AS/NZS 61241.14:2005
(Incorporating Amendment Nos 1, 2, 3, 4 and 5)

AS/NZS 61241.14:2005

Australian/New Zealand Standard™

Electrical apparatus for use in the presence of combustible dust

Part 14: Selection and installation (IEC 61241-14, Ed.1.0(2004) MOD)

STANDARDS Australia

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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 5 April 2005 and on behalf of the Council of Standards New Zealand on 11 February 2005.
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The following are represented on Committee EL-014:

Auckland Regional Chamber of Commerce
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Australian Industry Group
Australian Institute of Petroleum Ltd
Certification Interests (Australia)
Department of Natural Resources and Mines (Qld)
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We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

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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 AS/NZS 61241.1.2:2000, *Electrical apparatus for use in the presence of combustible dust,* Part 1.2: *Electrical apparatus protected by enclosures and surface temperature limitation—Selection, installation and maintenance* .

This Standard incorporates Amendment No. 1 (June 2005), Amendment No. 2 (September 2005), Amendment No. 3 (November 2006), Amendment No. 4 (February 2007) and Amendment No. 5 (March 2007). The changes required by the Amendments are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide guidance on the selection and installation of electrical apparatus to be used in areas where combustible dusts are or may be present.

This Standard is an adoption with national modifications and has been reproduced from IEC 61241-14, Ed.1.0(2004), *Electrical apparatus for use in the presence of combustible dust – Part 14: Selection and installation*, and has been varied as indicated to take account of Australian/New Zealand conditions.

The major changes with respect to AS/NZS 61241.1.2, are as follows.

(a) Installation has changed to align with the changes to the definitions of the zones.

(b) Requirements for installation of pressurization have been included.

(c) Layers are no longer restricted to zone 20. Provision for the application of temperature according to layer depth is included.

Variations to IEC 61241-14:2004 are indicated at the appropriate places throughout this standard. Strikethrough (~~example~~) identifies IEC text, tables and figures which, for the purposes of this Australian/New Zealand Standard, are deleted. Where text, tables or figures are added, each is set in its proper place and identified by shading (example). Added figures are not themselves shaded, but are identified by a shaded border.

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 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 61241.4).

† To be published.

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

The terms ‘normative’ and ‘informative’ are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

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INTRODUCTION

Many types of dust that 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 dust, 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 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 this standard
  - 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 AS/NZS 61241~~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.

In this standard, for “protection by enclosure tD” only, two different types of practice, A and B, are specified 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 or 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 as both performance and prescriptive based requirements
Maximum surface temperature is determined with 5 mm layer of dust and installation rules require 75 °C 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 °C margin between the surface temperature and ignition temperature of the particular dust
A method of achieving the required dust ingress protection by the use of resilient seals on joints and rubbing seals on rotating or moving shafts or spindles and determining dust ingress according to IEC 60529 – IP Code	A method of achieving the required dust ingress protection by specified widths and clearances between joint faces and, in the case of shafts and spindles, specified lengths and diametrical clearances between moving and stationary parts and determining dust ingress according to the heat cycling test

NOTES

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Any table, figure or text of the international standard that is struck through is not part of this Standard. Any Australian/New Zealand table, figure or text that is added is part of this Standard and is identified by shading.

1 Scope

This part of AS/NZS 61241~~IEC 61241~~ specifies general requirements, additional to those required for basic electrical safety, for the selection of electrical apparatus and instruments and associated equipment, and for the installation of electrical apparatus to ensure safe use in areas where combustible dust may be present in quantities which could lead to a fire or explosion hazard.

NOTE Various parts of the AS/NZS 61241~~IEC 61241~~ series specify requirements for the design, construction and testing of electrical apparatus. Apparatus within the scope of this standard may also be subjected to additional requirements in other standards.

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 which are not within the scope of this standard.

This standard includes several types of protection that protect either from ingress of dust or have insufficient energy to cause ignition and provide surface temperature limitation.

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

Where the apparatus is required 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. The requirements of this standard apply only to the use of electrical apparatus under normal or near normal atmospheric conditions. For other conditions, additional precautions may be necessary. For example, most flammable materials and many materials which are normally regarded as non-flammable might burn vigorously under conditions of oxygen enrichment. Other precautions might also be necessary in the use of electrical apparatus under conditions of extreme temperature and pressure. Such precautions are beyond the scope of this standard.

This standard does not apply to dust from explosives which do not require atmospheric oxygen for combustion; neither does it apply to pyrophoric substances.

This standard is not applicable to electrical apparatus intended for use in underground parts of mines, nor 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.

The requirements specified in this standard are supplementary to and not alternative to any requirements that would apply to apparatus and installations in non-hazardous areas (AS/NZS 3000).