

Australian Standard[®]

**Electrical equipment for
explosive atmospheres —
Explosion-protection techniques**

Part 1: General requirements

This Australian Standard was prepared by Committee EL/14, Electrical Equipment in Hazardous Areas. It was approved on behalf of the Council of Standards Australia on 3 August 1989 and published on 13 November 1989.

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
Department of Industrial Relations and Employment, N.S.W.
Department of Labour, Vic.
Department of Minerals and Energy, N.S.W.
Department of Mines, Qld
Electrical Contractors Associations of Australia
Institute of Instrumentation and Control
Insurance Council of Australia
Regulatory authorities (electrical)
Testing interests

Review of Australian Standards. To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

Australian Standard[®]

**Electrical equipment for
explosive atmospheres —
Explosion-protection techniques**

Part 1: General requirements

First published as AS 2380.1—1980.
Second edition 1985.
Third edition 1989.
Incorporating:
Amdt 1—1998

PREFACE

This Standard was prepared by the Standards Australia Committee on Electrical Equipment in Hazardous Areas to supersede AS 2380.1—1985. It is intended for the guidance of manufacturers, users, regulatory authorities and associated interests, and for use with the *SAA Wiring Rules (AS 3000)* and relevant mining regulations.

In its terminology, definitions and general treatment of the subject, this Standard is similar to corresponding requirements contained in IEC 79-0, *Electrical apparatus for explosive gas atmospheres*, Part 0: *General requirements*. Acknowledgment is made of the assistance received from this source.

This Standard is the first of a series of Standards dealing with the explosion-protection of electrical equipment intended for use in explosive atmospheres. It is supplemented by other parts covering specific types of protection.

The major change in this edition is the deletion of requirements for clearances, separations and creepage distances. These are now included in the appropriate parts covering specific types of protection.

© Copyright — STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

CONTENTS

	<i>Page</i>
FOREWORD	5
SECTION 1. SCOPE AND GENERAL	
1.1 SCOPE	6
1.2 APPLICATION	6
1.3 REFERENCED DOCUMENTS	6
1.4 DEFINITIONS	6
1.5 STANDARD ATMOSPHERIC CONDITIONS	7
1.6 LOW ENERGY DEVICES	7
1.7 GROUPING AND CLASSIFICATION OF ELECTRICAL EQUIPMENT	7
1.8 TEMPERATURES	7
1.9 MANUFACTURER'S RESPONSIBILITY	7
SECTION 2. REQUIREMENTS FOR ALL ELECTRICAL EQUIPMENT	
2.1 GENERAL	9
2.2 ENCLOSURES OF NON-METALLIC MATERIAL	9
2.3 METALLIC ENCLOSURES	9
2.4 FASTENERS	9
2.5 INTERLOCKING DEVICES	10
2.6 BUSHINGS AND TERMINAL STUDS	10
2.7 MATERIALS USED FOR CEMENTING AND SEALING	10
2.8 CONNECTIONS	10
2.9 CONNECTION FACILITIES FOR EARTHING OR BONDING CONDUCTORS	10
2.10 CONNECTION FACILITIES AND TERMINAL COMPARTMENTS	10
2.11 CABLE AND CONDUIT ENTRIES	10
SECTION 3. SUPPLEMENTARY REQUIREMENTS FOR CERTAIN ELECTRICAL EQUIPMENT	
3.1 ROTATING ELECTRICAL MACHINES	11
3.2 SWITCHGEAR	11
3.3 ENCLOSURES CONTAINING FUSES	11
3.4 PLUGS AND SOCKET-OUTLETS	11
3.5 LUMINAIRE	12
SECTION 4. MARKING	
4.1 GENERAL	13
4.2 INFORMATION TO BE MARKED	13
4.3 MIXED TYPES OF EXPLOSION-PROTECTION	13
4.4 ORDER OF MARKING	13
4.5 MARKING OF Ex COMPONENTS	13
4.6 MARKING OF SMALL ELECTRICAL EQUIPMENT	14
4.7 METHOD OF MARKING	14
4.8 EXAMPLES OF MARKING	14
SECTION 5. VERIFICATION AND TESTS	
5.1 GENERAL AND APPLICATION	15
5.2 IMPACT AND DROP TESTS	15
5.3 DEGREE OF PROTECTION TEST	15
5.4 TORQUE TESTS	15
5.5 TEMPERATURE-RISE TEST	15
5.6 THERMAL SHOCK TEST	15
5.7 INSULATION RESISTANCE OF PLASTICS PARTS	15

	<i>Page</i>
SECTION 6. ROUTINE TESTS	
6.1 GENERAL	16
6.2 HIGH VOLTAGE TEST	16
APPENDICES	
A IMPACT TEST	17
B TEMPERATURE-RISE TEST	20
C INSULATION RESISTANCE TEST	21

Currently in preview, click buy full version

FOREWORD

In coal mines, and many other industrial situations, electrical equipment may have to operate in an explosive atmosphere. The precautions to be taken against explosion are prescribed by Australian State Authorities responsible for safety. These authorities generally require that all categories of equipment for use in explosive atmospheres must be approved or certified. Where explosive atmospheres exist or can exist, equipment and installations must comply with the mining or wiring regulations of the State or Territory in which the installation is located. The regulations of States and Territories are very similar and are generally based on national Standards and codes of practice. The requirements of published Australian Standards for explosion-protected electrical equipment are solely concerned with the design and construction of electrical equipment for use in explosive atmospheres to ensure that the equipment will not cause an explosion in the surrounding atmosphere. They are relevant where the risk arises from the possible presence of an explosive atmosphere.

Several different types of explosion-protection techniques for the construction of electrical equipment for explosive atmospheres are covered by the various parts of this Standard. These techniques provide the required level of safety when the electrical equipment is operated within the limits indicated by its nameplate marking and is adequately protected against overcurrents, 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 by internal or external means to values that can be sustained by the electrical equipment without damage.

The classification of hazardous areas is dealt with in AS 2430.

STANDARDS AUSTRALIA

Australian Standard

Electrical equipment for explosive atmospheres — Explosion-protection techniques

Part 1: General requirements

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard specifies general requirements for the construction of electrical equipment for explosive atmospheres and is supplemented or modified by the particular Standards for the specific types of explosion-protection.

The requirements contained in this Standard are supplementary to the requirements for electrical equipment specified in AS 3000, SAA Wiring Rules, and the relevant Australian Standard Approval and Test Specifications called-up therein. This Standard covers safety of the equipment with regard to explosion hazards only.

1.2 APPLICATION. This Standard is intended for application by designers and manufacturers of explosion-protected electrical equipment. It is also intended for application by certifying authorities in assessing compliance on the basis of type tests.

This Standard does not contain requirements for ensuring that, in production, the equipment continues to comply. However, it is the manufacturer's responsibility to make the routine verifications and tests necessary to ensure that production models continue to comply with the Standard and are not inferior to the prototype or sample submitted for testing.

Likewise this Standard does not include requirements for ensuring that maintenance work is carried out to ensure that equipment, originally manufactured in accordance with this Standard, continues to comply with the Standard. It is the owner's responsibility to ensure that appropriate maintenance is undertaken on a regular basis.

1.3 REFERENCED DOCUMENTS. The following documents are referred to in this Standard:

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)
1076.1	Part 1: Basic requirements
1202	A.C. motor starters (up to and including 600 V)
1202.1	Part 1: Direct-on-line (full voltage) starters
1039	Classification of degrees of protection provided by enclosures for electrical equipment
2012	Metallic conduits and fittings
2380	Electrical equipment for explosive atmospheres — Explosion-protection techniques
2380.6	Part 6: Increased safety
2420	Fire test methods for solid insulating materials and non-metallic enclosures used in electrical equipment
2430	Classification of hazardous areas

3000	SAA Wiring Rules
3100	Approval and test specification for definitions and general requirements for electrical materials and equipment
SAA MP 42	Explosion-protected electrical equipment — Conditions and procedures for SAA certification
NFPA 325M	Fire hazard properties of flammable liquids, gases and volatile solids

1.4 DEFINITIONS. For the purpose of this Standard, the definitions below apply.

1.4.1 Cable entry — means of introducing an electric cable into an electrical equipment.

1.4.2 Certifying authority — body responsible for issuing certificates of compliance.

1.4.3 Clearance — shortest distance in air between two conductive parts.

1.4.4 Conduit entry — a means of introducing a conduit into an electrical equipment.

1.4.5 Creepage distance — shortest distance along the surface of electrical insulating material between two conductive parts.

1.4.6 Connection facilities — terminals, screws and other parts, used for the electrical connection of conductors of external circuits.

1.4.7 Degree of protection of enclosures — measure applied to the enclosures of electrical equipment to provide for —

- (a) the protection of persons against contact with, or approach to, live parts and against contact with moving parts (other than smooth rotating shafts and the like) inside the enclosure and protection of the equipment against ingress of solid foreign bodies; and
- (b) the protection of the equipment inside the enclosure against harmful ingress of water.

1.4.8 Electrical equipment — all items applied as a whole or in part for the utilization of electrical energy, such as items for the generation, transmission, distribution, storage, measurement, regulation, conversion, consumption of electrical energy, and items for telecommunications.

1.4.9 Electrical equipment for explosive gas atmospheres — electrical equipment for use in hazardous areas and complying with an appropriate Australian Standard.

NOTE: Such equipment may also be referred to as 'explosion-protected electrical equipment'.