AS 2381.7—1989

Australian Standard®

Electrical equipment for explosive atmospheres— Selection, installation and maintenance

Part 7: Intrinsic safety i

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 24 November 1988 and published on 20 March 1989.

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 Defence

Department of Industrial Relations and Employment, N.S.W.

Department of Industry and Commerce

Department of Minerals and Energy, 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

Additional interests participating in preparation of Standard:

Australian Gas Association

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PREFACE

This Standard was prepared by the Standards Australia Committee on Electrical Equipment in Hazardous Areas, to supersede AS 1076.4–1977, *Code of practice for selection, installation and maintenance of electrical apparatus and associated equipment for use in explosive atmospheres (other than mining applications), Part 4: Apparatus with type of protection 'i' – Intrinsically safe apparatus and systems,* and AS 2010–1977, *Code of practice for installation and application of shunt diode safety barriers.* This Standard is intended for the guidance of manufacturers, designers, installers, users, statutory authorities and associated interests.

In its terminology, definitions and general treatment of the subject, this Standard is similar to BS 5345, *Code of practice for selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres (other than mining applications or explosive processing and manufacture, Part 4: Installation and maintenance requirements for electrical apparatus with type of protection 'i', intrinsically safe electrical apparatus and systems.*

Acknowledgement is made of the assistance received from this source.

This Standard is Part 7 of a series of Standards which deal with the installation of electrical equipment in potentially explosive atmospheres.

Historically, intrinsic safety has been used as a protection technique for electrical equipment intended to be used in explosive gas (Class I) atmospheres. However, this technique has now been recognized as suitable for combustible dust areas (Class II) under certain specified conditions.

The purpose of this new edition is to ensure that all requirements for intrinsic safety installations are contained in one Standard.

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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out requirements for the selection, installation and maintenance of intrinsically safe electrical equipment and systems.

NOTE: Requirements for the design and construction of intrinsically safe electrical equipment are given in AS 2380.7.

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

AS
1076 Code of practice for selection, installation and maintenance of electric apparatus and associated equipment for use in explosive atmospheres (other than mining applications)
1076.1 Part 1: Basic requirements
1660 Methods of test for electric cables, cords and conductors
1660.2 Part 2: Insulation, extruded semi-conductive screens and non-metallic sheaths
1939 Classification of degrees of protection provided by enclosures for electrical equipment
2380 Electrical equipment for explosive atmospheres — Explosion-protection techniques
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2430.2 Part 2: Combustible dusts
2700 Colour standards for general purposes
3187 Approval and test specification — Mineral-insulated metal-sheathed cables

1.3 DEFINITIONS. For the purpose of this Standard, the definitions given in AS 1076.1 and those below apply.

1.3.1 Associated electrical equipment — electrical equipment in which the circuits are not all intrinsically safe but which contains circuits that can affect the safety of intrinsically safe circuits connected to it.

NOTE: Associated electrical equipment may be either of the following:

(a) Electrical equipment which has an alternative type of explosion-protection for use in the explosive atmosphere.

Example: A safety barrier housed inside a flameproof enclosure.

(b) Electrical equipment not so protected and which is therefore not to be used within an explosive atmosphere, i.e. must be located in a safe area.

Example: A recorder which is located in a safe area where only the recorder input circuit is intrinsically safe.

1.3.2 Electrical equipment — assembly of electrical components, circuits or parts of circuits usually within a single enclosure.

NOTE: The term 'usually' has been introduced to indicate that an equipment may occasionally be in more than one enclosure, e.g. a telephone instrument or a portable radio transceiver with a hand microphone.

1.3.3 Fault — defect of any component, or a defective connection between components, upon which the intrinsic safety of a circuit depends.

NOTE: If a fault can lead to a subsequent fault or faults, the primary and subsequent failures are considered to be a single fault.

1.3.4 Infallible component or infallible assembly of components — component, or an assembly of components, which in service or in storage, is not liable to become defective in such a manner as would lower the intrinsic safety of the circuit.

NOTE: Such a component or assembly of components is considered as not subject to fault in that manner when tests of intrinsic safety are made.

1.3.5 Intrinsically safe circuit — circuit in which any spark or any thermal effect produced in the test conditions prescribed in AS 2380.7 (which include normal operation and specified fault conditions) is incapable of causing ignition of a given explosive atmosphere.

NOTE: In many cases an intrinsically safe circuit comprises only part of a larger circuit, the other part of which comprises those components and other factors on which the intrinsic safety depends and by which the circuit is made intrinsically safe. For the purpose of this Standard, particularly where dealing with constructional requirements such as clearance and creepage distances, it is convenient to refer to the entire circuit as the intrinsically safe circuit.

1.3.6 Intrinsically safe electrical equipment — electrical equipment in which all the circuits are intrinsically safe. The equipment may be self-contained or may form part of an intrinsically safe electrical system.

1.3.7 Intrinsically safe electrical system — assembly of interconnected items of electrical equipment in which the circuits or parts of circuits, intended to be used in an explosive atmosphere, are intrinsically safe circuits.

1.3.8 Normal operation — intrinsically safe electrical equipment or associated electrical equipment is in normal operation when it complies electrically and mechanically with its design specification and is used within the limits specified by the manufacturer.

1.4 CERTIFICATION. Intrinsically safe electrical equipment may be certified under one of the following categories:

(a) *Self-contained equipment.* Equipment that would be powered by an internal power source (and therefore would not require any external cabling).