INTERNATIONAL STANDARD

IEC 61241-1-1

Second edition
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Electrical apparatus for use in the presence of combustible dust –

Part 1-1: Electrical apparatus protected by enclosures and surface temperature limitation – Specification for apparatus

Matériels électriques destinés à être utilisés en présence de poussières combustibles –

Partie 1-1: Matériels électriques protégés par enveloppes et limitation de la température de surface – Spécification pour les matériels

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL APPARATUS FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST –

Part 1-1: Electrical apparatus protected by enclosures and surface temperature limitation – Specification for apparatus

FOREWORD

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International Standard IEC 61241-1-1 has been prepared by subcommittee 31H: Apparatus for use in the presence of combustible dust, of IEC technical committee 31: Electrical apparatus for explosive atmospheres.

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

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

FDIS	Report on voting
31H/90/FDIS	31H/96/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.

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

IEC 61241 consists of the following parts under the general title: Electrical apparatus for use in the presence of combustible dust:

– Part 1: Electrical apparatus protected by enclosures and surface temperature limitation
– Part 2: Test methods
– Part 3: Classification of areas where combustible dusts are or may be present
– Part 4: Type of protection pressurization "p"[1)]
– Part 5: Intrinsically safe apparatus[1)]

1) Under consideration.

INTRODUCTION

Combustible dust can be ignited by electrical apparatus in several main ways:

- by surfaces of the apparatus that are above the minimum ignition temperature of the dust concerned. The temperature at which a type of dust ignites is a function of the properties of the dust, whether the dust is in a cloud or layer, the thickness of the layer and the geometry of the heat source;
- by arcing or sparking of electrical parts such as switches, contacts, commutators, brushes, or the like;
- by discharge of an accumulated electrostatic charge;
- by radiated energy (for example electromagnetic radiation);
- by mechanical sparking or frictional sparking or heating associated with the apparatus.

In order to avoid ignition hazards it is necessary that

- the temperature of surfaces, on which dust can be deposited, or which would be in contact with a dust cloud, is kept below the temperature limitation specified in IEC 61241-1-2;
- any electrical sparking parts, or parts having a temperature above the minimum ignition temperature of the dust
  - are contained in an enclosure which adequately prevents the ingress of dust, or
  - the energy of electrical circuits is limited so as to avoid arcs, sparks or temperatures capable of igniting combustible dust;
- any other ignition sources are avoided.

The protection specified in this standard will not provide the required level of safety unless the electrical apparatus is operated within its rating and is installed and maintained according to the relevant codes of practice or requirements, for example in respect of protection against over-currents, internal short circuits, and other electrical faults. In particular, it is essential that the severity and duration of an internal or external fault be limited to values that can be sustained by the electrical apparatus without damage.

Two different types of practice, A and B, are specified in this standard. Both are intended to provide an equivalent level of protection.

ELECTRICAL APPARATUS FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST –

Part 1-1: Electrical apparatus protected by enclosures and surface temperature limitation – Specification for apparatus

1 Scope

This part of IEC 61241 is applicable to electrical apparatus protected by enclosures and surface temperature limitation for use in areas where combustible dust may be present in quantities which could lead to a fire or explosion hazard. It specifies requirements for design, construction and testing of electrical apparatus.

NOTE – IEC 61241-1-2 gives guidance on the selection, installation and maintenance of the apparatus. Apparatus within the scope of this standard may also be subject to additional requirements in other standards – for example, IEC 60079-0.

The ignition protection is based on the limitation of the maximum surface temperature of the enclosure and other surfaces which could be in contact with dust and on the restriction of dust ingress into the enclosure by the use of "dust-tight" or "dust-protected" enclosures.

The application of electrical apparatus in atmospheres which may contain explosive gas as well as combustible dust, whether simultaneously or separately, requires additional protective measures.

Where the apparatus has to meet other environmental conditions, for example, protection against ingress of water and resistance to corrosion, additional methods of protection may be necessary. The method used is not to adversely affect the integrity of the enclosure.

The principles of this standard may also be followed when combustible fibres or flyings cause a hazard.

This standard does not apply to dusts of explosives which do not require atmospheric oxygen for combustion, or to pyrophoric substances.

This standard is not applicable to electrical apparatus intended for use in underground parts of mines as well as those parts of surface installations of such mines endangered by fire damp and/or combustible dust. This standard does not take account of any risk due to an emission of flammable or toxic gas from the dust.

This standard does not include other types of protection and is only applicable to protection by enclosures and surface temperature limitation.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61241. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61241 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60034-5:1991, *Rotating electrical machines – Part 5: Classification of degrees of protection provided by enclosures of rotating electrical machines (IP code)*

IEC 60050(426):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 426: Electrical apparatus for explosive atmospheres*

IEC 60079-0:1998, *Electrical apparatus for explosive gas atmospheres – Part 0: General requirements*

IEC 60079-7:1990, *Electrical apparatus for explosive gas atmospheres – Part 7: Increased safety "e"*

IEC 60079-11:1991, *Electrical apparatus for explosive gas atmospheres – Part 11: Intrinsic safety "i"*

IEC 60093:1980, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*

IEC 60192:1973, *Low-pressure sodium vapour lamps*

IEC 60243-1:1998, *Electrical strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60216-1:1990, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 1: General guidelines for ageing procedures and evaluation of test results*

IEC 60216-2:1990, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 2: Choice of test criteria*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60662:1980, *High-pressure sodium vapour lamps*

IEC 60947-3:1990, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 61241-1-2:199X, *Electrical apparatus for use in the presence of combustible dust – Part 1-2: Electrical apparatus protected by enclosures – Selection, installation and maintenance*

IEC 61241-2-1:1994, *Electrical apparatus for use in the presence of combustible dust – Part 2: Test methods – Section 1: Methods for determining the minimum ignition temperatures of dust*

IEC 61241-3:1997, *Electrical apparatus for use in the presence of combustible dust – Part 3: Classification of areas where combustible dusts are or may be present*

ISO 178:1993, *Plastics – Determination of flexural properties*

ISO 527 (all parts), *Plastics – Determination of tensile properties*

ISO 4225:1994, *Air quality – General aspects – Vocabulary*