

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Explosive atmospheres –
Part 17: Electrical installations inspection and maintenance
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Atmosphères explosives –
Partie 17: Inspection et entretien des installations électriques
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EXPLOSIVE ATMOSPHERES –**Part 17: Electrical installations inspection and maintenance**

FOREWORD

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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 fifth edition cancels and replaces the fourth edition published in 2007 and constitutes a technical revision.

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

- Equipment specific inspection tables for luminaires, heating systems and motors have been added into Annex A to supplement the general protection concept tables.
- Document has been updated to complement the changes made to IEC 60079-14 for initial inspection.

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

FDIS	Report on voting
31J/224/FDIS	31J/229/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.

This International Standard is to be used in conjunction with IEC 60364-6.

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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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. This standard provides the details for initial inspection and on-going inspections as either;

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

When necessary, maintenance may also be needed.

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.

Inspections are carried out in accordance with this standard, however for older installations the details for the equipment and installations requirements should be referenced to the standards applied at the date of the installation.

NOTE Standards applied at the date of installation may not have been IEC standards.

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EXPLOSIVE ATMOSPHERES –

Part 17: Electrical installations inspection and maintenance

1 Scope

This part of the IEC 60079 series 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,
- dusts of explosives that do not require atmospheric oxygen for combustion,
- pyrophoric substances.

2 Normative references

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

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

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

IEC 60079-10-2, *Explosive atmospheres – Part 10-2: Classification of areas – Combustible dust atmospheres*

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

IEC 60079-14, *Explosive atmospheres – Part 14: Electrical installations design, selection and erection*

IEC 60079-15, *Explosive atmospheres – Part 15: Equipment protection by type of protection "n"*

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

IEC 60079-31, *Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure "t"*

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

IEC 61241-4, *Electrical apparatus for combustible dust atmospheres – Part 4: Type of protection "pD"*

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 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

EXAMPLE Steps, (where necessary), and tools.

Note 1 to entry: 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 1 to entry: 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

live maintenance

maintenance activities carried out while circuits are energized

3.9

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

3.10

periodic inspection

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

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3.11

sample inspection

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

3.12

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

3.13

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

3.14

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 (verification dossier) including any modification records, 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 60079-10-1 and IEC 60079-10-2),
- 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), (for example list and location of equipment, spares, certificates, technical information),
- f) copies of previous inspection records,
- g) copy of the additional initial inspection records as detailed in IEC 60079-14.

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

4.2 Qualification of personnel

The inspection and maintenance of installations covered by this standard 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 documented and available.

4.3 Inspections

4.3.1 General

4.3.1.1 Basic Principles

Before plant or equipment is brought into service, it shall be given an initial inspection. As part of the plant commissioning and start up procedures, initial inspection and other additional requirements are provided in IEC 60079-14.

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 can 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 and 3.

The inspection activity shall be sufficiently independent of any immediate demands of maintenance and/or other activities so as not to prejudice the reliability of any report findings from the inspection.

NOTE 2 Inspection personnel do not need to be members of an external independent organisation.

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, group 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.

NOTE 3 This includes removing any residual dust and replacing gaskets correctly.

NOTE 4 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.

4.3.1.2 Verification of unmarked equipment

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.

4.3.1.3 Acceptance of equipment in old installations

For existing equipment not able to be identified as being certified for use in a hazardous area it is necessary to establish that the equipment is suitable for on-going use. In order to correctly operate and maintain the equipment, an assessment will be necessary to verify the specification of the equipment, to determine it is fit-for-purpose in the specific location in order to determine the appropriate inspection and maintenance requirements. In these circumstances the procedure given in Annex C may be followed.

NOTE This assessment is intended to apply to items in an installation that predate any requirement for the use of certified electrical equipment in hazardous areas.

4.3.2 Grades of inspection

The grade of inspection may be visual, close or detailed. Tables 1, 2, and 3 detail the checks required for these three grades of inspection on general and specific items of electrical equipment.

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 1, 2 and 3.

4.3.3 Types of inspection

Types of inspections include:

- a) Initial inspections used to check that the selected type of protection and its installation are appropriate based on detailed inspections. The requirements are covered in IEC 60079-14.
- b) Periodic inspections which may be visual, close or detailed in accordance with Tables 1, 2, and 3, or modified tables in accordance with 5.7, as appropriate.
- c) Sample inspections which may be visual, close or detailed in accordance with Tables 1, 2, and 3, or modified tables in accordance with 5.7, as appropriate. The size and composition of all samples shall be determined with regard to the purpose of the inspection.

Sample inspections 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 in accordance with Tables 1, 2, and 3, or modified tables in accordance with 5.7, as appropriate and 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 inspections shall be recorded and retained, and may lead to a need for further actions. The requirements for continuous supervision are detailed in 4.5.5.

4.4 Periodic inspections

4.4.1 Personnel

Regular periodic inspection requires personnel who are competent for the inspection required, including that they:

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

4.4.2 Fixed installations

The grade of inspection and the interval between periodic inspections shall be determined taking account of the type of equipment, the manufacturer's guidance, if any, the factors governing its deterioration (see 4.3.1.1, Note 3), 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, installations 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. The basis for changing the inspection period shall be documented.

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

Once an interval has been fixed, the installation should be subjected to additional interim sample inspections to support or modify the proposed interval and grade of inspection.

Ongoing review of the results of inspections will be required to justify the interval between, and grade of inspections.