Worldwide Explosion Protection Rules and Regulations

Part of the Basic Explosion Protection Compendium

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The content of this publication has been compiled by the editor with due and thorough regard of the legal regulations valid at the date of publication and of established technical measures. Nevertheless, incomplete, inaccurate or ambiguous assertions cannot be excluded in the publication. The publication consists of several individual brochures containing general fundamental information on explosion protection. The content of the publication is not intended for and is not suitable for assessing the potential danger of a specific plant.

All regulations on explosion protection are established by German law, including the German Protection at Work Act, and national and international standards. Adherence to these regulations and the German Protection at Work Act are fundamental obligations of the plant designer, plant operator, and employer.

The regulations on explosion protection are subject to legal guidelines and can vary by country.

Furthermore, industrial plants can differ greatly from one another in their design, materials used, and methods of operation. The individual brochures of this compendium provide an overview of topics relating to explosion protection. With this in mind, the technical and organizational measures for explosion protection can only be detailed generally and thus incompletely. In a given specific case, each plant operator must determine his requirements and approach on the basis of an individual hazard assessment, and implement and document these in a fashion verifiable in accordance with the national regulations.

Where necessary, we refer to the relevant IEC/EN standards. Many other countries have comparable national standards. References to national standards are given where required for purposes of clarity and accuracy.

Ask us if you have any questions—we will be happy to help!

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Introduction

In the field of explosion protection there are a number of requirements, directives, laws, standards, and other publications that consider the subject from different perspectives. It is thus difficult to obtain an overview and to identify the essential information for one's own field of activity and area of responsibility.

The key term "field of activity" presents the first challenge:

Manufacturers of explosion-protected equipment must meet different explosion protection requirements than operators of plants where this equipment is used. Test facilities for the relevant products have a different focus than test facilities for workspaces and plants. In addition, some statutory accident insurers and property insurers have published specific regulations on the different areas.

All of these groups have to deal with electrical and non-electrical equipment to varying extents.

Typical applications where this equipment is used among others include:

- Explosion-hazardous areas of mining operations
- Surface mining plants in the process industry
- Petrochemical applications
- The production and processing of wood products and foodstuffs

The subject of explosion protection becomes even more complex when putting it into global perspective. This publication undertakes the attempt to give an overview and summarize the different rules and regulations for different regions, nations, and parts of the world that contribute key rules and regulations in order to make them transparent and comparable.

IECEx – An Internationally Recognized Explosion Protection Certification Scheme

Introduction

Besides the drafting and preparation of international standards, the International Electrotechnical Commission (IEC) facilitates the operation of conformity assessment systems. One such system is the IECEx system. Founded in 1996, the IECEx System stands for “International Electrotechnical Commission (IEC) System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres.” The system aims to help industry, authorities, and regulators to ensure the worker safety and to keep electrical and non-electrical equipment safe in explosion-hazardous areas. The system has become a network of certification bodies (ExCBs) that spans more than 33 countries.

The IECEx System is intended to facilitate international trade in equipment and services for use in potentially explosive atmospheres, while maintaining the required level of safety and system integrity.

The IECEx System covers the following aspects (IECEx: 2019):

- Certified equipment scheme
- Certified service facilities scheme
- Certified personnel scheme

Based on the IECEx System, equipment compliance can be ensured through third-party certification of equipment, systems and assemblies, service providers, and people.

Explosion-Hazardous Areas (Ex Areas)

According to the IECEx System, explosion-hazardous areas are “places where flammable liquids, vapors, gases, or combustible dusts are likely to occur in quantities sufficient to cause a fire or an explosion.” There are several names for these areas, including hazardous locations, hazardous areas, and (potentially) explosive atmospheres.

Role of International Standards

Requirements like those monitored by the IECEx System have been around for decades. IEC and ISO international standards address the basic principles of explosion protection, such as requirements for hazardous area systems and equipment.

Manufacturers, suppliers, service providers, and end users in hazardous industries have adopted these international standards to ensure safe products and processes. Countries around the world have also adopted them both regionally and nationally.

Most market participants engage in global trading and must therefore meet national and international requirements. To ensure that uniform safety practices are implemented in sectors that involve substantial hazards, national regulations often require third-party certification bodies to evaluate conformity. Participants in international trade may find this problematic because the equipment being traded globally may have to be tested and assessed for conformity in each of its import countries. Thus, importing equipment becomes more expensive and without any additional safety upon installation.

Internationally recognized certification systems mitigate these issues and ensure that uniform regulatory requirements apply around the world. By standardizing certification, these systems reduce costs and testing delays/duplication and maintain international safety standards, such as those developed by the Technical Comitee 31 of the International Electrotechnical Commission (IEC TC 31).

Legal Acceptance

The IECEx System has been written into the national legal requirements as an accepted alternative to national certification standards (albeit with some minor restrictions) by the following five countries:

- Australia
- New Zealand
- Singapore
- India
- Israel

In countries where there is no legally mandated certification process, the IECEx System is also accepted over other regional or national schemes.

All regions and countries with an IECEx ExCB are committed to indirect acceptance via their own certification bodies.

Sometimes, this is written directly into the legislation. This is the case in the following instances:

- Brazil
- Eurasian Economic Union (Armenia, Belarus, Kazakhstan, Kyrgyzstan, and the Russian Federation)
- United Arab Emirates (U.A.E.)
- U.S. Coast Guard (USCG) for equipment for hazardous locations installed offshore in the Gulf of Mexico. The ExCB that issues the IECEx certification needs to be a USCG approved test lab.

IECEx Certification Procedure

IECEx offers certification services to enable manufacturers of Ex equipment to get their products certified internationally. Manufacturers can use the "IECEx-certified equipment scheme" to receive proof that the equipment conforms to the international standards listed on the certificate. The certificate consists of several components.

Certification Explained Step-by-Step

1. To obtain the IECEx certificate, the manufacturer prepares a sample of the Ex equipment or application and submits it to the relevant IECEx Certification Body (ExCB).
2. The Ex equipment sample in question is tested by an IECEx Test Facility (ExTL) of the ExCB and a IECEx Test Report is generated (IEC ExTR).
3. After that, depending on the type of Ex equipment or application, it can be necessary that a Quality Assessment Report (QAR) takes place at the manufacturer's site.
   For this, the manufacturer/the manufacturing location requires to maintain a quality management system for the manufacture of Ex equipment, referred to as "Quality Assessment Report (QAR)."
   - The manufacturing site producing the Ex equipment or application is under the surveillance of an IECEx Certification Body (ExCB), which issues an IECEx QAR related to the IECEx Certificate of Conformity (CoC).
4. If required, on-going periodic QARs then ensure that the stringent standards are being maintained by the manufacturer, over time.

The IECEx Certificate - Components in Brief

In summary, for an IECEx certification of a series Ex equipment to be valid, three key elements are required:

1. IECEx ExTR: A test report issued by an IECEx Test Facility (ExTL) and endorsed by an IECEx Certification Body (ExCB)
2. IECEx QAR: A quality assessment report issued by an IECEx Certification Body (ExCB)
3. IECEx CoC: A certificate of conformity issued by an ExCB. An original IECEx Certificate of Conformity (CoC) is available online on the IECEx website (www.iecex.org) where it can solely be accessed.

A list of national organizations that are IECEx-approved to operate within the IECEx Certified Equipment Scheme and to issue IECEx Test Reports (ExTRs), IECEx Quality Assessment Reports (QARs), and the Online Certificate of Conformity (CoC) is available in the member area at iecex.com.

Marking

The IECEx mark serves as an conformity mark giving evidence that equipment bearing this mark is IECEx certified. According to IECEx 01B, the logo may be used among others by the following in order to certify the conformity to IECEx (according to IECEx OD 422) of a tested Ex equipment:

- IECEx certification bodies (ExCBs) and testing labs (ExTLs)
- Manufacturer of IECEx-certified equipment

Figure 2.1 IECEx conformity mark. Once an Ex equipment has been certified by an ExCB to be in accordance with IECEx, the mark may be placed directly on the equipment, on the packaging, or instructions.

Certification Scheme Overview: International (IECEx) — Europe (ATEX) — North America (NEC®/CE Code)

Certification	IECEx	ATEX	NEC®/CE Code
Area of application	Global (except Europe and North America)	European Union	US/Canada
Scope	■ Electrical equipment ■ Non-electrical equipment ■ Gas /dust applications ■ Service facilities ■ Certification of personnel competencies (CoPC)	■ Electrical equipment ■ Non-electrical equipment ■ Gas /dust applications	■ Electrical equipment ■ Gas /dust applications
Compliance required	■ IEC standards ■ ISO standards	■ ATEX Directive: Annex II, Essential Health and Safety Requirements (EHSR)	■ US: CFR 29, subpart S 1910.307; national standards by UL, FM, ISA, NFPA ■ Canada: CEC 2-024; national standards by CAN/CSA
Certification bodies	Testing Facilities (ExTLs) and Certification Bodies (ExCBs) evaluated and qualified by IECEx assessors	Notified Body (NB) evaluated and qualified by an official body and notified to the EU Commission	■ US: Nationally Recognized Testing Laboratory (NRTL) accredited by Occupational Safety and Health Administration (OSHA) ■ Canada: Certification body (CB) accredited by Standards Council of Canada (SCC) Examples: CSA, FM, Intertek, UL ...
Resulting proof	Certificate of conformity (CoC)	EU-Type Examination Certificate	■ US: Listing, approval, or certification by a National Recognized Testing Laboratory (NRTL). ■ Canada: "Approval" by a Standards-Council-of-Canada-approved laboratory (SCC-approved)
Marking	Marking per applied standards	■ Mandatory marking per Directive ■ Marking per applied standards, if any	Ex mark according to the applied standard; including mark of the approving authority (NRTL or CB).
Self-declaration options	None. All equipment for use in explosion-hazardous areas requires a CoC, without exception.	ATEX Directive permits equipment for use in Zone 2 or 22 in explosion-hazardous areas to be self-declared due to reduced risk (risk-based approach).	It is theoretically possible that the manufacturer issues a self-declared confirmation, provided this is accepted by the Authority Having Jurisdiction (AHJ). From experience, this is rarely accepted or utilized, though.
Certificate issuance	Central transparent point-of-access for all certificates: www.iecex.com	Notified Body (NB) issues certificates (on paper and/or digitally).	CB issues certificates (on paper or digitally) and depending on the body offers transparent point-of-access on the website

Table 2.1 Comparison of the major explosion-protection certification or approval schemes

Sources and References

International Electrical Commission Secretariat: Informative Brochure: IECEx System. Switzerland, 2019.
www.iecex.com/publications/iecex-brochures/

International Electrical Commission & IEC System for Certification to Standards relating to Equipment for Use in Explosive Atmospheres: International IECEx Certification: The Way to Safety Compliance in Hazardous Areas
www.iecex.com/publications/iecex-brochures/

IECEx 04: IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres (IECEx System) - IECEx conformity mark licensing scheme – Rules.

IECEx 04A: IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres (IECEx System) - Rules and guidance for making applications for and use of IECEx conformity mark, IECEx 04

IECEx 01B: IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres (IECEx System) - Rules and guidance for the use of the IECEx logo, Edition 4.0

Physikalisch-Technische Bundesanstalt (PTB): Certification according to IECEx
https://www.ptb.de/cms/en/metrological-services/kbs/kbs1/explosion-protection/further-information/certification-according-to-iecex.html

Underwriters Laboratories (UL): IECEx Hazardous Areas Certification for Access to International Markets
www.ul.com/services/iecex-hazardous-areas-certification-access-international-markets

Explosion Protection Equipment Certification in European Countries

Hazardous Area Product Certification in Europe (Example: Germany)

Whereas the Directive 2014/34/EU addresses the manufacturer responsibilities, this part of the publication intends to give users or operators working in this field an insight into these requirements. It is geared to clarify the meaning of the European Directive 2014/34/EU and to explain the procedures and terms involved.

Directive 2014/34/EU ("Directive [...] relating to equipment and protective systems intended for use in potentially explosive atmospheres") is aimed at manufacturers of explosion-protected equipment or those who provide such products on the market. This Directive covers the requirements for conformity assessment, marking, and documentation of the relevant products. This Directive does not cover zone classification, explosion protection documents, the testing of equipment and plants, or many other operator responsibility requirements. Information on this topic can be found in other publications in this series.

Note

Referring to the Directive

Directive 2014/34/EU or its predecessor Directive 94/9/EC, which is addressed in this publication, is sometimes also referred to as "ATEX 95." The subsequent number refers to the article of the European Treaties—in the context of ensuring free trade. However, since these are artificial terms, which can evidently change and are somewhat confusing, reference will be made hereinafter to the Directive (i. e., Directive 2014/34/EU).

Target of Directive 2014/34/EU

Short Historical Review

As early as 1979, Directives existed in Europe that placed requirements on equipment for use in explosion-hazardous areas, e. g., the Directive 76/117/EEC or Directive 79/196/EEC. The aim of these Directives was to ensure the free trade of such products, since it had been recognized that the rules in force in the individual Member States differed from country to country and thus constituted barriers to trade. The title of the directives referred explicitly to electrical equipment. However, this meant that a large number of non-electrical equipment was not covered. The issue of dust explosion protection was not handled in the same way as we know it today.

A milestone in this context was Directive 94/9/EC, which was also published in 1994 under the title "Directive [...] relating to equipment and protective systems intended for use in potentially explosive atmospheres" and which became binding as of July 1, 2003 within the scope of the Directive.

Current Directive 2014/34/EU

In summary, the Directive contains the following regulatory information:

- Transposition into national law:
  The Directive had to be transposed into national law by the Member States of the European Union and has been applicable throughout Europe since April 20, 2016.
- Scope of Application:
  The Directive establishes requirements for equipment with an intended use in potentially explosive atmospheres, including some other products, e. g., safety devices.
- Conformity Assessment:
  Explosion-protected products must be shown to comply with all applicable requirements of the Directive.
  Note that not all equipment that falls within the scope of the Directive must be explosion-protected; e. g., a barrier that is installed in a non-hazardous area does not need to be explosion-protected.

- Marking:
  Products falling within the scope of the Directive must be provided with the appropriate marking.
- Documentation:
  Products falling within the scope of the Directive must be provided with the appropriate documentation.

Transposition Into National Law

The European Directives address Member States of the European Union as legal entities and not individual manufacturers, users, or private individuals as natural persons in these states. Therefore, these Directives must be transposed into national laws within specified time limits before they become legally valid for natural persons in the different states.

In Germany, this was incorporated as part of the 11th Regulation the "Explosion Protection Ordinance" (Explosionsschutzprodukteverordnung, 11. ProdSV) to the Product Safety Act (Produktsicherheitsgesetz, ProdSG). Many of the requirements of the Directive were adopted, some of which contained a direct reference to the original text. Since the Directive is aimed at enabling free trade, Member States were not allowed to amend, add to, tighten, or weaken the law in the course of national transposition in a way that was contrary to the purpose of free trade.

Scope of Application

The scope of application of Directive 2014/34/EU is relatively broad and comprises the following **equipment and systems:**

- Equipment
- Protective systems
- Safety devices, controlling devices, and regulating devices
- Components

Equipment refers to products that store and/or convert energy, etc. and have their own potential ignition source (for the exact definition, see Directive 2014/34/EU). Traditionally, this includes electrical equipment such as:

- Motors
- Lights
- Sensors
- Measuring instruments
- Junction boxes
- And a variety of other products

But also **non-electrical equipment** such as:

- Gears
- Pumps
- Compressors
- Centrifuges
- Fans

This equipment can also have its own potential ignition source and thus possibly ignite a surrounding potentially explosive atmosphere.

The following **fasteners and tools** are not covered by the scope of application:

- Cable
- Piping
- Flanges
- Screwdriver

These do not have a potential ignition source per se. But care should still be taken when using such products in explosion-hazardous areas! A hazard assessment based on Directive 1999/92/EC, among other things, must always be carried out.

Safety devices, controlling devices, and regulating devices are products that are generally used (although there are exceptions) outside the explosion-hazardous area. Explosion protection of devices and protective systems is substantially dependent on the correct function of such devices. Examples include:

- Intrinsically safe power supply units (Zener barriers, transmitter power supplies, etc.) that supply, evaluate, etc. intrinsically safe equipment
- Motor protective switches or PTC resistor relays that disconnect explosion-protected motors from the electricity supply in the event of overload or brake application to prevent impermissibly high temperature rises and thus ignition sources

Protective systems are products that detect an incipient explosion and extinguish it in its initial stage or isolate the affected area. In the event of an explosion, these systems prevent its uncontrolled propagation and limit the extent of harm. Examples of such products include:

- Explosion suppression systems
- Bursting disks
- Flame arresters
- Detonation flame arresters

Components, in contrast, enjoy a special position in this list, since by definition they do not have their own autonomous function. Nevertheless, components have a significant influence on the explosion protection of devices in which they are used. These can include, e. g.:

- Empty enclosures
- Terminals
- Locking elements for enclosures

The extent, to which components contribute to explosion protection is measured by characteristics such as mechanical strength, protection against self-loosening, compliance with specific gap dimensions in flameproof enclosures, etc. These components are accompanied by a special certificate called "U certificate," which will be discussed later.

Once the manufacturer has clarified which products to supply on the market for use in explosion-hazardous areas and which product corresponds to the above classification, further elements must still be clarified.

For example, equipment is divided into equipment groups (also shortened to "groups") I and II, depending on its area of use:

- Equipment group I comprises equipment intended for use in underground mining operations and the surface mining plants connected to them
- Equipment group II comprises equipment intended for use in other areas

In the next step, equipment categories (also shortened to "categories") are assigned to the equipment. The category is the safety level of an apparatus. This refers to the protection level at which an explosion-protected apparatus does not become an ignition source even in the case of a fault, or at which a safety device, controlling device, or regulating device fulfills its required function.

Using the example of equipment group II, category 1, Directive 2014/34/EU states that:

"equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a very high level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapors, mists, or by air/dust mixtures, are present continuously, for long periods, or frequently. Equipment in this category must ensure the requisite level of protection, even in the event of rare incidents relating to equipment, and is characterized by means of protection such that either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection, or the requisite level of protection is assured in the event of two faults occurring independently of each other."

This section refers to the presence of a potentially explosive atmosphere. It is therefore reasonable to assume that this refers to zones into which explosion-hazardous areas should be divided in accordance with Directive 1999/92/EC. However, the term "zone" is not a manufacturer's term, but a user term and is therefore not mentioned at all in Directive 2014/34/EU. Nevertheless, since the equipment is actually intended for use in these zones, the following table provides a comparison of equipment groups, equipment categories, and zones, after all:

Groups, Categories, and Zones

Equipment group	Equipment category	Probability of potentially explosive atmosphere	Protection level to be guaranteed
I (mine gas, combustible dusts)	M1	Present	Very high
	M2	Occasionally present	High
II all other areas (mixtures of air and gases, vapors, mist, dusts)	1	Present permanently, for prolonged periods, or frequently	Very high
	2	Occasionally present	High
	3	Not or rarely present	Normal

Table 3.1 Assignment of equipment groups, equipment categories, in correlation with zones

If the device belongs to group II, the manufacturer must, among other things, specify and document the type of potentially explosive atmosphere in which the device is intended for use in the marking. Depending on whether it is an explosive gas atmosphere or a dust atmosphere, the category is supplemented by a "G" or a "D".

Figure 3.1 LED handheld lamp for use in Zones 1 and 2 in the gas explosion-hazardous area and Zones 21 and 22 in the dust explosion-hazardous area

Conformity Assessment

As mentioned above, products covered by Directive 2014/34/EU must comply to all applicable requirements. Since these are details that the user is not usually confronted with, the most important aspects of the conformity assessment procedures are mentioned here:

The question of whether a product should be certified by an 3rd party conformity assessment body —the "Notified Body (NB)"—according to Directive 2014/34/EU depends on the following aspects:

- Equipment category
- Type of product

"Type of product" essentially means distinguishing between electrical or non-electrical equipment (for details, see Annex III … IX of the Directive).

Evidence of Conformity According to Directive 2014/34/EU

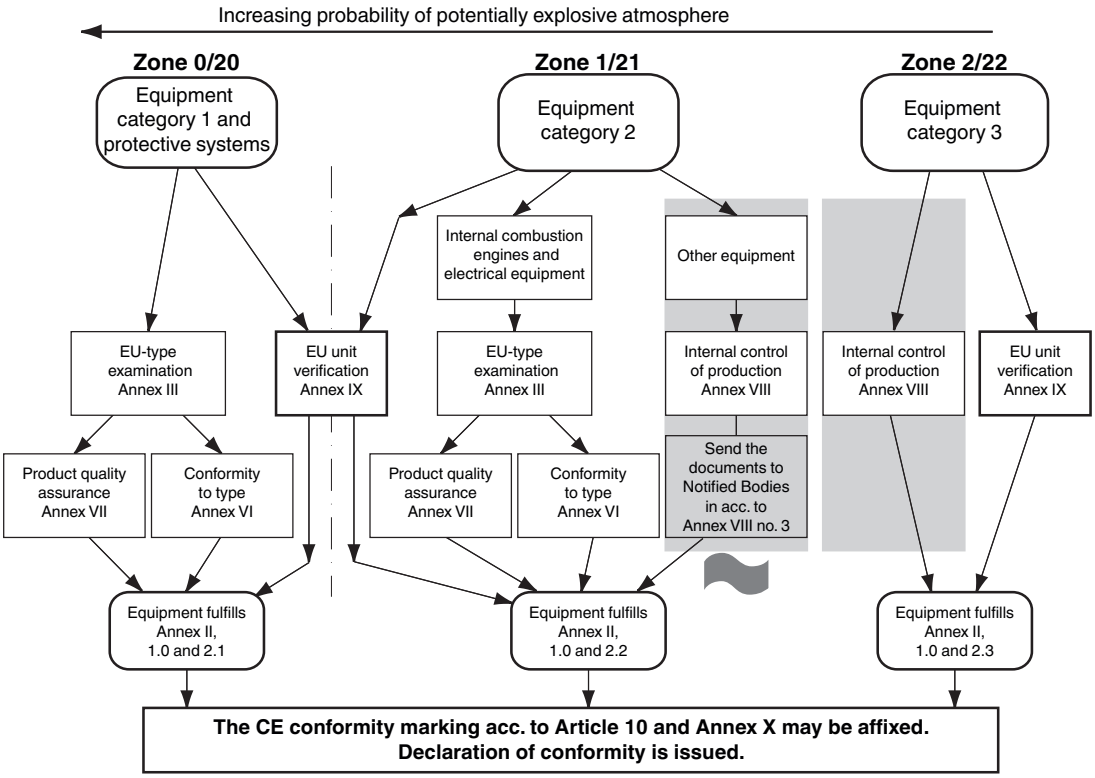


Figure 3.2 Conformity assessment according to Directive 2014/34/EU

The figure above shows the following:

Category 1: Products must be subjected to an EU-type examination or EU unit verification by a Notified Body. This also applies to category–1 safety devices, controlling devices, and regulating devices. This relates to all equipment to be installed in Zones 0 and 20, including non-electrical equipment.

Category 2: Products must also be subjected to an EU-type examination if they are electrical equipment; this is not necessary if the products are non-electrical equipment.

Category 3: No electrical or non-electrical equipment of category 3 needs to be subjected to an EU-type examination.

The difference between the different types of certification is important as can be observed in the following examples.

If the type-examination certificate or the marking is not supplemented by a letter, the corresponding apparatus can be used in accordance with the applicable installation specifications and the instruction manual, without observing any further specific conditions of use.


CESI

CERTIFICATE

EU-TYPE EXAMINATION CERTIFICATE

CESI 21 ATEX 017

Figure 3.3 Example: Title page of the certificate CESI 21 ATEX 017:

If the type-examination certificate or the marking is not supplemented by a letter, the corresponding apparatus can be used in accordance with the applicable installation specifications and the instruction manual, without observing any further specific conditions of use.

Greater caution must be exercised by the user if the certificate or marking is supplemented by the letter "X." This letter is used to identify the apparatus if specific conditions of use must be observed to safely use the apparatus in question, without these conditions being directly attributable to the apparatus. This may include particular information regarding the operating temperature range, possible restrictions on mechanical strength, precautions for preventing electrostatic charge, etc.

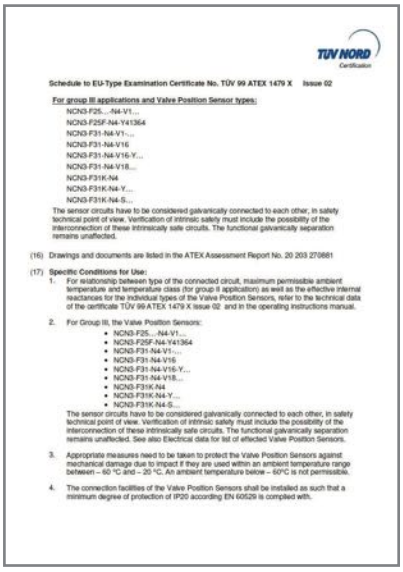
The following excerpt of a certificate shows examples of specific conditions of use that may be listed in a certificate.


TÜV NORD

Translation

EU-Type Examination Certificate

Figure 3.4 Example: Title page of the certificate TÜV 99 ATEX 1497 X: "X" denotes specific conditions of use that apply to the certified product with section (10) providing a separate indication of this fact.



TÜV NORD Certification

Schedule to EU-Type Examination Certificate No. TÜV 99 ATEX 1479 X Issue 02

For group III applications and Valve Position Sensor types:

NCN3-F25...-N4-V1...
NCN3-F25F-N4-Y41364
NCN3-F31-N4-V1-...
NCN3-F31-N4-V16
NCN3-F31-N4-V16-Y...
NCN3-F31-N4-V18...
NCN3-F31K-N4
NCN3-F31K-N4-Y...
NCN3-F31K-N4-S...

The sensor circuits have to be considered galvanically connected to each other, in safety technical point of view. Verification of intrinsic safety must include the possibility of the interconnection of these intrinsically safe circuits. The functional galvanically separation remains unaffected.

(16) Drawings and documents are listed in the ATEX Assessment Report No. 20 203 270881

(17) **Specific Conditions for Use:**

1. For relationship between type of the connected circuit, maximum permissible ambient temperature and temperature class (for group II applications) as well as the effective internal reactances for the individual types of the Valve Position Sensors, refer to the technical data of the certificate TÜV 99 ATEX 1479 X issue 02 and in the operating instructions manual.
2. For Group III, the Valve Position Sensors:
   - NCN3-F25...-N4-V1...
   - NCN3-F25F-N4-Y41364
   - NCN3-F31-N4-V1-...
   - NCN3-F31-N4-V16
   - NCN3-F31-N4-V16-Y...
   - NCN3-F31-N4-V18...
   - NCN3-F31K-N4
   - NCN3-F31K-N4-Y...
   - NCN3-F31K-N4-S...

   The sensor circuits have to be considered galvanically connected to each other, in safety technical point of view. Verification of intrinsic safety must include the possibility of the interconnection of these intrinsically safe circuits. The functional galvanically separation remains unaffected. See also Electrical data for list of effected Valve Position Sensors.
3. Appropriate measures need to be taken to protect the Valve Position Sensors against mechanical damage due to impact if they are used within an ambient temperature range between – 60 °C and – 20 °C. An ambient temperature below – 60°C is not permissible.
4. The connection facilities of the Valve Position Sensors shall be installed as such that a minimum degree of protection of IP20 according EN 60529 is complied with.

Figure 3.5 Example of "Specific Conditions of Use" in section (17) of the TÜV 99 ATEX Certificate 1479 X

Other types of certifying and marking often lead to errors, because they are often confused with the above-mentioned X certification and X marking. If a certificate or marking is supplemented with the letter "U," it is a component within the meaning of the Directive that does not fulfill its own autonomous function and can therefore not readily be used in plants in potentially explosive atmospheres.

Fiditas explosion safety solutions

[1] **EU – TYPE EXAMINATION CERTIFICATE**

[2] Component intended for use on/in an Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU.

[3] EU-Type Examination Certificate Number: **FIDI 21 ATEX 0013U** Issue: 1

[4] Product: FB IO
Type: FB7304*3

[5] Manufacturer: Pepperl+Fuchs SE

[6] Address: Lilienthalstrasse 200, 68307 Mannheim, Germany

[7] This product and any acceptable variation thereto is specified in the schedule to this certificate and documents therein referred to.

[8] FIDITAS Ltd., Notified Body number 2829 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II of the Directive.

The examination and test results are recorded in confidential Report No: FIDI 21 CR 013

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018 EN 60079-1:2014 EN 60079-5:2015
EN IEC 60079-7:2015 / A1:2018

except in respect of those requirements listed at item 18 of the Schedule.

[10] The sign 'U' is placed after the certificate number. It indicates that this certificate must not be mistaken for a certificate intended for an equipment or protective system. This partial certification may be used as a basis for certification of an equipment or protective system.

[11] This EU-Type Examination Certificate relates only to the design, examination and test of the specified product in accordance with Annex III. Further requirements of the Directive apply to the manufacturing process and supply of this products. These are not covered by this certificate.

[12] The marking of the product shall include the following:

Ex II 2G Ex db eb q IIC Gb

FIDITAS Ltd.
Certification department
Approved:

Our ref.: 20.CRT.273
Date: 29.04.2021

Fiditas d.o.o. Dr. sc. Mladen Karlavaris, M.E.Eng.

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Figure 3.6 Example: Title page of the certificate FIDI 21 ATEX 0013 U for a component that is by itself not ready for use in potentially explosive atmospheres

Section (10) clearly states that it is a partial certificate which serves only as the basis for the overall certificate of a complete apparatus. Empty enclosures, sealing elements for unused cable glands, and terminals, etc. are marked as such.

Marking

The current marking of explosion-protected equipment is occasionally confusing for users. If you keep in mind that the overall marking originates from two sources, this will make identification and interpretation of the individual components easier with time.

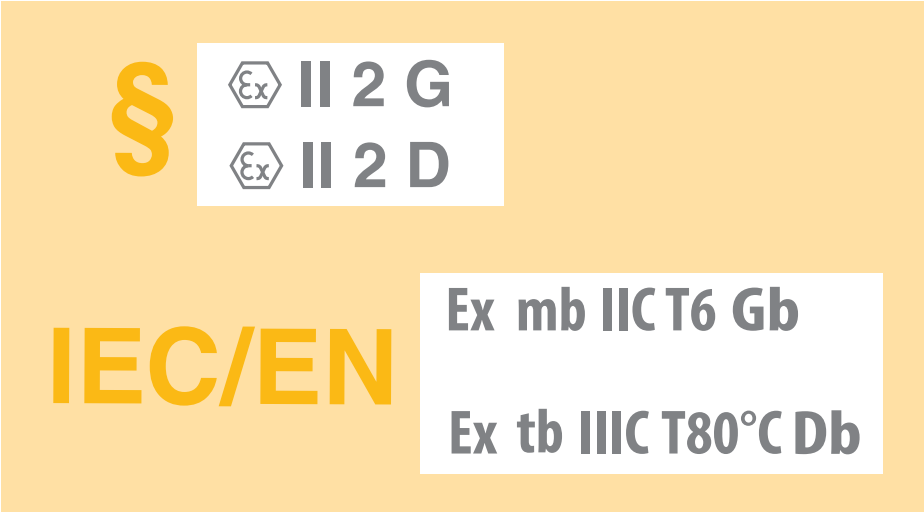


Figure 3.7 Example of legal marking vs. technical marking

- Legal marking (§): Derived from the requirements of Directive 2014/34/EU
- Technical marking (IEC/EN): Derived from harmonized standards as part of the design and conformity assessment of the Ex product

The first document requiring the appropriate marking of explosion-protected equipment is Directive 2014/34/EU, which is presented in this publication. Hereinafter this is referred to as "legal marking." Secondly, almost all manufacturers refer to one or more harmonized standards as part of the design and conformity assessment of their products. Beside technical requirements for the equipment, these standards also require marking—hereinafter referred to as "technical marking." Since the two sources might use different regulations for the marking of one and the same set of facts, it makes sense to use a step-by-step approach. In this section, legal marking is presented. For details on technical marking, see the Explosion Protection Compendia "Types of protection for electrical apparatus" and "Dust explosion protection."

The content of the legal marking can almost be derived from see chapter where the essential elements of the marking are mentioned which, according to Directive 2014/34/EU, must include:

- The name and address of the manufacturer
- CE marking (exception: components)
- Name of series and type
- Serial number, if applicable
- Year of manufacture
- Ex mark for the prevention of explosions, followed by the Roman numeral that indicates the equipment group
- For equipment group II, the letter "G" (for "GAS:" areas where potentially explosive mixtures of gas, vapor, mist, and air are present) and/or the letter "D" (for "DUST:" areas where dust may form potentially explosive atmospheres)

In addition, Ex equipment is often marked with warnings, where this has been deemed necessary.

Here are a few examples of applications:

Applications in Zone 20

Figure 3.8 Applications such as a proximity sensor for use in Zone 20 are marked with Ex, equipment group II, category 1 D. Since it is therefore a category-1 device; an EU-type examination must be carried out by the Notified Body.

Sensors in Zone 1

Figure 3.9 Inductive sensors directly mounted with actuator for use in Zone 1 are marked with Ex, equipment group II, category 2 G. Since this is therefore a category 2 electrical device, an EU-type examination must be carried out by the notified body.

Pump in Zone 1

Figure 3.10 A pump for use in Zone 1 is also marked with  , equipment group II, category 2 G. However, since this is a non-electrical category 2 apparatus, an EU-type examination does not need to be carried out.

Sensor for Use between Zone 0 and Zone 1

Figure 3.11 A sensor for installation in a separation wall between Zone 0 and Zone 1 is marked with  , equipment group II, category 1/2 G. The slash represents the separation wall between two zones (e. g., container, conduit) and indicates that the device has different categories at different points.

Documentation

In addition to conformity assessment and marking, Directive 2014/34/EU contains other important aspects to allow explosion-protected equipment to be used for its intended purpose and operated safely: the EU declaration of conformity and the instruction manual. Since the latter is extremely important for safe use, the wording of the Directive (1.0.6) is quoted here:

"All equipment and protective systems must be accompanied by instructions, including at least the following particulars:

- a recapitulation of the information with which the equipment or protective system is marked, except for the batch or serial number, together with any appropriate additional information to facilitate maintenance (e. g., address of the repairer, etc.);
- instructions for safe—
  - putting into service;
  - use;
  - assembling and dismantling;
  - maintenance (servicing and emergency repair);
  - installation;
  - adjustment;
- where necessary, an indication of the danger areas in front of pressure-relief devices;
- where necessary, training instructions;
- details which allow a decision to be taken beyond any doubt as to whether an item of equipment in a specific category or a protective system can be used safely in the intended area under the expected operating conditions;
- electrical and pressure parameters, maximum surface temperatures, and other limit values;
- where necessary, special conditions of use, including particulars of possible misuse which experience has shown might occur;
- where necessary, the essential characteristics of tools which may be fitted to the equipment or protective system."

The manufacturer or its authorized representative established in the European Union (EU) shall draw up the instruction manual in one of the EU languages.

When commissioning equipment or a protective system, the original instructions and a translation of this instruction manual in the language(s) of the country of use must be supplied.

This translation shall be drawn up either by the manufacturer or by their authorized representative established in the EU or by whoever is bringing the equipment or protective system into the language area concerned.

However, the maintenance instructions for trained and qualified personnel employed by the manufacturer or its authorized representative established in the EU may be drawn up in a single EU language understood by these personnel.

The instruction manual contains the plans and diagrams necessary for commissioning, servicing, inspection, functionality checking, and, if necessary, repair of the equipment or protective system, and all expedient information, in particular with regard to safety.

With regard to safety aspects, the documents in which the equipment or protective system is presented must not contradict the instruction manual.

Sources and References

Council Directive 76/117/EEC of 18 December 1975 on the approximation of the laws of the Member States concerning electrical equipment for use in potentially explosive atmospheres (Directive 76/117/EEC)

Council Directive 79/196/EEC of 6 February 1979 on the approximation of the laws of the Member States concerning electrical equipment for use in potentially explosive atmospheres employing certain types of protection (Directive 79/196/EEC)

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.

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. (Directive 1999/92/EC)

ProdSG: Act on making products available on the market (Product Safety Act, Germany)

ProdSV 11: 11th Regulation regarding the German Product Safety Act (explosion protection products regulation)

Wettingfeld, Klaus: Explosionsschutz nach VDE und BetrSichV. VDE-Schriftenreihe, Band 65, ISBN 978-8007-3012-4 [Explosion protection according to VDE and the German Ordinance on Industrial Safety and Health. VDE series, volume 65]

Heuer, Jens-Uwe/Reusch, Philipp: Das neue Produktsicherheitsgesetz. Erläuternde Darstellung - Gegenüberstellung GPSG/ProdSG - Gesetzestext. Bundesanzeiger Verlag, ISBN 978-3-8462-0001-8 [The new German Product Safety Act. Explanatory presentation - comparison GPSG/ProdSG vs. text of the law]

European Commission ed.: ATEX Guidelines, Guidelines on the application of Directive 2014/34/EU of the European Parliament and the council of February 26, 2014 on the harmonisation of the law of the member states relating to equipment and protective systems intended for use in potentially explosive atmospheres. (New edition) April 2016.

Hazardous Location Equipment Certification in North America

Equipment Certification in the USA — Overview

In the USA, the legal requirement that often leads to equipment certification can be found in Title 29 of the Code of Federal Regulations (29 CFR). Part 1910 of 29 CFR covers occupational safety and health standards and is monitored and regulated by the Occupational Safety and Health Administration (OSHA). Within Subpart S, 29 CFR 1910.307 addresses electrical equipment and installations for hazardous (classified) locations. Based on this, the main obligation to ensure worker safety involving both electrical equipment and the wiring used for the installation lies with the user/operator. However, the details of electrical equipment and wiring materials are often not known by the end user. There might be some specific situations where the equipment does not require specific markings or indication that it can be used in hazardous locations. For the vast majority of cases, though, the equipment or wiring manufacturer provides a method for the end user or employer to know the suitability of the equipment for their application. In 29 CFR 1910.307(c), electrical equipment or wiring components are acceptable for installation into hazardous locations in one of three ways:

In 29 CFR 1910.307, electrical equipment or wiring components are acceptable for installation into hazardous locations if they are designed to meet either of the following options:

1. It is intrinsically safe
2. It is approved for the hazardous location
3. It is safe for the hazardous location

The first of these options is a protection concept that is often used. Any equipment that is identified as intrinsically safe, is typically assessed by a Nationally Recognized Testing Laboratory (NRTL), as there are strict requirements for this protection concept. The manufacturer of the equipment typically receives an NRTL approval.

The second option involves all possible protection concepts, but requires an approval method that is acceptable to OSHA. The methods that are considered “acceptable” are further described in 29 CFR 1910.399 as follows:

1. The equipment is accepted, certified, listed, labeled, or otherwise determined to be safe by a NRTL; or
2. With respect to equipment where it is of a kind that no NRTL accepts, certifies, or otherwise deems to be safe, if inspected or tested by another federal agency, or by a State, municipal, or local authority responsible for enforcing the occupational safety requirements of the NEC® and found in compliance with the requirements of the NEC®; or
3. With respect to custom-made equipment or installations that are …intended for a particular customer, if it is determined to be safe for its intended use by its manufacturer on the basis of the test data which the employer keeps and make available for inspections to the assistant secretary and their authorized representatives.

The third option from 29 CFR 1910.307(c) is similar to the third option from 29 CFR 1910.399, where the employer determines and can demonstrate that the equipment provides protection against arising hazards.

For most equipment that is commercially available, manufacturers generally choose to get the equipment certified by an NRTL. This provides a clear path for the employer to be able to demonstrate acceptability of the equipment for use in hazardous locations.

Also, for options where the equipment is custom-made or where employers do not have the needed technical expertise, many NRTLs have an option for a field certification. The field certification assesses the particular piece of equipment to assure safety.

OSHA’s NRTL program provides the rules, guidelines, and oversight for each NRTL. Under this program, an NRTL is recognized for the individual testing standards that it is able to certify to, working from a list of approved testing standards published by OSHA. Not all NRTLs are capable of certifying equipment for use in hazardous locations, and those that can certify to one particular standard, may not be able to certify to another. While all NRTLs are equal when it comes to OSHA compliance and requirements, due to a variety of complex factors, some NRTL marks

are preferred or required over others in some markets. This makes the selection of an NRTL a decision that also concerns marketing. Along these lines, there may be marketing decisions that lead to multiple NRTL certifications for a piece of equipment. Unlike IECEx, where only one certification body can be involved for the current and active certification, under OSHA regulations a piece of equipment can have any number of NTRL approvals that are valid at one time.

Class/Division and Zone Hazardous-Area Classification

Although Class/Division classification is the predominant scheme for hazardous-area classification in the USA, Zone-classified hazardous areas are also recognized. There are a number of hazardous-area-specific equipment standards available, and a number of bodies that write those standards. The three most prevalent bodies are:

- Underwriters Laboratories Inc. (UL), who also took over a number of ISA standards
- Factory Mutual (FM)
- National Fire Protection Association (NFPA) which provides NFPA 70® and other standards

Standards that cover the requirements for Zone-classified hazardous areas are based on the IEC 60079 series of standards but contain national deviations to accommodate US-specific requirements. All IEC standards that are adopted in the USA are published by UL as UL versions with ANSI recognition, e.g., ANSI/UL 60079-0. Standards that cover Class/Division requirements have historically not aligned with the Zone-related requirements, but this has been changing. In the past several years, bodies that write Class/Division standards have been taking steps where possible to harmonize them with the IEC 60079 series of standards. For example, the most recent edition of UL 913, which covers intrinsic safety for various Class/Division applications, now largely points to the requirements in UL 60079-11.

Dual Certification

Since both Zone and Class/Division hazardous-area classification schemes exist in the USA, it is possible to get a product dual certified. Dual certification indicates that the product meets the requirements for each classification scheme. Additionally, the Zone equipment standards and many of the Class/Division equipment standards allow for dual marking. Compared to dual certification, this provides an easier way for a product that is certified under one hazardous-area classification scheme to be identified as permitted for installation into another type of hazardous-area classification. The cross from Zone to Class/Division is also covered in NFPA 70®, and the dual marking helps support this allowance.

Ordinary Location Certification

Electrical equipment that is certified for use in a hazardous location by an NRTL must also comply with all applicable ordinary location equipment standards. Depending on the type of equipment, there may be a national adoption of an IEC-based standard that is available to cover these requirements, but this is not always the case. The result is a certification from an NRTL for the piece of equipment to support proper installation and safe use of the equipment by the employer according to 29 CFR 1910, Subpart S.

Physical Audits

Once electrical equipment receives certification, audits are needed to ensure ongoing compliance. To stay accredited, NRTLs must at particular intervals provide follow-up physical inspections at each manufacturing location for each device that they have certified, depending on the end-use application of the device. For hazardous-location electrical equipment, inspections occur quarterly. During these inspections, the product being built is physically audited for compliance with the issued certification.

This is vastly different from the quality system-type audit structures that are used for ATEX, IECEx, and many other schemes. The NRTL product-based audits are always physical—they cannot be done over the phone or via a paper trail—and evaluate the end product being built and shipped at a given production location. Variation notices are given by the NTRL for non-compliance. In extreme cases, factories can be stopped from shipping a product with the NRTL's logo when violations have been found and not addressed.

Product Markings

Certification markings on a piece of equipment include a logo for the NTRL that has certified the equipment. The markings may also include details that aid in the verification of the equipment certification. Many NRTLs have websites for equipment lookup to verify that equipment certification is currently valid. In addition to the NRTL mark, requirements include markings to indicate the hazardous locations in which the equipment can be installed, warnings, and general electrical information. These details are dictated by the equipment standards that are used and by NFPA 70®.

Product Certification in Canada — Overview

Canadian Electrical Code Rule 2–024 requires the use of approved equipment, where "approved" is defined as certified by a certification body (CB) that is accredited by the Standard Council of Canada (SCC) under its "Product, Process, and Service Certification Body Program." However, the details of equipment certification are controlled by legislation for each territory or province, and approval for use falls to the responsible Authority Having Jurisdiction (AHJ). Although this technically means that there is no single piece of legislation for equipment certification requirements that covers all of Canada, most territories and provinces follow at least the spirit of Rule 2 024. Thus, a single equipment certification from an SCC accredited CB covers most markets in Canada.

Each CB has a scope of accreditation that is categorized based on the International Classification for Standards (ISO). Each CB is required to maintain a list of standards that it can certify to, grouped into customer-defined technical categories. So, similar to the USA, not all CBs can certify electrical equipment for hazardous locations.

Class/Division and Zone Hazardous-Area Classification

Canadian law dictates that any new hazardous-area installations are to be done under the Zone hazardous-area classification scheme. This is reflected in the Canadian Electric Code (CE Code) insofar as the requirements for Zone installations are in the main body text, and the Class/Division requirements have been moved to an Annex. However, there are still a large number of installations that use the Class/Division hazardous-area classification scheme, and updates to the Zone hazardous-area classification scheme are not forced. As a result, Canada, similar to the USA, still has some equipment standards that cover Class/Division-classified applications, and others that cover Zone-classified applications. CSA is the predominant standards development organization in Canada for hazardous-area-related standards for electrical equipment.

Standards that apply in Zone hazardous-areas are based on the IEC 60079 series of standards, but contain national deviations to accommodate Canada-specific requirements. All IEC standards that are adopted in Canada are published as CAN/CSA 22.2 versions – for example, CAN/CSA 22.2 No. 60079–0. Class/Division-based standards are slowly being phased out in favor of the Zone-based IEC standards.. Where Class/Division standards are still being maintained, efforts have been made to harmonize them where possible with the Zone-based IEC standards.

As in the USA, it is possible to have a product dual certified according to both, the Zone and the Class/Division hazardous-area classification scheme. The Zone-based standards and some of the updated Class/Division standards also support the dual marking of devices, as covered in the CE Code.

Ordinary Location Certification

Similar to US requirements, electrical equipment certified for use in a hazardous location must also be certified by the SCC accredited CB to the applicable ordinary location equipment safety standards. Depending on the type of equipment, there may be a national adoption of an IEC standard available that covers these requirements, but this is not always the case.

Physical Audits

Once electrical equipment receives a certification, factory surveillance or factory audits happen typically four times per year, under the same basic premise as the factory inspections done under US requirements. The factory audits verify actual production of a certified product and must be done via a physical visit and verification. The factory audit happens at each location that produces a given product.

Product Markings

Markings on the equipment to indicate the SCC-accredited CB certification include the logo for the CB and may include further details that aid in the verification of the equipment certification. Many CBs have a website with certification data available for verification. In addition to the CB logo, additional markings for the hazardous-location certifications, standard equipment markings, warnings and any other standard requirements are also placed on the equipment label. All warnings on a piece of equipment must appear in English and French.

Product Certification for USA and Canada

While each country has different legal requirements and equipment standards, some are similar, and a few of the equipment standards are bi-national. This makes it easier to certify electrical equipment for both countries. There are also several organizations that are both NRTL- and SCC-accredited CBs. This means that a certification project with a single organization can result in certifications that cover both Canadian and US requirements. By working with a single organization that can cover both, the entire certification and auditing process is simplified. However, since marketing can be an element involved in the selection of an organization, understanding where and how a piece of equipment will be used may influence the decision.

The major organizations that are both an NRTL- and an SCC- accredited CB are:

- Canadian Standards Association (CSA)
- FM Approval LLC. (FM)
- Intertek Group PLC. (ETL)
- UL LLC. (UL)

Other organizations include:

- MET Laboratories Inc. (MET Labs)
- QPS Evaluation Services Inc. (QPS)
- SGS S.A. (SGS)

When a piece of equipment has been certified by a single organization for both Canada and the USA, the logo of the organization typically has a lower-case "c" and "us" on either side.

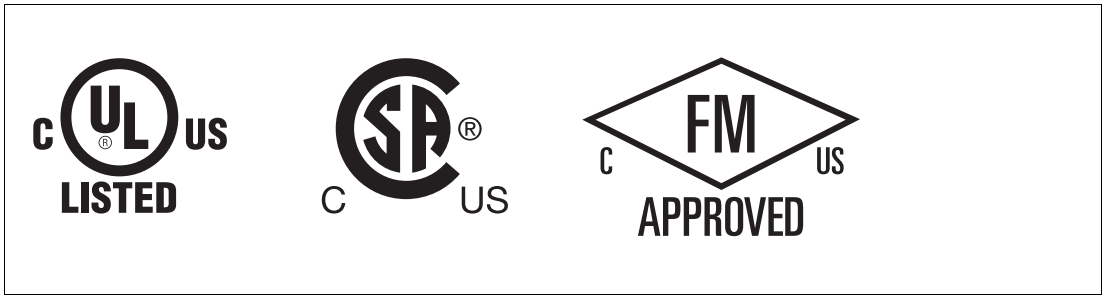


Figure 4.1 Examples of logos for equipment that has been certified by one organization for both Canada and the USA

Along with the logo identification, confirmation for both countries can typically be done on the organization's website. Each organization offers methods to differentiate whether the certifications are for Canada, the USA, or both.

Sources and References

NFPA 70® (ed.) 2017—National Electrical Code® (NEC®).

C22.1 2021—Canadian Electrical Code

Underwriters Laboratories (UL): www.ul.com

Occupational Safety and Health Association (OSHA): www.osha.gov

National Fire Protection Association (NFPA): www.nfpa.org

Factory Mutual (FM): www.fmapprovals.com

Canadian Standards Association (CSA): www.csa-international.org

Product Certification in Other Countries and Regions

Introduction

In the previous sections, IECEx, ATEX, and NEC®/CE Code systems were introduced in depth. These are the most widespread and established conformity assessment systems applicable to both electrical and non-electrical equipment for the use in potentially explosive atmospheres.

The application of the ATEX system for equipment to be used in potentially explosive atmospheres is mandatory in the European Union and EFTA countries like Switzerland and Norway.

A special situation has been created by the Brexit, with UK's wish to leave the EU and the introduction of a UK certification scheme, with its own conformity assessment mark UKCA for "United Kingdom Conformity Assessment." UKCA has just become mandatory for products to enter the UK market.

Generally, all global conformity assessment systems follow similar principles and requirements: Equipment listed for explosion-hazardous areas must be designed and produced according to essential health and safety requirements (EHSR) with the purpose to guarantee a minimum degree of worker, plant, and environmental safety. These requirements such as EHSR, OSHA, or EPA etc. result from national laws that are in turn the result of Directives and norms established and agreed upon on a national and international level.

Nearly all countries that are members in the IEC have adopted the IEC 60079 and ISO/IEC 80079 series of standards to create a national version with no, or only minor deviations. Many national standards are based on IEC standards of previous editions and are not always up-to-date. The IECEx website https://iecex.com/ is a helpful source for information regarding the relevant IEC standards.

The biggest economies in the world either already had their own certification scheme before IECEx was established, e. g., the EU with ATEX, or North America with the NEC®/CE Code. Other economically striving countries have been establishing their own certification systems similar to or based on ATEX or IECEx ever since.

In the following sections, international schemes of several countries and markets will be described.

Customs Union Certificate (EAC)

This certification scheme was created in 2012 by the Eurasian Economic Commission (EurAsEC) and is valid for the Eurasian Economic Union (Russian Federation, Belarus, Kazakhstan, Kyrgyzstan, and Armenia). In this context, the "Common Forms of the Certificate of Conformity and the Declaration of Conformity to Technical Regulations of the Customs Union TR CU" (or also called Customs Union Certificate – EAC) were approved and established.

EAC Requirements

Main Directive (file number) or national legal foundation:	TR CU 012/2011
Deviations from the ATEX Directive:	TR CU 012/2011 requires a Certificate of Conformity for all Ex equipment independent of its application.
Alignment of national standards with the international explosion protection standards (IEC 60079-0 ff.):	In general, national standards are aligned with IEC standards.
Deviations from the IECEx certification scheme:	■ In general, the EAC certificate is based on an IECEx (or an ATEX certificate). Certification bodies (CB) may use test reports that have been compiled for IECEx (/ATEX) certification. ■ No changes are allowed within valid certificates. ■ The EAC Ex marking differs from international Ex marking. ■ The structure of an EAC certificate is different from that of an IECEx certificate.
Examples of bodies that conduct EAC certifications:	■ НАНИО ЦСВЭ (www.ccve.ru, NANIO CCVE) ■ ТЕХНОПРОГРЕСС (https://tehnoprogress.ru , TechnoProgress) ■ Ленпромэкспертиза (www.lenpromexpertiza.ru, Lenpromexpertiza) ■ ВНИИФТРИ (www.vniiftri.ru, All-Russian Scientific Research Institute for Physical-Engineering and Radiotechnical Metrology)
"One-time-small-quantity" (batch) Ex certification process:	According to the EAC standards, it is possible to do the certificate for a batch. In this case it is required to specify the quantity of devices (without limitation) and to provide to the certification body (CB) all serial numbers of these devices. Otherwise the procedure is exactly the same as with a regular EAC Ex certificate: This means, it consumes the same time at the same expense.
Example of a typical EAC certificate number and EAC marking:	RU C-IT.AA87.B.00156 1Ex d (*) IIA T6 ... T3 Gb X or 1Ex d (*) IIB T6 ... T3 Gb X or 1Ex d (*) IIB+H_2 T6 ... T3 Gb X Ex tb IIIC T85 °C ... T200 °C Db X Note: In a typical EAC marking, the suitable gas zone is put in front of the "Ex".
Mandatory logos for marking EAC and Ex:	EAC and Ex
U-certified components inside Ex e equipment:	Alternative 1: The EAC Ex equipment certificate covers all safety-relevant components, regardless if these components are inside or outside of the product. Alternative 2: Components have separate EAC Ex U certificates. But in most cases there is no advantage in acquiring a separate EAC Ex U certificate for each component.

Validity of EAC certificates:	5 years
Requirements for normal electrical components inside Ex d equipment:	Electrical components require a mandatory EAC marking according to TR CU 004/2011 (Low Voltage Directive) and/or TR CU 020/2011 (EMC Directive).
Quality assurance at manufacturing sites and periodical on-site audits:	Every new manufacturing site requires an initial on-site audit. After that, the CB carries out an annual inspection. The formal procedure for this is as follows: The manufacturer must provide the CB with photos of the certified products with the EAC marking and photos from the manufacturing site. Every 2 to 3 years, a specialist from the CB carries out an on-site audit.
Documentation requirements:	■ Operating manual in Russian language containing all the safety information ■ Technical passport: similar to a basic datasheet in Russian language. However, this passport can have additional data like guarantees, useful lifetime of the product, maintenance, drawings, approvals, ...

Table 5.1 List of core requirements to be fulfilled for an EAC certification

China Compulsory Certification (CCC)

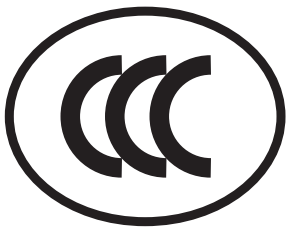
In July 2019, the State Administration for Market Regulation (SAMR) in China announced the extension of the CCC scope to include Ex equipment by issuing SAMR Notice No. 34 2019.

This announcement came into effect on October 1st, 2019 with a transition period of one year. After the transition date, Ex equipment that falls within the scope of the CCC is no longer allowed to be sold in, or imported to China without a valid CCC certificate.

CCC Requirements

Main Directive (file number) or national legal foundation:	CNCA-C23-01:2019 – "Implementation Rules of Compulsory Product Certification – Explosion-Protected Electrical Equipment" (also called "CCC Ex").
Scope:	Only the Ex equipment that is explicitly mentioned in one of the 17 CCC Ex categories listed in the range determination table of SAMR Notice No. 18 2020. All other Ex equipment does not fall within the scope of CCC, but do require a national Ex certificate.
Deviations from the ATEX Directive:	■ Self-declarations are not possible ■ Not all Ex equipment is within the CCC scope
Alignment of national standards with the international explosion protection standards (IEC 60079-0 ff.):	Starting from May 2022, Chinese explosion protection standards are in line with the latest edition of the IEC standards.
Deviations from the IECEx certification scheme:	An IECEx QAR is a helpful start, but Chinese regulation prohibits the acceptance of the IECEx QAR at face value. CCC Certification Bodies do not accept each other's surveillance audits. The surveillance audit intervals solely depend on the factory classification. The audit scope addresses traditional quality management system aspects, as well as product specific periodic verification.

Factory classification:	Quality system audit frequency:
A	Once every 2 years
B	Once every 18 months
C	Once every year
D	Twice a year

Examples of bodies that conduct CCC certifications:	SITIIAS, CNEx, CQM
"One-time-small-quantity" (batch) Ex certification process:	At this moment, an option for unit or small quantity certification is not available. The certification process is the same as for a series product, i. e., type test with initial audit, and ongoing surveillance audits.
Example of a CCC certificate number and CCC marking:	The CCC mark consists of a CCC logo in combination with a certification marking. A national Chinese certificate, e.g., NEPSI certificate is not mandatory for CCC products. It is not compulsory to place the CCC logo and certification marking near to each other.
Mandatory logo for the CCC marking:	
Validity of CCC certificates:	5 years

Requirements for normal electrical components inside Ex d equipment:	If electrical components fall under any of the other CCC Directives (e. g., low voltage), then they need a mandatory CCC marking according to this respective Directive.
Quality assurance at manufacturing sites and periodical on-site audits:	CB needs to do an initial audit and then conduct periodic audits where the period depends on the classification of the manufacturer (see above).
Documentation requirements:	An operating manual in Chinese language is required that contains all safety information.

Table 5.2 List of core requirements to be fulfilled for a CCC certification

The rules for the production quality at the manufacturer's plants are covered in the document CNCA-00C-005-2014 – "Compulsory Certification Implementation Rules – Factory Quality Assurance Ability Requirements."

The rules for the assessment of the production quality at the manufacturer's plants are covered in the document CNCA-00C-006-2014 – "Compulsory Certification Implementation Rules – General Requirements for Factory Inspection and Auditing."

Brazilian INMETRO Accreditation

INMETRO is the Brazilian accreditation body and is responsible for accrediting each certification body (CB). Besides these tasks, INMETRO defines the product requirements within this certification scheme. Any products, whether they are manufactured in or exported to Brazil, with the intention to be placed on the Brazilian market, require an INMETRO certificate issued by an accredited CB. Additional market access requirements may apply depending on the specific products.

INMETRO Requirements

Main Directive (file number) or national legal foundation:	INMETRO Portaria 179
Deviations from the ATEX Directive:	■ No Zone 2 self-declarations are possible ■ Besides the above, the Directive is very similar to ATEX
Alignment of national standards with the international explosion protection standards (IEC 60079-0 ff.):	The Brazilian national standards correspond with IEC 60079-0 ff. without significant deviations.
Deviations from the IECEx certification scheme:	The most prevalent deviation is that the frequency of the post-certification audits is not in line with IECEx production quality audit rules. The frequency of these audits is 18 months.
Examples of bodies that conduct INMETRO certifications:	DNVGL, TÜV Rheinland, TÜV Süd, UL do Brasil, CEPEL, Bureau Veritas, CERTUSP, ...
"One-time-small-quantity" (batch) Ex certification process:	There are two ways to certify batches: 1. Test batch according article 6.2: The batch can have an unlimited quantity, no follow-up audits are needed, tests are defined to be performed for 6 % of the batch. 2. The "Special Situations Model for Imported Products" is applied, also known as CSE - Certificado de Situações Especiais - which has the complete description in article 6.3. In this case, there are no factory inspections and technical testing required by the CB.This certification path can only be used for 20 units in 6 months and is not allowed to be used for electrical bulk material like light fittings, cable glands, or similar.
Example of an INMETRO certificate number and marking:	DNV 15.0221 X Ex d IIC Gb Ex e IIC Gb Ex tb IIIC Db IP66/IP68
Mandatory logo for the INMETRO marking:	Segurança INMETRO OCP 0017 Two logos are always required: The INMETRO logo plus the CB logo with the applicable registration number
Validity of INMETRO certificates:	3 years
Requirements for normal electrical components inside Ex d equipment:	No additional requirements.
Quality assurance at manufacturing sites and periodical on-site audits:	The CB does an initial on-site audit. After that, periodic on-site audits take place every 18 months.
Documentation requirements:	An operating manual in Brazilian Portuguese language is required that contains all safety information.

Table 5.3 List of core requirements to be fulfilled for an INMETRO certification

South Korean KCs Certification

"KC" stands for Korean Conformity and the additional "s" stands for "safety."

The ministry of labor authorizes accredited Certification Bodies (CB) to issue KCs certificates. The KCs mark itself has the same function as the CE mark in Europe.

The KCs certificates can be based on existing IECEx certificates and test reports.

KCs Requirements

Main Directive (file number) or national legal foundation:	Occupational Safety & Health Act of Korea, Article 84, Enforcement Decree of Occupational Safety & Health Act Article 74, and Enforcement Regulation of Occupational Safety & Health Act Article 107
Deviations from the ATEX Directive:	■ No Zone 2 self-declarations are possible ■ One certificate per product/enclosure size ■ Besides the above, very similar to ATEX
Alignment of national standards with the international explosion protection standards (IEC 60079-0 ff.):	The Korean certification regulations correspond with the international explosion protection standards with no significant deviations.
Deviations from the IECEx certification scheme:	Separate certificates are required for identical equipment in different sizes. Each equipment/enclosure size must be certified individually. Note: Since 2016 an IECEx certificate can no longer be 1:1 transferred into a KCs certificate for identical equipment available in different sizes. Since then, each size of an equipment needs an individual certificate.
Examples of bodies that conduct KCs certifications:	KOSHA, KTL, KGS
Example of an KCs certificate number and marking:	17-AV4BO-0190
Mandatory logo for the KCs marking:	 Two logos are always required: KCs logo (see above) plus the CB logo. Note: Brand-labeling is not possible in Korea.
Validity of KCs certificates:	5 years
Quality assurance at manufacturing sites and periodical on-site audits:	No additional audits are required.
Documentation requirements:	An operating manual in Korean language is required that contains all safety information.

Table 5.4 List of core requirements to be fulfilled for an KCs certification

Indian PESO (respectively CCE or CCoE)

This is a regulatory body founded under supervision of the Petroleum & Explosives Safety Organisation (PESO) to regulate the oil and gas industry. The Ex approvals are issued by the Chief Controller of Explosives (CCE or CCoE).

The Bureau of Indian Standards (BIS) issues the Indian explosion protection standards that are copies of the IEC 60079 series and called "IS/IEC 60079."

Different to procedures in other countries, international suppliers do not need an intermediate certification body (CB) to achieve a PESO approval. This can be done directly at PESO. It is based on the original IECEx certificate and test report and some additional documentation described below.

PESO Requirements

Main Directive (file number) or national legal foundation:	Rule 102 and Rule 106 of the Petroleum Rules, 2002
Deviations from the ATEX Directive:	■ No Zone 2 self-declarations are possible.
Alignment of national standards with the international explosion protection standards (IEC 60079-0 ff.):	The Indian national explosion protection standards correspond with the international explosion protection standard, with some slight deviations.
Deviations from the IECEx certification scheme:	PESO are regulatory approvals and not really comparable to the IECEx scheme.
Examples of approved local test facilities:	■ Central Institute of Mining & Fuel Research (CIMFR) in Dhanbad ■ Central Power Research Institute (CPRI) in Bangalore ■ Electronics Regional Testing Lab (ERTL) in Kolkata ■ Intertek in Delhi ■ Karandikar Lab in Boisar near Mumbai
"One-time-small-quantity" (batch) Ex approval process:	A "one-time-small-quantity" (batch) Ex approval is not possible in India.
PESO approval information:	Individual marking requirements are stated in the PESO approval letter.
Example of a PESO approval number:	P438240
Mandatory logo for the PESO marking:	No additional logo is required.
Validity of PESO approvals:	5 years
Requirements for normal electrical components inside Ex d equipment:	There are no additional requirements for normal electrical components inside Ex d equipment.
Quality assurance at manufacturing sites and periodical on-site audits:	Ex d products manufactured in India require a license by the Bureau of Indian Standards (BIS) which includes on-site audits. For imported products, no additional quality assurance measures are required.
Documentation requirements:	■ Company profile of the manufacturer ■ Company profile of the importing subsidiary/agency ■ Reference list of Indian customers and projects ■ Documentation of local infrastructure to proof the ability for local support

Table 5.5 List of core requirements to be fulfilled for a PESO approval

South African IA Certificate

South Africa has the Mines Health and Safety Act as well as Occupational Health and Safety Act. These acts refer to SANS10108 ("South African National Standard 10108 - The classification of hazardous locations and the selection of equipment for use in such locations") and to ARP0108 ("Aanbevole/Recommended Practice 0108 - Regulatory Requirements for Explosion-Protected Apparatus").

The expression "recommended practice" does not mean that it is optional in its application. The Department of Minerals and Energy (DME) and the Department of Labour (DOL) publish this document as the mandatory legal certification requirements for equipment listed for explosion-hazardous locations.

The certificate issued is called an IA certificate.

IA Requirements

Main Directive (file number) or national legal foundation:	SANS10108 and ARP0108
Deviations from the ATEX Directive:	■ No Zone 2 self-declarations are possible.
Alignment of national standards with the international explosion protection standards (IEC 60079-0 ff.):	The South African national standards do not significantly deviate from the international explosion protection standards. The following deviations exist: ■ For mining, the maximum radio transmission RF power output is limited to 500 mW, whereas the IEC 60079-0 allows up to 6 W for Group I.
Deviations from the IECEx certification scheme:	No deviations.
Examples of bodies that conduct IA certifications:	MASC, Explolabs, SABS, and MTEx (only for Group II products, not for mining), ...
"One-time-small-quantity" (batch) Ex certification process:	A "one-time-small-quantity" (batch) Ex certification process is not possible in South Africa.
Example of an IA certificate number and marking:	MASC S/17-2357X Ex d IIC Gb Ex e IIC Gb Ex tb IIIC Db IP 66/68
Mandatory logo for the IA marking:	No additional logo is required.
Validity of IA certificates:	3 years
Requirements for normal electrical components inside Ex d equipment:	There are no additional requirements for normal electrical components inside Ex d equipment.
Quality assurance at manufacturing sites and periodical on-site audits:	There are no additional quality assurance measures or on-site audits required if the original certificates are based on ATEX/IECEx.
Documentation requirements:	An operating manual in English language is required that contains all safety information.

Table 5.6 List of core requirements to be fulfilled for an IA certification

United Kingdom Conformity Assessed (UKCA)

In January 2020, the United Kingdom withdrew from the European Union and the so-called transition period ended on December 31st, 2020. The relevant UK regulations, i. e., the national implementations of the European Directives, have been amended by the EU exit regulations UK SI 2019 No. 696, formally establishing the UKCA mark and its conformity assessment procedures in the United Kingdom. On January 1st, 2023 the UKCA mark will be the only accepted conformity mark in Great Britain. The CE mark will remain valid in Northern Ireland.

UKCA Requirements

Main Directive (file number) or national legal foundation:	Since the UK was part of the European Union prior to the Brexit, the legal basis for the UKCA mark are the former British implementations of the relevant EU Directives with the addition and changes made by UK SI 2019 No. 696. Examples: ■ 2014/34/EU ATEX => UK SI 2016 No. 1107 (UKEx) ■ 2014/35/EU LVD => UK SI 2016 No. 1101 (LV)
Deviations from the ATEX Directive:	Nearly identical, except “EU” is replaced by “UK”, e. g. UK-declaration of conformity, UK-type examination certificate. The UKCA mark replaces the CE mark.
UK-designated standards:	Each of the UK regulations has a list of called designated standards for the presumption of conformity. Currently, this list is a 1:1 copy of the list of harmonized standards published in the official journal of each European Directive.
Alignment of national standards with the international explosion protection standards (IEC 60079-0 ff.):	In general, national standards are aligned with IEC standards.
Deviations from the IECEx certification scheme:	UKCA corresponds with the ATEX certificate.
Examples of UK-approved bodies:	SGS Baseefa Limited, Eurofins E&E CML Limited, FM Approvals Ltd.
"One-time-small-quantity" (batch) Ex certification process:	This process corresponds with the ATEX Directive.
Example of a typical UKCA marking:	Identical with ATEX except for UKCA mark below
Mandatory logos for UKCA and Ex marking:	UK CA
U-certified components inside Ex e equipment:	Identical with ATEX
Validity of UKCA certificates:	Identical with ATEX
Requirements for normal electrical components inside Ex d equipment:	Identical with ATEX
Quality assurance at manufacturing sites and periodical on-site audits:	Identical with ATEX
Documentation requirements:	Identical with ATEX

Table 5.7 List of core requirements to be fulfilled for a UKCA certification

Sources and References

Eurasian Economic Union: www.eaeunion.org

Gost Standard S.r.l.: www.gost-standard.com/eac-marking

China Certification: www.china-certification.com/en/certification-for-ex-products/

Ministério da Economia, Brazil, INMETRO: www.inmetro.gov.br

Onetech South Korean Certification: onetech.co.kr/en/national-certification/kcs-voluntary-safety-certification/

Korean Occupational Safety & Health Certification Institute (KOSHA): miis.kosha.or.kr/oshci/eng/busi/KCsInfo.do

South African Bureau of Standards (SABS): https://www.sabs.co.za/Sectors-and-Services/Sectors/Explosion/index.asp

Petroleum & Explosives Safety Organization (PESO):www.peso.gov.in/

Glossary of Worldwide Important Terms and Abbreviations

A	
29 CFR 1910	Title 29 of the Code of Federal Regulations, Part 1910 covers occupational safety and health standards.
AHJ	"Authority Having Jurisdiction." An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure. (NEC® Article 100)
ANSI	American National Standards Institute
apparatus	Device or assembly of devices that can be used as an independent unit for specific functions.
approval	The process of declaring equipment suitable for use in hazardous locations. One of the common terms in North American contexts.
ARP0108	"Aanbevole/Recommended Practice 0108": Guide to the regulatory requirements for explosion-protected apparatus issued by the Department Mineral Resources of the Republic of South Africa.
assessment	Demonstration that specified requirements relating to a product, process, system, person, or body are fulfilled.
ATEX	Abbreviation of ATmosphére EXplosible (1) Commonly used as part of the collective name for the ATEX Directive of the European Union (cf.Directive 2014/34/EU) (2) Overall term for the normative compliance of the properties of a product or components according to the European ATEX Directive.
audit	On-site verification activity (inspection or examination) to ensure compliance to the defined explosion-protection requirements. Systematic, independent, documented process carried out on-site or from remote. The purpose is to obtain records, statements-of-fact, or other relevant information, and assess them objectively in order to determine the extent, to which specified requirements are fulfilled.

B	
Brexit	Term for the step that the United Kingdom took to exit the European Union.

C	
CB	Abbreviation for "certification body," an organization that has the ability to certify compliance of equipment. Each CB has a scope of accreditation that is categorized based on the ISO International Classification for Standards. Each CB is required to maintain a list of standards that it can certify to, grouped into customer-defined technical categories.
CCC	Abbreviation for "China Compulsory Certification"
CCC Ex	Term established to specifically address CCC requirements for Ex products.
CCE (or CCoE)	Chief Controller of Explosives.
CE Code (CEC)	Short for "Canadian Electrical Code"

C	
CE mark	Short form derived from "Conformité Européenne". A mark by which the manufacturer indicates that the product is in conformity with the applicable requirements set out in European Union harmonization legislation.
CEPEL	Organization that offers INMETRO certifications
certification	Method to proof the compliance with certain requirements.
CERTUSP	Certificate issued by the "Universidade de São Paulo" (INMETRO certifications).
CIMFR	Central Institute of Mining & Fuel Research. Example of an approved local test facility for the Indian PESO approval.
Class/Division-hazardous-area classification scheme also: Class/Division classification	North American scheme in order to classify hazardous locations with regard to the rate of the explosive atmosphere present into different Classes and Divisions.
CNCA	Certification and Accreditation Administration of the People's Republic of China
CNEx	Example of a Chinese certification body that is able to issue CCC Ex certificates.
CoC	Certificate of conformity. Certificate issued by an authorized party (the manufacturer, an independent facility) stating that the equipment meets the required standards or specification.
component	One of the parts of a system, subsystem, or device performing a specific function.
conformity assessment system	Test to validate that a product or service complies with the requirements of a specification, technical standard, contract, or regulation.
CoPC	Certification of personnel competencies
country of use	Expression used in documents of European standards and Directives for labeling a country where the product to which the standard/Directive refers is intended to be applied.
CPRI	Central Power Research Institute. Example of an approved local test facility for the Indian PESO approval.
CQM	Example of a Chinese certification body that is able to issue CCC Ex certificates.
CSA	Canadian Standards Association.: CB accredited for NRTL and SCC
CSE	Abbreviation of Certificado de Situações Especiais (see INMETRO Accreditation)

D	
Directive	A legal act of the European Union, which requires member states to achieve a particular result without dictating the means of achieving that result.
Directive 2014/34/EU	EU Directive for equipment and protective systems intended for use in potentially explosive atmospheres.
DME	Abbreviation of "Department of Minerals and Energy" (South African IA certification)
documentation	Any parts of information that the manufacturer needs to supply in order to use the equipment safely throughout the complete product life cycle. Compare EU Directive 2014/34/EU, 1.0.6, for example.

D	
DOL	Abbreviation of "Department of Labour" (South African IA certification)
dual certification	Certification according to both classification schemes: Zone and Class/Division classification.

E	
EAC	Eurasian Customs Union
EFTA country	Member country of the European Free Trade Association
EHSR	Essential health and safety requirements: Requirements that need to be met in order to protect the workers' health and to enable safe work in potentially explosive atmospheres. The phrase is coined in Directive 2014/34/EU, Article 4.
electrical equipment	An electric component, an assembly, or the device of an electrical installation. This term is often used as the plural form of "apparatus" to refer to the group of apparatus in general.
EMC Directive	Directive on electromagnetic compatibility
EPA	Environmental Protection Agency (U.S.)
equipment	Single apparatus or set of devices or apparatuses, or the set of main devices of an installation, or all devices necessary to perform a specific task.
equipment category	Classification of equipment within each equipment group, determining the required level of protection to be ensured. (ATEX Directive 2014/34/EU, Article 2, Section 8)
equipment group	ATEX classification of devices in accordance to what area they are supposed to be used in.
ERTL	"Electronics Regional Testing Lab." Example of an approved local test facility for the Indian PESO approval
ETL	Intertek Group PLC.: CB accredited for NRTL and SCC
EU declaration of conformity	Declaration of the manufacturer to provide information required under this Directive on the conformity of a product with the requirements of this Directive and of other relevant European Union harmonization legislation.
EurAsEC	Eurasian Economic Commission (Russia)
Eurofins E&E CML Limited	Example of an approved body for the UK UKCA assessment
EU-Type Examination certificate	Conformity assessment procedure, whereby a notified body certifies a device and issues a EU-type examination certificate.
Ex area	Explosion-hazardous area. According to IECEx explosion-hazardous areas are "places where flammable liquids, vapors, gases, or combustible dusts are likely to occur in quantities sufficient to cause a fire or an explosion." Other names: hazardous (classified) locations, hazardous area, (potentially) explosive atmospheres.
Explolabs	Example of a body that conducts South African EAC certifications
explosion protection	Precautions to prevent an explosive atmosphere from igniting.
explosion protection document	Document that describes the precautions for a plant's explosion protection.

E	
explosion-hazardous area	Area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatus. This term is used in European EN and IEC contexts. For the North American designation according to NEC®, compare hazardous (classified) location
explosion-protected equipment	Devices that may be used as proven in potentially explosive atmospheres because it is methodically ensured that effective ignition sources are mitigated as required by the equipment protection level.

F	
FM	"Factory Mutual;" short for FM Approval Ltd.: CB accredited for NRTL and SCC

G	
Gost standard	Independent certification body specializing in countries belonging to the Eurasian Economic Union.

H	
harmonized standard	European standard developed by a recognized European Standards Organisation: CEN, CENELEC, or ETSI. It is created following a request from the European Commission to one of these organisations. The harmonised standards can be used to demonstrate that products, services, or processes comply with relevant EU legislation. The references of harmonised standards must be published in the Official Journal of the European Union.
hazard assessment	Assesses the risk of an explosive atmosphere, of possible sources of ignition and estimates the effects of an explosion if the occurrence of an explosive atmosphere cannot be prevented.
hazardous (classified) location	Expression denotes the North American NEC®/CEC classification of explosion hazardous locations. The classification uses: Class I, II, III that are divided into Divisions 1, 2.
hazardous area	EN/IEC: Area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatus. For NEC®/CEC see "hazardous (classified) location"

I	
IA certificate	South African certification scheme for explosion-protected electrical equipment
IEC	"International Electrotechnical Commission." A not-for-profit, non-governmental International Standards Organization that prepares and publishes international standards for all electrical, electronic, and related technologies.
IEC TC32	"International Electrotechnical Commission, Technical Comitee 32." Definition of international standards regarding specifications of all types of fuses.

I	
IECEx CoC	IECEx Certificate of Conformity
IECEx ExCB	IECEx Certification Body
IECEx ExTL	IECEx Test Facility
IECEx ExTR	IECEx Test Report
IECEx QAR	IECEx Quality Assessment Report
IECEx System	"International Electrotechnical Commission (IEC) System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres." A rating system of IECEx to facilitate the international business with devices and supplies in the field of explosion protection.
INMETRO	Brazilian accreditation body
instruction manual	Document that contains the drawings and diagrams necessary for commissioning , maintenance, inspection, checking of correct operation and, where appropriate, repair of the equipment or protective system, together with all useful instructions, in particular with regard to safety.
Intertek	Example of an approved local test facility for the Indian PESO approval
IS/IEC	International Standard/ International Electrotechnical Commission
ISA	International Society of Automation
ISO	International Organization of Standards

K	
Karandikar Lab	Example of an approved local test facility for the Indian PESO approval
KCs certificate	Korean Conformity Safety certificate
KGS	"Korea Gas Safety Corp." Example of a body that conducts Korean KCs certifications
KOSHA	"Korea Occupational Safety and Health Agency." Example of a body that conducts Korean KCs certifications
KTL	"Korea Testing Laboratory." Example of a body that conducts Korean KCs certifications

L	
Lenpromexpertiza	Example of a body that conducts Russian EAC certifications

M	
marking	Specification on a device. For example:  II 3G Ex ia IIC T4. Among other things, it states where the device may be installed.
MASC	"Mining and Surface Certification (Pty) Ltd." Example of a body that conducts South African EAC certifications

M	
MET Labs	"MET Laboratories Inc. (Eurofins)." CB accredited for NRTL and SCC
MTEx	"MTEx Laboratories." Example of a body that conducts South African EAC certifications

N	
NANIO CCVE	Example of a body that conducts Russian EAC certifications
NB	Notified Body
NEC®	"National Electric Code®." Regionally adoptable standard for the safe installation of electrical wiring and equipment in the United States.
NEPSI	"National Supervision and Inspection Center for Explosion Protection and Safety Instrumentation." Certification system established by SACS (Standardization Administration of China) based on IEC 60079.
NFPA®	National Fire Protection Association® (U.S.)
non-electrical equipment	Non-electrical device that, as a potential ignition source, could ignite a potentially explosive atmosphere. Typical examples are ventilators, fans, compressors, (vacuum) pumps, mechanical mills etc.
non-hazardous area	EN/IEC: An area in which an explosive gas or dust atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation, and use of equipment. (NEC®/CEC: unclassified location)
NRTL	"Nationally Recognized Test Facility." An independent third-party organization recognized by the U.S. Occupational Safety & Health Administration (OSHA) to provide evaluation, testing and certification of products.

O	
Ordinance on Industrial Safety and Health	German transposition of the European Directive 2009/104 /EC. The ordinance regulates the provision of work equipment by the employer, the use of work equipment by workers and the operation of plants requiring monitoring in order to ensure work safety.
OSHA	Occupational Safety & Health Administration (U.S.)

P	
PESO	Petroleum & Explosives Safety Organisation (India)
potentially explosive atmosphere	An atmosphere that could become explosive due to local and operational conditions. Mixture with air, under atmospheric conditions, of flammable substances in the form of gas, vapor, dust, fibers, or flyings, which, after ignition, permits self-sustaining propagation.
ProdSV	Brief for German "Produktsicherheitsverordnung." Part of the Product Safety Act.
Protection at Work Act	German law for governing and monitoring the employer's compliance in occupational safety and health, as well as of responsibilities and rights of employees.
PTB	"Physikalisch-Technische Bundesanstalt." A German notified body.

Q	
QPS	"QPS Evaluation Services Inc." CB accredited for NRTL and SCC

S	
SABS	"South African Bureau of Standards." Example of a body that conducts South African EAC certifications
SAMR	State Administration for Market Regulation (China)
SANS10108	"South African National Standard 10108." The classification of hazardous locations and the selection of equipment for use in such locations
SCC	Standards Council of Canada
self-declaration	Manufacturers use a first-party audit to declare that the product under audit meets specified requirements
SGS	"SGS S.A." CB accredited for NRTL and SCC
SGS Baseefa Limited	Example of a UK approved body
SITIIAS	Example of a Chinese certification body that is able to issue CCC Ex certificates
specific conditions of use	Essential information for the installation, use, or maintenance of the equipment. These conditions are defined in the EU-type examination certificate.

T	
TechnoProgress	Example of body that conducts Russian EAC certifications
Test facility	Organization that is accredited and able to provide appropriate test equipment and trained staff for conformance testing.
TÜV	"Technischer Überwachungsverein" (English =Technical Inspection Association). International (German/Austrian) service organizations that test, inspect, and certify to technical systems, facilities etc.

U	
U certificate	In IECEx (derived) contexts: A type of certificate for an Ex component marked with a "U." A U-certified Ex component does not fulfill its own autonomous function and can therefore not readily be used in plants in potentially explosive atmospheres.
UKCA	Conformity assessment mark for "United Kingdom Conformity Assessment"
UK-type examination certificate	Conformity assessment procedure, whereby a UK approved body certifies a device and issues a UK type examination certificate.
UL	"Underwriters Laboratories;" short for "UL LLC.:" CB accredited for NRTL and SCC
unit verification	Certifying the compliance of a single product or a small batch. This does not include the evaluation of the complete manufacturing process.
USCG	"U.S. Coast Guard" for equipment for hazardous locations installed offshore in the Gulf of Mexico. The USCG can issue approvals to test labs,e.g. to be eligible to certify according to IECEx.

V	
VDE	"Verband der Elektrotechnik, Elektronik und Informationstechnik e.V." (English = Association for Electrical, Electronic, and Information Technologies). A German technical-scientific organization founded in 1893 as the "Verband Deutscher Elektrotechniker".

X	
X certificate	In IECEx (derived) contexts: A type of certificate for an Ex component marked with a "X." An X-certified Ex component needs to fulfill specific conditions of use as described in the certificate in order to function and can therefore can only be used in plants in potentially explosive atmospheres under the provision that the specific conditions are met. These conditions are not directly attributable to the apparatus.

Z	
Zone	Designation for a hazardous area classification based on the likeliness, the frequency of the occurrence and duration of an explosive atmosphere (comp. Directive 1999/92/EC)."Zone" is not a manufacturer's term, but a user term. It is therefore not mentioned in Directive 2014/34/EU.
Zone-hazardous-area classification scheme also: Zone classification	European/Internationally applied scheme in order to classify hazardous areas with regard to the rate of the explosive atmosphere present into different zones.

Basic Brochures from Pepperl+Fuchs

Pepperl+Fuchs, ed., Physical-technical principles—Terminology definitions, explosions, examples, prerequisites, combustible substances and characteristic values, ignition sources.

Pepperl+Fuchs, ed., Types of protection for electrical apparatus—Types of protection for gas hazardous areas, functional principle, identification, specifics for use.

Pepperl+Fuchs editor, Nonelectrical explosion protection: Specifics of nonelectric devices, ignition hazard assessment, types of protection, marking.

Pepperl+Fuchs, ed., Type of protection: intrinsic safety.

Pepperl+Fuchs, ed., Dust explosion protection—Types of protection for dust hazardous areas, specifics of combustible dust, functional principle, identification, specifics for use.

Pepperl+Fuchs, ed., IEC/EN 60079-14 - Explosive atmospheres - Part 14: Electrical installations design, selection and erection.

Pepperl+Fuchs, ed., Global specifications and directives—Laws and regulations of regions or countries for the placing on the market of explosion-protected equipment.

Pepperl+Fuchs, ed., Type of Protection "Purge and Pressurization"

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Your automation, our passion.

Explosion Protection

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- Signal Conditioners
- FieldConnex® Fieldbus
- Remote I/O Systems
- Electrical Ex Equipment
- Purge and Pressurization
- Industrial HMI
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
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