Australian Standard®

Electrical equipment for explosive atmospheres — Explosion-protection techniques

Part 6: Increased safety

This Australian Standard was prepared by Committee EL/14, Electrical Equipment in Hazardous Areas. It was approved on behalf of the Council of the Standards Association of Australia on 11 August 1988 and published on 3 October 1988.

The following interest are represented on Committee EL/14:

Australian Coal Association
Australian Electrical and Electronic Manufacturers Association
Australian Institute of Petroleum
Confederation of Australian Industry
Department of Defence (Commonwealth)
Department of Industrial Relations and Employment, N.S.W.
Department of Labour, Vic.
Department of Mineral Resources, N.S.W.
Department of Mines, Qld
Electrical Contractors Associations of Australia
Electricity Supply Association of Australia
Institute of Instrumentation and Control
Insurance Council of Australia
Regulatory authorities (electrical)
Testing interests

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PREFACE

This Standard was prepared by the Association's Committee on Electrical Equipment in Hazardous Areas, to supersede AS 1593-1982, *Electrical equipment for explosive atmospheres — Increased safety apparatus — Type of protection e*. This Standard is intended for the guidance of manufacturers, users, statutory authorities and associated interests. It is Part 6 of a series of Standards dealing with the explosion-protection of electrical equipment intended for use in hazardous areas.

Increased safety is an explosion-protection technique for electrical equipment in hazardous areas, which can be applied to several different forms of electrical equipment, including cage induction motors, luminaires, handlamps, and instrument transformers.

Equipment complying with this Standard will be suitable for use in a Class I Zone 1 or Zone 2 area.

In its terminology, definitions and general treatment of the subject, this Standard is similar to the following Standards and draft Standards issued by the International Electrotechnical Commission and the European Committee for Electrotechnical Standardization:

IEC 79	Electrical apparatus for explosive gas atmospheres Part 7: Increased safety e
EN 50 019	Electrical apparatus for potentially explosive atmospheres Part 6: Increased safety e
IEC 31C(C.O.)8	Draft revision of IEC publication 79-7

Acknowledgement is made of the assistance received from these sources.

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SECTION 1. SCOPE AND DEFINITIONS

1.1 SCOPE. This Standard specifies requirements for the design, construction and testing of increased safety electrical equipment, type of protection 'e', intended for use in hazardous areas.

This Standard supplements AS 2380.1.

This Standard applies to electrical equipment and parts of electrical equipment which do not produce sparks or arcs or dangerous temperatures in normal service and which have rated voltages not exceeding 11 kV (phase-to-phase).

NOTE: Electrical equipment which does not produce electric sparks or arcs in normal service attains the degree of safety required for electrical equipment of type of protection 'e' increased safety only by the application of the specific measures prescribed in this Standard.

1.2 REFERENCED DOCUMENTS. The documents below are referred to in this Standard.

AS
1194 Winding wires
Part 1: Enamelled round copper winding wires (AS 1194.1)

1359 Rotating electrical machines — General requirements
Part 21: Classification of methods of cooling (AS 1359.21)

1939 Classification of degrees of protection provided by enclosures for electrical equipment

1828 Electrical equipment for explosive atmospheres — Cable glands

2325 Tungsten filament lamps for general service

2380 Electrical equipment for explosive atmospheres — Explosion-protection techniques
Part 1: General requirements (AS 2380.1)

2420 Fire test methods for solid insulating materials and non-metallic enclosures used in electrical equipment

2480 Electrical equipment for explosive atmospheres — Flameproof enclosure — Type of protection d

2768 Electrical insulating materials — Evaluation and classification based on thermal endurance

3000 SAA Wiring Rules

3008 Electrical installations — Selection of cables
Part 1: Cables for alternating voltages up to and including 0.6/1 kV (AS 3008.1)

3140 Approval and test specification for Edison-type screw lampholders

IEC
61 Lamp caps and holders together with gauges for the control of interchangeability and safety
61-1: Lamp caps
61-2: Lampholders

664 Insulation co-ordination within low-voltage systems including clearances and creepage distances for equipment
664A — First supplement

1.3 DEFINITIONS. For the purpose of this Standard the definitions given in AS 2380.1 and those below apply.

1.3.1 Increased safety — type of protection applied to electrical equipment that does not produce arcs or sparks in normal service in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks.

NOTES:

1. This type of protection is denoted by 'e'.
2. Equipment producing arcs or sparks in normal service is excluded by this definition.

1.3.2 Limiting temperature — maximum permissible temperature for electrical equipment or a part of an electrical equipment. It is the lower of the two temperatures determined by:

(a) The danger of ignition of the explosive gas atmosphere.

(b) The thermal stability of the materials used.

NOTE: This temperature may be the maximum surface temperature (see AS 2380.1) or a lower value (see Clause 2.9).

1.3.3 Initial starting current I_A — highest r.m.s. value of current absorbed by an a.c. motor when at rest, or by an a.c. magnet with the armature clamped in the position of maximum air gap, when supplied at rated voltage and rated frequency.

NOTE: Transient phenomena are ignored.

1.3.4 Starting current ratio I_A/I_N — ratio between initial starting current I_A and rated current I_N.

1.3.5 Time t_E — time taken for an a.c. winding, when carrying the initial starting current I_A, to be heated up to the limiting temperature from the temperature reached in rated service at the maximum ambient temperature.

1.3.6 Thermal current limit I_{th} — r.m.s. value of the current required to heat up the conductor within 1 s from the temperature reached in rated service at the maximum ambient temperature to the limiting temperature.