

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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

**Atmosphères explosives –  
Partie 19: Réparation, révision et remise en état du matériel**

IEC 60079-19:2006

<https://standards.iteh.ai/catalog/standards/iec/60079-19/12-0b29-42e3-bec3-10ecfca9e8a6/iec-60079-19-2006>

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# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## EXPLOSIVE ATMOSPHERES –

### Part 19: Equipment repair, overhaul and reclamation

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International Standard IEC 60079-19 has been prepared by subcommittee 31J: Classification of hazardous areas and installation requirements, of IEC technical committee 31: Equipment for explosive atmospheres.

This second edition cancels and replaces the first edition published in 1993 and constitutes a technical revision.

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

- additional requirements for repair and overhaul of equipment covered by IEC 60079-26 are included;
- additional requirements for repair and overhaul of equipment with type of protection 'tD' and 'pD' for combustible dusts are included;

- knowledge, skills and competencies of "Responsible Persons" and "Operatives" are explained;
- requirements for measurements in flameproof equipment during overhaul, repair and reclamation (including guidance on tolerances) are added.

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

FDIS	Report on voting
31J/124/FDIS	31J/135/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 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

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- withdrawn;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



## INTRODUCTION

When electrical equipment is installed in areas where dangerous concentrations and quantities of flammable gases, vapours, mists or dusts may be present in the atmosphere, protective measures are to be applied to reduce the likelihood of explosion due to ignition by arcs, sparks or hot surfaces produced either in normal operation or under specified fault conditions.

This part of IEC 60079 is supplementary to other relevant IEC standards, for example IEC 60364, as regards installation requirements, and also refers to IEC 60079 and its appropriate parts for the design requirements of suitable electrical equipment.

Clause 4 of this part of IEC 60079 contains general requirements for the repair and overhaul of equipment and should be read in conjunction with the other relevant clauses of this standard dealing with the detailed requirements for individual types of protection.

In cases where protected equipment incorporates more than one type of protection, reference should be made to all clauses involved.

This part not only gives guidance on the practical means of maintaining the electrical safety and performance requirements of repaired equipment, but also defines procedures for maintaining, after repair, overhaul or reclamation, compliance of the equipment with the provisions of the certificate of conformity or with the provisions of the appropriate explosion protection standard where a certificate is not available.

The nature of the explosion protection offered by each type of protection varies according to its unique features. Reference should be made to the appropriate standard(s) for details.

Users will utilize the most appropriate repair facilities for any particular item of equipment, whether they be the facilities of the manufacturer or a suitably competent and equipped repairer (see note).

This part recognizes the necessity of a required level of competence for the repair, overhaul and reclamation of the equipment. Some manufacturers may recommend that the equipment be repaired only by them.

In the case of the repair, overhaul or reclamation of equipment which has been the subject of design certification, it may be necessary to clarify the position of the continued conformity of the equipment with the certificate.

**NOTE** Whilst some manufacturers recommend that certain equipment be returned to them for repair or reclamation, there are also competent independent repair organizations who have the facilities to carry out repair work on equipment employing some or all of the types of protection covered by IEC 60079. For repaired equipment to retain the integrity of the type(s) of protection employed in its design and construction, detailed knowledge of the original manufacturer's design (which may only be obtainable from design and manufacturing drawings) and any certification documentation may be necessary. Where equipment is not being returned to the original manufacturer for repair or reclamation, the use of repair organizations that are recommended by the original manufacturer should be considered.



## EXPLOSIVE ATMOSPHERES –

### Part 19: Equipment repair, overhaul and reclamation

#### 1 Scope

This part of IEC 60079

- gives instructions, principally of a technical nature, on the repair, overhaul, reclamation and modification of a certified equipment designed for use in explosive atmospheres;
- is not applicable to maintenance, other than when repair and overhaul cannot be disassociated from maintenance, neither does it give advice on cable entry systems which may require renewal when the equipment is re-installed;
- is not applicable to type of protection 'm';
- assumes that good engineering practices are adopted throughout.

NOTE Much of the content of this standard is concerned with the repair and overhaul of electrical rotating machines. This is not because they are the most important items of explosion-protected equipment but rather because they are often major items of repairable capital equipment in which, whatever type of protection is involved, sufficient commonality of construction exists as to make possible more detailed instructions for their repair, overhaul, reclamation or modification.

#### 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 (all parts), *Explosive atmospheres*

IEC 60085, *Electrical insulation – Thermal classification*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61241-0, *Electrical apparatus for use in the presence of combustible dust – Part 0: General requirements*

IEC 61241-2, *Electrical apparatus for use in the presence of combustible dust – Part 2: Test methods*

ISO 4526, *Metallic coatings – Electroplated coatings of nickel for engineering purposes*

ISO 6158, *Metallic coatings – Electrodeposited coatings of chromium for engineering purposes*

ISO 9000, *Quality management and systems – Fundamentals and vocabulary*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **serviceable condition**

condition which permits a replacement or reclaimed component part to be used without prejudice to the performance or explosion protection aspects of the equipment, with due regard to the certification requirements as applicable, in which such a component part is used

#### 3.2

##### **repair**

action to restore faulty equipment to its fully serviceable condition and in compliance with the relevant standard

NOTE The relevant standard means the standard to which the equipment was originally designed.

#### 3.3

##### **overhaul**

action to restore to a fully serviceable condition equipment which has been in use or in storage for a period of time but which is not faulty

#### 3.4

##### **maintenance**

routine actions taken to preserve the fully serviceable condition of the installed equipment (see Clause 1)

#### 3.5

##### **component part**

an indivisible item

NOTE The assembly of such items may form equipment.

#### 3.6

##### **reclamation**

means of repair involving, for example, the removal or addition of material to reclaim component parts which have sustained damage, in order to restore such parts to a serviceable condition in accordance with the relevant standard

NOTE The relevant standard means the standard to which the individual parts were originally manufactured.

#### 3.7

##### **modification**

change to the design of the equipment which affects material, fit, form or function

#### 3.8

##### **manufacturer**

maker of the equipment (who may also be the supplier, the importer or the agent) in whose name usually the certification, where appropriate, of the equipment was originally registered

#### 3.9

##### **user**

user of the equipment

### **3.10 repair facility**

facility providing a service that consists of repairs, overhauls, or reclamations of explosion-protected equipment who may be the manufacturer, the user or a third party (repair agency)

### **3.11 certification**

certification leading to the issue of a certificate of conformity which refers primarily to assessments of equipment carried out by a recognized testing authority.

This standard may also apply to equipment certified by other certification authorities, or to equipment which has been self-certified by manufacturers or users as complying with recognized standards.

### **3.12 certificate references**

a certificate reference number may refer to a single design or a range of equipment of similar design

### **3.13 symbol "X"**

the symbol "X" is used to denote special conditions of safe use. The certification documents need to be studied before such equipment is installed, repaired, overhauled, reclaimed or modified.

### **3.14 copy winding**

process by which a winding is totally or partially replaced by another, the characteristics and properties of which are at least as good as those of the original

### **3.15 type of protection "d"**

type of protection in which parts which can ignite an explosive atmosphere are placed in an enclosure which can withstand the pressure developed during an explosion of an explosive mixture and which prevents the transmission of the explosion to the explosive atmosphere surrounding the enclosure

### **3.16 type of protection "i"**

circuit in which no spark or any thermal effect produced in the test conditions prescribed in the relevant standard(s) (which include normal operation and specific fault condition) is capable of causing ignition of a given explosive atmosphere.

### **3.17 type of protection "p"**

type of protection by which the entry of a surrounding atmosphere into the enclosure of the electrical equipment is prevented by maintaining, inside the said enclosure, a protective gas at a higher pressure than that of the surrounding atmosphere. The overpressure is maintained either with or without a continuous flow of the protective gas.

### **3.18 type of protection "e"**

type of protection by which measures are applied so as to prevent, with a higher degree of security, the possibility of excessive temperatures and the occurrence of arcs or sparks in the interior and on the external parts of the electrical equipment which would not produce them in normal service

**3.19**

**type of protection "n"**

type of protection applied to the electrical equipment such that, in normal operation, it is not capable of igniting the surrounding explosive atmosphere and that a fault capable of causing ignition is not likely to occur

**3.20**

**type of protection "tD"**

type of protection for explosive dust atmospheres where electrical equipment is provided with an enclosure providing dust ingress protection and a means to limit surface temperatures

**3.21**

**type of protection "pD"**

type of protection reliant upon the enclosure being subjected to a continuous pressure, according to IEC 61241-2, from a supply of uncontaminated air or other non-flammable gas while electricity is connected to the enclosure

**4 General**

**4.1 General principles**

This clause covers those aspects of repair, overhaul, reclamation and modification which are common to all explosion-protected equipment. Subsequent clauses provide instructions for the additional requirements relevant to specific types of protection. When equipment incorporates more than one type of protection, reference shall be made to the appropriate clauses.

NOTE 1 Additional requirements for types of protection "o" and "q" have not been defined.

Assuming that repairs and overhauls are carried out using good engineering practices, then

- a) if manufacturers' specified parts or parts as specified in the certification documentation are used in a repair or overhaul, the equipment is presumed to be in conformity with the certificate;
- b) if repairs or modifications are carried out on the equipment specifically as detailed in the certification documents, the equipment should still conform with the certificate.

In circumstances where the certification documents are not available, then the repair or overhaul shall be carried out on the equipment in accordance with this standard and other relevant standard(s). The steps taken to obtain the certification documents shall be recorded in the repair facility records (see 4.4.1.5.3).

If other repair or modification techniques are used which are not in accordance with this standard, then it will be necessary to ascertain, from the manufacturers, and/or the certification authority, the suitability of the equipment for continued use in an explosive atmosphere.

NOTE 2 Repair of equipment which has no marking plate should be avoided.

**4.2 Statutory requirements**

**4.2.1 Repair facility**

The repair facility shall be aware of any specific requirements in relevant national legislation which may govern the repair or overhaul operation.

#### **4.2.2 User**

The equipment user should be aware of any relevant legislation should he wish to undertake the repair or overhaul of equipment himself. In addition, he should be aware of any changes in responsibility for health and safety, should refurbishment and/or re-installation be carried out by a third party.

### **4.3 Instructions for the user**

#### **4.3.1 Certificates and documents**

The equipment design certificate and other related documents (see 4.4.1.5.1) should be obtained as part of the original purchase contract.

#### **4.3.2 Records and work instructions**

All relevant documentation that is available shall be obtained as part of the original purchase contract. Records of any previous repairs, overhauls or modifications shall be kept by the user and made available to the repairer.

NOTE It will be in the interests of the user that the repairer is notified, whenever possible, of the fault and/or nature of the work to be done.

Special requirements stipulated in the user's specifications, and which are supplementary to the various standards, e.g. enhanced ingress protection, shall be brought to the attention of the repairer.

The user shall inform the repairer of any statutory requirement for compliance with certification (see note in the introduction).

#### **4.3.3 Re-installation of repaired equipment**

Before the repaired equipment is re-commissioned, cable/conduit entry systems shall be checked to ensure that they are undamaged and are appropriate to the equipment type of protection. Recommendations may be found in the wiring systems clause of IEC 60079-14.

#### **4.3.4 Repair facilities**

The user shall ascertain that the repair facility concerned can demonstrate compliance with the relevant stipulations of this standard.

### **4.4 Instructions for the repair facility**

#### **4.4.1 Repair and overhaul**

##### **4.4.1.1 General**

Repair facilities shall operate a Quality Management System that meets with the requirements of the ISO 9000 series of standards.

The repair facility shall appoint a person ('Responsible Person') with the required competency (see Annex B), within the management organization, to accept responsibility and authority for ensuring that the overhauled/repaired equipment complies with the certification status agreed with the user. The person so appointed shall have a working knowledge of the appropriate explosion protection standards and an understanding of this standard.

The repair facility must have adequate repair and overhaul facilities as well as the appropriate equipment necessary and trained Operatives with the required competency (see Annex B) and authority to carry out the activities, taking into account the specific type of protection.

The repair facility shall conduct an assessment of the status of the equipment to be repaired, agree with the user the expected certification status of the equipment after repair and the scope of work to be done. This should include the omission of any tests mentioned within this document that the user could reasonably assume to be included. The assessment shall be documented and shall address the relevant clauses of the appropriate equipment standard and this standard and be included in the job report to the user. Such assessments shall be conducted by the Responsible Person (supported by appropriate Operatives). The Responsible Person shall only conduct assessments with the explosion protection techniques for which he has demonstrated his competence.

The repair facility shall include procedures and systems to carry out overhaul/repair work at sites external to the repair facility, where appropriate.

#### **4.4.1.2 Certification and standards**

The repairer's attention is directed to the need to be informed of, and to comply with, the relevant explosion-protection standards and certification requirements applicable to the equipment to be repaired or overhauled.

#### **4.4.1.3 Competency**

The repairer of the equipment shall ensure that those operatives directly concerned with the repair and/or overhaul of the certified equipment are trained, experienced, skilled, knowledgeable and/or supervised on this type of work.

Training and competency assessments are specified in Annex B.

Appropriate training and assessment shall be undertaken from time to time at intervals depending on the frequency of utilization of the technique or skill and change of standards or regulations. The interval should normally not exceed three years.

#### **4.4.1.4 Testing**

Should it prove impracticable to carry out certain tests, e.g., a component of a complete equipment taken off site for repair such as a rotor of a rotating machine, the repairer shall, before putting the repaired equipment back into service, ascertain from the user or manufacturer the consequences of omitting such tests.

NOTE In some countries, legal consequences may depend upon the extent to which the carrying out or not of certain actions or tests is practicable.

#### **4.4.1.5 Documentation**

##### **4.4.1.5.1 General**

The repair facility should seek to obtain all necessary information/data from the manufacturer or user for the repair and/or overhaul of the equipment. This may include information relating to previous repairs, overhauls or modifications. He should also have available and refer to the relevant explosion-protection standard.