

Position Paper

ATEX Directive – Filtering Separators



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This position paper serves merely as an aid and offers only an overview for the assessment of filtering separators with regard to ATEX Directive 2014/34/EU. It does not claim to be exact, nor to interpret the existing legal provisions with complete accuracy. It is no substitute for scrutinizing the relevant directives, laws and regulations. In addition, the particular features of the products in question and the different ways in which they can be used should be taken into account. A large number of other constellations are therefore conceivable for the assessments and approaches addressed in the position paper.

Preface

The aim of this position paper is to establish a basis for the reliable evaluation of filtering separators in accordance with ATEX Directive 2014/34/EU (manufacturer's directive), which superseded Directive 94/9/EC.

The functional principle of such systems is that a dust/air mixture flows through the filtering separator. The volume flow is directed through the filter medium so that the dust particles contained in the dust/air stream can be separated. With regenerative filtering separators, the filter medium can be regenerated using a cleaning system (compressed air, vibration, purge air). The dust particles accumulate in the lower part of the filter housing.

Note:

Filtering separators within the meaning of this position paper include:

- Separators
- Dust extraction systems
- Filters, filter equipment, filter systems.

1 Scope

The aim of this position paper is to establish a basis for the application of the ATEX Directive 2014/34/EU (manufacturer's directive) on filtering separators. In principle, the majority of filtering separators do not fall into the scope of the Directive 2014/34/EU. This also applies to filtering separators which are partially or completely intended for use in potentially explosive atmospheres according to ATEX Directive 1999/92/EC (operator's directive). See Annex III for additional information on this.

Should the manufacturer's risk assessment lead to the result that a dangerous, potentially explosive mixture forms in some areas of the filtering separator, then that risk must be eliminated and/or a product chosen in accordance with Directive 2014/34/EU¹.

The following explanations are based on the wording of Directive 2014/34/EU and the guidelines adopted by the European Commission (April 2016). To the extent that the conclusions made and positions taken are formulated on these basic principles, these are the result of intense discussions within VDMA.

Filtering separators which do not have a potential ignition source of their own may be used in potentially explosive areas. However, they are not subject to Directive 2014/34/EU and therefore may not bear an ATEX marking.

This position paper only refers to the filtering separators and not the piping connected to them. Explosion decoupling measures to be installed in the piping are also subject to Directive 2014/34/EU and must comply with its regulations.

¹ Directive 2014/34/EU does not apply to hazardous, explosive mixtures under non-atmospheric conditions. In these cases, additional protective measures must be taken by the manufacturer.

2 Application of the Directive 2014/34/EU

2.1 Basic requirements

The following information is required for planning a filtering separator in accordance with Directive 2014/34/EU:

Operator information

- Safety-related parameters of the dust/air mixture
- Mode of operation (e.g. amount of substance to be extracted, suction volume flow, operating life)
- Interfaces to connected systems or ignition sources, if applicable
- Ambient conditions at the installation site (potentially explosive area/hazardous area or zone classification in accordance with the German Ordinance on Hazardous Substances (GefStoffV) Annex I No. 1)
- Result of the risk assessment in accordance with the German Industrial Safety Ordinance (BetrSichV) § 3 Paragraph 3 and GefStoffV § 6 Paragraph 9.

2.2 Decision tree

The following decision tree (see Figure 1) provides support in determining whether a conformity assessment of the planned filtering separator needs to be conducted and/or explosion protection measures need to be implemented.

The introduction of a potential ignition source from connected piping is to be taken into account here.

The relevant technical rules are to be applied for defining structural explosion protection measures. The state-of-the-art technology for explosion protection on filtering separators is summarized in the Guideline VDI 2263 Part 6 and Part 6.1.

Decision tree

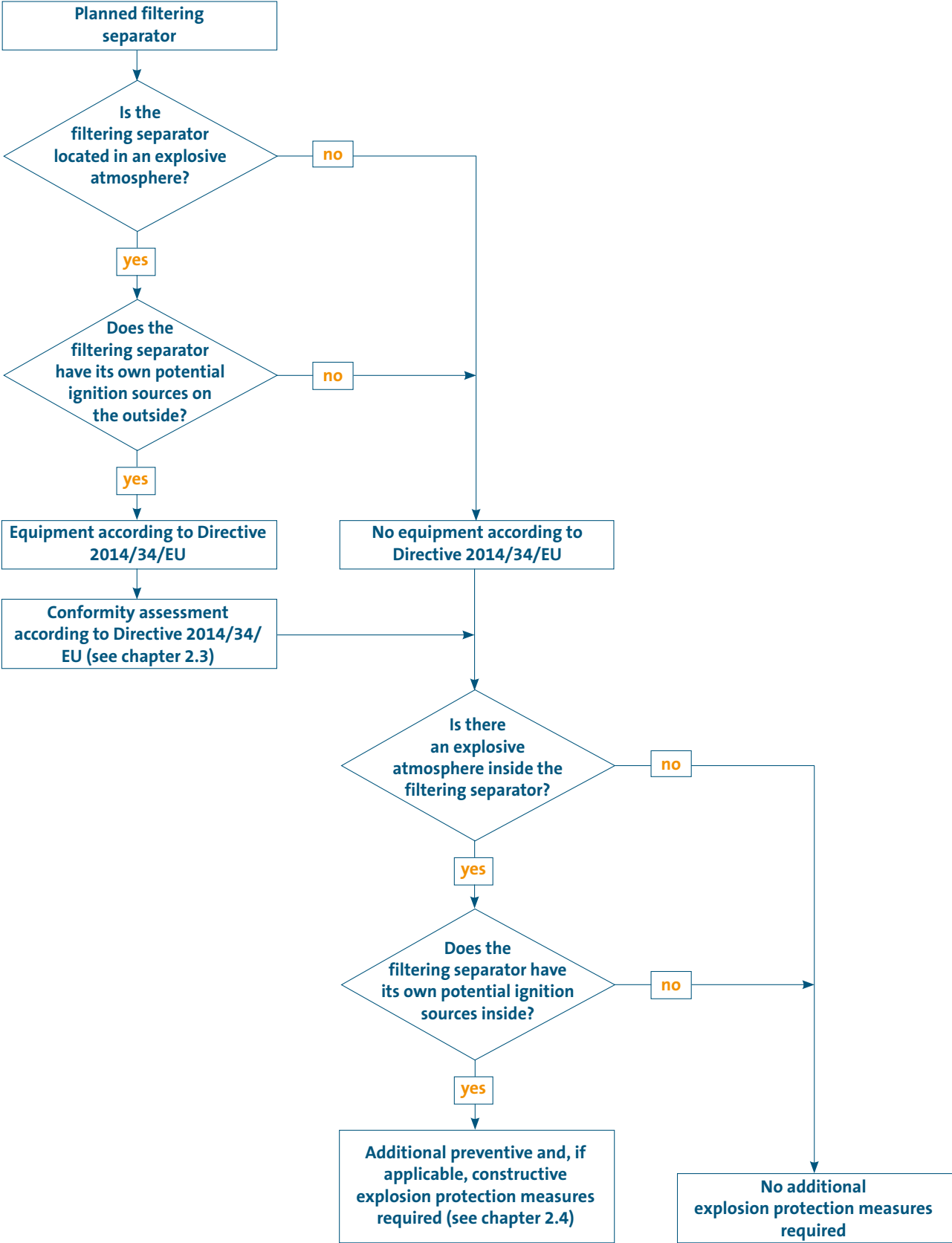


Figure 1: Decision tree

2.3 Conformity assessment procedure

If the filtering separator is subject to Directive 2014/34/EU, a conformity assessment is to be carried out in the corresponding module specified in the Directive (see Figure 2).

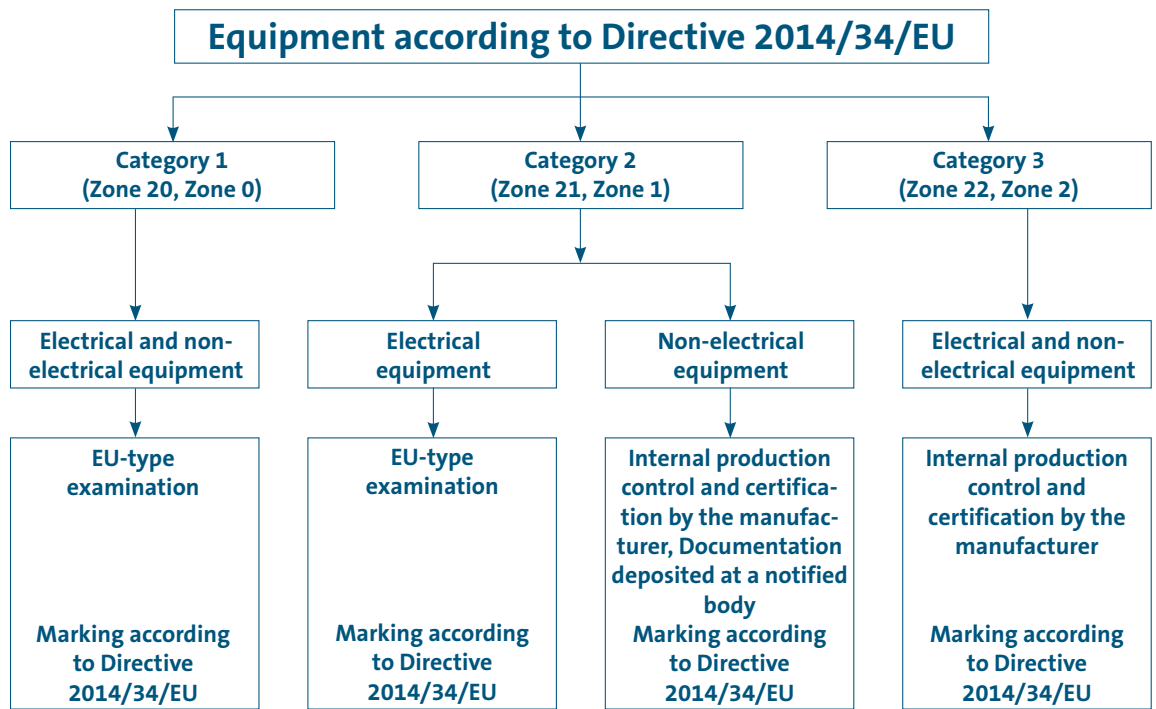


Figure 2: Conformity assessment in accordance with Directive 2014/34/EU

2.4 Explosion protection measures

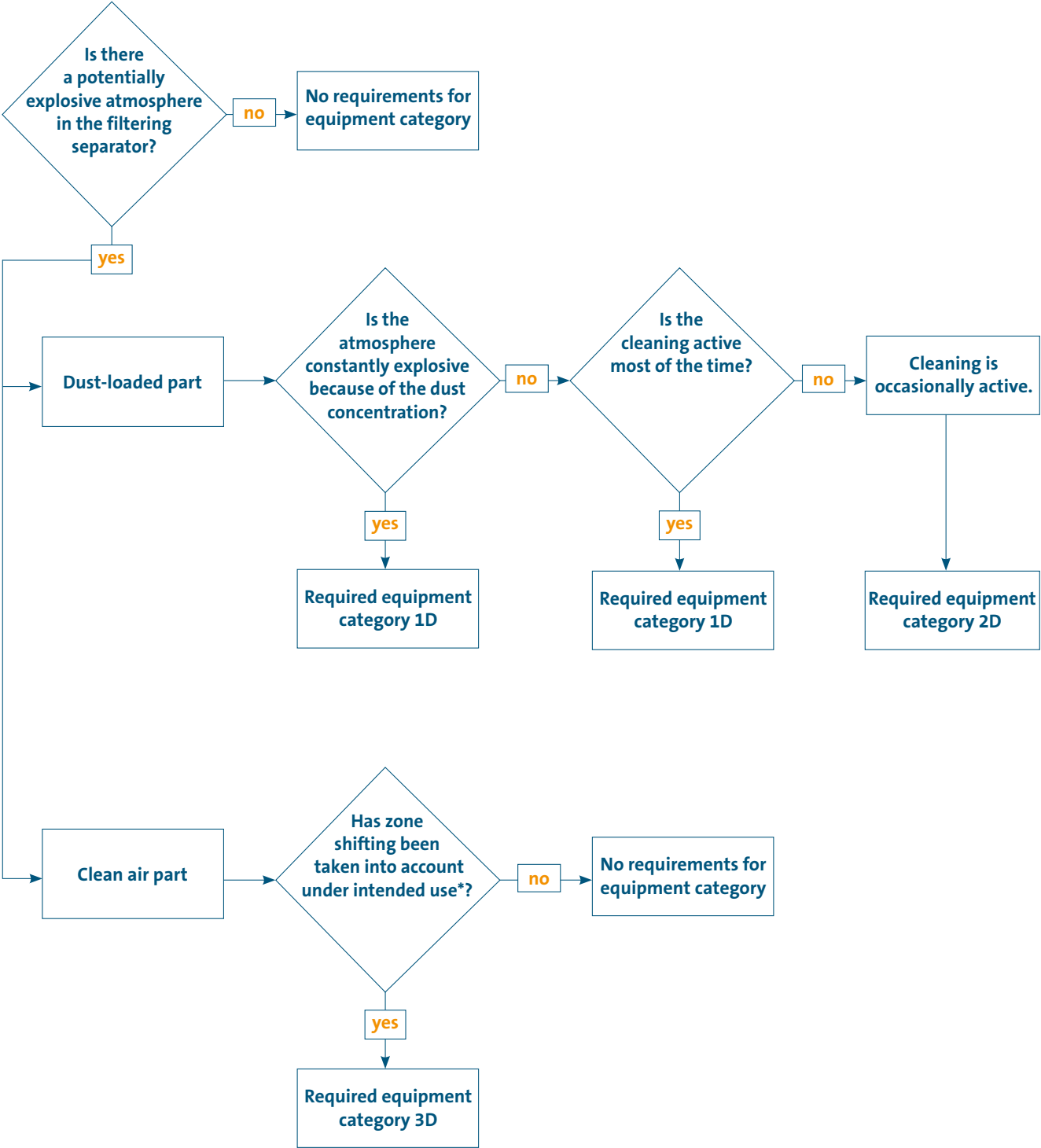
For further explosion protection measures, the analysis of ignition sources and ignition hazards for **non-electrical** equipment in the

- dust-loaded part,
- clean air part

is to be carried out in accordance with DIN EN ISO 80079-36 and DIN EN ISO 80079-37, as long as equipment is used that has not already been certified. The electrical and **non-electrical** equipment used must be designed according to the respective equipment category as per Directive 2014/34/EU.

The following flowchart can be used to determine the required category of equipment inside the filtering separator (see Figure 3, example for dust).

Determining the equipment category



* taking into account the particular maintenance intervals and depending on the project-specific risk analysis

Figure 3: Flowchart for determining the equipment category (using the example of dust)

2.5 Existing systems

Existing systems complying with state-of-the-art technology at the time of putting into service may continued to be used. The employer must assess the risks (risk assessment) arising before the use of the equipment (filtering separators are considered equipment according to BetrSichV) and derive the necessary and appropriate protection measures.

In accordance with BetrSichV § 3 (7), the employer must regularly review the risk assessment, taking the state-of-the-art technology into account. The employer must promptly update the risk assessment if:

1. **this is necessary due to safety-relevant changes to the working conditions, including a change in equipment,**
2. **new information, particularly knowledge from accidents or from occupational medical care becomes available, or**
3. **the testing of the effectiveness of the protective measures has shown that the protective measures adopted are ineffective or insufficient.**

If the review of the risk assessment shows that no update is necessary, the employer must record this fact including the date.

Amendments to the ATEX Directive or harmonized standards do not automatically imply that existing systems no longer correspond to the state-of-the-art technology!

2.6 Inspections and explosion protection document

In accordance with § 6 Paragraph (4) of the GefStoffV, the employer is responsible for determining, as part of a risk assessment, whether the dust to be separated can create hazardous explosive mixtures.

The risks resulting from hazardous explosive mixtures shall be compiled in an explosion protection document (in accordance with § 6 Paragraph (9) of the GefStoffV). The protective measures adopted shall be derived from these findings.

If the risk assessment establishes that no hazardous explosive mixtures can form, explosion protection measures are not necessary. In addition, no potentially explosive areas (zones) are identified and the filtering separator does not require monitoring.

If the risk assessment shows that hazardous explosive mixtures can be created, explosion protection measures must be taken and zones can also be assigned. In accordance with BetrSichV Section 3 and Annex 2 Section 3, all equipment subject to explosion protection measures, including connecting elements, is considered to be a system requiring monitoring.

According to BetrSichV §§ 15 and 16 and Annex 2, Section 3, Items 4.1, 5.1, 5.2 and 5.3, the employer must ensure that systems requiring monitoring installed in potentially explosive areas are inspected for explosion safety **prior to being commissioned** and **recurrently**. The following is a general overview of the items to be inspected and the relevant maximum intervals for the inspection (see Table 1).

The Technical Rule for Operational Safety 1201 Part 1 (TRBS 1201 Part 1) substantiates the employer's obligations with regard to the necessary inspections of systems requiring monitoring.

Table 1

Maximum intervals for the inspection of systems requiring monitoring with regard to explosion protection in accordance with BetrSichV Annex 2, Section 3, Items 4.1, 5.1 5.2 and 5.3.

Items to be inspected	Prior to commissioning	Recurrently		
	Source: Item 4.1	Annually Source: Item 5.3	Every 3 years Source: Item 5.2	Every 6 years Source: Item 5.1
Ventilation systems directly used for explosion protection (e.g. for preventing the formation of potentially explosive atmospheres)	●	●		
Gas warning and inertization facilities	●	●		
Components to be used in potentially explosive areas	●		●	
Completeness and plausibility of the technical documentation required for the inspection	●			●
Inspections in accordance with the BetrSichV Annex 2, Section 3, Item 4.1, Sentence 7 fully conducted and checked whether identified deficiencies have been rectified.	●			
Completeness of the documentation of the annual and 3-yearly inspections				●
Ensuring the safe use of the system in accordance with the BetrSichV	●			●
Suitability and effectiveness of the technical measures and suitability of the organizational measures for explosion protection	●			●
If applicable, suitability of an alternative maintenance concept (in accordance with Item 5.4)				●

In addition to approved notified bodies, the annual and 3-yearly inspections may also be performed by persons authorized in accordance with BetrSichV Annex 2, Section 3, Item 3.1. The 6-yearly tests are to be carried out by an approved notified body or a person authorized in accordance with BetrSichV Annex 2, Section 3, Item 3.3.

In accordance with BetrSichV Annex 2, Section 3, Item 5.4, periodic inspections according to Items 5.2 and 5.3 can be waived, if the employer has specified an equivalent maintenance concept in the documentation of the risk assessment that serves to ensure that the system is kept in a safe state and that explosion safety is permanently ensured. This document is to be kept on file at the site of operation at all times (including in electronic format) and submitted to the authorities upon request.



Annex I

Relationship of lower explosive limit (LEL) and critical limits

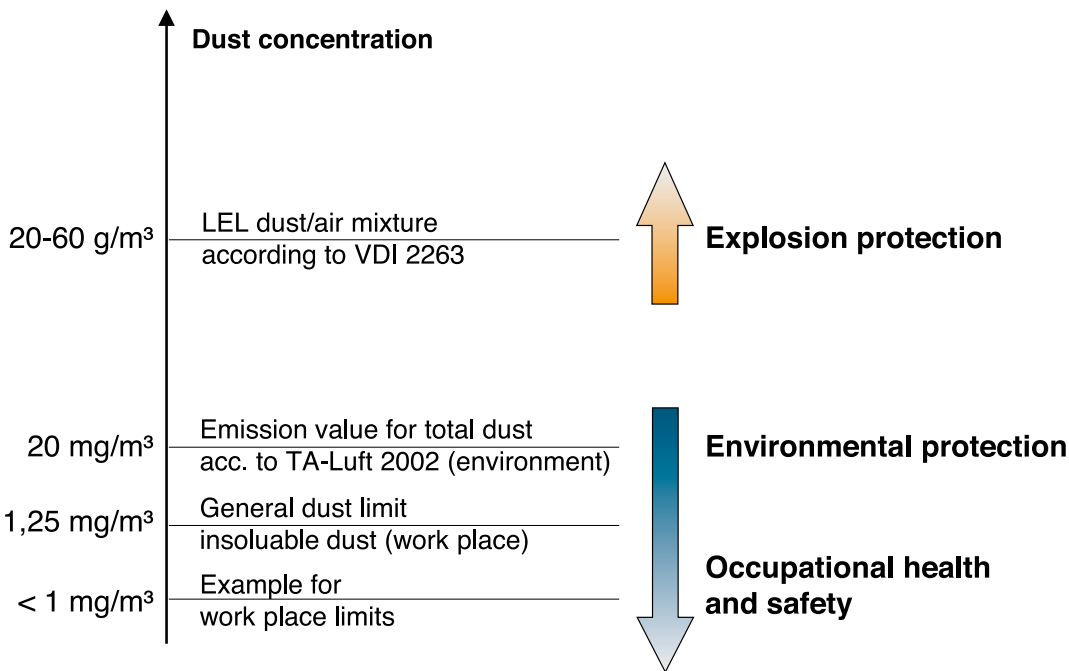
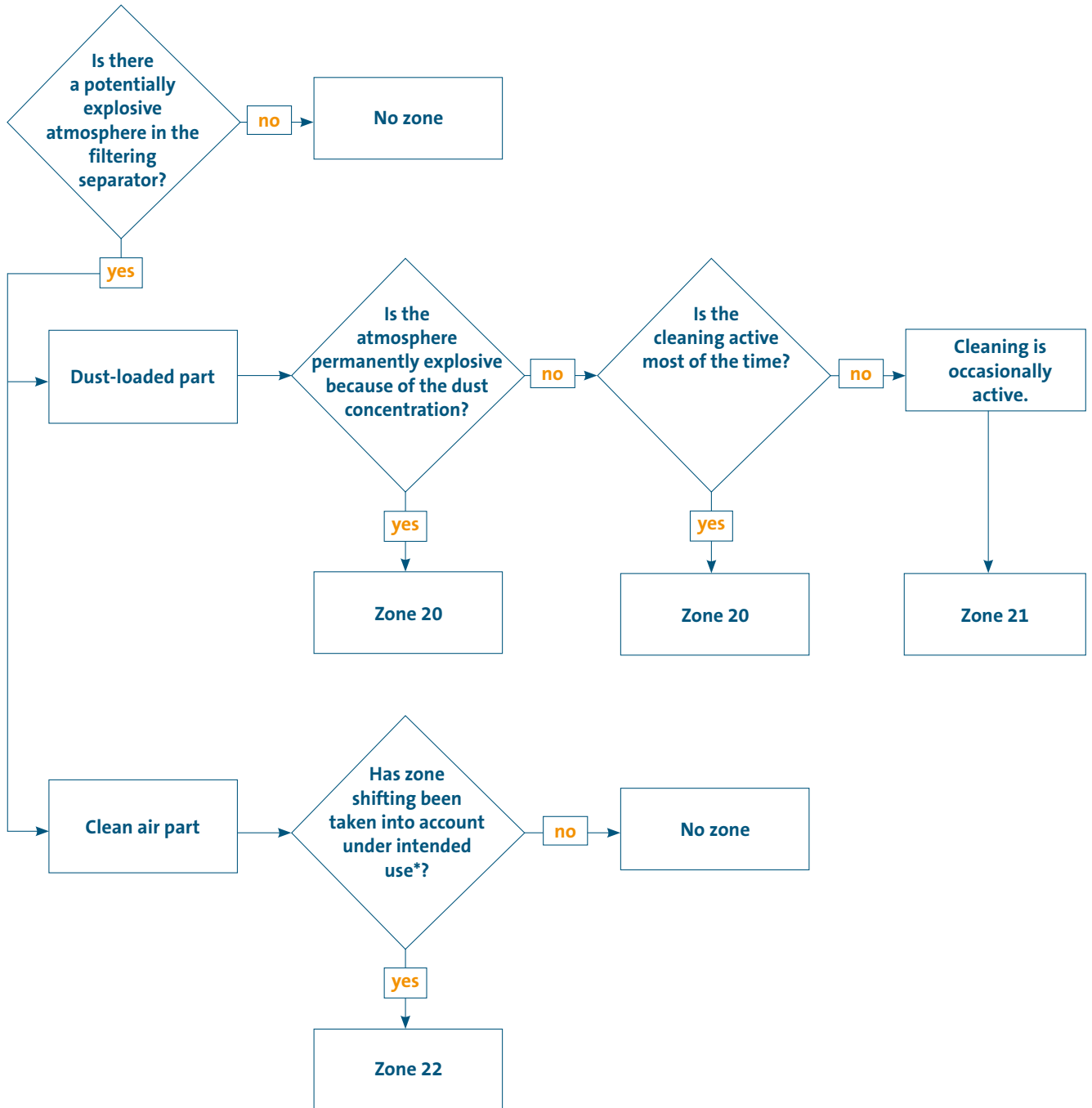


Figure 4: Relationship of lower explosive limit (LEL) and critical limits

Annex II

Flowchart for the determination of zones in filtering separators



* taking into account the particular maintenance intervals and depending on the project-specific risk analysis

Figure 5: Flowchart for the determination of zones in filtering separators (example: dust)

Annex III Guide to ATEX §35 and §243

§ 35 Interface to different potentially explosive atmospheres

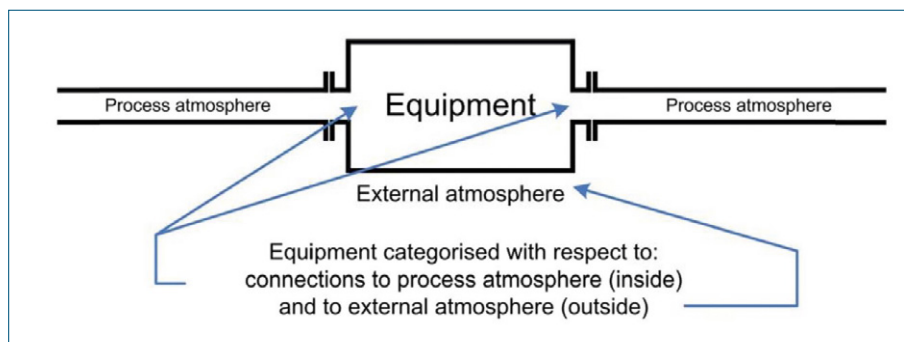
This point seeks to provide guidance on the application of the ATEX Directive 2014/34/EU to equipment²⁰ intended to operate with interfaces to different potentially explosive atmospheres.

At this point it is necessary to note that equipment that contains a potentially explosive atmosphere but is neither connected to, nor intended for use in, an external or process related potentially explosive atmosphere does not fall under the scope of Directive 2014/34/EU.

However, any equipment inside this „container“ will, so long as it fulfils the criteria for inclusion in scope, need to comply with the relevant provisions.

The categorisation of equipment is to be determined on the basis of the ignition risk assessment²¹ by the manufacturer or his authorised representative and the equipment's relationship with respect to its interface with its process atmosphere and any external atmosphere.

The following diagram illustrates this point:



For example, the inside or process side of a pump for flammable liquid which normally runs full but occasionally contains an explosive atmosphere may, depending on the actual situation, be considered zone 1 if no other measures have been taken to prevent the pump running dry. If it has been decided that the surroundings or external explosive atmosphere is zone 2 then a pump conforming to category 2 inside and category 3 outside must be used to meet the essential health and safety requirements of the Directive.

²⁰ Equipment here is taken to mean all products within scope of Directive 2014/34/EU.

²¹ The category classification is performed by the person responsible for making the EU declaration of conformity according to Directive 2014/34/EU.

²² „Zoning“ is not a concept to be found in Directive 2014/34/EU but in Directive 1999/92/EC dealing with employer's obligations with respect to employees operating in hazardous atmospheres. It is not the responsibility of the manufacturer to „zone“ but evidently this it is helpful to give an example of the area of intended use.

Note

The process atmosphere zone (and the respective category) needs not necessarily to be the same for the two connections to the process atmosphere.

The following guidelines may help in the selection of an appropriate category:

The ATEX category (or categories) assigned to equipment shall be determined for each part of the equipment which comes into contact with, or is connected to, a zone with a potentially explosive atmosphere (see Directive 1999/92/EC).

The category assigned to a piece of equipment intended to contain a potentially explosive atmosphere not connected to the outside of that equipment is determined by the ignition risk associated with the outside parts of the equipment, not by its internal atmosphere i.e. only the part of the equipment which is intended to come into contact with a zone is relevant for the assignment of the appropriate category.

The category (or categories) assigned to the process connecting points of equipment containing an explosive atmosphere cannot be higher than that appropriate to the ignition risk.

For example, consider the case of a fan conveying an explosive gas atmosphere over its rotating blades, or a powder mill producing an explosive dust atmosphere inside the mill. Each having an outlet connected to an external potentially explosive atmosphere. The ignition risk assessment for both these items of equipment has shown for these specific examples that an effective ignition source (for the explosive atmosphere connected to them) is not present in normal operation but may be present in the case of an expected malfunction. If such equipment/assembly is placed on the market without additional ignition protection or a protective system it can only be classified as category 3²³ (see section § 44 on combined equipment (assemblies)).

Such equipment can only be used when it is connected to an explosive atmosphere which is present continuously (i.e. zone 0/20) if additional ignition protection or a protective system is fitted (see Directive 1999/92/EC).

Where a piece of equipment is fitted with an autonomous protective system such as flame arresters, or a suppression system which is already compliant to Directive 2014/34/EU, additional testing and conformity assessment of the resulting assembly, i.e. equipment together with the protective system, is not required provided the protective system is used within its intended design capabilities covering the specific case, is installed in accordance with the manufacturer's instructions and no new ignition hazards are introduced. However, an ignition risk assessment will be required and relevant action taken if additional hazards are identified.

Similarly, Directive 2014/34/EU does not require that the pressure resistance of a vessel or container protected against the effects of an explosion by an autonomous protective system be tested, if it has been demonstrated that the autonomous protective system successfully detects and suppresses an explosion and if the vessel can withstand the residual pressure peak of the suppressed explosion.

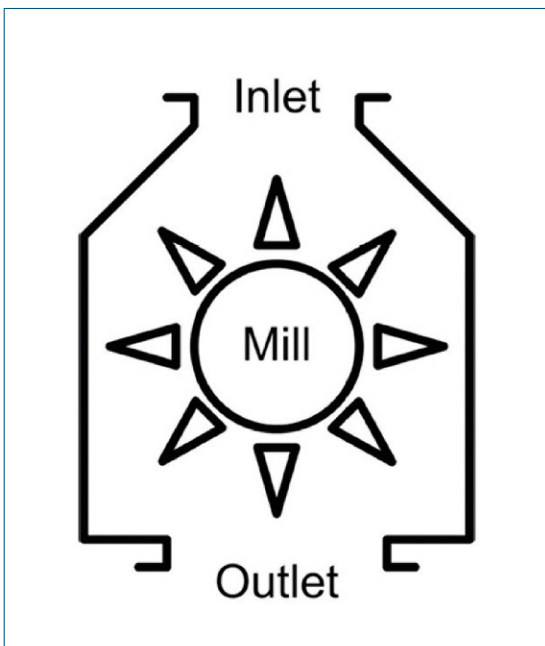
²³ Additional measures to cover expected malfunctions may provide category 2; if two faults or one rare fault are dealt with, category 1 can be reached.

Example

Note

The following is one of many examples that can be used to illustrate the above points. The assumptions made in this example should not be taken as the only possible situation. The categorisation of a particular piece of equipment will depend on the specific ignition hazard assessment that is made of the equipment and its intended use together with any ignition protection measures applied. The example only considers the inside and connecting explosive atmospheres, i.e. the process side. A separate ignition hazard assessment and categorisation must be made of the outside if the equipment is to be used in potentially explosive atmosphere.

Consider a powder mill as shown in the following scheme:



The ignition hazard assessment carried out by the manufacturer has identified that in this case:

- there is no ignition source inside the mill which can become effective in normal operation²⁴,
- there is an ignition source inside the mill which can become effective during expected malfunctions.

The highest category that can be assigned to the mill is therefore category 3 when it is placed on the market as shown. The outlet from the mill in this case produces fine dust in the form of a potentially explosive dust cloud which is continuously present in normal operation, i.e. category 1 is required. In cases when category 1 cannot be provided, the manufacturer has to take additional measures that the mill can be used safely, e.g. to provide an explosion-resistant design of the mill. If the explosion safety can be reached through additional explosion prevention or protection measures of the end-user, the manufacturer's instructions must therefore make clear that the mill can only be used with these additional measures.

²⁴ It is clear that for some milling technologies an ignition source may be unavoidable.

Analysis

Directive 2014/34/EU defines equipment as follows:

- intended for use in potentially explosive atmospheres;
- and/or for the processing of material;
- capable of causing an explosion through their own potential sources of ignition.

This definition applies to the grinding assembly of a mill for combustible materials of the food and fodder industry. Therefore, these are within the scope of Directive 2014/34/EU.

The intended purpose of a grinding assembly in a mill is the grinding of combustible materials whereby the content of fine particles is increased considerably.

According to the risk assessment the grinding installation should fulfil the requirements for category 1, but in the best case it will meet category 3. Despite all construction measures to prevent ignition sources, the occurrence of dust explosions cannot be excluded definitely. Therefore, the mill when fully installed must be provided with additional protection measures, which reduce the effect of a dust explosion for people and goods to below a dangerous level.

These measures are essential for the grinding system to fulfil the requirements of Directive 2014/34/EU.

Consequently:

- all requirements on the construction of the grinding assembly (e.g. suitable selection of material and bearings, minimum distances between rotating and fixed parts), on certain equipment of the mill (e.g. foreign particles separator, overload protection, temperature detector at the bearings)

and

- all construction measures of the mill (explosion pressure resistant design for the maximum explosion pressure, or explosion pressure resistant design for the reduced explosion pressure in combination with explosion pressure relief or explosion suppression, and in most cases additional explosion decoupling for connected installations)

are necessary to make the grinding operation safe.

§ 243 Filter units and vented silo bins

The question arises, how should the Directive be applied to filter units and vented silo bins?

Most filters and silo bins will have an explosive dust cloud inside at some point during normal operation.

The inside may be areas in which an explosive atmosphere caused by air/dust mixtures are present continuously, for long periods or frequently, or areas in which such an atmosphere is likely to occur, depending on the operating conditions.

Many filters and silos are located in the open air, or in a room in a building which does not need to be classified as hazardous.

With the exception of 5) a) and 7) the description below of different cases assumes that filters and silos themselves will not be a source of dust release that would give rise to a potentially explosive atmosphere in the surrounding area.

This description also considers that many apparatuses with filters inside are fitted with explosion protection devices, such as vent panels, doors or suppression equipment.

1) The filter or the silo bin has no moving parts or electrical equipment on the inside, and is located in a non-hazardous area.

Conclusion

These filters or silos are not in scope of the Directive 2014/34/EU.

Electrostatic hazards may exist from insulating surfaces inside the filter, from the filter elements or from cone discharges in silos. This risk depends for example on the properties of the dust being collected, and other operating conditions. But any electrostatic risks are not considered as giving the filter or silos its own potential source of ignition, so these filters or silos do not fulfil the definition of equipment in Article 1(3)a.

Remark

These filters or silos do not fulfil the other criteria of the definition.

The electrostatic risks can be covered by other directives, for example the Machinery Directive when the filter is part of a machine. In this case the manufacturer of the machine is responsible to avoid this risk according to the provisions of the **Machinery Directive 2006/42/EC** (see section § 233). In all cases these risks must be controlled by the user under **Directive 1999/92/EC**. The electrostatic risks are covered in the standard EN ISO 80079-36 “Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements”.

2) The filter has moving parts inside that can be considered as mechanical equipment, such as a bag shaking mechanism, or a screw feeder to remove collected dust. The whole filter is located in a non-hazardous area.

Conclusion

The manufacturer must assess whether the moving parts create its own potential source of ignition. If the moving parts do not create any potential source of ignition, perhaps because they have low power, or move very slowly, the situation is the same as case 1, and the filter is not in scope of the Directive.

Remark

Low power in this sense is not given, when for example the power source is strong and only the power inside the equipment is reduced by protection methods in order to avoid an ignition risk. There is a similar situation in case of the electrical type of protection the „intrinsic safety“.

If the mechanical equipment on the inside does create an ignition risk, this equipment (as part of the complete apparatus) must comply with the ATEX Directive 2014/34/EU (see section § 34 on place of intended use).

If inside the filter an explosive atmosphere caused by air/dust mixtures is present continuously, for long periods or frequently, according to Annex I for the equipment inside, conformity with category 1 should be reached. But this will in respect of the state of the art not always be possible.

In these cases according to:

- Annex II A, technological knowledge must be taken into account

and

- Annex II 1.0.1, the principles of integrated explosion safety must be applied.

That means, when it is not possible to prevent the ignition source sufficiently – according to the „state of the art“ – to reach category 1, category 2 can be sufficient when the manufacturer takes additional measures „to halt it immediately and/or to limit the range of explosion flames and explosion pressures to a sufficient level of safety“ (see Annex II 1.0.1 indent 3). It is in the responsibility of the manufacturer to take this decision.

The explosion vent can be seen as an example of integrated explosion safety as described under Annex II 1.0.1.

In this case, and if the complete apparatus (filter with explosion vent panel or doors) is produced and integrated by the same manufacturer, not only the mechanical but all equipment inside falls under the scope of Directive 2014/34/EU. Consequently the manufacturer takes the following measures:

- preventing sufficiently the ignition source inside (according to the „state of the art“);
- selecting an appropriate protective system in order to limit the range of explosion flames and pressure;
- designing the filter in such a way that it can withstand an internal explosion without rupturing (design for the reduced explosion pressure in conjunction with explosion pressure relief or explosion suppression).


3) The complete filter or the silo bin has electrical equipment inside. In filters this electrical equipment may be a pressure switch, or level switch on the container that collects the dust, in silos level indicators are widely used.

Conclusion

This electrical equipment is equipment in the sense of Article 1.1 of the Directive 2014/34/EU and therefore must comply with this Directive.

- 4) The silo bin or the complete apparatus with the filter is fitted by the manufacturer with explosion vent panels or doors, supplied by another manufacturer.**

Conclusion

These panels or doors are ‘protective systems’ in the sense of the Directive 2014/34/EU and the manufacturer of these systems has to apply the Directive when placing this as an autonomous system on the market. That means the procedure set out in Article 13(2) has to be applied and they must be CE and  marked. Selecting the correct panel or door (for example: size, quality, function) depends on the application and has to be done by the manufacturer of the apparatus.

- 5) The silo bin or the complete apparatus with the filter is fitted with explosion vent panels or doors produced and integrated into the filter or silo by the filter/silo manufacturer themselves.**

Conclusion


For filters we have to distinguish two cases:

- a) The complete apparatus is in the scope of the Directive 2014/34/EU.
- b) The complete apparatus is not in the scope of the Directive 2014/34/EU.

For silos, generally case b) is applicable.

Case a)

These are not autonomous protective systems according to Article 2(2) because they are placed on the market as a part of an equipment in the sense of Article 1(1) and not separately. Therefore Article 13(2) has not to be applied. The protective system alone is not in the scope of the Directive but the whole equipment. That means the conformity procedure of the equipment includes the protective system.

However, if another manufacturer sells complete replacement vent panels or doors as spare parts, these are autonomous protective systems, separately placed on the market and then he must apply the Directive 2014/34/EU. That means they must for example be tested, CE and  marked in the same way as complete panels or doors separately placed on the market from other manufacturers.

Case b)

These complete apparatus or explosion vent panels or doors are autonomous protective systems according to Article 2(2) because they are separately placed on the market in the sense of the Directive and therefore Article 13(2) has to be applied. That is because they are not placed on the market as a part of an equipment in the sense of Article 1(1).

Remark for filters

In case 4 or 5, the manufacturer in any case carries responsibility for ensuring that the body of the filter will not fail in the event of an explosion, even though it is not covered by specific EU legislation. Users should ask the manufacturers how they can be sure that the filter complies with the safety requirements of the Work Equipment Directive 2009/104/EC (that repealed the Directive 89/655/EC amended by 95/63/EC and 2001/45/EC); especially Annex I, 2.7.

Remark for silos

Even protective systems such as vent areas which are integrated in the cell ceiling of silos or inserted lightweight constructions are protective systems for the purpose of Directive 2014/34/EU and must be placed separately on the market as autonomous protective systems and must therefore be treated as such with regard to assessment of conformity and marking.

6) A – normally small – apparatus with only a filter sock, plastic collection bag and fan, but no metal enclosure.

Conclusion

If during the intended use a dangerous explosion pressure cannot be formed in such a small apparatus when a dust cloud inside the filter is ignited, the inside is not to be classified as a hazardous area and the equipment used inside is not in the scope of the Directive 2014/34/EU.

This is the case with some filters used for collecting wood dust and wood-waste.

7) The silo or an apparatus with a filter is intended to be installed in an area, in which air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

Conclusion

In respect of the complete apparatus the Directive 2014/34/EU is only relevant for the manufacturer, if it is equipment in the sense of this Directive. To find out if the whole apparatus is such equipment, the manufacturer of this apparatus for example must examine if it creates any possible sources of ignition, which can ignite an explosive atmosphere on the outside. When this can happen, he has to apply the Directive 2014/34/EU.

The apparatus must in this case conform to category 3.

Remark

Equipment of this type may be needed if there are for example sources of dust release from other equipment nearby.

As silos have no own possible ignition source, which can ignite an explosive atmosphere on the outside, they will not conform to category 3.

General remark for autonomous protective systems

Measures for the indirect explosion pressure venting at buildings, like for example windows, walls of lightweight construction or similar, do not fall within the scope of Directive 2014/34/EU. The employer/operator himself is responsible to implement such measures. In doing so, priority shall be given to the requirements according to the building regulations.

Annex IV Standards, Guidelines and Publications

Directive 2006/42/EC	Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
Directive 2014/34/EU	Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast) http://eur-lex.europa.eu/legal-content/EN/TXT/PDF (ATEX 114)
11. ProdSV	Eleventh Regulation following the Product Safety Law (Explosion protection regulation – 11. ProdSV) dated 6. January 2016; Bundesgesetzblatt Jahrgang 2016 Teil I Nr. 2, issued in Bonn on 15. January 2016
Directive 1999/92/EC	Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) http://europa.eu.int/comm/enterprise/atex/otherinfo.htm (ATEX 137, former ATEX 118a)
BetrSichV	National implementation of the Directive 2009/104/EG and partial implementation of the Directive 1999/92/EG - Ordinance on Industrial Safety and Health for the use of work equipment (Industrial Health and Safety Ordinance / Betriebssicherheitsverordnung – BetrSichV), June 2015
ATEX-2014/34/EU Guidelines	Guide to application of the Directive 2014/34/EU of the of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres http://eur-lex.europa.eu/legal-content/
DGUV Rule 113-001:2015	Explosion prevention regulations (EX-RL)
DGUV Rule 109-002:2004	Workplace air – Ventilation technical measures
DIN EN 1127-1:2011-10	Explosive atmospheres – Explosion prevention and protection - Part 1: Basic concepts and methodology; German version EN 1127-1:2011
DIN EN 14986:2017-04	Design of fans working in potentially explosive atmospheres; German version EN 14986:2017
DIN EN ISO 80079-36:2016-12	Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements (ISO 80079-36:2016); German version EN ISO 80079-36:2016

DIN EN ISO 80079-37:2016-12	Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres – Non-electrical type of protection constructional safety „c“, control of ignition sources „b“, liquid immersion „k“ (ISO 80079-37:2016); German version EN ISO 80079-37:2016
DIN EN ISO 19353:2016-07	Safety of machinery – Fire prevention and fire protection (ISO 19353:2015); German version EN ISO 19353:2016
GESTIS Substance Database	Information system on hazardous substances of the German Social Accident Insurance www.dguv.de/ifa/stoffdatenbank
ISO 6184-1:1985-11	Explosion protection systems – Part 1: Determination of explosion indices of combustible dusts in air
TRBS 1201 Part 1:2006	Technical Rule for Operational Safety – Part 1: Testing of plants in hazardous areas and examination of work places in hazardous areas
TRGS 727:2016	Technical Rule for Hazardous Substances – Avoiding ignition hazards as a result of electrostatic charges
VDI 2263:1992-05	Dust fires and dust explosions – Hazards, assessment, protective measures
VDI 2263 Part 1:1990-05	Dust fires and dust explosions – Hazards, assessment, protective measures – Test methods for the determination of the safety characteristic of dusts
VDI 2263 Part 2:1992-05	Dust fires and dust explosions – Hazards, assessment, protective measures – Inerting
VDI 2263 Part 3:1990-05	Dust fires and dust explosions – Hazards, assessment, protective measures – Pressure-shock-resistant vessels and apparatus – Calculation, construction and tests
VDI 2263 Part 4:1992-04	Dust fires and dust explosions – Hazards, assessment, protective measures – Suppression of dust explosions
VDI 2263 Part 6:2007-09	Dust fires and dust explosions – Hazards, assessment, protective measures – Dust fires and explosion protection in dust extracting installations
VDI 2263 Part 6:2016-01	Dust fires and dust explosions – Hazards - assessment - protective measures – Dust fires and explosion protection in dust extracting installations; Draft
VDI 2264:2001-07	Commissioning, operation and maintenance of separator systems for the removal of gaseous and particulate substances from gas streams
VDI 3673 Part 1:2002-11	Pressure venting of dust explosions
VDMA 24180:2005-05	Extraction systems – Fire and explosion protection

VdS 2106:2012-12	VdS-Guideline for spark detection, spark separation and spark extinguishing systems – Planning and installation
VdS 3445:2008-09	Data sheet on damage prevention – Fire protection in dust extraction systems

Internet resources

- The “**CE coach**” **learning application** is a free tool offered by the Ministry of the Environment, Climate Protection and the Energy Sector Baden-Württemberg, compiling basic knowledge on the subject of “CE marking and market access conditions for machinery”.
<https://www.cecoach.de/lernanwendung/>
- **EUR-Lex** provides free access to the following documents in 24 official EU languages:
 - the Official Journal of the European Union
 - EU law (EU contracts, directives, regulations, resolutions and decisions, consolidated legislation etc.)
 - Preparatory work (legislative proposals, reports, green and white papers etc.)
 - EU jurisdiction (rulings, resolutions etc.), international conventions
 - EFTA documents
 - other publicly available documents<http://eur-lex.europa.eu/content/welcome/about.html>
<http://eur-lex.europa.eu/legal-content/>
- **Federal Institute for Occupational Safety and Health (BAuA)**
 Research for work and safety
 Safe and healthy working conditions are a symbol of social progress and a competitive economy. The Federal Institute for Occupational Safety and Health (BAuA) conducts research and development in the field of health and safety at work, promotes the transfer of knowledge into practice, advises policy-makers and fulfills official tasks – all with regards to legislation on hazardous substances, product safety and the health data archive. The BAuA is a departmental research institute within the Federal Ministry of Labour and Social Affairs (BMAS).
<http://www.baua.de/de/Themen-von-A-Z/Anlagen-und-Betriebssicherheit/Rechtstexte/Betriebssicherheitsverordnung.html>
- **Synopsis of the new German Industrial Safety Ordinance (BetrSichV) 2002 – 2015**
<http://www.baua.de/de/Themen-von-A-Z/Anlagen-und-Betriebssicherheit/Rechtstexte/Betriebssicherheitsverordnung.html>

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