



Valves

# ATEX

## Guidelines for the Valve Industry

28 November 2003

Guidelines on the Interpretation of  
Directive 94/9/EC

"Equipment and Protective Systems Intended for Use  
in Potentially Explosive Atmospheres"  
-dated 19.04.1994-

(with effect of 01 July 2003)

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# INDEX

Foreword	3
Part A General Part	
A 1. Directives on Explosion Protection in Potentially Explosive Atmospheres	4
A 2. General Scope, Definition of Terms	5
A 3. Conformity Assessment Procedures, Classification into Equipment Groups, Categories and Zones	9
Part B Special Part - Valves	
Introductory Remarks	17
B 1. Application of 94/9/EC	18
Application of 94/9/EC in case of <u>non</u> -electrically operated valves	20
Application of 94/9/EC in case of electrically operated valves	20
B 2. Examples of valves and actuators	20
B 3. Information on manufacturer's certification and operating instructions	26
Annex A: Definitions	27
Annex B: Annex II to 94/9/EC : "Principles of Integrated Explosion Safety"	28
Annex C: Exemptions from 94/9/EC	29

## Foreword

The discussions which have been held and current knowledge concerning EC Directive 94/9/EC, better known under the more common name of "ATEX", continue to cause unease in the mechanical engineering industry. This is due to the uncertainty of many manufacturers as to whether their products are covered or not.

This manual is intended to provide a basis for more certainty with regard to this Directive in the valve industry. Besides giving a condensed description of the areas which it covers and an explanation of important key terms, the paper also shows examples in order to summarise the concrete relevance of the Directive for valves.

**On the basis of previous discussions in the sector, it can be said that by far the greater majority of mechanical valves are not covered by the Directive since, with the exception of theoretically conceivable specialist valves, they do not demonstrate a potential source of ignition.**

The following explanations are based directly on the text of EC Directive 94/9/EC and the accompanying guidelines approved by the European Commission (May 2000). Insofar as they form the basis for drawing conclusions or forming opinions, these are the result of an intensive discussion held within the VDMA. This manual reflects the level of knowledge at the time of going to press.

Member companies of VDMA, plant operators and Notified Bodies participated in preparation of these guidelines.

## Part A General Part

### A 1. Directives on Explosion Protection in Potentially Explosive Atmospheres

The following three EC Directives contain regulations concerning explosion protection in so-called "explosive atmospheres":

#### 1. EC Machinery Directive 98/37/EC.

Annex I to this Directive contains a fundamental protection target in the form of the principles of explosion protection, requires the labelling of machines which are suitable for use in potentially explosive atmospheres (number 1.7.3) as well as information on explosion protection in the operating instructions.

However, Art. 1 (4) of the Directive contains the following special provision: "If the risks stated in this Directive, arising from a machine or a safety component, are either wholly or partly covered by other specific community Directives, this Directive does not apply to these machines or a safety component and these hazards, or no longer applies following the introduction of this special Directive, for which reason the following EC Directive 94/9/EC can be either wholly or partly applied, since the EC Machinery Directive indicates only a basic protection target in Annex 1 no. 1.5.7 but not detailed protection targets as does 94/9/EC .

#### 2. Directive 94/9/EC for "Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres" (EC-ABI no. L100 dated 19.04.1994).

This Directive (according to Art. 95 – previously 100a - EC contract, therefore also ATEX 100, ATEX 95) covers equipment and protection systems for use according to regulations in potentially explosive atmospheres and for safety devices, controlling devices and control units for use outside explosive atmospheres which, with regard to explosion hazards, are either necessary for or contribute to the safe use of equipment and protection systems.

#### 3. Directive "Protection of Safety and Health of Workers while Working in Potentially Explosive Atmospheres" 1999/92/EC (Directive according to Art. 137, previously 118 EC contract, therefore also ATEX 118 or ATEX 137).

This Directive is aimed at the operator and contains, amongst other things, the data and definitions concerning zoning necessary for assessment.

The current European Union regulations for the introduction of products and the conformity assessment procedure foreseen for this are familiar to most manufacturers from the already established EC Directives. Directives 94/9/EC and 1999/92/EC, with their additional specifications regarding mechanical explosion protection, are an integral part of this system.

Thus, a machine labelled CE indicates to the customer that all European Directives which cover this product are also adhered to. The manufacturer is also obliged to check whether a particular Directive – including 94/9/EC - covers his product or not.

## A 2. General Scope, Definition of Terms

### 1. "Potentially Explosive Atmosphere"

Directive 94/9/EC is to be applied to products which are used either in or in relation to an explosive atmosphere. The Directive defines the explosive atmosphere as an atmosphere in which the atmosphere can become explosive due to local and operating conditions.

The manual presented by the commission defines the term "explosive" as follows:

In terms of Directive 94/9/EC, a potentially explosive atmosphere is defined as a mixture

- i) of **combustible substances** in the form of gases, vapours, mists or dusts*
- ii) **and air***
- iii) under **atmospheric conditions**,*
- iv) in which the combustion process after ignition spreads to the whole of the unburned mixture*

It should be noted that products do **not** come under Directive 94/9/EC<sup>1</sup>, if they are destined for use in or in relation to with atmospheres which under certain circumstances could be explosive, but in which **one or more** of the **preconditions stated** under i) to iv) **above is not present**.

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<sup>1</sup> Examples of such mixtures could be: mixtures which are explosive without the presence of air, (e.g. H<sub>2</sub>, mixed with Cl<sub>2</sub>, mixtures of combustible substances with other oxidants such as air, pressure and/or temperature conditions outside the atmospheric area, etc.

## 2. "Products" as Defined in Directive 94/9/EC

For a product to be covered by the Directive, it must be:

- a) a piece of **equipment**, article 1 paragraph 3 letter a)
- b) a **protective system**, article 1 paragraph 3 letter b)
- c) a **component**, article 1 paragraph 3 letter a)
- or
- d) a **safety device**, a **controlling device** or a **control unit**, article 1 paragraph 2

### a) Equipment

The Directive covers equipment if it is (either wholly or partly) **intended for use in explosive atmospheres**. The fact that in line with use according to regulations, an explosive atmosphere can be present within the equipment is only of significance in the following potential exceptions.

- (1) If products (e.g. containers) which contain potentially explosive atmospheres according to regulations and also equipment with an autonomous function - as defined in the Directive - this equipment is also covered by the Directive.
- (2) If equipment with explosive atmospheres are capable of producing an explosive atmosphere due to their construction, their operation etc., which surrounds them either wholly or partially, such equipment is actually inside potentially explosive atmospheres and is therefore covered by the Directive.

A further element which defines equipment in terms of the Directive is that it must have its **own potential ignition source**. This is the case if, during operation according to regulations (which also includes malfunctions etc. to an extent which is independent of the equipment category in question - see Annex I to the Directive) in a potentially explosive atmosphere, it is capable of igniting the atmosphere, insofar as no concrete safety measures are taken.

Potential ignition sources can be: electric sparks, arcs and thunderbolts, electrostatic discharges, electromagnetic waves, ionising radiation, hot surfaces, flames and hot gases, mechanically produced sparks, radiation in the optic region, chemical reactions<sup>2</sup>, adiabatic condensation.

In some cases, a product can only contain an explosive atmosphere which can be ignited intentionally. Directive 94/9/EC is clearly not intended to cover such products, provided that no other relevant hazard has been detected.

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<sup>2</sup> Here, article 1 paragraph 4 of Directive 94/9/EC should be taken into consideration, in which an exception is only made if the explosion hazard is produced by the absence of explosive or unstable chemical substances.

## b) Protective Systems

Due to its function according to regulations, it is clear that a protective system is always, at least partly, installed and used in a potentially explosive atmosphere.

Since the function of a protective system is to eliminate or to curb (a safety function) the hazardous effects of an explosion, it is covered by the Directive regardless of whether it possesses a potential ignition source or not. In the first case, it would also have to fulfil the "essential health and safety requirements for equipment".

According to article 1 paragraph 3 letter b) protective systems are brought into circulation separately as autonomous systems. Accordingly, their conformity with the relevant essential health and safety requirements in Annex II in accordance with article 8 paragraph 2 must be assessed and they are to be labelled in accordance with article 10 paragraph 2.

"Protective systems" can, of course, also be brought into circulation as integral parts of equipment. Although in technical terms, due to their function, they are still protective systems, they are not, however, to be seen as protective systems as defined by the Directive with regard to conformity assessment and labelling. In such cases, their conformity is assessed during the conformity assessment of the equipment into which they are integrated, whereby the procedures foreseen in article 8 for the particular equipment group and category are to be applied. A separate labelling is carried out.

It should be remembered that the essential health and safety requirements in Annex II paragraph 3 also apply to integrated "protective systems".

## c) Components

In article 1 paragraph 3 letter c) components are defined by two factors:

- (1) they are **necessary for the safe operation** of equipment and protective systems,
- (2) however, they cannot perform **any autonomous function** (if this were the case, they would have to be classified as equipment, protective systems or devices, as defined by article 1 paragraph 2.)

To be remembered here are, for example, meters, brakes, containers, heating elements, covers, vehicles, counterweights, rolls, braces, connecting elements, plows, stay-bolts, rotary elements etc.

According to article 8 paragraph 3, the conformity of such components is to be assessed using the same procedures as for the equipment, protective systems or devices in accordance with article 1 paragraph 2, in which they are integrated.

For example, actuator belts, bearings, Zener diodes etc. are commonly brought into circulation, not with the express purpose of being integrated into equipment, protective systems or devices according to article 1 paragraph 2, but for general technical purposes. Their conformity (i.e. their suitability for the purpose according to regulations with regard to the safety of the product in which they are integrated) must be assessed during the conformity assessment of the whole product.

If components, however, are brought into circulation with the express purpose of being integrated into equipment, protective systems or devices in accordance with article 1 paragraph 2 (for example, as explosion-protected terminal blocks, compression housing etc.), then they are to be assessed separately and a written description of conformity must be produced for them according to article 8 paragraph 3. If this is not the case, the member states may prohibit, restrict or prevent their circulation (article 4 paragraph 2) and assume they do not conform (article 5 paragraph 1).

#### **d) Safety devices, Controlling Devices and Control Units according to Definition in Article 1 Paragraph 2**

Article 1 paragraph 2 defines the application area of the Directive

- i) for **safety devices, controlling devices and control units**, which are required for or contribute to the safe use of equipment and protective systems with regard to explosion hazards;*
- ii) **even if they are used outside explosive atmospheres.***

The essential requirements only apply to these devices insofar as they are necessary for **safe and reliable functioning and handling** of these devices with regard to explosion hazards (Annex II, Introductory Remark B).

In accordance with the specifications under point i), the Directive does not cover:

- (1) devices other than safety devices, controlling devices and control units
- (2) **any devices**, including safety devices, controlling devices and control units **which, with regard to the explosion hazard, neither contribute to nor are necessary for** safe functioning,
- (3) even **safety devices, controlling devices and control units** which, although they may contribute to or be necessary for safe functioning, **however with regard to .....**,

Examples of devices **covered by article 1 paragraph 2:**

- a mains adapter which supplies an intrinsically safe measuring system (Ex i), which is used to supervise process parameters;
- a pump, a pressure regulator, a reserve accumulator unit etc. which guarantee adequate pressure and output for a hydraulically driven safety system (with regard to the explosion hazard);

- Overload switch for electromotors of EEx type of protection "increased security";
- Control units in a safe area for an environment supervisory system which consists of gas alarm devices distributed in a potentially explosive atmosphere, in order to introduce appropriate measures if hazardous gas concentrations are identified;
- control units for temperature, pressure, output meters etc., which are located in a safe area and which deliver information which is used to steer electrical means of operation during production or maintenance work.

Examples of **devices which article 1 paragraph 2 does not cover**:

- control gears, numeric controls etc. which have no relation to safety functions (with regard to explosion hazard) due to point 2) above.

Point ii) says that the Directive covers the devices specified even outside the explosive atmosphere.

For reasons of safety and economy, most such devices are preferably installed in a non-hazardous atmosphere. However, it can sometimes be necessary to place such devices inside a potentially explosive atmosphere. In such cases, these devices can be labelled as equipment, even if this is not expressly stated in the Directive.

Two situations can be distinguished:

- If the device possesses its own potential ignition source, not only the requirements from article 1 paragraph 2, but also the requirements concerning equipment apply.
- If the device does not possess its own potential ignition source, the device is not considered as equipment, whereby of course the requirements arising from article 1 paragraph 2 remain valid.

### **A 3. Conformity Assessment Procedure, Classification into Equipment Groups, Categories and Zones**

#### **1. Specification of Equipment Group and Category**

In order to identify the procedure suitable for conformity assessment, the manufacturer must first decide to which equipment group and category the product belongs, on the basis of use according to regulations. As defined by the Directive, equipment including devices and components is, if necessary, divided into two equipment groups.

- a) **Equipment group I** applies to equipment for use in underground plants of mines, as well as their overground plants, which can be endangered by methane and/or combustible dusts .

(No further reference will be made to equipment group I.) For the sake of completeness, this equipment group, however, is listed in Table 2.)

- b) **Equipment group II** applies to equipment for use in the other areas which may be endangered by a potentially explosive atmosphere.

## b) Equipment group II

### (1) Category 1

This category applies to products designed in such a way that they can be used in accordance with the parameters supplied by the manufacturer and which can guarantee a *very high degree of safety* for their use in accordance with regulations in areas in which the occurrence of explosive atmospheres due to gases, vapours, mist or dust mixing with air is *very likely* and occurs continually, in the long term or frequently.

Equipment of this category is distinguished by apparative explosion prevention measures which function in such a way that:

- if an apparative protection measure fails, then at least a second independent protective measure guarantees the required safety, or
- if two independent errors occur, the safety required is guaranteed<sup>3</sup>.

### (2) Category 2

This category applies to products designed in such a way that they can be used in accordance with the parameters supplied by the manufacturer and which can guarantee a *high degree of safety* for their use in accordance with regulations in areas in which the occurrence of potentially explosive atmospheres due to gases, vapours, mist or dust mixing with air is *likely* and occurs continually, in the long term or frequently. The explosion protection for this category must function in such a way that the safety required, also in the case of equipment impairment or in the case of hazardous defective conditions of the *equipment*, which can commonly be expected, is guaranteed<sup>4</sup>.

### (3) Category 3

This category applies to products designed in such a way that they can be used in accordance with the parameters supplied by the manufacturer and which can guarantee a *standard degree of*

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<sup>3</sup> Products of this category must also fulfil the more far-reaching requirements set out in Annex II number 2.1 to the ATEX Directive.

<sup>4</sup> Products of this category must also fulfil the more far-reaching requirements set out in Annex II number 2.2 to the ATEX Directive.

*safety* for their use in accordance with regulations in areas in which the occurrence of explosive atmospheres due to gases, vapours, mist or dust mixing with air is *less likely*. The constructive design of products in this category must guarantee an *adequate degree of safety* during normal operation <sup>5</sup>.

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<sup>5</sup> Products of this category must also fulfil the more far-reaching requirements set out in Annex II number 2.3 to the ATEX Directive.

## Degrees of Protection in the Various Equipment Categories

The various equipment categories must be capable of functioning in accordance with the parameters specified by the manufacturer for a certain degree of protection.

**Table 1 Degrees of Protection**

DEGREE OF PROTECTION	CATEGORY		GUARANTEE OF PROTECTION	OPERATING CONDITIONS*
	GROUP I	GROUP II		
Very high	M 1		Two independent protection measures or safe if two errors occur independently	Equipment remains ready for use and continues to be used in the presence of a potentially explosive atmosphere
Very high		1	Two independent protection measures or safe if two errors occur independently	Equipment remains ready for use and continues to be used in zones 0, 1, 2 (G) and 20, 21, 22 (D)
High	M 2		Suitable for normal use and more difficult operating conditions <sup>9</sup>	Equipment is switched off in presence of potentially explosive atmosphere
High		2	Safe in normal operation and in case of commonly occurring errors	Equipment remains ready for use and continues to be used in zones 1, 2 (G) and/or 21, 22 (D)
Normal		3	Safe in normal operation	Equipment remains ready for use and continues to be used in zones 2 (G) and/or 22 (D)

\*REMARK: See also Directive 1999/92/EC on minimum regulations for improvement of health protection and the safety of workers who could be put at risk by potentially explosive atmospheres<sup>6,7</sup>.

The equipment in the various categories must not only fulfil the requirements outlined in the above table but also those in Annex II to the Directive, "Essential Safety and Health Requirements".

<sup>6</sup> Footnote 36 to the EU manual. Even if the requirements for equipment in categories M2 and 2 differ in their wording in the relevant annexes to Directive 94/9/EC, these two categories are treated parallel in EN 50014 and specific standards. The technical protective concept for electrical means of operation in categories M2 and G2 (gas) are identical in the EN-50014 row. If necessary, the requirements for category 2D (dust) must be considered separately

<sup>7</sup> Footnote 37 to the EU manual: ABI. L 23 dated 28.01.2000

## 2. Risk Assessment

The compulsory fulfilment of the Essential Health and Safety Requirements of Directive 94/9/EC serves to guarantee the explosion protection of equipment and protection systems. The requirements should take into account potential hazards arising from design and construction. Attention should be paid here to the use according to regulations in accordance with article 1 of Directive 94/9/EC.

In order to fulfil the requirements of Directive 94/9/EC, therefore, it is necessary to perform a risk assessment. According to Annex II point 1.0.1, manufacturers are obliged to design equipment and protection systems on the basis of the principles of the *integrated explosion safety*. The *integrated explosion safety* should prevent the occurrence of potentially explosive atmospheres and ignition sources and, in case of an explosion, halt it and/or limit the range of its effects. In this context, the manufacturer has to take measures with regard to explosion hazards. Additionally, according to Annex II point 1.0.2 of the Directive, design and manufacture of equipment and protection systems must take into account potential errors, so that hazardous situations can be avoided as far as possible.

With regard to the obligations arising from the requirements of Directive 94/9/EC, a method of risk assessment should not only cover the aspects of design and construction but also include a relationship between construction and use.

## 3. Methods of Risk Assessment

Various methods or procedures are available for risk assessment, in particular for hazard detection. A suitable risk assessment procedure will exhibit the following:

Systematic structure, i.e. the procedure guides the persons concerned in such a way that all parts of the system, all phases of use and all rationally foreseeable hazards are taken into account.

Due to the use of various procedures, the possibility of overlooking relevant hazards is minimised. An important result of hazard detection is a numbered list of hazardous occurrences which could arise from use of the products concerned and which can be used for risk assessment.

A risk estimation should comprise the risk profiles which may be foreseen on rational consideration; the coincidental parameters should also be included. These aspects undergo a risk assessment in the form of a "series of logical steps, in order to make possible the systematic testing of the risks connected with products".

In principle, the risk assessment consists of four steps <sup>8</sup>:

- (1) Risk identification: a systematic procedure to detect all risks connected with the products. As soon as a risk is recognised, the design can be changed in order to minimise the risk regardless of whether the degree of

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<sup>8</sup> Footnote 38 to the EU manual: For further information on risk assessment, see EN 1127-1997: Explosive Atmospheres – Explosion Protection – Part 1: Basic Concepts and Methods

risk has been estimated or not. Unless the risk is recognised, it cannot be taken into consideration in the design.

- (2) Risk estimation: determination of the probability of identified risks occurring as well as the degree of the potential damage from the risks under inspection (see also EN 1050).
- (3) Risk assessment: making a decision as to whether the risk is acceptable or whether the product design has to be changed in order to reduce the risk.
- (4) Assessment of the possibilities to reduce risk: the final step in risk assessment is the identification, selection and modification of design changes which, if necessary, reduce the total risk connected with the product. Even if it is possible to reduce risks further and further, it is seldom that they can be eradicated altogether. Possibilities involving those hazardous events which constitute the greatest part of the total risk possess the greatest potential for reducing risk. The effectiveness of risk reduction always begins with changes to the design concept, i.e. an intrinsically safe design.

#### **4. Zone Classification**

Although manufacturers of products for use in potentially explosive atmospheres must state all information regarding equipment groups and categories (see Chapter 4.2 of the EU manual, May 2000), so that decisions can be made about how their product can be used, they cannot, however, be sure which zones will actually be present. The classification of hazardous atmospheres into zones is the responsibility of the end user on whose premises/in the course of whose work such hazards may exist or arise.

In Directive 1999/92/EC of the European Parliament and the Council dated December 16, 1999 concerning minimum regulations for improvement of health protection and the safety of workers who could be put at risk due to potentially explosive atmospheres, the various zones for gases, vapours and dusts are specified.

The table on the following page (Table. 2) summarises the zones and groups/categories in an overview:

**Table 2**

*Equipment Groups according to EC-Richtlinie 94/9/EC, Annex I*

<b>Group I</b> <i>(mines, methane and/or combustible dusts)</i>		<b>Group II</b> <i>(potentially explosive atmospheres or gas/air or dust/air mixtures, mist of vapours)</i>					
<b>Category M</b>		<b>Category 1</b>		<b>Category 2</b>		<b>Category 3</b>	
<b>1</b>	<b>2</b>	<b>G</b> (Gas) (Zone 0)	<b>D</b> (Dust) (Zone 20)	<b>G</b> (Gas) (Zone 1)	<b>D</b> (Dust) (Zone 21)	<b>G</b> (Gas) (Zone 2)	<b>D</b> (Dust) (Zone 22)
<b>Equipment which guarantees a very high degree of safety. Operation guaranteed in case of rare errors</b>	<b>Equipment which guarantees a high degree of safety. Switching off possible if potentially explosive atmosphere occurs</b>	<b>For equipment which guarantees a very high degree of safety. Intended for cases where potentially explosive atmospheres are often or constantly to be expected</b>		<b>For equipment which guarantees a high degree of safety. Intended for cases where a potentially explosive atmosphere is to be expected.</b>		<b>For equipment which guarantees a standard degree of safety. Intended for cases where a potentially explosive atmosphere can be expected only rarely, and then, only for a short time.</b>	
Annex II / no.2.0.1 or 2.0.2		Annex II / no.2.1		Annex II / no.2.2		Annex II / no.2.3	

## Case Distinctions

The following table presents the area covered by Directive 94/9/EC.

The manufacturer assigns his product for the required use to one of the following cases (cf. Chapter B2) and can see in Table 3 whether Directive 94/9/EC covers the product or not.

**Table 3: Observed Cases**

Question	A	B	C	D	E	F	G	H
Does the equipment possess its own potential ignition source?	Yes	No	Yes	Yes	No	Yes	No	No
Is the equipment used in or in relation to a potentially explosive atmosphere?	Yes	Yes	No	Yes	No	No	Yes	No
Does the equipment have an internal potentially explosive atmosphere?	Yes	Yes	Yes	No	Yes	No	No	No
Directive 94/9/EC covers the equipment	Yes	No <sup>1) 2)</sup>	No <sup>1) 2)</sup>	Yes	No <sup>1) 2)</sup>	No <sup>2)</sup>	No <sup>2)</sup>	No <sup>2)</sup>

<sup>1)</sup> The NO does not apply to products within the internal potentially explosive atmosphere. Moreover, it has to be taken into consideration that the entire product must be able to function in accordance with the operating parameters specified by the manufacturer and guarantee the degree of protection required by Annex II point 1.0.1 of Directive 94/9/EC (principles of integrated explosion safety).

<sup>2)</sup> Yes, however, in the case of devices as defined by article 1 paragraph 2 of the Directive (control and monitoring installations with influence on equipment in the explosive atmosphere)

## Part B Special Part - Valves

### Introductory Remarks

Before considering the various cases and the classification of specific designs to the resulting necessary conformity assessment measures, let us mention some points here which are related to the requirements of EC Directive 94/9/EC.

Regardless of whether a machine or a piece of equipment is used in or in relation to a potentially explosive environment, or not, the manufacturer is under obligation to assess hazards of any kind which may occur through operation according to regulations - but also through a "rationally foreseeable misuse" of his product. He must take appropriate measures and/or safety precautions/safety controls in order to avoid aforementioned risks or, wherever possible, demonstrate suitable measures for their minimisation. The risk assessment in accordance with 94/9/EC must be carried out by the manufacturer regardless of certification by a "Notified Body" which may be necessary and must include an ignition risk assessment.

The European norms are helpful to the ignition risk analysis with regard to EC Directive 94/9/EC:

EN 1127-1:	Potentially Explosive Atmospheres – Explosion Protection – Part 1: Basic Concepts and Methodology
EN 12874:	Flame Blow-out Fuses - Performance Requirements, Test Procedure and Usage Restrictions
EN 13463-1:	Non-electrical Equipment for Use in Potentially Explosive Atmospheres - Part 1: Basic Concepts and Methodology
prEN 13463-5: (2003-05)	Non-electrical Equipment for Use in Potentially Explosive Atmospheres - Part 5: Protection by Design Safety

The cost of a certification according to EC Directive 94/9/EC is based on both the complexity of the machine/equipment and the zone foreseen for use of the machine/equipment or on the category of the equipment. In the past, since differences are only slight, a higher zone classification, and therefore equipment of a higher category, was often ordered than that which corresponds to the actual atmosphere present. This makes it possible to avoid unreasonably high costs. Since the operator has to specify the zones on the basis of the work safety law and, as a rule, orders equipment from a particular category, the operator should investigate exactly which zone/category has to be selected prior to purchase. The classification can be performed in consultation between manufacturer and operator.

## B1. Application of 94/9/EC

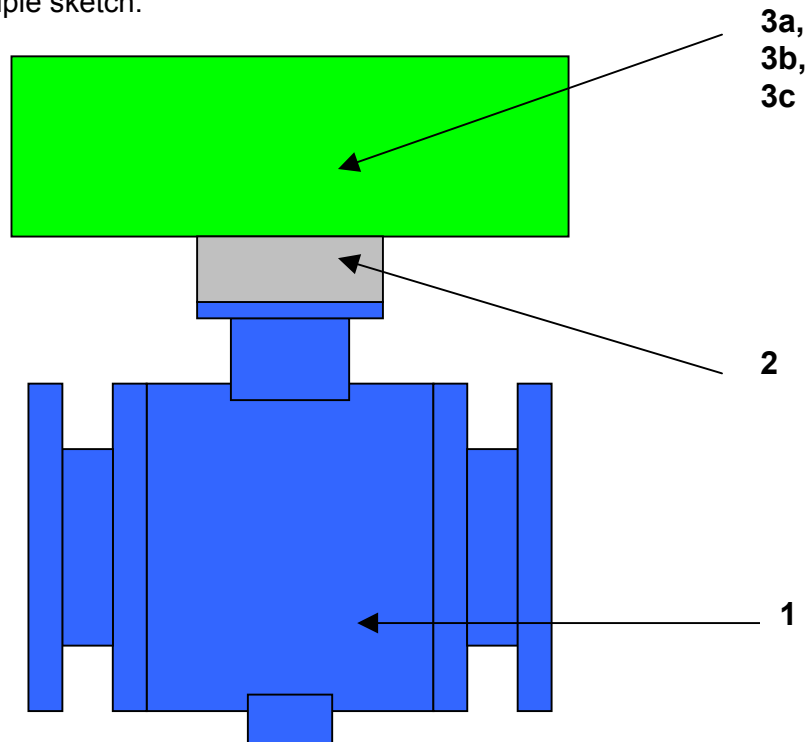
In Directive 94/9 products are differentiated as

- equipment
- protective systems
- components
- safety devices, controlling devices or control units.

A valve is a "non-electrical product". If an electrical actuator is used to operate the valve, which has already been assessed using the relevant conformity assessment procedure and the combination (valve/actuator) does not conceal any other hazards, further consideration of the electrical part is not necessary.

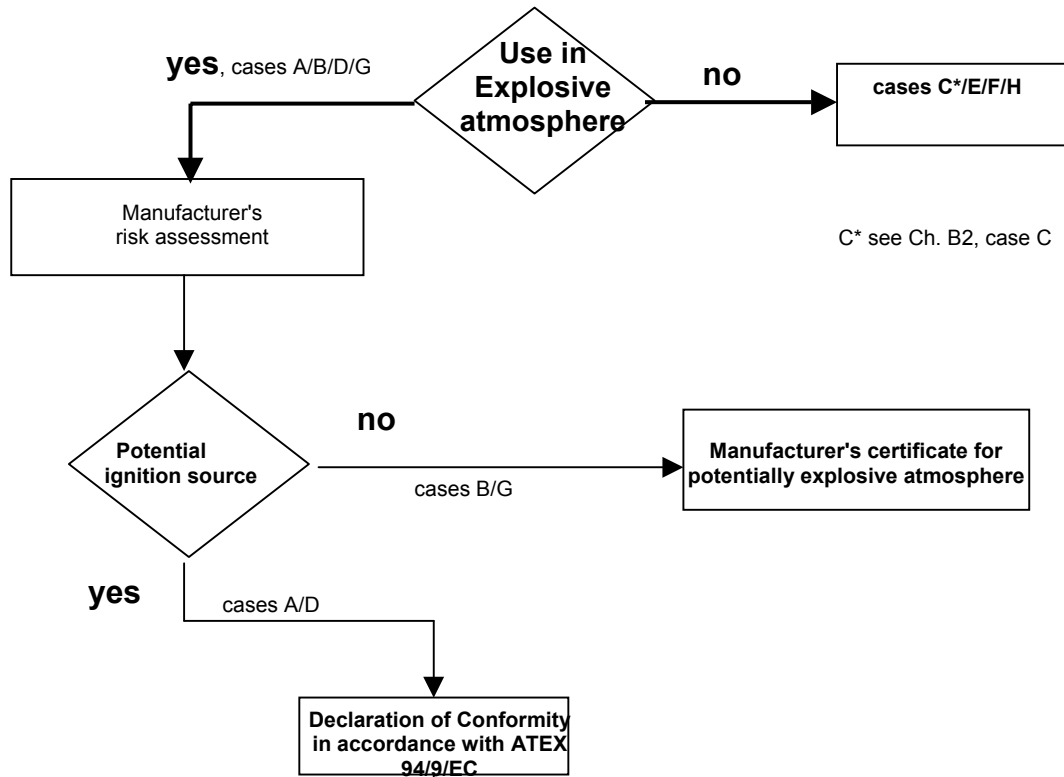
Valves and actuators are products which - if ATEX-relevant - are to be understood in terms of the Directive as equipment, components or safety devices, controlling devices or control units.

Principle sketch:



Part	Name	Classification according to 94/9/EC
1	Valve	Generally no classification
2	Valve accessories (e.g. coupling, adapter)	Components
3a	Actuator – <i>mechanical</i> (e.g. <i>pneumatic, manually operated, transmissions</i> )	Equipment ( <i>non-electrical</i> )
3b	Actuator – <i>electrical</i>	Equipment ( <i>electrical</i> )
3c	Accessories – actuator (e.g. <i>solenoid valves, positioners</i> )	Equipment ( <i>electrical</i> )

**ATEX – applicable yes / no?** (The cases stated refer to Chapter B2)



Equipment Groups according to EC-Directive 94/9/EC, Annex I							
Group I <i>(mines, methane and/or combustible dusts)</i>		Group II <i>(potentially explosive atmospheres due to gas/air or dust/air mixtures, mist or vapours)</i>					
Category M		Category 1		Category 2		Category 3	
1	2	G (Gas) (Zone 0)	D (Dust) (Zone 20)	G (Gas) (Zone 1)	D (Dust) (Zone 21)	G (Gas) (Zone 2)	D (Dust) (Zone 22)
Equipment which guarantees a very high degree of safety. leisten. Operation guaranteed in case of rare errors	Equipment which guarantees a high degree of security. Switching off possible if potentially explosive atmosphere occurs	Equipment which guarantees a high degree of safety. Intended for cases where potentially explosive atmospheres are often - or constantly to be expected		Equipment which guarantees a high degree of safety. Intended for cases where a potentially explosive atmosphere can be expected		Equipment which guarantees a standard degree of safety. Intended for cases where a potentially explosive atmosphere can be expected only rarely, and then only for a short time	
Annex II / no.2.0.1 or . 2.0.2		Annex II / no.2.1		Annex II / no.2.2		Annex II / no.2.3	

### **Application of 94/9/EC in Case of Non-electrically Operated Valves**

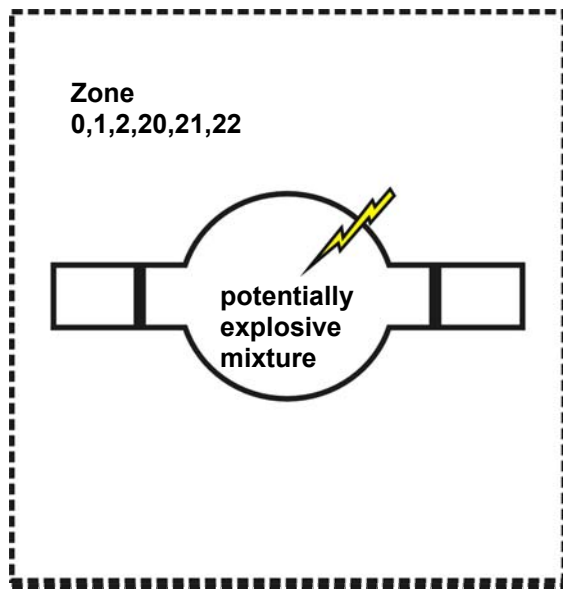
All ignition sources named in the Directive must be taken into consideration during the risk assessment. Particular attention should be paid to the following ignition sources: mechanically produced sparks, hot surfaces, electrostatic discharge

### **Application of 94/9/EC in Case of Electrically Operated Valves**

All ignition sources named in the Directive must be taken into consideration during the risk assessment. Particular attention should be paid to the following ignition sources: mechanically/electrically produced sparks, hot surfaces, electrostatic discharge

## **B 2. Example cases for Valves and Actuators**

In the following, actuators are considered as additional components of valves.



**Case A:** The valve is used in or in relation to a potentially explosive atmosphere, has its own potential ignition source and, in accordance with regulations, has its own internal potentially explosive atmosphere.

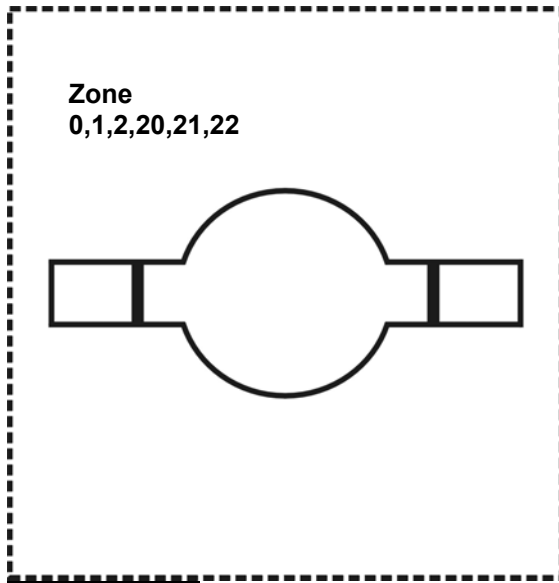
**VDMA:** An example of such an application can be seen in a valve in a petrol vapour return line.

The valve is covered by Directive 94/9/EC. In accordance with 94/9/EC, it must undergo a conformity assessment.

Valves for zones 0, 20 / category I require an EC Type Examination in accordance with 94/9/EC.

Non-electrically operated valves for zones 1, 21 / category II require a manufacturer's conformity assessment and submission of the documentation to a "Notified Body".

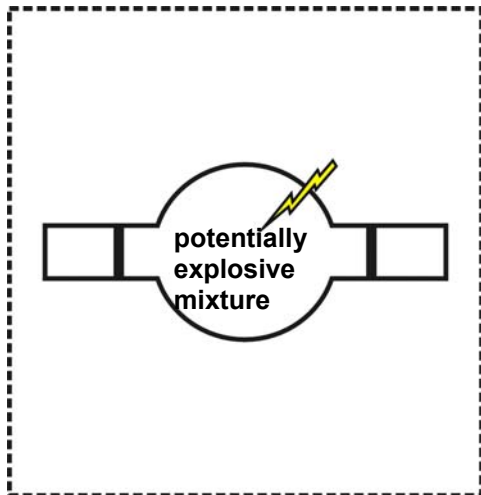
In the case of electrically operated valves for zones 1, 21 / category II, only the electrical components require an EC Type Examination in accordance with 94/9/EC.



**Case B:** The valve is used in or in relation to a potentially explosive atmosphere, does not have its own potential ignition source but does have an internal potentially explosive atmosphere in accordance with regulations.

**VDMA:** The operator is responsible for static discharges caused by non-conductive media.

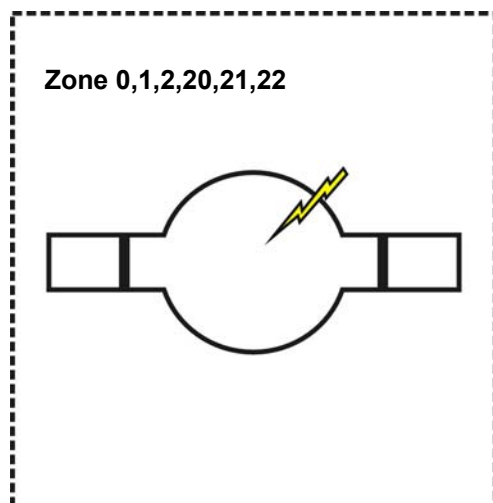
**The valve is not covered by Directive 94/9/EC. The conformity assessment procedure according to relevant directives suffices. It is not a piece of equipment as defined in Directive 94/9/EC.**



**Fall C:** The valve is not used in or in relation to a potentially explosive atmosphere, has its own potential ignition source and, in accordance with regulations, has an internal potentially explosive atmosphere.

**VDMA:** Case A applies if a potentially explosive mixture occurs outside the valve after the risk assessment.

In general, the valve is not covered by Directive 94/9/EC. A conformity assessment procedure in accordance with relevant directives suffices. It is not a piece of equipment as defined in Directive 94/9/EC. Attention must, however, be paid to the effect on the operator's adjacent components.



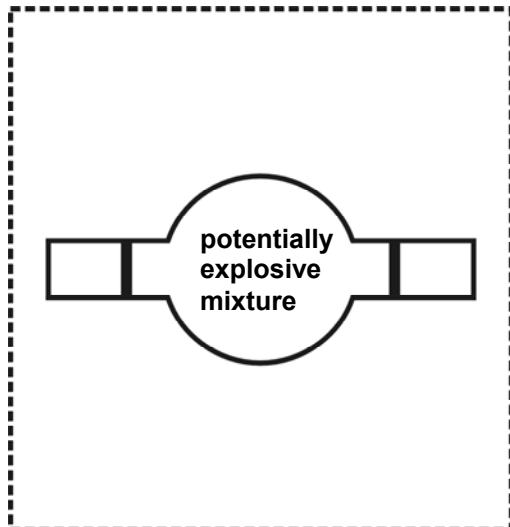
**Case D:** The valve is used in or in relation to a potentially explosive atmosphere, has its own potential ignition source and, in accordance with regulations, does not have an internal potentially explosive atmosphere.

The valve is covered by Directive 94/9/EC. It must undergo a conformity assessment according to 94/9/EC.

Valves for zones 0,20 / category I require an EC Type Examination in accordance with 94/9/EC.

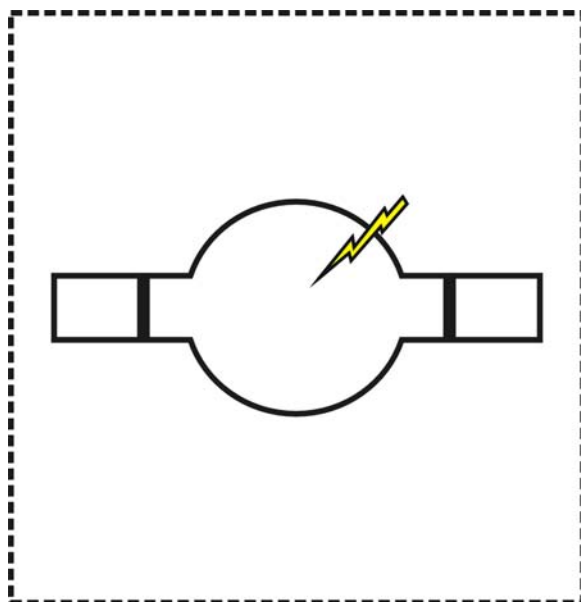
Non-electrically operated valves for zones 1, 21 / category II require a manufacturer's conformity assessment and submission of the documentation to a "Notified Body".

In the case of electrically operated valves for zones 1, 21 / category II, only the electrical components require an EC construction design survey in accordance with 94/9/EC.



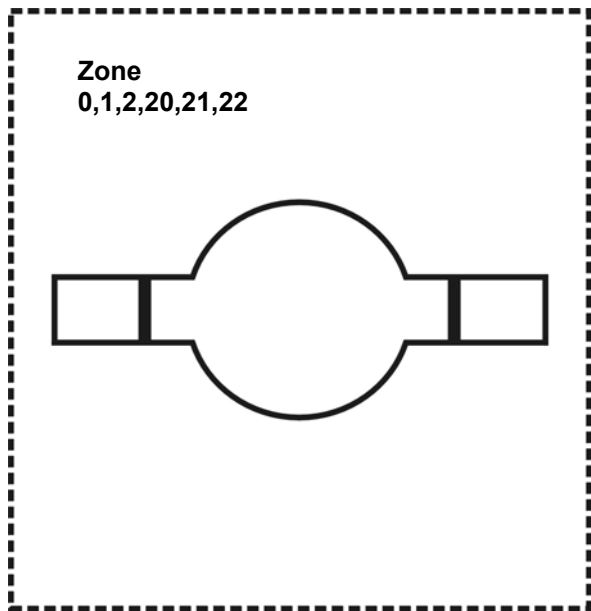
**Case E:** The valve is not used in or in relation to a potentially explosive atmosphere, does not have its own potential ignition source, but does have an internal potentially explosive atmosphere in accordance with regulations.

The valve is not covered by Directive 94/9/EC. A conformity assessment procedure in accordance with relevant directives suffices. It is not a piece of equipment as defined in Directive 94/9/EC



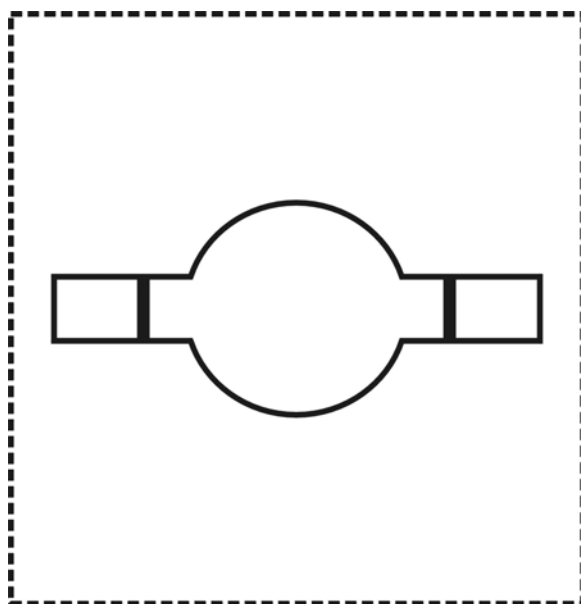
**Case F:** The valve is not used in or in relation to a potentially explosive atmosphere, has its own potential ignition source and, in accordance with regulations, does not have an internal potentially explosive atmosphere.

The valve is not covered by Directive 94/9/EC. A conformity assessment procedure according to relevant guidelines suffices. It is not a piece of equipment as defined in Directive 94/9/EC.



**Case G:** The valve is used in or in relation to a potentially explosive atmosphere, does not have its own potential ignition source and, in accordance with regulations, does not have an internal potentially explosive atmosphere.

The valve is not covered by Directive 94/9/EC. A conformity assessment procedure in accordance with relevant directives suffices. It is not a piece of equipment as defined in Directive 94/9/EC



**Case H:** The valve is not used in or in relation to a potentially explosive atmosphere, does not have its own potential ignition source and, in accordance with regulations, does not have an internal potentially explosive atmosphere.

The valve is not covered by Directive 94/9/EC. A conformity assessment procedure in accordance with relevant directives suffices. It is not a piece of equipment as defined in Directive 94/9/EC

### **B 3. Information concerning the manufacturer's certificate (see diagram, p. 19) and the operating instructions**

A manufacturer's certificate concerning ATEX documents the result of the conformity assessment in accordance with the Directive in case the product is not covered by the ATEX. It should include the usual information. The following information can be included in the operating instructions in the chapter "Use in accordance with regulations":

- result of the conformity assessment (e.g. statements on potential ignition sources)
- the valve is not covered by the ATEX, the valve may be used in the explosive atmosphere
- information on operation and maintenance

## Definitions

**Explosive atmosphere:** see 94/9/EC Article 1 (3)

**Potentially explosive atmospheres:** see 94/9/EC article 1 (3)

**Product:** The Directive 94/9/EC divides products into:

**Equipment** see 94/9/EC article 1 (3) a)

**Protective systems:** see 94/9/EC article 1 (3) b)  
and

**Components:** see 94/9/EC article 1 (3) c)

**Devices as defined in article 1 paragraph 2:** see 94/9/EC article 1 (2)

## **Annex II to 94/9/EC : "Principles of Integrated Explosion Safety"**

### **1 Common Requirements for Equipment and Protective Systems**

#### **1.0 Essential Requirements**

##### **1.0.1 Principles of Integrated Explosion Safety**

Equipment and protective systems for use according to regulations in potentially explosive atmospheres must be designed in accordance with the principles of integrated explosion safety.

This means that the manufacturer must take measures in order to

- as a matter of priority, avoid potentially explosive atmospheres which can be created by equipment and protective systems themselves, wherever possible;
- prevent the ignition of potentially explosive atmospheres taking into consideration electrical and non-electrical types of ignition sources in each case;
- in the event of an explosion which can present a risk to persons and animals or goods through direct or indirect intervention, immediately halt and/or limit to a sufficiently safe extent the effect of explosion flames and explosion pressure.

## Exemptions from 94/9/EC

These exemptions are based on Article 1 Paragraph 4 of Directive 94/9/EC:

- Medical equipment for use according to regulations in medical environments;
- Equipment and protective systems whose risk of explosion is caused exclusively by the presence of explosives or chemically unstable substances;
- Equipment which is foreseen for use in domestic and non-commercial environments in which a potentially explosive atmosphere can only seldom be produced and only as a result of an unintentional gas leakage;
- Personal protective equipment as defined in Directive 89/686/EC<sup>19</sup> There are cases in which personal protective equipment with its own potential source of ignition is intended for use in potentially explosive atmospheres. In case of this type of personal protective equipment, the procedures specified in Directive 94/9/EC should be followed in order to guarantee the required degree of explosion safety.
- Seagoing vessels and mobile off-shore rigs as well as equipment onboard such vessels or rigs, since they are already covered by the IMO Convention. Fixed off-shore rigs together with equipment on board vessels as well as rigs and vessels which are not regarded as suitable for the open sea (i.e. less than 500 tonnes, which are not intended for sea navigation but for inland navigation on rivers, canals and lakes) are covered by Directive 94/9/EC;
- Means of transport, i.e. vehicles and their trailers which are intended exclusively for transporting persons in the air, on roads and rail networks or on waterways and means of transport insofar as they are designed for the transport of goods in the air, on public roads and rail networks or on waterways. Not exempted are vehicles which are to be used in potentially explosive atmospheres.
- Equipment as defined in Article 223 Paragraph 1 Letter b) EC contract, i.e. products which are designed and manufactured specifically for use by the armed forces or for maintaining law and order. Not excepted is equipment with two different purposes.

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<sup>9</sup> Footnote 38 of RI: ABI. L 399, 30.12.1989, amended by Directive 93/95/EEX, ABI. L 276, 09.11.1993 and Directive 93/68/EWG ABI. L 220, 30.08.1993