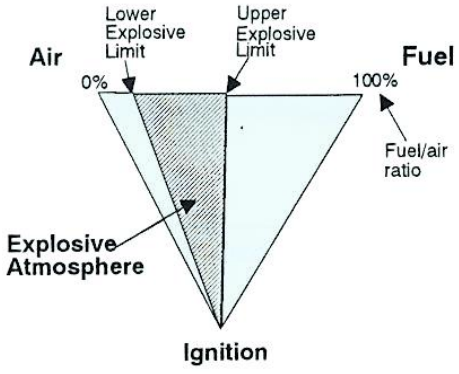
Explosion protection is the technique of preventing or controlling the effects of explosions, which might otherwise occur where flammable materials are handled, stored or processed. It is widely recognised internationally by the symbol:

Why is Explosion Protection needed ?

In the past two centuries the process of industrial development has been punctuated by major disasters involving explosions and fires, which caused extensive fatalities, injuries and damage. Coal mining disasters caused by the ignition of firedamp, destruction of dwellings following leakage of gas from the public supply and the more recent Piper Alpha disaster on a North Sea oil platform all resulted from a combination of three key factors :

- a flammable material (fuel)
- oxygen (usually air)
- an ignition source

The fuel (in the form of a gas, vapour, mist or dust) and the air together form a potentially explosive atmosphere, which can be ignited by an ignition source. Outside the limits, known as the upper and lower explosive limits, the mixture will not ignite but has the potential to do so if the proportion can change.



The Explosion Triangle

Preventing ignition

Where formation of explosive atmosphere cannot be ruled out, measures must be taken to prevent their ignition. The measures will be related to the risk involved. The area classification system, defined in Directive 99/92/CE, identifies three types of zones (for non-mining applications). Each type of zone corresponds to an equipment category, i.e. to a protection degree.

Zone	Explosive atmosphere …
0	present continuously or for long periods of time.
1	present occasionally under normal operating circumstance.
2	not normally present and then only for short periods.

Potential ignition sources

Potential ignition sources have been identified and must be taken into account for the risk assessment :

- electrical arcs,
- electric sparks,
- flames,

- hot surfaces,
- static electricity,
- mechanical impact sparks,
- mechanical friction,
- compression ignition,
- electromagnetic radiation including optical frequencies.

Specific examples of some of the above potential sources of ignition have been identified by valve/actuator manufacturers :
- drive nut/stem thread friction on outside screw, rising stem valves,
- high friction due to unsuitable tolerances on moving parts,
- friction in worm gear drive gearboxes,
- friction in thrust collar bearings on non-rising stem valves (particularly bronze),
- thrust pads,
- build up of static electricity in non-metallic, non-conducting seat/bearing,
- materials,
- build up of static electricity in non-conducting fabric dust boots on stem,
- extensions,
- build up of static electricity in spring energised polymeric stem packings,
- build up of static electricity in diaphragm operated actuators.

Note that internal and external must be taken into account as they are connected to external or process related atmospheres.

3) What are the Essential Health and Safety Requirements ?

The ATEX Directive, 94/9/EC specifies the Essential Health and Safety Requirements (EHSR) relating to the design and construction of equipment and protective systems intended to be used in potentially explosive atmospheres.

The EHSR are listed in annex II of the ATEX Directive and relate to concepts that are necessary in order to prevent explosions or to control the effects of incipient explosions. In addition to design and construction, annex II also provides concepts on marking, instructions for use and replacement parts and the level of detail requirements are specified therein.
This guide provides an overview of the EHSR and therefore the reader must make reference to the Directive and, in particular, annex II for detail.

An overview of annex II is provided by its principles of explosion safety :
- **above all, if possible, prevent the formation of an explosive atmosphere which may be produced or released by equipment and by protective systems themselves,**
- **prevent the ignition of explosive atmospheres, taking into account every electrical and non-electrical source of ignition,**
- **should an explosion occur, to halt it immediately and/or limit the range of explosion flames and pressure to a sufficient level of safety.**

Annex II makes the following preliminary observations:
- Technological knowledge, which can change rapidly, must be taken into account as far as possible and be utilised immediately. This implies that only the latest standards should be used.
- For Equipment and protective systems the EHSR shall apply only in so far as they are necessary for the safe and reliable functioning and operation of those devices with respect to the risk of explosion.

The EHSR are divided into three groups :
- **Common requirements for equipment and protective systems,**
- **Supplementary requirements for equipment,**
- **Supplementary requirements for protective systems.**

Common requirements for equipment and protective systems

❖ **General requirements**
- principals of integrated explosion safety
- design and manufacture taking into account possible operating faults, including misuse, to preclude a dangerous situation occurring.
- special checking and maintenance conditions
- surrounding area conditions
- marking

- instructions

❖ **Selection of materials**

❖ **Design and construction**

❖ **Potential ignition sources**

❖ **Hazards arising from external effects**

❖ **Requirements in respect of safety devices**

❖ **Integration of safety requirements relating to the system**

Supplementary requirements for equipment

The supplementary requirements depend on the equipment category. These categories are :

Category M1 : Mining equipment with very high level of protection.

Category M2 : Mining equipment with high level of protection.

Category 1 : Non-mining equipment with very high level of protection.

Category 2 : Non-mining equipment with high level of protection.

Category 3 : Non-mining equipment with normal level of protection.

Within each section, these supplementary requirements cover :
- prevention of ignition sources from becoming active,
- control of surface temperatures,
- safe opening,
- prevention of dust ingress and egress.

Supplementary requirements for Protective Systems

❖ **General requirements**
- dimensions to reduce effects of explosions to a safe level,
- positioning to prevent explosions from spreading,
- power failure,
- resistance to outside interference.

❖ **Planning and design**
- characteristics of materials,
- shockwave resistance,
- pressure-withstand of accessories,
- account taken of pressure in peripheral equipment and pipework,
- pressure relief systems,
- explosion suppression systems,
- explosion decoupling systems,
- integration into safety system.

Notice that the second edition of the ATEX Guidelines explicitly exclude water spray systems designed to protect from fire.

4) What are the Equipment Categories?

The ATEX Directive, in annex 1, defines five categories divided into two groups. The categories define the level of protection of equipment:

Group I (mines, methane and/or combustible dusts)		**Group II** (potentially explosive atmospheres or gas/air or dust/air mixtures, mist of vapours)					
Category M1	Category M2	Category 1		Category 2		Category 3	
		G *(Gas)*	D *(Dust)*	G *(Gas)*	D *(Dust)*	G *(Gas)*	D *(Dust)*

Definitions of Categories

❖ **Category M1**

Equipment which is:

- intended for use in mines endangered by firedamp and/or coal dust,
- required to remain functional with an explosive atmosphere present,
- capable of providing a very high level of protection against the ignition of an explosive atmosphere, even in the event of rare incidents and malfunctions relating to the equipment,
- characterised by means of protection which will either :
  - provide an independent second means of protection in the event that the first means should fail, or
  - assure the requisite level of protection in the event of two faults occurring independently of each other.

❖ **Category M2**

Equipment which is:

- intended for use in mines endangered by firedamp and/or coal dust,
- intended to be de-energised in the presence of an explosive atmosphere,
- capable of providing a high level of protection against the ignition of an explosive atmosphere during normal operation and in the case of more severe operating conditions such as rough handling or changing environmental conditions.

Although Category M2 equipment is **intended** to be de-energised in the presence of an explosive atmosphere, it must still retain its explosion protection capability in case the means of detecting an explosive atmosphere or de-energising the equipment should fail.

Note that in order to determine the appropriate conformity assessment processes, Category M2 is subdivided into:

- electrical equipment – *i.e. equipment having a potential ignition source of electrical origin (mains or battery)* – and internal combustion engines,
- other equipment.

❖ **Category 1**

Equipment which is:

- intended to be used in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or dusts are present continuously or for long periods of time,
- capable of providing a very high level of protection against the ignition of an explosive atmosphere even in the event of rare incidents and malfunctions relating to the equipment,
- characterised by means of protection which will either :
  - provide an independent second means of protection in the event that the first means should fail, or,
  - assure the requisite level of protection in the even of two faults occurring independently of each other.

❖ **Category 2**

Equipment which is:

- intended to be used in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or dusts are likely to occur,
- capable of providing a high level of protection against the ignition of an explosive atmosphere even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account.

It is intended that Category 2 equipment should be able to retain its explosion protection capability in the event of a fault affecting the means of protection.

Note that in order to determine the appropriate conformity assessment processes, Category 2 is subdivided into:

- electrical equipment – *i.e. equipment having a potential ignition source of electrical origin (mains or battery)* – and internal combustion engines
- other equipment

❖ **Category 3**

Equipment which is:

- intended to be used in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or dusts are unlikely to occur or only to occur infrequently or for short periods of time,

- capable of providing a normal level of protection against the ignition of an explosive atmosphere during normal operation.

How do I decide which Category my equipment comes within ?

As a first approximation, and for guidance purposes only, the following rules may be applied:

❖ **Mining equipment**
If the equipment has to remain energised in the presence of firedamp, for example for safety or rescuer purposes, it should be classified as M1. Otherwise, if for use in "gassy" mines, then Category M2 would be appropriate.

❖ **Non-mining equipment**
Equipment intended for use in **Zone 0** would normally be classified as **Category 1**, which would include electrical equipment designed to the Intrinsic Safety ia standard

Equipment intended for use in **Zone 1** would normally be classified as **Category 2**. Included in this category, means of protection for electrical equipment, would be:

- **ia** Intrinsic safety
- **d** Flameproof enclosure
- **e** Increased safety
- **p** Purged and pressurised
- **m** Encapsulated
- **o** Oil filled
- **q** Powder filled

Equipment intended for use in **Zone 2** would normally be classified as **Category 3**, which would include equipment designed to the non-incendive standard n.

All these means of protection refer to harmonized standard EN 13463 (See A.8).

5) Conformity Assessment Procedures

	Group	Category	Procedure
Electrical Equipment	I	M1	EC Type Examination & Production Quality Assurance ***or*** Product Verification
		M2	EC Type Examination & Product Quality Assurance ***or*** Conformity to Type
	II	1	EC Type Examination & Production Quality Assurance ***or*** Product Verification
		2	EC Type Examination & Product Quality Assurance ***or*** Conformity to Type
		3	Internal Control of Production
Mechanical Equipment	I	M1	EC Type Examination & Production Quality Assurance ***or*** Product Verification
		M2	Internal Control of Production & Communication of technical documentation to a Notified Body
	II	1	EC Type Examination & Production Quality Assurance ***or*** Product Verification
		2	Internal Control of Production & Communication of technical documentation to a Notified Body
		3	Internal Control of Production
Protection Devices			EC Type Examination & Production Quality Assurance ***or*** Product Verification

6) What are the conformity assessment procedures?

The ATEX Directive specifies a number of conformity assessments and the circumstances when they must be used. The procedures are :

EC Type Examination – Annex III
The examination, including testing and inspection where appropriate, of a product design and samples by a Notified Body for conformity with either harmonised European Standards or the essential requirements or a combination of the two.

The application must include:
- the name and address of the manufacturer and, if the application is lodged by an authorised representative, his name and address as well,
- a written declaration that the same application has not been lodged with any other notified body,
- the technical file defining the product.

Production Quality Assurance – Annex IV
The assessment and periodic auditing (including inspection or testing of production samples where appropriate) by a Notified Body of the manufacture's quality systems for compliance with ISO 9002.

The Directive requires the quality assurance system to address the following points:
- quality objectives, organisational structure, responsibilities and powers of management with regard to equipment quality,
- manufactured, quality control and quality assurance techniques, processes and systematic actions, which will be used,
- examinations and tests, which will be carried out before, during and after manufacture and frequency with which they are carried out,
- quality records (inspection reports, test data, calibration data, qualifications of personnel, etc.),
- means to monitor achievement of required equipment quality and effective operation of the system.

Product Quality Assurance – Annex VII
The assessment and periodic auditing (including inspection or testing of production samples where appropriate) by a Notified Body of the manufacturer's quality system for compliance with ISO 9003.

The Directive requires the quality assurance system to address the following points:
- quality objectives, organisational structure, responsibilities and powers of management with regard to product quality,
- examinations and tests which will be carried out after manufacture,
- means to monitor effective operation of the system,
- quality records (inspection reports, test data, calibration data, qualifications of personnel, etc).

Product Verification – Annex V
The inspection and/or testing of each production item by a Notified Body for conformity with the type that was subjected to EC Type Examination.

The Directive requires:
- the manufacturer to ensure that the manufacturing process guarantees conformity of the equipment with type described in the EC Type Examination certificate,
- the manufacturer or his authorised representative in the EU to affix the CE Marking to each piece of equipment,
- the Notified Body to examine and test each item of equipment to verify conformity with the type as described in EC Type Examination certificate.

Conformity to Type – Annex VI
The examination and/or testing of each production item by the manufacturer under the responsibility of a Notified Body for conformity with type that was subjected to EC Type examination.
This process is specified in annex VI of the directive

The Directive requires the manufacturer to:
- ensure that the manufacturing process assures compliance of the manufactured products with type described in EC Type Examination Certificate,
- carry out test under the responsibility of a Notified Body to confirm the conformity of each item manufactured with the certified type,
- affix the CE Marking to each item that has been found to be in conformity,
- affix the Notified Body's identification number to each item that has been found to be in conformity, under the responsibility of the Notified Body.

Unit Verification – Annex IX
The examination, including inspection and testing as appropriate, of each production item by a Notified Body for conformity with either harmonised European Standards or the essential requirements or a combination of the two.

The Directive requires:
- the manufacturer to draw up technical documentation,
- the Notified Body to carry out the necessary work to confirm that the equipment meets the requirements of the Directive,

- the Notified Body to affix its identification number to the approved equipment, and provide a certificate of conformity,
- the manufacturer or his authorised representative in the EU to affix the CE Marking to the equipment.

Internal Control of Production – Annex VIII
verification by the manufacturer that the product design and each production item conform to either harmonised European Standards or the essential requirements or a combination of the two.

The Directive requires the manufacturer to:
- assess the conformity of the equipment with essential requirements,
- draw up the technical documentation,
- check that each piece of equipment conforms to the design specified in the Technical File,
- affix the CE Marking to each conforming product,
- draw up a declaration of conformity,
- retain the declaration of conformity and the technical file for a least 10 years after the last piece of equipment was manufactured,
- update the technical file to cover changes to the equipment,
- in some cases send a copy of the technical file to a Notified Body.

Quality System documentation
The quality system documentation specific to ATEX, which is common to annexes IV and VII, shall contain the following descriptions:
- quality objectives and the organisational structure, responsibilities and powerful of the management with regard to equipment quality,
- the manufacturing, quality control and quality assurance techniques, processes and systematic actions which will be used,
- the examinations and tests which will be carried out before, during and after manufacture and their frequency,
- the quality records, such as inspection reports and test data, calibration data, reports on the qualifications of the personnel concerned, etc,
- the means to monitor the achievement of the required equipment quality and the effective operation of the quality system.

7) What is a Technical File?

A technical file is a dossier of information specifying the product in sufficient detail for it to be manufactured and containing the evidence of conformity with requirements of the Directive. The evidence may include reference to applicable standards and results of tests carried out. A technical file must be prepared by the manufacturer regardless of which conformity assessment procedures are used. For EC type examination the technical file will consist of records gathered during the assessment and be represented by the Notified Body issuing a report certificate.

Non electrical equipment Category 2 & M2 and Equipment Category 3

It is permissible for the manufacturer of non-electrical or non-combustion engine equipment with protection level Category 2 & M2 and equipment Category 3 to self assess their equipment in order to demonstrate conformity to the EHSR's. This may be done via calculation and/or testing or by demonstrating compliance with the EN13463 series of standards.
A technical file must be lodged with a notified body prior to marking the equipment and issuing the EC declaration of conformity for the equipment. For category 3, manufacturer should only keep the technical documentation available.

What should be included in a Technical File ?

The technical documentation shall contain all documents needed, in order to enable the conformity of the product with the requirements of the Directive to be assessed. So, it shall contain :
- a general description of the product,
- design and manufacturing drawings and layouts of components, sub-assemblies, circuits, etc.,
- description and explanations necessary for the understanding of the drawings and layouts and the operation of the product,
- a list of harmonised or other standards that have been applied in full or in part,
- for aspects where standards have not been applied, description of the solutions that have been adopted to meet the essential requirements of the Directive,
- results of design calculations made, examinations carried out…
- test reports.

Note that the Directive does not explicitly requires the whole risk analysis.

8) CE Marking

Who affixes the CE Marking?

The CE Marking is normally affixed to the products by the manufacturers. Where products are manufactured outside the EU the CE Marking may be affixed by the manufacturer's legally appointed representative in the EU. However, the representative would then be taking legal responsibility for verifying the conformity of the products with the requirements of the relevant directives. In that case the representatives would have to comply with the conformity assessment procedures, including, where required, EC Type Examination and EC Quality Assurance.

Where must the CE Marking be used ?

For the ATEX Directive, the CE Marking must be affixed to each item of equipment or to each protective system. Ideally it should be placed in such a position that the regulatory authorities can readily see it, if only to avoid the inconvenience of questions being raised as to the sustainability of the product. The CE Marking must not be affixed to components which do not of themselves comply with all relevant requirements but which must be combined with other parts in order to comply.

What is the CE Marking ? CE

The CE Marking is intended to facilitate the free movement of products within the EU by signifying that essential health and safety requirements have been met.

The CE Marking comprises together with such other information as may be required by the European Union directives that apply to a particular product.
For the ATEX Directive, the symbols CE must be accompanied by the following :

- name and address of manufacturer,
- designation of series or type,
- serial number, if any,
- year of construction,
- Ex symbol, followed by equipment group and category,
- for equipment Group II the letters G and /or D for type of atmosphere (gases, vapours, mists/dusts.),
- where required, the identification number of the Notified Body involved in the manufacturing phase.

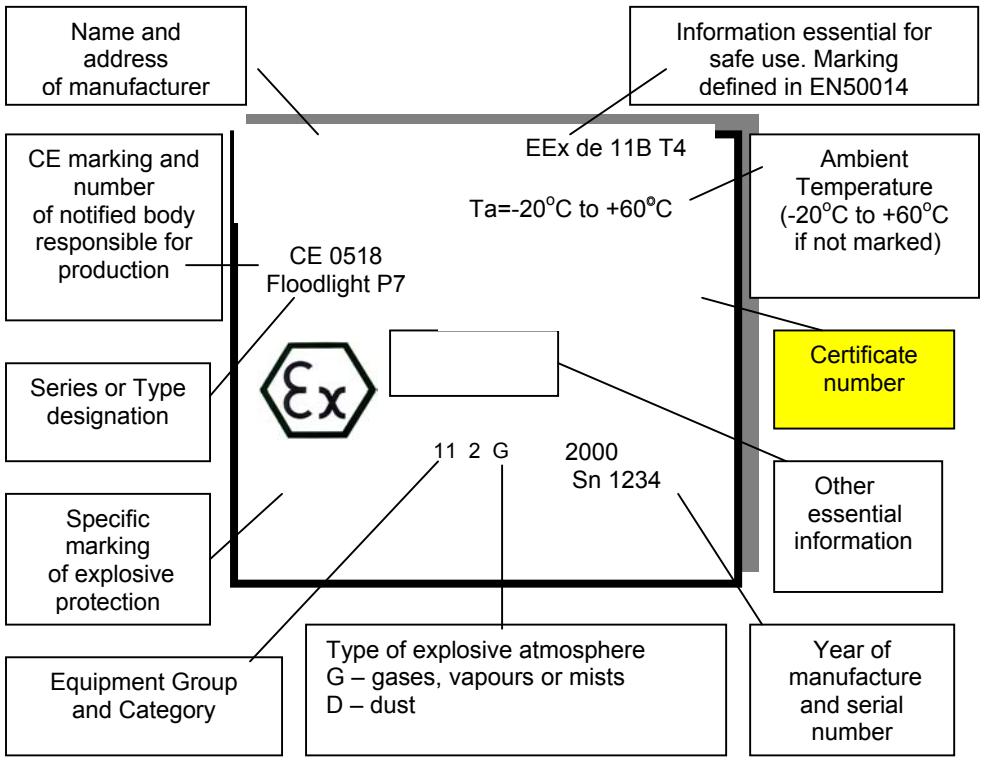
Note that user instructions shall explain in detail the meaning of the marking on the product.

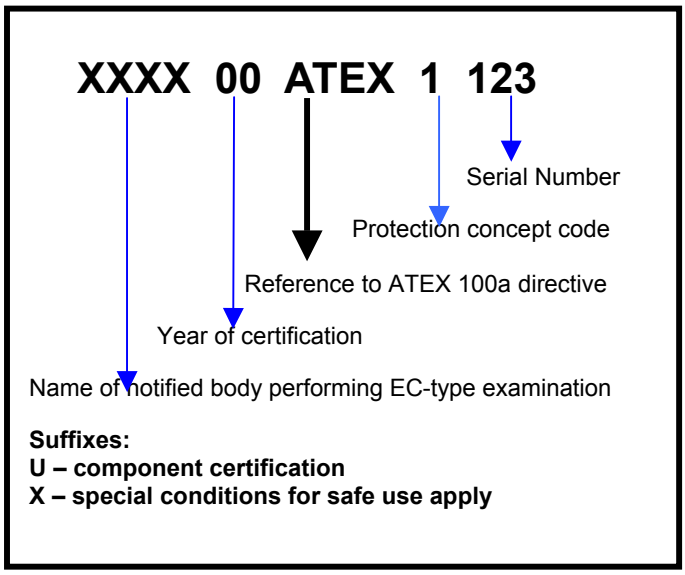
Declaration of Conformity

Equipment conforming to ATEX must include a EC Declaration of Conformity. The EC declaration of conformity must contain the following elements :

- the name or identification mark and the address of the manufacturer or his authorised representative established within the Community,
- a description of the equipment, protective system or device,
- all relevant provisions fulfilled by the equipment, protective system or device referred to,
- where appropriate, the name, identification number and address of the notified body and the number of the EC type examination certificate,
- where appropriate, reference to the harmonised standards,
- where appropriate, the standards and technical specifications which have been used,
- where appropriate, references to other Community Directives which have been applied,
- identification of the signatory who has been empowered to enter into commitments on behalf of the manufacturer or his authorised representative established within the Community.

Typical electrical equipment marking – EC Type Examination

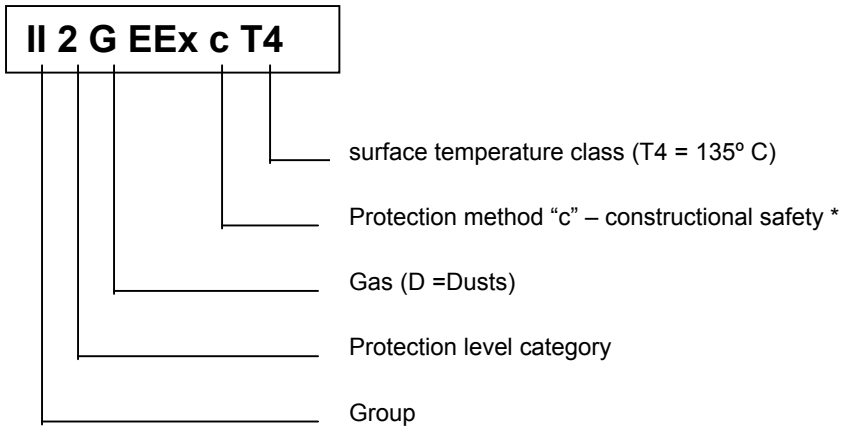




Typical mechanical equipment marking

If compliance with the EN13463 series of standards has been demonstrated, the standard details how the equipment shall be marked. A declaration of conformity is also required.

Example :



Supplementary / Specific marking

- Devices separately placed on the market, shall be marked with the category of the equipment under control in round brackets.
- … / … : means the product has two different categories (interface of two atmospheres, or internal/external).
- - means that a part of the product is not conforming to the directive.

The following table shows some examples of such markings :

II 1/2 G	level gauge installed in the tank wall between zone 0 and zone 1
II (2) 3 G	an electrical field bus device affecting category 2 equipment installed in zone 2
II 2/- G	a ventilator exhausting out of zone 1 but to be installed outside potentially explosive atmospheres. The Directive has no provisions for marking in case of installation outside potentially explosive atmospheres.
II 2/3 G	a ventilator extracting out of zone 1 but to be installed in zone 2
II 3/- D	a screw conveyor conveying dust out of a zone 22 but installed outside potentially explosive atmospheres. The Directive has no provisions for marking in case of installation outside potentially explosive atmospheres.
II -/2 D	blower conveying no explosive atmosphere but to be installed in zone 21

Protection methods described in the harmonised standard EN 13463

- EN 13463-1:2001

Non-electrical equipment for potentially explosive atmospheres — *Part 1: Basic method and requirements*

- EN 13463-2

Non-electrical equipment for potentially explosive atmospheres — *Part 2 : Protection by flow restricting enclosure (fr)*

- EN 13463-3

Non-electrical equipment for potentially explosive atmospheres — *Part 3 : Protection by flameproof enclosure (d)*

- prEN 13463-4

Non-electrical equipment for potentially explosive atmospheres — *Part 4 : Protection by inherent safety (g)*

- EN 13463-5

Non-electrical equipment for potentially explosive atmospheres — *Part 5 : Protection by constructional safety (c)*

- EN 13463-6

Non-electrical equipment for potentially explosive atmospheres — *Part 6 : Protection by control of ignition source (b)*

- prEN 13463-7

Non-electrical equipment for potentially explosive atmospheres — *Part 7 : Protection by pressurisation (p)*

- EN 13463-8

Non-electrical equipment for potentially explosive atmospheres — *Part 8 : Protection by liquid immersion (k)*

9) Assemblies

An assembly formed by combining two or more pieces of equipment, together with components if necessary, has to be considered as a product falling under the scope of directive 94/9/EC, provided that this assembly is placed on the market and/or put into service by a responsible person (who will then be the manufacturer of that assembly) as a single functional unit.

The above mentioned parts are put together by the same person (the manufacture of the assembly), and placed on the market as a single functional unit. This person assumes responsibility for the compliance of the integral assembly with the directive.

The EC declaration of conformity, as well as the instructions for use must refer to the assembly as a whole. It must be clear (e.g. by enclosing a list of all parts and/or a list of safety related data) which is/are the combination(s) that form(s) the assemblies. The manufacturer assumes responsibility for compliance with the directive, and must therefore, in accordance with annex 11 1.0.6, provide clear instructions for assembly/installation/operation/maintenance etc. in the instructions for use.

The manufacture of the assembly may presume conformity of these pieces of equipment and may restrict his own risk assessment of the assembly to those additional ignition and other relevant hazards, which become relevant because of the final combination. If additional hazards are identified due to the combination a further conformity assessment of the assembly regarding these additional risks is necessary.

10) Risk Assessments for Products

To meet the requirements of directives 94/9/EC it is absolutely necessary to conduct a risk assessment process. According to annex 11, 1.0.1 manufacturers are under an obligation to design equipment and protective systems from the point of view of integrated explosion safety. Integrated explosion safety is conceived to prevent the formation of explosive atmospheres as well as sources of ignition and, should an explosion nevertheless occur, to halt it immediately and/or to limit its effects. In this connection, the manufacturer must take measures with respect to the risks of explosion. In addition, as required in annex 11, 1.0.2 of the directive, equipment and protective systems must be designed and manufactured after due analysis of possible operating faults in order, as far as possible, to preclude dangerous situations.

Risk assessment methodology should comprise the risk profiles including the accidental parameters that can reasonably be anticipated. These aspects become subject to a risk assessment as a “series of logical steps to enable, in a systematic way, the examination of the hazards associated with products”.

In principle, the risk assessment is an iterative process composed of a series of logical steps to enable, in a systematic way, the examination of the hazards associated with product :

1. Determination of the limits and the intended use of the product

2. Identification of the ignition sources (Typical ignition sources are given in § 5 of EN 1127)

   Depending on the intended equipment category ignition sources shall be considered as following :

   ⇒ Category 3 : ignition sources caused in the case of normal operation,
   ⇒ Category 2 : ignition sources caused in the case of normal operation and expected malfunction
   ⇒ Category 1 : ignition sources caused in the case of normal operation expected and rare malfunction

3. Selection of appropriate protective measures

   Different protective measures can be applied, for example :

   ⇒ Protection by constructional safety (c)
   ⇒ Protection by control of ignition sources (b)
   ⇒ Protection by liquid immersion (k)

Although risks can always be reduced further they can seldom be reduced to zero except by eliminating the activities.

11) Harmonised Standards

What are the harmonised standards for the ATEX Directive?

"Where a national standard transposing a harmonised standard, the reference of which has been published in the Official Journal of the European Communities, covers one or more of the essential health and safety requirements, the equipment (…) or the component (…) designed in accordance with that standard shall be presumed to comply with the relevant essential health and safety requirements. Member States shall publish the references of national standards transposing harmonised standards."

If equipment complies with the criteria of a non-harmonised, even unpublished standard, and if the said standard is referred to by a general harmonised standard, then the equipment is assumed to be compliant with the requirements of the Directive (so-called "umbrella" standards).
For example, if the equipment is fitted with a flameproof enclosure that complies with standard EN 13463-3, and inasmuch as the harmonised standard NF EN 13463-1 refers to EN 13463-3 in paragraph 1 "Scope", then the equipment is assumed to conform with Directive 94/9/EC, and the means of protection applied shall be indicated by the letter "d" on the markings.

List of harmonised standards

An updated list of standards harmonised for the ATEX Directive is available on the European Community web site, via the link :
http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/reflist/atex.html

The last references have been published in the Commission communication in OJEC C 204 of 2004-08-12

CEN EN 1127-1:1997	Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology None
CEN EN 1127-2:2002	Explosive atmospheres — Explosion prevention and protection — Part 2: Basic concepts and methodology for mining
CEN EN 1755:2000	Safety of industrial trucks — Operation in potentially explosive atmospheres — Use in flammable gas, vapour, mist and dust
CEN EN 1834-1:2000	Reciprocating internal combustion engines — Safety Requirements for design and construction of engines for use in potentially explosive atmospheres — Part 1: Group II engines for use in flammable gas and vapour atmospheres
CEN EN 1834-2:2000	Reciprocating internal combustion engines — Safety requirements for design and construction of engines for use in potentially explosive atmospheres — Part 2: Group I engines for use in underground workings susceptible to firedamp and/or combustible dust
CEN EN 1834-3:2000	Reciprocating internal combustion engines — Safety requirements for design and construction of engines for use in potentially explosive atmospheres — Part 3: Group II engines for use in flammable dust atmospheres
CEN EN 1839:2003	Determination of explosion limits of gases and vapours
CEN EN 12874:2001	Flame arresters — Performance requirements, test methods and limits for use
CEN EN 13012:2001	Petrol filling stations — Construction and performance of automatic nozzles for use on fuel dispensers
CEN EN 13160-1:2003	Leak detection systems — Part 1: General principles
CEN EN 13237:2003	Potentially explosive atmospheres — Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres
CEN EN 13463-1:2001	Non-electrical equipment for potentially explosive atmospheres — Part 1: Basic method and requirements
CEN EN 13463-5:2003	Non-electrical equipment intended for use in potentially explosive atmospheres — Part 5: Protection by constructional safety 'c'
CEN EN 13463-8:2003	Non-electrical equipment for potentially explosive atmospheres — Part 8: Protection by liquid immersion 'k'
CEN EN 13673-1:2003	Determination of the maximum explosion pressure and the maximum rate of pressure rise of gases and vapours — Part 1: Determination of the maximum explosion pressure
CEN EN 13760:2003	Automotive LPG filling system for light and heavy duty vehicles — Nozzle, test requirements and dimensions
CEN EN 13821:2002	Potentially explosive atmospheres — Explosion prevention and protection — Determination of minimum ignition energy of dust/air mixtures
CEN EN 13980:2002	Potentially explosive atmospheres — Application of quality systems
CENELEC EN 50014:1997	Electrical apparatus for potentially explosive atmospheres — General requirements
CENELEC EN 50015:1998	Electrical apparatus for potentially explosive atmospheres — Oil immersion 'o'

CENELEC EN 50017:1998	Electrical apparatus for potentially explosive atmospheres — Powder filling ‘q’
CENELEC EN 50018:2000	Electrical apparatus for potentially explosive atmospheres — Flameproof enclosure ‘d’
CENELEC EN 50019:2000	Electrical apparatus for potentially explosive atmospheres — Increased safety ‘e’
CENELEC EN 50020:2002	Electrical apparatus for potentially explosive atmospheres — Intrinsic safety ‘i’
CENELEC EN 50021:1999	Electrical apparatus for potentially explosive atmospheres — Type of protection ‘n’
CENELEC EN 50104:1998	Electrical apparatus for the detection and measurement of oxygen — Performance requirements and test methods
CENELEC EN 50104:2002	Electrical apparatus for the detection and measurement of oxygen — Performance requirements and test methods
CENELEC EN 50241-1:1999	Specification for open path apparatus for the detection of combustible or toxic gases and vapours — Part 1: General requirements and test methods
CENELEC EN 50241-2:1999	Specification for open path apparatus for the detection of combustible or toxic gases and vapours — Part 2: Performance requirements for apparatus for the detection of combustible gases
CENELEC EN 50281-1-1:1998	Electrical apparatus for use in the presence of combustible dust — Part 1-1: Electrical apparatus protected by enclosures — Construction and testing
CENELEC EN 50281-1-2:1998	Electrical apparatus for use in the presence of combustible dust — Part 1-2: Electrical apparatus protected by enclosures — Selection, installation and maintenance
CENELEC EN 50281-2-1:1998	Electrical apparatus for use in the presence of combustible dust — Part 2-1: Test methods — Methods for determining the minimum ignition temperatures of dust
CENELEC EN 50284:1999	Special requirements for construction, test and marking of electrical apparatus of equipment group II, Category 1 G
CENELEC EN 50303:2000	Group I, Category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust
CENELEC EN 60079-7:2003	Electrical apparatus for explosive gas atmospheres — Part 7: Increased safety ‘e’
CENELEC EN 60079-15:2003	Electrical apparatus for explosive gas atmospheres — Part 15: Type of protection ‘n’
CENELEC EN 61779-1:2000	Electrical apparatus for the detection and measurement of flammable gases — Part 1: General requirements and test methods
CENELEC EN 61779-2:2000	Electrical apparatus for the detection and measurement of flammable gases — Part 2: Performance requirements for group I apparatus indicating a volume fraction up to 5 % methane in air
CENELEC EN 61779-3:2000	Electrical apparatus for the detection and measurement of flammable gases — Part 3: Performance requirements for group I apparatus indicating a volume fraction up to 100 % methane in air
CENELEC EN 61779-4:2000	Electrical apparatus for the detection and measurement of flammable gases — Part 4: Performance requirements for group II apparatus indicating a volume fraction up to 100 % lower explosive limit
CENELEC EN 61779-5:2000	Electrical apparatus for the detection and measurement of flammable gases — Part 5: Performance requirements for group II apparatus indicating a volume fraction up to 100 % gas
CENELEC EN 62013-1:2002	Caplights for use in mines susceptible to firedamp — Part 1: General requirements — Construction and testing in relation to the risk of explosion

12) Notified Bodies

A Notified Body is a body which is independent of the supply of the products and which has the necessary technical competence and administration structure to assess the conformity of products and manufacturers with the requirements of the Directive.

A Notified Body has to be approved and appointed by its government who notify the European Commission of the appointment. In general, Notified Bodies will be the recognised certification bodies in their field.

In view of the multitude of notified bodies in Europe, manufacturers are free to consult bodies in other Member States or even to accept competing offers for the certification of their equipment.
Any decision taken by a notified body shall be considered as applicable by all other notified bodies.

A list of the European Notified Bodies is available on the web page :
http://europa.eu.int/comm/enterprise/newapproach/legislation/nb/en94-9-ec.pdf

Be careful, Notified Bodies are often notified only for some of the conformity assessment procedures, or only for electrical equipment for example.

13) Bibliography and useful links

European legislation

- Directive 94/9/EC on the approximation of the laws of Member States concerning Equipment and protective systems intended for use in potentially explosive atmospheres.

OJEC L100/1, 19/04/94
http://europa.eu.int/comm/enterprise/atex/direct/newapproach.htm

- Directive 1999/92/EC concerning minimum requirements for the safety and health of workers potentially at risk from explosive atmospheres

OJEC L23/57, 28/01/2000

- Commission Communication 2004/C204/04 (Publication of titles and references of harmonised standards under the terms of the Directive)

OJEC C42/03, 21/02/2003

- Second version of the Guidelines published by the European Commission

http://europa.eu.int/comm/enterprise/atex/guide/index.htm

- Guide to the Implementation of Directives Based on New Approach and Global Approach

http://ec.europa.eu/enterprise/newapproach/legislation/guide/index.htm

Useful web sites

European Commission:
www.europa.eu.int/comm/enterprise/atex
European Committee for Standardisation:
www.cenorm.be
www.cenelec.org

B. Application of ATEX 94/9/CE to the valve industry

1) Scope of ATEX 94/9/CE Directive

The term “simple valve” has been introduced in the second edition of the European ATEX Guidelines (July 2005). The introduction of this term, which has no sense for manufacturers, opens a long discussion between CEIR representatives and ATEX Standing Committee, who is in charge of ATEX implementation through EC-Guidelines.
This discussion could not lead to a common definition of a “simple valve”, so it was agreed to delete this misleading term from the EC-Guidelines (in course or already issued).

The minutes of the ATEX Standing Committee meeting, held on December 2005, states both that agreement, and the common understanding of how 94/9/CE Directive should be applied to industrial valve, ie:

- An industrial valve, for which the hazard assessment carried out by the manufacturer does not show any own ignition source, is outside directive 94/9/EC scope.
- Consequently, if the hazard assessment shows that an industrial valve does have its own ignition source, such a valve falls within directive 94/9/EC scope.
- Electrostatic charges caused by the flow-through of the fluid are not to be considered as own ignition sources.

Nevertheless and considering as **priority** all safety actions in terms of preventive protection of people or an equipment, the CEIR hardly recommends to consider all specific adaptation of a valve (for example anti-static device, attention to coatings, …) as necessary and to consider such a valve as a product falling into the scope of the directive.

Let’s notice that, even if a valve has no own ignition source according to directive 94/9/EC, the user Directive 99/92/EC applies nevertheless. That is to say that user shall specify the conditions of use and the manufacturer shall offers a suitable valve. Then adequate documentation shall be attached to the valve, clarifying technical characteristics and conditions for use allowed. It is also an additional reason to consider valves as ATEX products to simplify the contract between the user (customer) and the manufacturer.

2) Responsibilities

Responsibilities are addressed more closely, in the “Guide to the Implementation of Directives based on The New Approach” published by the European Commission. This document simply addresses the split of responsibilities between parties involved in the implementation of these regulations.
European Directive 94/9/EC applies to equipment, components and protective systems intended for use in potentially explosive atmospheres with a view to improving the protection of workers who are exposed to the risk of explosion (Directive 1999/92/EC). These new regulations applying to potentially explosive atmospheres provide a clearer definition of the responsibilities of the various parties involved, including the user, the installer and the manufacturer (the installer may be the manufacturer, the user or a third party).

The responsibilities of the distributor are limited to the administrative control of documents accompanying the equipment. If the distributor is in charge of the equipment assembly, then refer to the corresponding paragraphs.

User’s responsibilities
The user is responsible for implementing European Directive 1999/92/EC.

- The most important form of protection against potentially explosive atmospheres consists in preventing their formation or, if they form, in dissipating them.
- The end user shall oversee all works performed in explosive atmospheres (installation, repairs, maintenance), and shall issue instructions in writing.
- The end user shall train all employees working in explosive atmospheres or shall make sure that all employees working under such conditions are suitably trained.
- The end user shall make sure that all special instructions provided by the equipment manufacturer against the risk of explosion during the maintenance and servicing of equipment installed in potentially explosive atmospheres are followed.

Valve industrial sites are establishments where potential explosive atmosphere may occur. End users of companies must first of all apply this regulation in their establishment.

Installer’s responsibilities
The installer is an intermediary between the manufacturer and the user. When installing ATEX equipment, the installer must pay special attention to the instructions provided, such as:

- Making sure that all employees working in explosive atmospheres are suitably trained.

- Following all instructions provided by the manufacturer when installing ATEX equipment.

The installer shall inform the user of explosion risks and, if known, the means of reducing these risks (including the ATEX documents of the installed products).

All suitable measures shall be taken if the installer assembles the equipment prior to the installation.

Manufacturer's responsibilities

The manufacturer of the equipment to be installed in a potentially explosive zone shall undertake to supply only equipment that is suited to use in the zone defined by the user. To this end, the manufacturer shall be provided with all necessary information concerning the operating conditions of the equipment (category or zone at least).

Distributors responsibilities

ATEX compliant equipment can be held by distributors providing that the valves are clearly CE marked and other electrical conformity markings – it is the distributors responsibility to ensure that the equipment supplied to the user is compliant with the requirements of the operating conditions.

3) Contractual relations

When ordering ATEX equipment, special attention shall be paid to the following points (under the responsibility of the purchaser):

- Classification of the zone
- Choice of category
- Specifications

When the ATEX equipment is placed on the market, special attention shall be paid to the following (under the responsibility of the manufacturer):

- Documents to be provided
- Putting into service of the equipment

4) Specifications

Performances, process data, operating conditions, etc.

The above information is usually included in the specifications. However, special attention shall be paid to process data and operating conditions. The operating conditions (atmosphere, transported fluids, frequency of operation, installation environment, etc.) are important for both the risk analysis and the identification of parties' responsibilities (for example, checks to be made by the user shall be indicated in the instructions).

Required certifications

When not explicitly indicated, checks shall be done as to whether the equipment must be certified as conforming to certain regulations (equipment in contact with foodstuffs, Pressure Equipment, Machinery, EMC, Construction Products, etc.).
All Declaration of Conformity shall refer to all Directives/regulations applicable to the equipment.

To achieve conformity with Directive 94/9/EC, the manufacturer requires information relating to the classification of the danger zone. The user/installer of the complete installation is responsible for classifying the danger zone in accordance with Directive 1999/92/EC that sets out the minimum requirements for the safety and health of workers potentially at risk from explosive atmospheres.

If the end user forgets to specify during the enquiry and the command, that the equipment's intended use is in ATEX zone, the manufacturer cannot be responsible in case of problem linked to this ATEX zone.

5) Risk assessment

Generally speaking the analysis of the valves showed that, among the potential sources of inflammation given in EN 1127 –1, the only significant hazardous phenomenon found on the valves were those of electrostatic origin and, though they are less critical, sparks of a mechanical origin on valves and check valves. The valves in fact are not directly affected by the following sources: Electrical equipment, Flames and hot gases, Lightning, Electromagnetic waves, Ionising radiation, Ultrasound, adiabatic compression and shock waves, Exothermic reactions. Some essential requirements of annex II of ATEX directive are obviously fulfilled taking into account that :

- the products comply with directive 97/23/EC (choice of materials, sealing, etc.),
- they are designed according to the EN 12266-1, EN 1092, EN 1597, EN ISO 5210 and EN ISO 5211 standards (interfaces, sealing, etc.),
- they do not have any filling and draining holes.

Typical risk assessments have been carried out for the main product families (GGC, ball valve, butterfly valve, actuator …), taking into account all the Essential Health and Safety Requirements (see A.3 & annex II of 94/9/EC Directive) of the Directive. For each of them, a technical solution has been proposed by the experts of the French working group.
See Part C for details.
Be careful : in any case the manufacturer must do his own risk assessment (the typical analysis are only an help in this view).

The main results are :
- The aspects relating to hot surfaces depend on the user.
- The aspects relating to sparks of mechanical origin are mainly dealt with through the choice of materials and by linear speeds of less than 1m/s.
- Stray currents are dealt with by earthing.
- Specific instructions need to be given in the manual to draw the user's attention to all the consequences of the fluid being carried with regard to the external ATEX atmosphere (checks to ensure there are no leaks to the outside, temperature, specific precautions during the transient phases, maintenance, etc.)

Electrostatic charges

In order to analyse this phenomenon, additional tests were carried out with one of the French notified bodies and with a Technical Laboratory - CETIM (*Centre Technique des Industries Mécaniques* - French Industrial and Mechanical Technical Centre).

The tests have been carried out by CETIM on a specific case representing the least favourable valve technology configuration: butterfly valve with PTFE/PFA lined components, including an anti-static device to ensure the internal electrical continuity. Of course, earthing stays mandatory.
These tests show that charges generated by the fluid carried remain very low. The residual charges on the periphery of the liner (surface in contact with the outside) as well as those on the outer parts of the valve cannot constitute a risk of inflammation by means of sparks of electrostatic origin, for a potentially explosive atmosphere which would be external (Zones 0, 1 and 2 for gas groups IIA, IIB and IIC or for zones 20, 21 and 22).
See B.1) for details on electrostatic charges

Under the degraded conditions chosen for conducting the tests, the measured values show that there is still a risk in the case of group-IIC gas and vapour ATEX that is the worst case (examples of gas of group IIC: hydrogen is a gas likely to be released owing to a reaction between products). These measurements result from highly damaging conditions (in particular, absence of connection between the valve body and the earth, and of interconnection with conductive pipes). This does not mean that this type of valve is unusable in the case of an internal explosive atmosphere in zone 0 with a gas IIC, but that the risk analysis must be sharpened for each particular case (transient or abnormally foreseeable overflow phase, value of fluid resistivity, possible presence of impurities,….) to be able to reach a decision.

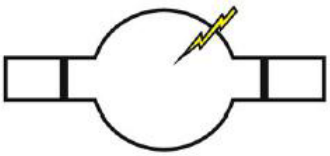
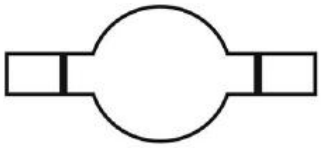
The residual charges generated solely by operating the valve cannot constitute a risk of inflammation by means of sparks of electrostatic origin, for an external potentially explosive atmosphere which would be located in the zone near the butterfly valve (Zones 0, 1 and 2 for gas groups IIA, IIB and IIC or for zones 20, 21 and 22).

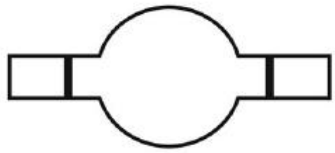
Internal potentially explosive atmosphere

These typical risk assessments are also valid for internal potentially explosive atmosphere ; according that internal ATEX have to be taken into account only for start up and shut down working conditions.

When do I must carry a risk assessment ?

The following table resume all the possible combinations, with the 3 parameters :
- Surrounding ATEX (*Zone 0,1,2,20,21,22*)
- Internal ATEX (*potentially explosive mixture*)
- Potential ignition source 

Zone 0,1,2,20,21,22 	The valve is covered by Directive 94/9/CE, it must undergo a conformity assessment.
Zone 0,1,2,20,21,22 	The valve is covered by Directive 94/9/CE, it must undergo a conformity assessment.
	The valve is covered by Directive 94/9/CE, it must undergo a conformity assessment. Start up and shut down phases.
	The valve is not covered by Directive 94/9/CE.
Zone 0,1,2,20,21,22 	The valve is not covered by Directive 94/9/CE. **Absence of ignition source must be proved.**
	The valve is not covered by Directive 94/9/CE. **Absence of ignition source must be proved.**

	The valve is not covered by Directive 94/9/CE.

Conclusion of the standard risk assessment

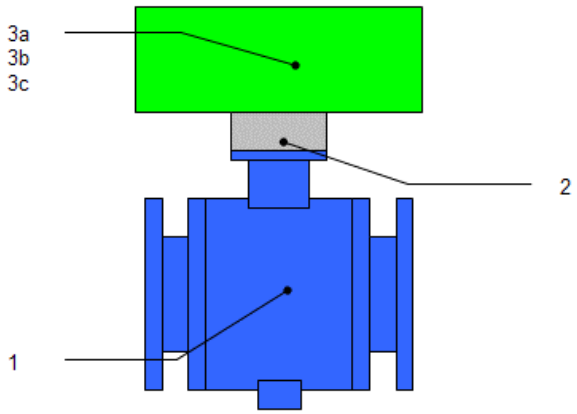
Generally speaking, subject to correct application of the details contained in the template risk analysis and, where applicable, their certification, the design of the valves that were studied means that it is possible to envisage using them in external potentially explosive atmospheres (scope of directive 94/4/EC, see point 1.) for Zones 0, 1 and 2 for gas groups IIA, IIB and IIC or for zones 20, 21 and 22.

The template risk analysis give the main points which valve manufacturers should include in their analyses, along with the types of solution which are acceptable to the notified bodies. They show the links to the requirements shown in appendix II of the ATEX directive. **The above does not mean that manufacturers simply have to perform the standard analyses without checking that the equipment fully meets all requirements ; these template risk analysis are only a tool describing the frame of the risk analysis he must carry out.**

6) Assemblies

Assembly by the manufacturer

In the valve industry, manufacturers are faced with a number of assessment procedures that may be applied to their equipment, which often are assemblies of various mechanical and electrical components. The Directive makes no explicit reference to such assemblies.
For example, an assembly of mechanical and electrical components is not considered as being electrical if the electrical components have already been assessed.
We have attempted to simplify the process by using a simple scenario :



N°	Assembly element	Type of element
1	Valve	Mechanical equipment
2	Coupling	Mechanical part
3a	Mechanical, hydraulic or pneumatic actuator	Mechanical equipment
3b	Electrical actuator	Electrical equipment
3c	Positioner	Electrical equipment

Manufacturers may produce assemblies or simply components that are intended to be assembled. Subsequently, a number of configurations are possible and a corresponding number of conformity assessment procedures are necessary. The Commission's Guidelines address this subject. Nevertheless, we have chosen to provide more precise details to meet the needs of the valve industry equipment :

<table>
<tr><th colspan="2">Placing on the market of…</th><th>Conformity assessment</th><th>Marking</th><th>Category</th><th>EC declaration</th></tr>
<tr><td colspan="2">Equipment (mechanical or electrical) intended to become part of an assembly</td><td>Of the equipment</td><td>Of the equipment</td><td>Of the equipment</td><td>Of the equipment</td></tr>
<tr><td rowspan="3">Assembly of certified mechanical and electrical elements</td><td rowspan="2">The resulting assembly does not give rise to any additional hazards</td><td rowspan="2">None</td><td>The different elements are marked, but not the assembly, even if the components belong to different categories</td><td>The category corresponds to the least favourable category of any one of the equipment of the assembly</td><td>Of each component</td></tr>
<tr><td>Single marking for the assembly</td><td>Corresponds to the category of the assembly</td><td>Of the assembly</td></tr>
<tr><td>The resulting assembly gives rise to additional hazards</td><td>Of the assembly as mechanical or electrical equipment (if the risks come from electrical parts)</td><td>Single marking for the assembly</td><td>Corresponds to the category of the assembly</td><td>Of the assembly</td></tr>
<tr><td colspan="2">Assembly of equipments, at least one of which is not certified</td><td>Of the assembly as:
• Electrical equipment if the non-certified equipment is electrical
• Mechanical equipment if the non-certified equipment is mechanical</td><td>Single marking for the assembly</td><td>Corresponds to the category of the assembly</td><td>Of the assembly</td></tr>
</table>

Assembly by the installer

The manufacturer, the distributor or any other party may perform the installation. In all cases, the following recommendations apply.

❖ **On-site assembly of components assessed as part of an assembly (accompanied by a declaration of conformity of each part, or of the assembly) :**

The installer shall pay attention to couplings and connections between the different components that require special measures as described by the manufacturer of the assembly in the instructions and to the installation conditions recommended in the instructions for the assembly (checks of couplings, insulation, etc.).
In this case, the installer is not the manufacturer of the assembly, and shall under no circumstances substitute for the manufacturer if the assessment of conformity has not been completed.

❖ **On-site assembly of an equipment, intended to be integrated in installation :**

The assessment of conformity shall be done on the assembled equipment. The installer becomes so the manufacturer of the assembly.

❖ **Integration of certified assembly (accompanied by a declaration of conformity) :**

The installer shall pay attention to instructions (connections to the installation, insulation,…). The manufacturer of the assembly is the legally mentioned on the EC-Declaration.

❖ **Integration of non-certified assembly :**
In this case, Directive 94/9/EC is not applicable, but the end user shall re-assess the installation in accordance with Directive 1999/92/EC.

7) Instructions for use

The instructions establish a channel of communication between the manufacturer of the certified product and the user. The instructions shall contain all technical information about the product and all precautions that have been taken or that must be taken for the product to operate correctly according to the terms of the ATEX Directive.
The contents of the instructions are described in detail in Directive 94/9/EC, Annex II, § 1.0.6.
Nevertheless, manufacturers must pay special attention to the following points :

- The equipment is certified according to a category, permitting it to be used in a given zone. The user alone shall be liable for the use of the equipment in a zone it is not certified for.
- Instructions do not have to include the analysis of hazardous phenomena. However, the instructions must include certain results of the analysis :
  - All maintenance operations resulting from the risk analysis and that are indicated in the certification technical documentation as being "means of protection" against the risk of ignition or malfunction must be clearly and explicitly mentioned in the instructions as well as the frequency they must be carried out. The user or operator is responsible for maintenance operations and shall follow the manufacturer's recommendations.
  - Electric and pressure parameters, maximum surface temperatures and the values of other limits.
  - Indications of possible misuse (based on experience).
- All work (installation, adjustment, repairs, maintenance) on the equipment shall be done by staff that is aware of the risks of explosion and that may have followed specific ATEX training.
- If the manufacturer places an assembly on the market as separate parts, then the assembly conditions must be indicated in the corresponding instructions.

Note: Users must be able to clearly identify the technical information relating to the conformity of the equipment with Directive 94/9/EC. If these specific conditions are not included in an annex to the existing instructions, they must be indicated by an easily recognisable marking  .

8) Documentation attached to the equipment

EC declaration of conformity
The CEIR statement is that "manufacturers undertake to provide at least the EC declaration of conformity on their web site in all 12 community languages (Danish, Dutch, English, Finnish, French, German, Greek, Italian, Norwegian, Portuguese, Spanish and Swedish)."

Instructions
Similarly, "manufacturers undertake to provide at least instructions in English with the equipment and publish the translation into the eleven other community languages on their web site."

Manufacturer's obligations
Manufacturers shall keep a copy of the declaration of conformity and make this copy available to the authorities. Manufacturers shall also keep the technical documentation and all documents sent to the notified body if required to do so by the assessment procedure.

Documentation certifying the conformity of the equipment
Some customers/users require the manufacturer to provide the contents of the technical documentation used to obtain the conformity of the product (results of the risk analysis, internal quality processes, etc.).
These documents are not required by Directive 94/9/EC. However, these documents may be required by contract and covered by a non-disclosure agreement between the parties.

Documentation relating to the quality system
Certified bodies must use the documents listed in annexes III to IX. Under no circumstances shall they refer to standard EN 13480 relating to quality requirements.

9) Installation

Users are responsible for both the installation and the maintenance of certified equipment in ATEX zones. The installation conditions must be clearly defined in the specifications so that the manufacturer can take all appropriate measures (dusty environment, etc.).
These measures must be mentioned in the instructions.
If an assembly is installed as part of a larger system, then the user is responsible for making sure that the installation is compliant, if the conformity of the assembly has not already been checked.

10) Maintenance

Some maintenance operations constitute a means of protection against certain equipment failures (E.g., replacement of bearings). These operations must be mentioned in the instructions.
Every intervention on equipment (part changes,…) shall be done by well informed employees to ATEX risks, and with original parts or components supplied by the equipment manufacturer, in conformity with instructions and in every case following the state of the art.
If this procedure is not followed, the equipment will loose its ATEX certification.
According to Directive 1999/92/EC, the end user on whose premises potentially explosive atmospheres may occur is responsible for the maintenance operations and shall follow the recommendations of the manufacturer of the certified equipment.

11) Equipment stored or fitted in ATEX zones

End users on whose premises explosive atmospheres may occur are required to make their complete installation compliant within three years. This requirement means that equipment already installed must also be made compliant, if not otherwise stated by the explosion protection document based on the risk assessment.
Close attention must be paid to the contractual conditions of any additional work done by the manufacturers of already installed equipment in order to make the equipment compliant after putting into service.

C. Template risk assessments

The following template risk assessments dealing with:

1) Pneumatic Actuators
2) Hydraulic Actuators
3) Check valves
4) Pressure reducing valves
5) Pinch valves (with diaphragms or sleeve)
6) Butterfly valves
7) Globe valves
8) Ball valves
9) Direct Action Pressure Relief Valves
10) Conical or cylindrical plug valves
11) Gate valves
12) Control valves
13) Self-regulating control valves

have been issued within the valve commission of the CETIM (*Centre Technique des Industries Mécaniques* - French Industrial and Mechanical Technical Centre).

For more information, see www.cetim.fr.

1) Pneumatic Actuators

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 § 8		
• No reaction with the atmosphere	EN 13463-1 § 8.2		
B Design and Construction	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts	Use of parts supplied by the manufacturer and S.I. [1]		
B3 Dust deposits [2]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Dust inflammation	cf. § "Unacceptable rises in temperature"		
B4 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	Category 2 expected malfunctions	Category 1 rare malfunctions
C1 Sparks of mechanical origin			
• Friction of metal parts[3]	Linear speed ≤ 1 $m.s^{-1}$		
C2 Sparks of electrostatic origin [4]			
• Plastic or fluorinated parts in contact with the ATEX	Choice as stated in EN 13463-1 § 7.4		
• Plastic or fluorinated parts not in contact with the ATEX (loss of pneumatic chamber sealing/tightness)		The chamber must not be vented to the atmosphere or choice as stated in EN 13463-1 § 7.4	
• Coating	Thicknesses as stated in EN 13463-1 § 7.4		
C3 Stray electric and leakage current			
• No DDP between materials	Good engeenering practice and S.I. Continuity check (S.I.). The designing of the earthing provisions should take account of any external constraints which might alter this		
C4 Unacceptable temperature rises[5]			
• Friction of parts	S.I. ($\Delta T \leq 45°C$)		
• Wear on bearings		Low linear speed ≤ 1 $m.s^{-1}$ and S.I.	
• Failure of bearings			Low linear speed ≤ 1 $m.s^{-1}$ and S.I.

[1] S.I.: Service Instructions
[2] The presence of dust must also be envisaged, even in the case of a "G" ATEX
[3] The handling of risks caused by foreign bodies in contact with mobile parts or the consequences of the failure of mobile parts depends on the actuator technology (the sealing/tightness of the chamber is one possible principle on which a solution could be based)
[4] For earthing operations, cf. C.3
[5] Please note: also take the fluid and note 3 into account

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Return spring		Maintenance as stated in EN 982	
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and Earthing	Continuity check	
• Friction of parts			ΔT shown
• Wear on bearings		Service plan (re-testing on site after work has been carried out)	
• Failure of bearings		Periodic check on the bearings	
• Connecting the devices	Standardised connections		
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies		

2) Hydraulic Actuators

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 § 8		
• No reaction with the atmosphere	EN 13463-1 § 8.2		
B Design and Construction	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts	Use of parts supplied by the manufacturer and S.I.[6]		
B3 Dust deposits[7]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Dust inflammation	cf. § "Unacceptable rise in temperature"		
B4 Additional protection			
• Prevention of additional external constraints	Impact test on impulse withstand and compliance with standard installation practice		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	Category 2 expected malfunctions	Category 1 rare malfunctions
C1 Sparks of mechanical origin			
• Friction of metal parts[8]	Linear speed ≤ 1 $m.s^{-1}$		
C2 Sparks of electrostatic origin[9]			
• Plastic or fluorinated parts in contact with the ATEX	Choice as stated in EN 13463-1 § 7.4		
• Plastic or fluorinated parts not in contact with the ATEX (loss of pneumatic chamber sealing/tightness)		The chamber must not be vented to the atmosphere or choice as stated in EN 13463-1 § 7.4	The chamber must not be vented to the atmosphere
• Coating (PTFE, PFA, epoxy, PU, etc.)	Thickness as stated in EN 13463-1 § 7.4		
C3 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engineering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		
C4 Unacceptable temperature rises[10]			
• Friction of parts	S.I. ($\Delta T \leq 45$ °C)		
• Wear on bearings		Low linear speed ≤ 1 $m.s^{-1}$ and S.I.	
• Failure of bearings			Low linear speed ≤ 1 $m.s^{-1}$ and S.I.

[6] S.I.: Service Instructions
[7] The presence of dust must also be envisaged, even in the case of a "G" ATEX
[8] The handling of risks caused by foreign bodies in contact with mobile parts or the consequences of the failure of mobile parts depends on the actuator technology (the sealing of the chamber is one possible principle on which a solution could be based)
[9] For earthing operations, cf. C.3
[10] Please note: the working medium and note 3 must also be taken into account

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet
• Rise in temperature on surface	Depends on the working medium (S.I.)

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Return spring		Maintenance as stated in EN 982	
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Friction of parts			ΔT shown
• Wear on bearings		Service plan (re-testing on site after work has been carried out)	
• Failure of bearings		Periodic check on the bearings	
• Connecting the devices	Standardised connections		
• Rise in temperature on surface			Warning to the user

3) Check valves

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 §8		
• No reaction with the atmosphere	EN 13463-1 §8.2		
B Design and Construction	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device			
	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts			
	Use of parts supplied by the manufacturer and S.I. [11]		
B3 Enclosed structure and prevention of leaks			
• Outward sealing/tightness	Product sealing/tightness test based on EN 12266-1 and S.I.		
• Wear on the sealing/tightness device (wear on the bearings)	Service and maintenance plan (re-testing on site after work has been carried out) (S.I.)		
B4 Dust deposits [12]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Dust inflammation	cf. § "Rise in temperature on surface"		
B1 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	Category 2 expected malfunctions	Category 1 rare malfunctions
C1 Sparks of electrostatic origin [13]			
• Plastic or fluorinated parts in contact with the ATEX	Choice as stated in EN 13463-1 § 7.4		
• Plastic or fluorinated parts not in contact with the ATEX	Cf. § "Dismantling instructions (S.I.)"		
• Coating (PTFE, PFA, epoxy, PU, etc.)	Thicknesses as stated in EN 13463-1 § 7.4		
C2 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engeenering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet
• Rise in temperature on surface	Depends on the working medium used (S.I.)
• Opens without danger: discharging of internal electrostatic charges	Dismantling instructions (S.I.)

[11] S.I.: Service Instructions
[12] The presence of dust must also be envisaged, even in the case of a "G" ATEX
[13] For earthing operations, cf. C2

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Outward sealing/tightness			Take any potential risks of leakage into account [14]
• Wear on bearings		Service plan (re-testing on site after work has been carried out)	
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Discharging of internal electrostatic charges		Instructions on dismantling and warning to the user	
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Connecting the devices	Standardised connections		
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies		
• Rise in temperature on surface			Depends on the working medium used
• Opens without danger		Warning to the user for maintenance operations	

[14] The scenarios relating to bursting are not covered by the EN 60079-10 zone classification standard

4) Pressure reducing valves

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
• A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 § 8		
• No reaction with the atmosphere	EN 13463-1 § 8.2		
• B Design and Construction	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device			
	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts			
	Use of parts supplied by the manufacturer and S.I. [15]		
B3 Enclosed structure and prevention of leaks			
• Outward sealing/tightness	Product sealing/tightness test based on EN 12266-1 and S.I.		
• Wear on the sealing/tightness device (wear on the bearings)	Service and maintenance plan (re-testing on site after work has been carried out) (S.I.)		
• Use of filling and draining holes	Product sealing/tightness test based on EN 12266-1 and S.I.		
B4 Dust deposits [16]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Spring chamber	Cleaning as shown in S.I.		
B5 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
• C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	Category 2 expected malfunctions	Category 1 rare malfunctions
C1 Sparks of mechanical origin			
• The spring fails			The spring chamber must not be vented to the atmosphere
C2 Sparks of electrostatic origin [17]			
• Plastic or fluorinated parts in contact with the ATEX	Choice as stated in EN 13463-1 § 7.4		
• Coating	Thicknesses as stated in EN 13463-1 § 7.4		
C3 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engeenering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		

[15] S.I.: Service Instructions
[16] The presence of dust must also be envisaged, even in the case of a "G" ATEX
[17] For earthing operations, cf. C3

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet
• Rise in temperature on surface	Depends on the working medium used (S.I.)

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Outward sealing/tightness			Take any potential risks of leakage into account [18]
• Wear on the engine		Service plan (re-testing on site after work has been carried out)	
• Use of filling and draining holes			Compliance with operating conditions
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Cleaning the spring chamber		Regular cleaning	
• Changing settings			Follow the manufacturer's recommendations
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Connecting the devices	Standardised connections		
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies		
• Rise in temperature on surface			Depends on the working medium used

[18] The scenarios relating to bursting are not covered by the EN 60079-10 zone classification standard

5) Pinch valves (with diaphragms or sleeve)

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 § 8		
• No reaction with the atmosphere	EN 13463-1 § 8.2		
B Design and Construction	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device			
	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts			
	Use of parts supplied by the manufacturer and S.I. [19]		
B3 Enclosed structure and prevention of leaks			
• Outward sealing/tightness	Product sealing/tightness test based on EN 12266-1 and S.I.		
• Wear on the pinch	Service and maintenance plan (re-testing on site after work has been carried out) (S.I.)		
• Use of filling and draining holes	Product sealing/tightness test based on EN 12266-1 and S.I.		
B4 Dust deposits [20]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Dust inflammation	cf. § “Unacceptable rise in temperature” and “Temperature rise on surface”		
B5 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	**Category 2 expected malfunctions**	**Category 1 rare malfunctions**
C1 Sparks of mechanical origin			
• Friction of metallic parts	Linear speed ≤ 1 $m.s^{-1}$		
C2 Sparks of electrostatic origin [21]			
• Plastic or fluorinated parts in contact with the ATEX	Thiskness as staded in EN 13463 - 1 § 7.4.		
• Plastic or fluorinated parts not in contact with the ATEX	Cf. § “Other risks (which are not the responsibility of the manufacturer)”		
• Coating	Thicknesses as stated in EN 13463-1 § 7.4		
C3 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engeenering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		
C4 Unacceptable rises in temperature			
• Intermittent friction of rotating parts	ıw linear speed ≤ 1 $m.s^{-1}$ ıort travel		
• Wear on bearings		Low linear speed ≤1 $m.s^{-1}$ Short travel	
• Failure of bearings			Low linear speed ≤1 $m.s^{-1}$ Short travel and S.I.

[19] S.I.: Service Instructions
[20] The presence of dust must also be envisaged, even in the case of a “G” ATEX
[21] For earthing operations, cf. C3

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet
• Rise in temperature on surface	Depends on the working medium used (S.I.)
• Sleeve/Liner charge by the medium, liner in contact with the ATEX	Earthing the facility (S.I.)

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Outward sealing/tightness			Take any potential risks of leakage into account [22]
• Wear on the obturator		Service plan (re-testing on site after work has been carried out)	
• Use of filling and draining holes			Compliance with operating conditions
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Discharging of internal electrostatic charges		Instructions on dismantling and warning to the user	
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Failure of bearings		Periodic check on the bearings	
• Connecting the devices	Standardised connections		
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies		
• Rise in temperature on surface			Depends on the working medium used
• Opens without danger		Warning to the user for maintenance operations	
• Liner/Sleeve charge by the medium, sleeve/liner in contact with the ATEX	Earthing the facility		

[22] The scenarios relating to bursting are not covered by the EN 60079-10 zone classification standard

6) Butterfly valves

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 § 8		
• No reaction with the atmosphere	EN 13463-1 § 8.2		
B Design and Construction	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts	Use of parts supplied by the manufacturer and S.I. [23]		
B3 Enclosed structure and prevention of leaks			
• Outward sealing/tightness	Product sealing/tightness test based on EN 12266-1 and S.I.		
• Wear on the sealing/tightness device (wear on the bearings)	Service and maintenance plan (re-testing on site after work has been carried out) (S.I.)		
B4 Dust deposits [24]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Dust inflammation	cf. § "Unacceptable rise in temperature" and "Temperature rise on surface"		
B5 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	**Category 2 expected malfunctions**	**Category 1 rare malfunctions**
C1 Sparks of mechanical origin			
• Friction of metal parts	Linear speed ≤ 1 $m.s^{-1}$		
C2 Sparks of electrostatic origin [25]			
• Friction of plastic or fluorinated parts in contact with the ATEX	Thickness as stated in EN 13463-1 § 7.4		
• Plastic or fluorinated parts not in contact with the ATEX	Cf. § 2 Other risks		
• Coating	Thickness as stated in EN 13463-1 § 7.4		
C3 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engineering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		
C4 Unacceptable rises in temperature			
• Intermittent friction of rotating parts	Low linear speed ≤1 $m.s^{-1}$ Short travel		
• Wear on bearings		Low linear speed ≤1 $m.s^{-1}$ Short travel	
• Failure of bearings			Low linear speed ≤1 $m.s^{-1}$ Short travel and S.I.

[23] S.I.: Service Instructions
[24] The presence of dust must also be envisaged, even in the case of a "G" ATEX
[25] For earthing operations, cf. C0.2

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet
• Rise in temperature on surface	Depends on the working medium used (S.I.)
• Sleeve/Liner (PTFE, PFA) charge by the medium, liner/sleeve in contact with the ATEX	Earthing the facility (S.I.)

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Outward sealing/tightness			Take any potential risks of leakage into account [26]
• Wear on bearings		Service plan (re-testing on site after work has been carried out)	
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Discharging of internal electrostatic charges		Instructions on dismantling and warning to the user	
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Failure of bearings		Periodic check on the bearings	
• Connecting the devices	Standardised connections		
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies		
• Rise in temperature on surface			Depends on the working medium used
• Opens without danger		Warning to the user for maintenance operations	
• Slleve/Liner charge by the medium, liner/sleeve in contact with the ATEX	Earthing the facility		

[26] The scenarios relating to bursting are not covered by the EN 60079-10 zone classification standard

7) Globe valves

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 § 8		
• No reaction with the atmosphere	EN 13463-1 § 8.2		
B Design and Construction	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts	Use of parts supplied by the manufacturer and S.I. [27]		
B3 Enclosed structure and prevention of leaks			
• Outward sealing/tightness	Product sealing/tightness test based on EN 12266-1 and S.I.		
• Wear on the sealing/tightness device (wear on the bearings)	Service and maintenance plan (re-testing on site after work has been carried out) (S.I.)		
• Use of filling and draining holes	Compliance with operating conditions (S.I.)		
B4 Dust deposits [28]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Dust inflammation	cf. § "Rise in temperature on surface"		
B5 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
B6 Opens without danger			
• Discharging of internal electrostatic charges	Dismantling instructions (S.I.)		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	**Category 2 expected malfunctions**	**Category 1 rare malfunctions**
C1 Sparks of mechanical origin			
• Friction of metal parts	Linear speed $\leq$ 1 $m.s^{-1}$		
C2 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engeenering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		
C3 Unacceptable rises in temperature			
• Intermittent friction of rotating parts	Low linear speed $\leq$1 $m.s^{-1}$ Short travel		
• Wear on bearings		Low linear speed $\leq$1 $m.s^{-1}$ Short travel	
• Failure of bearings			Low linear speed $\leq$1 $m.s^{-1}$ Short travel and S.I.

[27] S.I.: Service Instructions

[28] The presence of dust must also be envisaged, even in the case of a "G" ATEX

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet
• Rise in temperature on surface	Depends on the working medium used (S.I.)

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Outward sealing/tightness			Take any potential risks of leakage into account [29]
• Wear on bearings		Service plan (re-testing on site after work has been carried out)	
• Use of filling and draining holes			Compliance with operating conditions
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Discharging of internal electrostatic charges		Instructions on dismantling and warning to the user	
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Connecting the devices	Standardised connections		
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies		
• Rise in temperature on surface			Depends on the working medium used

[29] The scenarios relating to bursting are not covered by the EN 60079-10 zone classification standard

8) Ball valves

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 §8		
• No reaction with the atmosphere	EN 13463-1 §8.2		
B Design and Constructing	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts	Use of parts supplied by the manufacturer and S.I. [30]		
B3 Enclosed structure and prevention of leaks			
• Outward sealing/tightness	Product sealing/tightness test based on EN 12266-1 and S.I.		
• Wear on the sealing/tightness device (wear on the bearings)	Service and maintenance plan (re-testing on site after work has been carried out) (S.I.)		
B4 Dust deposits [31]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
• Dust inflammation	cf. § "Unacceptable rise in temperature" and S.I.		
B5 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
B6 Opens without danger			
• Discharging of internal electrostatic charges	Dismantling instructions (S.I.)		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	**Category 2 expected malfunctions**	**Category 1 rare malfunctions**
C1 Sparks of mechanical origin			
• Friction of metal parts	Low linear speed ≤1 $m.s^{-1}$ Short travel		
C2 Sparks of electrostatic origin [32]			
• Plastic casing in contact with the ATEX	Choice as stated in EN 13463-1 § 7.4		
• Plastic or fluorinated parts not in contact with the ATEX	cf. § "Dismantling instructions "		
• Coated metal casing (PTFE, PFA, epoxy, PU, etc.)	Thicknesses as stated in EN 13463-1 § 7.4		
C3 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engeenering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		
C4 Unacceptable rises in temperature			
• Intermittent friction of rotating parts	Low linear speed ≤1 $m.s^{-1}$ Short travel		
• Wear on bearings		Low linear speed ≤1 $m.s^{-1}$ Short travel	
• Failure of bearings			Low linear speed ≤1 $m.s^{-1}$ Short travel and S.I.

[30] S.I.: Service Instructions
[31] The presence of dust must also be envisaged, even in the case of a "G" ATEX
[32] For earthing operations, cf. C0.2

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet
• Rise in temperature on surface	Depends on the working medium used (S.I.)

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	Maintenance	Use
• Components/spare parts		Use parts supplied by the manufacturer	
• Outward sealing/tightness			Take any potential risks of leakage into account [33]
• Wear on bearings		Service plan (re-testing on site after work has been carried out)	
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Discharging of internal electrostatic charges		Instructions on dismantling and warning to the user	
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Connecting the devices	Standardised connections		
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies		
• Rise in temperature on surface			Depends on the working medium used

[33] The scenarios relating to bursting are not covered by the EN 60079-10 zone classification standard

9) Direct Action Pressure Relief Valves

Results of the risk analysis

RISKS NOTED	MEASURES APPLIED		
A Materials	*cf. requirement 1.1 in annex II to Directive 94/9/EC*		
• Must not cause an explosion	EN 13463-1 § 8		
• No reaction with the atmosphere	EN 13463-1 § 8.2		
B Design and Constructing	*cf. requirement 1.2 in annex II to Directive 94/9/EC*		
B1 Safety in terms of risks of explosion during the life of the device			
	Compliance with the measures listed in the risk analysis		
B2 Components/spare parts			
	Use of parts supplied by the manufacturer and S.I. [34]		
B3 Enclosed structure and prevention of leaks			
• Outward sealing/tightness	Product sealing/tightness test based on ISO 4126-1 to 7 and S.I.		
• Wear on the sealing/tightness device (wear on the engine)	Service and maintenance plan (I.S.)		
• Use of filling and draining holes	Compliance with operating conditions (S.I.)		
B4 Dust deposits [35]			
• Cleaning of dust deposits	Products which are easy to clean (S.I.)		
B5 Additional protection			
• Prevention of additional external constraints	Impact test and compliance with standard installation practice		
• Changing settings	Manufactured on the basis of ISO 4126 and S.I.		
C Potential sources of inflammation	*cf. requirement 1.3 in annex II to Directive 94/9/EC*		
	Category 3 normal operation	Category 2 expected malfunctions	Category 1 rare malfunctions
C1 Stray electric and leakage current			
• No dangerous potential difference between materials	Good engeenering practice and S.I. Continuity check (I.S.). The design of the earthing provisions must take into account any external constraints which might alter it		

Other risks (which are not the responsibility of the manufacturer)

RISKS NOTED	MEASURES TO BE APPLIED
• Connecting the devices	Standardised connections (S.I.)
• Impacts involving foreign bodies inside the device	The installer must check to ensure that there are no foreign bodies (S.I.)
• Operation under changeable and/or disruptive conditions	Compliance with the Specifications and details of the device's limitations on the Technical Datasheet

[34] S.I.: Service Instructions

[35] The presence of dust must also be envisaged, even in the case of a "G" ATEX

Specific instructions which must appear in the instructions

RISKS	SPECIFIC PRECAUTIONS		
	Installation	**Maintenance**	**Use**
• Components/spare parts		Use parts supplied by the manufacturer	
• Outward sealing/tightness			Take any potential risks of leakage into account [36]
• Wear on the engine		Service plan	
• Use of filling and draining holes			Compliance with operating conditions
• Cleaning of dust deposits		The body of the device must be regularly cleaned	
• Changing settings			Follow the manufacturer's recommendations
• No dangerous potential difference between materials	Equipotentiality of the metal parts (of both the device and the pipes) and earthing	Continuity check	
• Connecting the devices	Standardised connections		

[36] The scenarios relating to bursting are not covered by the EN 60079-10 zone classification standard

10) Conical or cylindrical plug valves

Please refer to:
8) Ball valves

11) Gate valves

Please refer to:
6) Butterfly valves
7) Globe valves
8) Ball valves
10) Conical or cylindrical plug valves

12) Control valves

Please refer to the analysis for actuators combined with:
6) Butterfly valves
7) Globe valves
8) Ball valves
10) Conical or cylindrical plug valves

13) Self-regulating control valves

Please refer to the analysis for actuators combined with:
4) Pressure reducing valves
7) Globe valves