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Apparatus

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AS 1829 — 1980
UDC 621.3.019.3 : 614.83

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9-1980

Australian Standard 1829—1980

ELECTRICAL EQUIPMENT FOR EXPLOSIVE ATMOSPHERES
INTRINSICALLY SAFE ELECTRICAL APPARATUS

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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Coal Association

Australian Electrical and Electronics Manufacturers Association

Confederation of Australian Industry

Co-opted specialist interests

Department of Productivity

Departments of Explosives

Departments of Labour and Industry

Departments of Mines

Electrical Contractors Associations of Australia

Insurance Council of Australia

Oil companies

Statutory Electricity Authorities

Sydney County Council (Testing Interest)

This standard, prepared by Committee EL/14, Electrical Equipment for Hazardous Locations, was approved on behalf of the Council of the Standards Association of Australia on 13 March 1980, and was published on 1 May 1980.

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AUSTRALIAN STANDARD

INTRINSICALLY SAFE ELECTRICAL APPARATUS FOR EXPLOSIVE ATMOSPHERES

AS 1829 — 1980

First published (as AS C376)	1968
Revised and issued as AS 1829	1976
New edition	1980

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PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR STREET, NORTH SYDNEY, N.S.W.

ISBN 0 7262 1910 X

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PREFACE

This standard was prepared by the Association's Committee on Electrical Equipment for Hazardous Locations, for the guidance of manufacturers, users, statutory authorities and associated interests and for use with the SAA Wiring Rules and Relevant Mining Regulations. It prescribes requirements in respect of design, construction and marking of intrinsically safe and associated apparatus and includes a section on testing.

In its terminology, definitions and general treatment of the subject this standard is similar to corresponding recommendations issued by the International Electrotechnical Commission (IEC) and the certification standard issued by the British Approvals Service for Electrical Equipment in Flammable Atmospheres, viz:

IEC 79-11 Electrical Apparatus for Explosive Gas Atmospheres Part 11—Construction and Test of Intrinsically Safe and Associated Apparatus

SFA3012:1972 — BASEEFA Certification Standard for Intrinsic Safety

Acknowledgement is made of the assistance received from these sources.

In this edition the published amendments to the 1978 edition have been incorporated, and substantial changes have been made to the foreword and to Clause 3.1 (General) to permit interface with IEC 79-11 and the assessment of an intrinsically safe circuit where the electrical parameters are sufficiently well defined for its safety to be deduced from recognized gas ignition charts.

The standard may require reference to—

AS 1147	Plastics Insulating Materials of Mouldings for Cable Connecting Devices for Use in Coal Mines
AS 1939	Classification of Degrees of Protection Provided by Enclosures of Electrical Equipment
AS 2010	Installation and Application of Shunt Diode Safety Barriers
AS 2011	Shunt Diode Safety Barriers
AS 3000	Part 1—SAA Wiring Rules
AS C98	Flameproof Enclosure of Electrical Equipment for Explosive Atmospheres
AS 3100	Definitions and General Requirements for Electrical Materials and Equipment
BS 2050	Electrical Resistance of Conductive and Antistatic Products made from Polymeric Material
BS 5308	Instrumentation Cables Intended for Intrinsically Safe Systems Part 1—Polyethylene Insulated Cables Part 2—PVC Insulated Cables
BS 9300	Semiconductor Devices of Assessed Quality: Generic Data and Methods of Test
ISO 54	Cylindrical Gears for General Engineering and for Heavy Engineering — Modules and Diametral Pitches

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
INTRINSICALLY SAFE ELECTRICAL APPARATUS FOR EXPLOSIVE ATMOSPHERES

FOREWORD

The purpose of this standard is to establish design criteria such as to ensure that the thermal energy available at any arcing or sparking points under any condition of operation is not capable of causing ignition of prescribed flammable atmospheres.

Apparatus may be certified Category 'ia' or 'ib' according to the zonal classification of the hazardous area and the number of faults that are taken into account by the testing authority. Category ia has a larger safety factor than ib, and intrinsically safe apparatus certified 'ia' may therefore be used in areas of greater risk. Apparatus of Category ia and apparatus of Category ib are suitable for Zone 0 and Zone 1 areas of hazard respectively.

The following sequence is recommended in the marking of intrinsically safe explosion protected electrical apparatus:

Zone — Type of protection — Group — Sub-group — Temperature classification.

Typical marking for intrinsically safe apparatus might be—

Z0 Exia IIC T5

This marking indicates certification to Zone 0 area of hazard, Category ia. The apparatus group IIC indicates compliance with the requirements of that group and by implication with less onerous requirements of groups IIA and IIB. The apparatus may be safely used with all compounds allocated to these groups subject to consideration of temperature, classification and chemical compatibility.

The precautions which must be taken to ensure that safe interconnection of items of intrinsically safe apparatus and associated safe area intrinsically safe systems must be such that the number of faults will not be lessened for the degree of hazard concerned.

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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard applies to electrical apparatus for use in intrinsically safe systems, all or parts of which, by design, cannot constitute a source of ignition for a hazardous gas or vapour.

The standard prescribes the design and constructional requirements and test procedures for apparatus and parts of apparatus intended for use in a hazardous area and also for associated apparatus and parts of associated apparatus intended for use in a safe area.

Relevant requirements of this standard also apply to components or subassemblies or apparatus submitted to a certifying authority for approval.

NOTE: A certificate of intrinsic safety should specify the complete electrical system together with any special installation requirements for safe operation of the system.

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

1.2.1 Intrinsically safe circuit—a circuit in which any spark or thermal effect produced either normally or in specified fault conditions is incapable under prescribed test conditions of causing ignition of a given gas or vapour.

1.2.2 Intrinsically safe apparatus—apparatus in which all the circuits are intrinsically safe, or which is designed to form part of an intrinsically safe system. Intrinsically safe apparatus may be installed in a hazardous area.

1.2.3 Intrinsically safe system — a system comprising apparatus and interconnecting wiring in which any spark or thermal effect in any part of the system intended for use in the hazardous area is incapable under prescribed conditions of causing ignition of a given gas or vapour.

1.2.4 Associated safe area apparatus — apparatus designed to form part of an intrinsically safe system, in which not all the circuits are intrinsically safe circuits, but which affects the safety of the intrinsically safe system of which it forms a part. Such apparatus may not be installed in a hazardous area unless provided with appropriate protection.

NOTE

1. Examples of associated safe area apparatus are a power unit fed from a mains supply supplying power to intrinsically safe apparatus in a hazardous area, and a recorder in a safe area actuated by a transducer situated in a hazardous area.
2. Appropriate protection which would enable associated safe area apparatus to be mounted in a hazardous area would be a flameproof enclosure.

1.2.5 Normal operation — an intrinsically safe system is in normal operation when it conforms electrically and mechanically with its design specification.

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