

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Explosive atmospheres –  
Part 17: Electrical installations inspection and maintenance**

**Atmosphères explosives –  
Partie 17: Inspection et entretien des installations électriques**

IEC 60079-17:2007

<https://standards.iteh.ai/en/standards/iec/ab63548b-39dc-4717-a55b-7016e9958ece/iec-60079-17-2007>



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## EXPLOSIVE ATMOSPHERES –

## Part 17: Electrical installations inspection and maintenance

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International Standard IEC 60079-17 has been prepared by subcommittee 31J: Classification of hazardous areas and installation requirements, of IEC technical committee 31: Equipment for explosive atmospheres.

This fourth edition cancels and replaces the third edition published in 2002 and constitutes a technical revision.

The significant technical changes with respect to the previous edition are as follows:

- Additional requirements for inspection and maintenance of electrical installations for combustible dusts are included.
- Knowledge, skills and competencies of "responsible persons", "technical persons with executive function" and "operatives" are explained in new Annex B.
- Equipment Protection Levels (EPLs) have been introduced and are explained in the new Annex C.

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

FDIS	Report on voting
31J/145/FDIS	31J/148/RVD

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

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

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

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

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WITHDRAWN

## INTRODUCTION

Electrical installations in hazardous areas possess features specially designed to render them suitable for operations in such atmospheres. It is essential for reasons of safety in those areas that, throughout the life of such installations, the integrity of those special features is preserved; they therefore require initial inspection and either

- a) regular periodic inspections thereafter, or
- b) continuous supervision by skilled personnel

in accordance with this standard and, when necessary, maintenance.

NOTE Correct functional operation of hazardous area installations does not mean, and should not be interpreted as meaning, that the integrity of the special features referred to above is preserved.

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## EXPLOSIVE ATMOSPHERES –

### Part 17: Electrical installations inspection and maintenance

#### 1 Scope

This part of IEC 60079 applies to users and covers factors directly related to the inspection and maintenance of electrical installations within hazardous areas only, where the hazard may be caused by flammable gases, vapours, mists, dusts, fibres or flyings.

It does not include:

- other fundamental installation and inspection requirements for electrical installations;
- the verification of electrical equipment;
- the repair and reclamation of explosion protected equipment (see IEC 60079-19).

This standard supplements the requirements of IEC 60364-6.

In the case of dusts, fibres or flyings the level of housekeeping may influence the inspection and maintenance requirements.

This standard is intended to be applied where there can be a risk due to the presence of explosive gas or dust mixtures with air or combustible dust layers under normal atmospheric conditions. It does not apply to

- underground mining areas,
- areas where a risk can arise due to the presence of hybrid mixtures,
- dusts of explosives that do not require atmospheric oxygen for combustion,
- pyrophoric substances.

#### 2 Normative references

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

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

IEC 60079-1, *Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d"*

IEC 60079-2, *Explosive atmospheres – Part 2: Equipment protection by pressurized enclosures "p"*

IEC 60079-7, *Explosive atmospheres – Part 7: Equipment protection by increased safety "e"*

IEC 60079-10, *Electrical apparatus for explosive gas atmospheres – Part 10: Classification of hazardous areas*

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*

IEC 60079-14, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*

IEC 60079-15, *Electrical apparatus for explosive gas atmospheres – Part 15: Construction, test and marking of type of protection "n" electrical apparatus*

IEC 60079-19, *Explosive atmospheres – Part 19: Equipment repair, overhaul and reclamation*

IEC 60364-6, *Low-voltage electrical installations – Part 6: Verification*

IEC 61241 (all parts), *Combustible dust*

IEC 61241-1, *Electrical apparatus for use in the presence of combustible dust – Part 1: Protection by enclosures "tD"*

IEC 61241-4, *Electrical apparatus for use in the presence of combustible dust – Part 4: Type of protection "pD"*

IEC 61241-10, *Electrical apparatus for use in the presence of combustible dust – Part 10: Classification of areas where combustible dusts are or may be present*

IEC 61241-11, *Electrical apparatus for use in the presence of combustible dust – Part 11: Protection by intrinsic safety "iD"*

IEC 61241-14:2004, *Electrical apparatus for use in the presence of combustible dust – Part 14: Selection and installation*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60079-0 and the following apply.

NOTE Additional definitions applicable to explosive atmospheres can be found in Chapter 426 of the International Electrotechnical Vocabulary (IEV) IEC 60050 (426).

#### 3.1

##### **close inspection**

inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, such as loose bolts, which will be apparent only by the use of access equipment, for example steps, (where necessary), and tools

NOTE Close inspections do not normally require the enclosure to be opened, or the equipment to be de-energized.

#### 3.2

##### **continuous supervision**

frequent attendance, inspection, service, care and maintenance of the electrical installation by skilled personnel who have experience in the specific installation and its environment in order to maintain the explosion protection features of the installation in satisfactory condition

#### 3.3

##### **detailed inspection**

inspection which encompasses those aspects covered by a close inspection and, in addition, identifies those defects, such as loose terminations, which will only be apparent by opening the enclosure, and/or using, where necessary, tools and test equipment

### 3.4

#### **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 equipment

NOTE For the purposes of this standard, an area is a three-dimensional region or space.

### 3.5

#### **initial inspection**

inspection of all electrical equipment, systems and installations before they are brought into service

### 3.6

#### **inspection**

action comprising careful scrutiny of an item carried out either without dismantling, or with the addition of partial dismantling as required, supplemented by means such as measurement, in order to arrive at a reliable conclusion as to the condition of an item

### 3.7

#### **maintenance**

combination of any actions carried out to retain an item in, or restore it to, conditions in which it is able to meet the requirements of the relevant specification and perform its required functions

### 3.8

#### **non-hazardous area**

area in which an explosive atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of equipment

### 3.9

#### **periodic inspection**

inspection of all electrical equipment, systems and installations carried out on a routine basis

### 3.10

#### **sample inspection**

inspection of a proportion of the electrical equipment, systems and installations

### 3.11

#### **skilled personnel**

persons whose training has included instruction on the various types of protection and installation practices, the requirements of this standard, the relevant national regulations/company rules applicable to the installation and on the general principles of area classification

### 3.12

#### **technical person with executive function**

person providing technical management of the skilled personnel, having adequate knowledge in the field of explosion protection, having familiarity with the local conditions, having familiarity with the installation and who has overall responsibility and control of the inspection systems for the electrical equipment within hazardous areas

### 3.13

#### **visual inspection**

inspection which identifies, without the use of access equipment or tools, those defects, such as missing bolts, which will be apparent to the eye

## 4 General requirements

### 4.1 Documentation

For the purposes of inspection and maintenance, up-to-date documentation of the following items shall be available:

- a) zone classification of areas and, if included, the equipment protection level (EPL) required for each location (see IEC 60079-10 and IEC 61241-10),
- b) for gases: equipment group (IIA, IIB or IIC) and temperature class requirements,
- c) for dusts: equipment group (IIIA, IIIB or IIIC) and maximum surface temperature requirements,
- d) equipment characteristics e.g. temperature ratings, type of protection, IP rating, corrosion resistance,
- e) records sufficient to enable the explosion protected equipment to be maintained in accordance with its type of protection (see IEC 60079-14 and IEC 61241-14), (for example list and location of equipment, spares, certificates, technical information),
- f) copies of previous inspection records.

Requirements for other documentation that may be necessary are provided in IEC 60079-14, IEC 60079-19 and IEC 61241-14.

### 4.2 Qualification of personnel

The inspection and maintenance of installations shall be carried out only by experienced personnel, whose training has included instruction on the various types of protection and installation practices, the requirements of this standard, the relevant national regulations/company rules applicable to the installation and on the general principles of area classification (see Annex B). Appropriate continuing education or training shall be undertaken by personnel on a regular basis. Evidence of the relevant experience and training claimed shall be available.

### 4.3 Inspections

#### 4.3.1 General

Before plant or equipment is brought into service, it shall be given an initial inspection.

To ensure that the installations are maintained in a satisfactory condition for continued use within a hazardous area, either

- a) regular periodic inspections, or
- b) continuous supervision by skilled personnel,

and, where necessary, maintenance shall be carried out.

NOTE 1 In the case of dusts, fibres or flyings, housekeeping may influence the inspection and maintenance requirements.

Following any adjustment, maintenance, repair, reclamation, modification or replacement, the equipment or relevant parts of equipment concerned shall be inspected in accordance with the relevant items of the detailed column of Tables 1, 2, 3 and 4.

Where the certification plate or markings on explosion protected equipment is missing or illegible, alternative methods may be used to determine traceability to the certification details of the specific equipment. The method used could include: additional identification labels which incorporate unique tag numbers, serial numbers or reference to the installation

databases. The method of attaching or fixing the labelling shall not reduce the integrity of the equipment.

The inventory and identification tagging method used for managing explosion protected equipment shall be capable of tracking the replacement of equipment with replacement or repaired equipment, which may have different certification markings and details to the original equipment.

If at any time there is a change in the area classification or the Equipment Protection Level requirements or if any equipment is moved from one location to another, a check shall be made to ensure that the type of protection and surface temperature, where appropriate, are suitable for the revised conditions.

If plant or equipment is dismantled during the course of an inspection, precautions shall be taken during reassembly to ensure that the integrity of the type of protection is not impaired, which includes removing any residual dust and replacing gaskets correctly.

NOTE 2 The major factors effecting the deterioration of equipment include: susceptibility to corrosion, exposure to chemicals or solvents, likelihood of accumulation of dust or dirt, likelihood of water ingress, exposure to excessive ambient temperature, risk of mechanical damage, exposure to undue vibration. Other service factors include: training and experience of personnel, likelihood of unauthorized modifications or adjustments and likelihood of inappropriate maintenance, for example that which is not in accordance with the manufacturer's recommendation.

#### 4.3.2 Grades of inspection

The grade of inspection may be visual, close or detailed. Tables 1, 2, 3 and 4, or modified tables in accordance with 5.7, as appropriate, detail the specific checks required for these three grades of inspection.

Visual and close inspections can be performed with the equipment energized. Detailed inspections will generally require the equipment to be isolated.

The grade of inspection selected for equipment using more than one type of protection (e.g. Ex "ed" equipment) shall be a combination of the relevant columns from the Tables in Annex A.

#### 4.3.3 Types of inspection

- a) Initial inspections are used to check that the selected type of protection and its installation are appropriate. They are to be detailed inspections in accordance with Tables 1, 2, 3 and 4, or modified tables in accordance with 5.7, as appropriate.

NOTE 1 A full initial inspection is not required if an equivalent inspection has been performed by the manufacturer, and it is unlikely that the installation process will have affected those items inspected by the manufacturer. For example, an initial detailed inspection of internal flamepaths of a flameproof motor or the internal joints of an Ex tD motor is not required; however, the terminal housing cover, which would have been removed to facilitate connection of the field wiring, should be inspected after as part of the installation process.

- b) Periodic inspections may be visual or close in accordance with Tables 1, 2, 3 and 4, or modified tables in accordance with 5.7, as appropriate.

A visual or close periodic inspection may lead to the need for a further detailed inspection.

- c) Sample inspections may be visual, close or detailed. The size and composition of all samples shall be determined with regard to the purpose of the inspection.

NOTE 2 Sample inspection should not be expected to reveal faults of a random nature, such as loose connections, but should be used to monitor the effects of environmental conditions, vibration, inherent design weakness, etc.

- d) Continuous supervision utilizing the visual or close inspections of Tables 1, 2, 3 and 4, or modified tables in accordance with 5.7, as appropriate, shall be in accordance with 4.5. Where the installation falls outside the capability for continuous supervision it shall be subject to periodic inspection.

The results of all initial, periodic and sample inspections shall be recorded and retained. The recording requirements for continuous supervision by skilled personnel are detailed in 4.5.5.

#### **4.4 Periodic inspections**

##### **4.4.1 Personnel**

Regular periodic inspection requires personnel who:

- a) have a knowledge of area classification/EPL and sufficient technical knowledge to understand its implications for the location under consideration;
- b) have technical knowledge and understanding of the theoretical and practical requirements for electrical equipment and installations used in those hazardous areas;
- c) understand the requirements of visual, close and detailed inspections as they relate to the installed equipment and installations.

NOTE 1 Competencies and training may be identified in relevant national training and assessment frameworks.

Such personnel will need to be sufficiently independent of the demands of the maintenance activities, for example, so as not to prejudice their ability to reliably report the findings of the inspection.

NOTE 2 It is not a requirement that such personnel are members of an external independent organisation.

##### **4.4.2 Fixed installations**

To predict accurately an appropriate periodic inspection interval is a complex issue. The grade of inspection and the interval between periodic inspections shall be determined taking account of the type of equipment, manufacturer's guidance, if any, the factors governing its deterioration (see Note 2 to 4.3.1), the area classification and/or the EPL requirements and the results of previous inspections. Where inspection grades and intervals have been established for similar equipment, plants and environments, this experience shall be used in determining the inspection strategy.

The interval between periodic inspections shall not exceed three years without seeking expert advice.

NOTE 1 Intervals between periodic inspections exceeding three years should be based on an assessment including relevant information.

Once an interval has been fixed, the installation shall be subjected to additional interim sample inspections to support or modify the proposed interval. Similarly, the grade of inspection will need to be determined, and here again sample inspection can be used to support or modify the proposed inspection grade. Ongoing review of the results of inspections will be required to justify the interval between, and grade of, inspections.

A typical inspection procedure is shown diagrammatically in Annex A.

NOTE 2 When large numbers of similar items such as luminaires, junction boxes, etc. are installed in a similar environment, it may be feasible to carry out periodical inspections on a sample basis provided that the number of samples in addition to the inspection frequency is subjected to review. It is, however recommended that all items be subjected at least to 'visual inspection'.

##### **4.4.3 Moveable equipment**

Movable electrical equipment (hand-held, portable, and transportable) is particularly prone to damage or misuse and therefore the interval between periodic inspections may need to be reduced. Movable electrical equipment shall be submitted to a close inspection at least every 12 months. Enclosures which are frequently opened (such as battery housings) shall be given a detailed inspection at least every 6 months. In addition, the equipment shall be visually checked by the user, before use, to ensure that the equipment is not obviously damaged.