

English Version

**Explosive atmospheres - Part 32-1: Electrostatic hazards,
guidance
(IEC/TS 60079-32-1:2013, IEC/TS 60079-32-1:2013/A1:2017)**

Atmosphères explosives - Partie 32-1: Risques
électrostatiques - Guide
(IEC/TS 60079-32-1:2013, IEC/TS 60079-32-
1:2013/A1:2017)

Explosionsgefährdete Bereiche - Teil 32-1: Elektrostatische
Gefährdungen, Leitfaden
(IEC/TS 60079-32-1:2013, IEC/TS 60079-32-
1:2013/A1:2017)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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European foreword

This document (CLC/TR 60079-32-1:2018) consists of the text of IEC/TS 60079-32-1:2013 and IEC/TS 60079-32-1:2013/A1:2017 prepared by IEC/TC 31 "Equipment for explosive atmospheres".

This document supersedes CLC/TR 60079-32-1:2015.

The technical specification IEC/TS 60079-32-1 is written as a general guidance document for products in general and process properties necessary to avoid ignition hazards arising from static electricity in a hazardous area.

The IEC standard IEC 60079-0 specifies the general requirements, including the requirements to avoid electrostatic charging, for construction, testing and marking of Ex equipment and Ex Components intended for use in explosive atmospheres.

In some cases, the requirements given in IEC 60079-0 are different from the information given in IEC/TS 60079-32-1.

It was decided to have all information also given complete in the guidance document and therefore the new Clause 14 was added to the IEC/TS 60079-32-1 summarizing the requirements given in IEC 60079-0 for Ex equipment and Ex-Components as additional information.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The texts of the International Technical Specifications IEC/TS 60079-32-1:2013 and IEC/TS 60079-32-1:2013/A1:2017 were approved by CENELEC as a Technical Report without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60243-1	NOTE Harmonized as EN 60243-1.
IEC 60243-2	NOTE Harmonized as EN 60243-2.
IEC 60247	NOTE Harmonized as EN 60247.
IEC 61340-2-1	NOTE Harmonized as EN 61340-2-1.
IEC 61340-4-5	NOTE Harmonized as EN 61340-4-5.
IEC 61340-4-7	NOTE Harmonized as EN 61340-4-7.
ISO 8028	NOTE Harmonized as EN ISO 8028.
ISO 8330	NOTE Harmonized as EN ISO 8330.
ISO 13688	NOTE Harmonized as EN ISO 13688.
ISO 20344	NOTE Harmonized as EN ISO 20344.
ISO 20345	NOTE Harmonized as EN ISO 20345.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60079-0	2011	Explosive atmospheres - Part 0: Equipment - General requirements	EN 60079-0	2012
IEC 60079-10-1	-	Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres	EN 60079-10-1	-
IEC 60079-10-2	-	Explosive atmospheres - Part 10-2: Classification of areas - Combustible dust atmospheres	EN 60079-10-2	-
IEC 60079-14	-	Explosive atmospheres - Part 14: Electrical installations design, selection and erection	EN 60079-14	-
IEC 60079-20-1	-	Explosive atmospheres - Part 20-1: Material characteristics for gas and vapour classification - Test methods and data	EN 60079-20-1	-
IEC 60079-32-2	2015	Explosive atmospheres - Part 32-1: Electrostatics hazards - Tests	EN 60079-32-2	2015
IEC 60093	-	Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials	HD 429 S1	-
IEC 60167	-	Methods of test for the determination of the insulation resistance of solid insulating materials	HD 568 S1	-
IEC 61340-2-3	-	Electrostatics - Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation	EN 61340-2-3	-
IEC 61340-4-1	-	Electrostatics - Part 4-1: Standard test methods for specific applications - Electrical resistance of floor coverings and installed floors	EN 61340-4-1	-
IEC 61340-4-3	-	Electrostatics - Part 4-3: Standard test methods for specific applications - Footwear	EN 61340-4-3	-
IEC 61340-4-4	2012	Electrostatics - Part 4-4: Standard test methods for specific applications - Electrostatic classification of flexible intermediate bulk containers (FIBC)	EN 61340-4-4	2012

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 284	-	Conveyor belts - Electrical conductivity - Specification and test method	EN ISO 284	-
ISO 6297	-	Petroleum products - Aviation and distillate fuels - Determination of electrical conductivity	-	-
ISO 8031	-	Rubber and plastics hoses and hose assemblies - Determination of electrical resistance and conductivity	EN ISO 8031	-
ISO 9563	-	Belt drives - Electrical conductivity of antistatic endless synchronous belts - Characteristics and test method	-	-
ISO 12100-1	-	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology	EN ISO 12100-1	-
ISO 16392	-	Tyres - Electrical resistance - Test method for measuring electrical resistance of tyres on a test rig	-	-
ISO 21178	-	Light conveyor belts - Determination of electrical resistances	EN ISO 21178	-
ISO 21179	-	Light conveyor belts - Determination of the electrostatic field generated by a running light conveyor belt	EN ISO 21179	-
ISO 21183-1	-	Light conveyor belts - Part 1: Principal characteristics and applications	EN ISO 21183-1	-
ASTM D257	-	Standard Test Methods for DC Resistance or Conductance of Insulating Materials	-	-
ASTM D2624-07a	-	Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels	-	-
ASTM D4308-95	-	Standard Test Method for Electrical Conductivity of Liquid Hydrocarbons by Precision Meter	-	-
ASTM E582-88	-	Standard test method for minimum ignition energy and quenching distance in gaseous mixtures	-	-
ASTM E2019-03	-	Standard test method for minimum ignition energy of a dust cloud in air	-	-
ASTM F150	-	Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring	-	-
ASTM F1971	-	Standard Test Method for Electrical Resistance of Tires Under Load On the Test Bench	-	-
BS 5958-1	-	Code of practice for control of undesirable static electricity - Part 1: General considerations	-	-
BS 5958-2	-	Code of practice for control of undesirable static electricity - Part 2: Recommendations for particular industrial situations	-	-
BS 7506-2	-	Methods for measurements in electrostatics -- Part 2 Test methods	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
DIN 51412-1	-	Testing of petroleum products; determination - of the electrical conductivity - Part 1: laboratory method		-
DIN 51412-2	-	Testing of petroleum products; determination - of the electrical conductivity - Part 2: field method		-
-	-	Resilient floor coverings - Determination of the electrical resistance	EN 1081	-
-	-	Protective clothing - Electrostatic properties - Part 3: Test methods for measurement of charge decay	EN 1149-3	-
-	-	Protective clothing - Electrostatic properties - Part 5: Material performance and design requirements	EN 1149-5	-
-	-	Rubber and plastic hoses and hose assemblies for measured fuel dispensing systems - Specification	EN 1360	-
-	-	Rubber hoses and hose assemblies for aviation fuel handling - Specification	EN 1361	-
-	-	Non-electrical equipment for use in potentially explosive atmospheres - Part 1: Basic method and requirements	EN 13463-1	-
-	-	Thermoplastic and flexible metal pipework for underground installation at petrol filling stations	EN 14125	-
-	-	Conveyor belts for use in underground installations - Electrical and flammability safety requirements	EN 14973	-
ISGOTT	2006	International Safety Guide for Oil Tankers and Terminals (ISGOTT), fifth edition, International chamber of shipping, 2006	-	-
JNIOOSH TR 42		Recommendations for Requirements for Avoiding Electrostatic Hazards in Industry	-	-
NFPA 77	-	Recommended practice on static electricity	-	-
SAE J1645	-	Surface vehicle recommended practice - Fuel systems and Components - Electrostatic Charge Mitigation	-	-

FOREWORD

This amendment has been prepared by IEC technical committee 31: Equipment for explosive atmospheres.

The text of this amendment is based on the following documents:

DTS	Report on voting
31/1237/DTS	31/1253/RVC

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

2 Normative references

Replace the following two references:

IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60079-32-2, *Explosive atmospheres – Part 32-2: Electrostatics hazards – Tests*

with the following two new references:

IEC 60079-0:2011, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60079-32-2:2015, *Explosive atmospheres – Part 32-2: Electrostatics hazards – Tests*

Insert, after Clause 13, a new Clause 14 as follows:

14 Special requirements for equipment according to IEC 60079-0

14.1 General

In this document, threshold limits are given for electrostatic testing of products which differ from the threshold limits in IEC 60079-0:2011. The threshold limits specified in this document are in some cases more conservative, as they apply to a broad range of industrial applications where the physical situation may be quite different to that in which electrical equipment complying with IEC 60079-0 is used. The more conservative limits are based on theoretical modeling supported by empirical data.

In order to have all relevant electrostatic requirements accessible in one place, the requirements from IEC 60079-0:2011 are included for information in this clause of this document, with the addition of helpful explanatory material and cross-references to other text in this document.

The test methods in IEC 60079-32-2:2015 are equivalent to those cited in IEC 60079-0:2011, but in some cases climatic conditions are different. Equipment within the scope of IEC 60079-0 may be tested in the climatic conditions specified in IEC 60079-0.

NOTE The use in apparatus of products and materials conforming to the threshold limits specified in IEC 60079-0:2011 is not known to have resulted in any accidental ignition.

14.2 Electrostatic charges on external non-metallic materials

14.2.1 Applicability

The requirements of this subclause only apply to external non-metallic materials of electrical equipment, including non-metallic parts which are applied to the external surface of an enclosure.

NOTE 1 Non-metallic paints, films, foils, and plates are typically attached to external surfaces of enclosures to provide additional environmental protection. Their ability to store an electrostatic charge is addressed by this subclause.

NOTE 2 It is generally acknowledged that glass is not susceptible to storing an electrostatic charge.

14.2.2 Avoidance of a build-up of electrostatic charge on Group I or Group II electrical equipment

Electrical equipment should be so designed that under normal conditions of use, maintenance and cleaning, danger of ignition due to electrostatic charges are avoided. This requirement should be satisfied by one or more of the following:

- a) By suitable selection of the material so that surface resistance shall meet at least one of the criteria given below (see 6.2.1) when measured in accordance with IEC 60079-32-2:
 - $\leq 100 \text{ G}\Omega$ measured at $(30 \pm 5) \%$ relative humidity
 - $\leq 1 \text{ G}\Omega$ measured at $(50 \pm 5) \%$ relative humidity

NOTE 1 For more information see 6.1.

- b) By limitation of the surface area of non-metallic parts of enclosures, determined according to 6.3.2, to the values of Table 23.

The values for surface area can be increased by a factor of four if the exposed area of non-metallic material is surrounded by and in contact with conductive earthed frames (see 6.3.3).

Alternatively, for long parts with non-metallic surfaces, such as tubes, bars, or ropes, the surface area need not be considered, but the diameters or widths should not exceed the values shown in Table 23.

NOTE 2 Electric cables for connection of external circuits are not in the scope of Clause 14. Information on external cables can be found in IEC 60079-14.

NOTE 3 Requirements for pipes and hoses for liquids are not in the scope of Clause 14. Requirements for pipes and hoses for liquids are given in 7.7, and for solids in 9.3.3.

- c) By provision of an insulating layer bonded to a conductive surface. This layer should meet at least one of the following criteria:
- 1) the layer is not expected to be subject to high charging processes stronger than manual rubbing (see 3.13) and has a thickness ≤ 2 mm for Groups I, IIA, IIB or $\leq 0,2$ mm for Group IIC (see Table 23 and 6.3.4.2).
 - 2) the breakdown voltage measured through the thickness of the insulating material is ≤ 4 kV (see 6.3.4.3) when measured as described in IEC 60079-32-2.

NOTE 4 According to IEC 60243-2, insulating materials stressed by DC have their breakdown voltage tested with DC and the method described in IEC 60243-1 with the additional requirements in IEC 60243-2. This method and the additional requirements are also given in IEC 60079-32-2.

- d) By provision of a conductive coating (see 6.3.5). Non-metallic surfaces may be covered with a bonded durable conductive coating. The resistance between the coating and either the bonding point (in the case of fixed equipment) or the farthest point of possible contact with the enclosure (in the case of portable equipment) should not exceed 1 G Ω . The resistance should be measured in accordance with IEC 60079-32-2 but using the 100 mm² electrode at the worst case position of the surface and either the bonding point or the farthest point of possible contact.

NOTE 5 The environmental conditions that have an effect on the coating material can include influences from small particles in an air stream, solvent vapours, and the like.

- e) By using any other safety measure in this Technical Specification to avoid the danger of ignition due to electrostatic charges.
- f) By testing that the maximum transferred charge measured according to IEC 60079-32-2 under worst case conditions is within the threshold limits of Table 23.
- g) In specific cases, IEC 60079-0 allows the use of fixed equipment which does not fulfill the requirements a) to f) and may have a risk from electrostatic discharges by marking them with "X". In this case, the instruction manual should provide guidance for the user to minimize the risk from electrostatic discharges by operational measures. Where practicable, the equipment should also be marked with the electrostatic charge warning given in IEC 60079-0. However, this alternative should not be used if hazardous electrostatic charging is expected during use (e.g. for hand-held equipment or for constantly charging fixed installations).

NOTE 6 X-marking is used e.g. for insulating housings of electrical equipment that are touched by the operator only during cleaning, maintenance and repair.

Table 23 – Alternative restrictions on insulating solid materials and isolated conductive or dissipative parts in hazardous areas for equipment within the scope of IEC 60079-0

	Group I	Group II				Group III		
	EPL Ma, Mb	Sub group	EPL Ga	EPL Gb	EPL Gc	EPL Da	EPL Db	EPL Dc
A) Surface area	≤10 000 mm ²	A	≤5 000 mm ²	≤10 000 mm ²	≤10 000 mm ²	No limits		
		B	≤2 500 mm ²	≤10 000 mm ²	≤10 000 mm ²			
		C	≤ 400 mm ²	≤ 2 000 mm ²	≤ 2 000 mm ²			
B) Width of bars, rods	≤30 mm	A	≤3 mm	≤30 mm	≤30 mm	No limits		
		B	≤3 mm	≤30 mm	≤30 mm			
		C	≤1 mm	≤20 mm	≤20 mm			
C) Thickness of insulating coatings to avoid brush discharges	≤2 mm	A	≤2 mm	No limits				
		B	≤2 mm					
		C	≤0,2 mm					
Thickness of insulating coatings to avoid any incendive discharge	Not permitted	Not permitted	Not permitted			≥ 8 mm if area > 500 mm ²		
D) Transferred charge	≤60 nC	A	≤60 nC			No limits for insulating solids		
		B	≤25 nC					
		C	≤10 nC			≤200 nC ^a		
E) Capacitance of unearthed metal parts	≤10 pF	A	≤3 pF	≤10 pF	≤10 pF	≤10 pF ^b		
		B	≤3 pF	≤10 pF	≤10 pF			
		C	≤3 pF					

^a Value only valid for spark discharges from unearthed conductive or dissipative parts

^b For equipment intended for use in ducts or pipes subject to the presence of fast moving dust a lower limiting value of capacitance is under consideration

NOTE 1 The width criterion in B) applies to thin pipes, cable sheaths, and other insulating materials having small widths or diameters.

NOTE 2 The limits in A) and B) are not absolute values that prevent incendive discharges, they merely reduce it to a generally accepted low level.

NOTE 3 The limits in C) apply to insulating coatings and layers on conductive or dissipative materials.

NOTE 4 The limits in D) ensure that incendive discharges do not occur.

NOTE 5 All of the values in D) contain a certain safety margin. Recent work indicates that the value hitherto used for IIB contains a lower safety margin than all other values. To equalize all safety margins the values for IIB have been reduced from 30 nC to 25 nC. This does not mean that the former value was unsafe or retesting is necessary.

NOTE 6 The subgroups are based on the maximum experimental safe gap (MESG) or the minimum ignition current ratio (MIC ratio) of the explosive gas atmosphere in which the equipment may be installed (see IEC 60079-20-1). More details can be found in C.6 and D.3.

NOTE 7 The values in EPL Gc do not exclude the possibility of high charging processes. Manual rubbing is usually not considered to be a high charging process (see 3.13).

NOTE 8 It is generally accepted that an unearthed metal fastener such as a cover screw will present a capacitance of not more than 3 pF.

14.2.3 Avoidance of a build-up of electrostatic charge on equipment for Group III

It is not possible to create electrostatic discharges from insulating surfaces that are incensive for dust clouds or dust layers just by manual rubbing. However, if high charging processes (see 3.13) are not excluded, painted/coated metal equipment and equipment of plastic material should be so designed that under normal conditions of use, ignition caused by propagating brush discharges is avoided.

Enclosures of plastic material cannot be charged to such a critical charge density that propagating brush discharges can be generated. However, no extended flat conductive surfaces should be installed inside the enclosure within a distance of 8 mm to the outer surface.

NOTE 1 An internal printed circuit board can be considered to be an extended flat conductive surface, though this need not be applied in small hand-held equipment unless the equipment is likely to be subjected to a prolific charge generating mechanism (such as might occur in pneumatic transfer of powders or charge spraying in a powder coating process). Charging through normal handling of hand-held equipment is not considered to lead to a prolific charge generating mechanism and therefore would not lead to a situation where a propagating brush discharge might occur.

NOTE 2 A single flat conductive surface not exceeding 500 mm² is not considered to be an extended flat surface. This allows for the standoffs or brackets used for the mounting of conductive flat plates inside of an enclosure.

Using external insulation of at least 8 mm in thickness on metal parts such as measurement probes or similar components can prevent propagating brush discharges. When evaluating the minimum thickness of the insulation to be used or specified it is necessary to allow for any expected wear under normal usage.

If plastic with a surface area exceeding 500 mm² is employed as a covering on a conductive material, and high charging processes (see 3.13) stronger than manual rubbing are not excluded, the plastic should have one or more of the following characteristics (see 6.3.4.3):

- a) material suitably selected so that surface resistance complies with the limits given in 14.2.2;
- b) a breakdown voltage ≤ 4 kV, measured through the thickness of the insulating material according to the method described in IEC 60079-32-2;
- c) a thickness ≥ 8 mm of the external insulation on metal parts.

14.3 Electrostatic charges on external conductive parts

All external conductive parts of the equipment (metal, conductive plastic etc.) should be earthed with a maximum earth resistance of 1 M Ω . For items having a capacitance of less than 100 pF, a maximum earth resistance of 100 M Ω is acceptable (see Table 22).

Accessible metal parts (e.g. aluminum labels on plastic enclosures) with a resistance to earth of more than 100 M Ω could be susceptible to electrostatic charges that could become a source of ignition, and should be tested in accordance with the capacitance test method in IEC 60079-32-2. The maximum allowed values are given in Table 23.

The requirements of 14.3 are not applicable if the capacitance requirements of unearthed metal parts in Table 23, section E), are fulfilled.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

Part 32-1: Electrostatic hazards, guidance

FOREWORD

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC/TS 60079-32-1, which is a technical specification, has been prepared by IEC Technical Committee 31: Equipment for explosive atmospheres, and IEC Technical Committee 101: Electrostatics.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
31/1033/DTS	31/1076/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 60079 series, under the general title *Explosive atmospheres*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

transformed into an International standard,
reconfirmed,
withdrawn,
replaced by a revised edition, or
amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

This IEC Technical Specification is based on CENELEC TR 50404:2003, *Code of practice for the avoidance of hazards due to static electricity* and a number of other documents:

- from the UK: BS 5958, Parts 1 & 2:1991, *Control of undesirable static electricity*,
- from Germany: TRBS 2153:2009, *Preventing risks of ignition due to electrostatic charges*,
- from Shell International Petroleum: *Static electricity – Technical and safety aspects*,
- from the US: NFPA 77, *Recommended Practice on Static Electricity (2007)*,
- from Japan: JNIOOSH TR42, *Recommendations for Requirements for Avoiding Electrostatic Hazards in Industry (2007)*,
- from ASTM, EUROPIA, IEC, International chamber of shipping, ISO etc.

It gives the best available accepted state of the art guidance for the avoidance of hazards due to static electricity.

This document is mainly written for designers and users of processes and equipment, manufacturers and test houses. It can also be used by suppliers of equipment (e.g. machines) and flooring or apparel when no product family or dedicated product standard exists or where the existing standard does not deal with electrostatic hazards.

A second part, IEC 60079-32-2, *Electrostatic Hazards, Tests*, is under development.

EXPLOSIVE ATMOSPHERES –

Part 32-1: Electrostatic hazards, guidance

1 Scope

This part of IEC 60079 gives guidance about the equipment, product and process properties necessary to avoid ignition and electrostatic shock hazards arising from static electricity as well as the operational requirements needed to ensure safe use of the equipment, product or process. It can be used in a risk assessment of electrostatic hazards or for the preparation of product family or dedicated product standards for electrical or non-electrical machines or equipment.

The hazards associated with static electricity in industrial processes and environments that most commonly give problems are considered. These processes include the handling of solids, liquids, powders, gases, sprays and explosives. In each case, the source and nature of the electrostatic hazard are identified and specific recommendations are given for dealing with them.

The purpose of this document is to provide standard recommendations for the control of static electricity, such as earthing of conductors, reduction of charging and restriction of chargeable areas of insulators. In some cases static electricity plays an integral part of a process, e.g. electrostatic coating, but often it is an unwelcome side effect and it is with the latter that this guidance is concerned. If the standard recommendations given in this document are fulfilled it can be expected that the risk of hazardous electrostatic discharges in an explosive atmosphere is at an acceptably low level.

If the requirements of this document cannot be fulfilled, alternative approaches can be applied under the condition that at least the same level of safety is achieved.

Basic information about the generation of undesirable static electricity in solids, liquids, gases, explosives, and also on people, together with descriptions of how the charges generated cause ignitions or electrostatic shocks, is given in the annexes and in IEC/TR 61340-1.

This Technical Specification is not applicable to the hazards of static electricity relating to lightning or to damage to electronic components.

This Technical Specification is not intended to supersede standards that cover specific products and industrial situations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60079-0, *Explosive atmospheres – Part 0: Equipment – General requirements*

IEC 60079-10-1, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*