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Australian Standard 1593—1982

ELECTRICAL EQUIPMENT FOR EXPLOSIVE ATMOSPHERES

INCREASED SAFETY APPARATUS—TYPE OF PROTECTION e

2380 Electrical equipment for explosive atmospheres—Explosion-protection techniques
Part 6: 1988 Increased safety
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Specifies design, construction and testing requirements for increased safety electrical equipment for use in explosive atmospheres. Technically similar to IEC 79-7.

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Represented on the committee which was responsible for the preparation of this standard were the following:

Australian Coal Association

Australian Electrical and Electronic Manufacturers Association

Australian Institute of Petroleum

Confederation of Australian Industry

Department of Industrial Relations, N.S.W.

Department of Industry and Commerce

Department of Mineral Resources, N.S.W.

Department of Minerals and Energy, Vic.

Department of Mines, Qld

Electrical Contractors Associations of Australia

Electricity Supply Association of Australia

Independent testing interests

Insurance Council of Australia

State electricity regulatory authorities

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AUSTRALIAN STANDARD

ELECTRICAL EQUIPMENT FOR EXPLOSIVE ATMOSPHERES

INCREASED SAFETY APPARATUS—TYPE OF PROTECTION e

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PREFACE

This edition of this standard was prepared by the Association's Committee on Electrical Equipment in Hazardous Locations, to supersede the 1974 edition. It is intended for the guidance of manufacturers, users, statutory authorities and associated interests and for use in association with the SAA Wiring Rules (AS 3000) and relevant mining regulations. It describes requirements for achieving increased safety in electrical equipment for use in explosive atmospheres.

This standard is based on corresponding requirements issued by the International Electrotechnical Commission (IEC 79-7) and the British Approval Service for Electrical Equipment in Flammable Atmospheres (BASEEFA Publication SFA 3008: 1970).

The following are the major changes in this edition:

(a) Reference is made to AS 2380, Part 1, for grouping of apparatus, temperature classification and marking.

(b) Glands complying with AS 1828 have been recognized as suitable for use with Type e equipment.

(c) The clearance and creepage distance requirements have been relaxed for lamp caps with a rated voltage of less than 32 V.

(d) It is now necessary for all equipment to satisfy certain tests of AS C100 where relevant.

This standard requires reference to the following standards:

AS 1076	Code of Practice for Selection, Installation and Maintenance of Electrical Apparatus and Associated Equipment for Use in Explosive Atmospheres (Other Than Mining Applications) Part 1—Basic requirements Part 2—Classification of Hazardous Areas Part 6—Apparatus with Type of Protection e—Increased Safety
AS 1194	Enamelled Round Copper Winding Wires
AS 1359	General Requirements for Rotating Electrical Machines
AS 1828	Cable Glands for Explosive Gas Atmospheres
AS 1829	Intrinsically Safe Electrical Apparatus for Explosive Atmospheres
AS 1896	Method of Test for Ignition Temperature of Gases and Vapours
AS 1939	Classification of Degrees of Protection Provided by Enclosures for Electrical Equipment
AS 2380	Electrical Equipment for Explosive Gas Atmospheres—Explosion Protection Techniques Part 1—General Requirements
AS 2430	Classification of Hazardous Areas Part 1—Explosive Gas Atmospheres Part 2—Dusts (Including Inherently Explosive Dusts)
AS 2480	Electrical Equipment for Explosive Atmospheres—Flameproof Enclosure—Type of Protection d
AS 3000	SAA Wiring Rules
AS C73	Magnet Winding Wire C73.1—Part 1—General C73.3—Part III—Test Methods
AS C100	Approval and Test Specification for Definitions and General Requirements for Electrical Materials and Equipment
IEC 61	Lamp Caps and Holders Together With Gauges for the Control of Interchangeability and Safety 61-1—Lamp Caps

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

ELECTRICAL EQUIPMENT FOR EXPLOSIVE ATMOSPHERES—INCREASED SAFETY APPARATUS—TYPE OF PROTECTION e

FOREWORD

The purpose of this standard is to establish requirements for achieving increased safety in electrical apparatus for use in flammable or explosive atmospheres in which gases or vapours may be present, and as required by the SAA Wiring Rules or by the mining regulations for defined hazardous areas.

The classification of hazardous areas is dealt with in AS 2430, Parts 1 and 2. Part 1 applies to explosive gas atmospheres and recognizes the following zones.

Zone 0—an area in which an explosive gas atmosphere is present continuously, or is expected to be present for long periods, or for short periods which occur with high frequency.

Zone 1—an area in which an explosive gas atmosphere can be expected to occur periodically or occasionally during normal operation.

Zone 2—an area in which an explosive gas atmosphere is not expected to occur in normal operation, and if it occurs is likely to be present only infrequently and for short duration.

Enclosures complying with this standard will be suitable for installation in a Zone 1 or Zone 2 area.

The 'increased safety' concept can be applied to several different forms of electrical equipment, including cage induction motors, lighting fittings, handlamps, and instrument transformers. The complete requirements for increased safety certification, however, will vary with each of these categories.

General constructional requirements are specified in Section 2. Particular requirements, relevant only to one form of increased safety equipment, such as rotating electrical machines or lighting fittings, are set out in Section 4.

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard specifies requirements for the construction and testing of electrical equipment with increased safety type of protection e, for use in explosive atmospheres. This type of protection can be applied only to those kinds of equipment, and parts of equipment, which do not produce sparks or arcs or dangerous temperatures in normal service.

It specifies the measures to be applied in order to increase the safety of such equipment so that it is suitable for operation in areas endangered by explosive gas atmospheres.

NOTE: Equipment which does not produce electric sparks or arcs in normal service attains the degree of safety required for apparatus of increased safety type of protection e only by the application of the special measures described in this standard.

1.2 DEFINITIONS. For the purpose of this standard, the following definitions apply:

1.2.1 Clearance—the shortest distance through the air between two conducting parts.

1.2.2 Creepage distance—the shortest distance between two conducting parts along the surface of the insulating parts.

1.2.3 Dynamic current limit I_{dyn}—the peak value of the maximum alternating current, the dynamic effect of which the electric equipment can sustain without damage.

1.2.4 Increased safety—a method of protection by which additional measures are applied to electrical equipment so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks during the service life of the equipment. It applies only to electrical equipment of which no parts produce arcs or sparks or exceed the limiting temperature in normal service.

1.2.5 Limiting temperature—the maximum permissible temperature for equipment or parts of equipment. It is determined by—

(a) the danger of ignition of the explosive gas atmosphere; and

(b) the thermal stability of the materials used.

The lower temperature is the one to be taken into consideration and is the critical limiting temperature.

1.2.6 Starting current I_A—the highest r.m.s. value of that current which flows in the primary part of a stalled cage rotor motor or in an alternating current magnet with a seized armature after the transient phenomena have ceased, when the equipment is supplied at rated voltage and rated frequency. It is normally measured a few seconds after application of rated voltage.

1.2.7 Starting current ratio I_A/I_N—the ratio between starting current I_A and the rated current I_N.

1.2.8 Thermal current limit I_{th}—the r.m.s. value of the current which, when it flows for 1 s, heats up the conductors to the limiting temperature.

1.2.9 Time t_E—the time taken for a.c. windings, when carrying the starting current I_A, to heat up from the temperature reached in rated service and at maximum ambient temperature, to the critical limiting temperature.

1.3 GROUPING. Apparatus shall be grouped in accordance with Clause 1.5 of AS 2380, Part 1.

1.4 TEMPERATURE CLASSIFICATION. Enclosures shall be classified in accordance with Clause 1.6 of AS 2380, Part 1.