

Australian Standard[®] 2380.1—1985

**ELECTRICAL EQUIPMENT FOR
EXPLOSIVE ATMOSPHERES—
EXPLOSION-PROTECTION
TECHNIQUES—**

**Part 1—GENERAL
REQUIREMENTS**



STANDARDS ASSOCIATION OF AUSTRALIA
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The following interests 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 Industrial Relations, N.S.W.
Department of Defence Support
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AUSTRALIAN STANDARD

**ELECTRICAL EQUIPMENT FOR
EXPLOSIVE ATMOSPHERES—
EXPLOSION-PROTECTION
TECHNIQUES**

Part 1

GENERAL REQUIREMENTS

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PREFACE

This standard was prepared by the Association's Committee on Electrical Equipment in Hazardous Locations to supersede AS 2380, Part 1—1980. 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 the International Electrotechnical Commission (IEC) Publication 79-0. Use was also made of European standard EN 50 014 in the preparation of this standard. Acknowledgement is made of the assistance received from these sources.

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

The following are the major changes in this edition:

- (a) The addition of requirements covering workmanship, conduit threads, Ex components, method of marking and testing to AS 3100.
- (b) The deletion of requirements for opening of enclosure-time interval, hand lamps and cap lamps.
- (c) The simplification of the requirements for special fasteners.
- (d) The inclusion of comprehensive requirements for clearances, separations and creepage distances.
- (e) The introduction of provision to satisfy marking requirements by means of engineering drawings instead of actual labels.
- (f) The deletion of the test covering thermal stability of plastics enclosures, and clamping tests for armoured cables.
- (g) The deletion of the appendix on classification of mixtures of gases or vapours with air (it is intended to include this information in the next edition of AS 1076, Part 1).
- (h) The recognition of the use of a polyamide head when applying the impact test to light-transmitting parts.

Readers not familiar with the use of electrical equipment in hazardous areas are advised to read AS 1076, Part 1, which gives useful background information.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard**for****ELECTRICAL EQUIPMENT FOR EXPLOSIVE ATMOSPHERES—
EXPLOSION-PROTECTION TECHNIQUES**

PART 1—GENERAL REQUIREMENTS**FOREWORD**

In coal mines and some 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 require that all categories of equipment for use in explosive atmospheres must be approved and/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, Parts 1 and 2. Part 1 applies to explosive 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.

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.

1.2 REFERENCED DOCUMENTS. This standard requires reference to the following documents:

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
AS 1202	A.C. Motor Starters (Up to and Including 1000 V) Part 1—Direct-on-line (Full Voltage) Starters
AS 1593	Electrical Equipment for Explosive Atmospheres—Increased Safety Apparatus—Type of Protection e
AS 1939	Classification of Degrees of Protection Provided by Enclosures for Electrical Equipment
AS 2052	Metallic Conduits and Fittings
AS 2420	Fire Test Methods for Solid Insulating Materials and Non-metallic Enclosures used in Electrical Equipment
AS 2430	Classification of Hazardous Areas Part 1—Explosive Gas Atmospheres Part 2—Dusts (Including Inherently-explosive Dusts)
AS 3100	Approval and Test Specification for Definitions and General Requirements for Electrical Materials and Equipment
SAA MP421	Conditions and Procedures for SAA Certifications of Explosion-protected Electrical Equipment
NFPA 325M	Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids

1.3 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 with standard. 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.

1.4 STANDARD ATMOSPHERIC CONDITIONS. The atmospheric conditions applicable to electrical equipment for explosive atmospheres are considered to include pressures within the range 80 kPa to 110 kPa and temperatures within the range -20°C to $+60^{\circ}\text{C}$.

NOTE: Atmospheric conditions outside this range may need special consideration.

1.5 LOW ENERGY DEVICES. Devices whose parameters can never exceed any of the values—

1.2 V, 0.1 A, 20 μJ or 25 mW

are considered safe for use in an explosive atmosphere and need not otherwise comply with the requirements of this standard.

However such devices are subject to the requirements of the various parts of this standard if they are connected to a device which contains a source or a storage element of electrical energy which could cause the circuit to exceed these parameters.

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

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

1.6.2 Certifying authority—the body responsible for issuing certificates of compliance.

1.6.3 Clearance—denotes the shortest distance between two conductive parts, or between a conductive part and the bounding surface of the appliance, measured through air.

NOTE: The bounding surface of the appliance is the outer surface of the enclosure, considered as though metal foil were pressed into contact with accessible surfaces of insulating material.

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

1.6.5 Creepage distance—denotes the shortest path between two conductive parts, or between a conductive part and the bounding surface of the appliance, measured along the surface of the insulating material.

1.6.6 Degree of protection of enclosures—the 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.

1.6.7 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, and consumption of electrical energy and items for telecommunications.

NOTE: Also referred to as 'electrical apparatus'.

1.6.8 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'.