AS/NZS 61241.1:2005
IEC 61241-1, Ed.1 (2004)

AS/NZS 61241.1:2005

Australian/New Zealand Standard™

Electrical apparatus for use in the presence of combustible dust

Part 1: Protection by enclosures ‘tD’

STANDARDS AUSTRALIA

STANDARDS NEW ZEALAND
Paerewa Aotearoa

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-014, Electrical Equipment in Hazardous Areas. It was approved on behalf of the Council of Standards Australia on 8 April 2005 and on behalf of the Council of Standards New Zealand on 15 April 2005.
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The following are represented on Committee EL-014:

Auckland Regional Chamber of Commerce
Australian Chamber of Commerce and Industry
Australian Electrical and Electronic Manufacturers Association
Australian Industry Group
Australian Institute of Petroleum Ltd
Certification Interests (Australia)
Department of Natural Resources and Mines (Qld)
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Part 1: Protection by enclosures ‘tD’

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-014, Electrical Equipment in Hazardous Areas to supersede, in part, AS/NZS 61241.1.1:1999.

This Standard is identical with, and has been reproduced from IEC 61241-1, Ed. 1(2004), *Electrical apparatus for use in the presence of combustible dust – Part 1: Protection by enclosures "tD"*.

The objective of this Standard is to specify construction and testing of electrical apparatus protected by enclosures and surface temperature limitations, for use in the presence of combustible dusts.

This first edition of AS/NZS 61241.1, together with AS/NZS 61241.0, cancels and replaces AS/NZS 61241.1.1 (1999).

This Standard supplements the general requirements in AS/NZS 61241.0.

This Standard (and other parts within this Series) was developed to align protection methods associated with electrical apparatus for use in the presence of combustible dust and those similar protection methods associated with the AS/NZS 60079 series of Standards, where possible.

AS/NZS 61241 consists of the following parts under the general title: *Electrical apparatus for use in the presence of combustible dust:*

Part 0: General requirements
Part 1: Protection by enclosures 'tD'
Part 2: Type of protection 'pD'*
Part 10: Classification of areas where combustible dusts are or may be present
Part 11: Protection by intrinsic safety 'iD'†
Part 14: Selection and installation
Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines)†
Part 18: Protection by encapsulation 'mD'
Part 20: Test methods‡
Part 20.1: Methods for determining the minimum ignition temperatures of dust
Part 20.2: Method for determining the electrical resistivity of dust in layers
Part 20.3: Method for determining minimum ignition energy of dust/air mixtures

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

(b) In the source text 'this international standard' should read 'this Australian/New Zealand Standard'.

(c) A full point should be substituted for a comma when referring to a decimal marker.

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* To be published (to supersede current AS/NZS 612141.4).

† To be published.

‡ Under consideration (to supersede current Parts 2.1, 2.2 and 2.3).

CONTENTS

INTRODUCTION

Many dusts which are generated, processed, handled and stored, are combustible. When ignited they can burn rapidly and with considerable explosive force if mixed with air in the appropriate proportions. It is often necessary to use electrical apparatus in locations where such combustible materials are present, and suitable precautions must therefore be taken to ensure that all such apparatus is adequately protected so as to reduce the likelihood of ignition of the external explosive atmosphere. In electrical apparatus, potential ignition sources include electrical arcs and sparks, hot surfaces, and frictional sparks.

Areas where dusts, flyings and fibres in air occur in dangerous quantities are classified as hazardous and are divided into three zones according to the level of risk.

Generally, electrical safety is ensured by the implementation of one of two considerations, i.e. that electrical apparatus be located where reasonably practicable outside hazardous areas and that electrical apparatus be designed, installed and maintained in accordance with measures recommended for the area in which the apparatus is located.

Combustible dust can be ignited by electrical apparatus in several 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 (e.g. 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 this standard;
- any electrical sparking parts, or parts having a temperature above the temperature limit specified in IEC 61241-14:
  - 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.

Compliance with this part of IEC 61241 will only provide the required level of safety if 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.

Several techniques are available for the explosion protection of electrical apparatus in hazardous areas. This standard describes the safety features of these types of explosion protection techniques and specifies the installation procedures to be adopted. It is most important that the correct selection and installation procedures be followed to ensure the safe use of electrical apparatus in hazardous areas.

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

Both of these practices are in common use and the requirements of each should be followed without mixing either the apparatus requirements and selection/installation requirements of the two practices. They adopt different methodology with the primary differences being:

Practice A	Practice B
Written principally as performance-based requirements	Written principally as prescriptive-based requirements
Maximum surface temperature is determined with 5 mm layer of dust and installation rules require 75 K margin between the surface temperature and ignition temperature of the particular dust	Maximum surface temperature is determined with 12,5 mm layer of dust and installation rules require 25 K margin between the surface temperature and ignition temperature of the particular dust
Method of determining dust ingress is according to IEC 60529 – IP Code	Method of determining dust ingress is in accordance with the heat cycling test

NOTES

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Part 1: Protection by enclosures 'tD'

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.

This standard supplements the general requirements in IEC 61241-0.

NOTE IEC 61241-14 gives guidance on the selection and installation of the apparatus. Apparatus within the scope of this standard may also be subjected 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 on 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 should not adversely affect the integrity of the enclosure.

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 firedamp 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.

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.

References to international standards that are struck through in this clause are replaced by references to identical Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading.

~~IEC 60529:2001, *Degrees of protection provided by enclosures (IP Code)*~~

AS 60529:2004, *Degrees of protection provided by enclosures (IP Code)* (identical to IEC 60529:2001)