AS/NZS 61241.11:2006
IEC 61241-11, Ed. 1.0 (2005) and
Corrigendum 1:2006

AS/NZS 61241.11:2006

Australian/New Zealand Standard™

Electrical apparatus for use in the presence of combustible dust

Part 11: Protection by intrinsic safety 'iD'

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 6 March 2006 and on behalf of the Council of Standards New Zealand on 17 March 2006.
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Australian/New Zealand Standard™

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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.

The objective of this Standard is to specify requirements for the construction and testing of intrinsically safe apparatus intended for use in potentially explosive dust cloud or dust layer environments and for associated apparatus that is intended for connection to intrinsically safe circuits which enter such environments.

This Standard is identical with, and has been reproduced from IEC 61241-11, Ed. 1.0 (2005), *Electrical apparatus for use in the presence of combustible dust – Part 11: Protection by intrinsic safety 'iD'* including its Corrigendum 1:2006.

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 IEC 61241-11 should read AS/NZS 61241.11.

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

(d) Any French text on figures should be ignored.

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 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 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 (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 to ignite combustible dust;
– any other ignition sources are avoided.

Several techniques are available for explosion protection of electrical apparatus in hazardous areas. This standard describes the safety features of this type of explosion-protection technique and specifies the requirements 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.

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, for example, installed in a system designed in accordance with the principles of IEC 60079-25 and installed in accordance with IEC 61241-14.

The following principles should be followed:

– the electronic circuits must fulfil Group IIB requirements according to IEC 60079-11 to avoid spark ignition;

– IP 6X or encapsulation is normally required to ensure that creepage and clearance distances are not compromised by dust. Therefore the importance and the durability of the integrity of the enclosure or encapsulation are much higher than required by IEC 60079-11;

– There should be power limitation for apparatus or parts of apparatus not protected by an enclosure or encapsulation (e.g. uninsulated sensor) to avoid ignition of a dust layer by power dissipation directly into the dust (power matching by conductive dusts) and to avoid thermal ignition on the surface of components;

– limitation of the temperature of all exposed surfaces of all apparatus or parts of apparatus exceeding the power limitation limits in accordance with IEC 61241-0. The surface can be the surface of the enclosure or of the encapsulation.

NOTES

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Australian/New Zealand Standard

Electrical apparatus for use in the presence of combustible dust Part 11: Protection by intrinsic safety ‘iD’

1 Scope

This part of IEC 61241 specifies requirements for the construction and testing of intrinsically safe apparatus intended for use in potentially explosive dust cloud or dust layer environments and for associated apparatus that is intended for connection to intrinsically safe circuits which enter such environments.

This standard supplements the general requirements of IEC 61241-0: except as indicated in the following list.

Apparatus utilized in systems will meet the requirements of IEC 60079-25.

If associated apparatus is protected by a type of protection listed in IEC 61241-0 or IEC 60079-0 then the requirements of that method of protection together with the relevant parts of IEC 61241 or IEC 60079 also apply to the associated apparatus. The list of exclusions which follows is directly applicable to associated apparatus intended for use in situations where there is no potentially hazardous atmosphere and in other circumstances should be used in combination with the requirements of the other methods of protection.

Clause or subclause of IEC 61241-0		Intrinsically safe apparatus	Associated apparatus
4.1	General	Applies	Applies
4.2	Principles for design and testing of apparatus for use in Zone 20	Applies	Excluded
4.3	Opening enclosures	Applies	Excluded
4.4	Environmental conditions	Applies	Excluded
5.1	Maximum surface temperature	Applies	Excluded
5.2	Maximum surface temperature with respect to dust layers above 50 mm	Applies	Excluded
5.3	Ambient temperature	Applies	Applies
6.1	Non-metallic enclosures and non-metallic parts of enclosures	Applies	Excluded
6.1.1	Material specification	Applies	Excluded
6.1.2	Plastic materials	Applies	Excluded
6.1.3	Verification of compliance	Applies	Excluded
6.1.4	Thermal endurance	Applies	Excluded
6.1.5	Electrostatic charges	Applies	Excluded
6.2	Enclosures containing light metals	Applies	Excluded
6.2.1	Composition	Applies	Excluded
6.2.2	Threaded holes	Excluded	Excluded
7	Fasteners	Excluded	Excluded
8	Interlocking devices	Excluded	Excluded
9	Bushings	Excluded	Excluded
10	Materials used for cementing	Applies	Excluded
11	Ex components	Applies	Excluded

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