BS 6705:1987

Specification for

Electrical measuring instruments for use on intrinsically safe circuits in coal mines

Confirmed
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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Mining and Quarrying Requisites Standards Committee (MQE/-) to Technical Committee MQE/25, upon which the following bodies were represented:

Association of British Mining Equipment Companies
British Coal
Council for Electrical Equipment for Flammable Atmospheres (BEAMA)
Health and Safety Executive
National Union of Mineworkers

This British Standard, having been prepared under the direction of the Mining and Quarrying Requisites Standards Committee, was published under the authority of the Board of BSI and comes into effect on 28 August 1987

The following BSI references relate to the work on this standard:
Committee reference MQE/25
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Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

Foreword

This British Standard has been prepared under the direction of the Mining and Quarrying Requisites Standards Committee. It is applicable to portable electrical measuring instruments used for testing intrinsically safe equipment installed in coal mines.

In testing intrinsically safe equipment in hazardous areas it is imperative that neither any testing instrument used nor the method of testing adopted adversely affect the intrinsic safety of the circuit under test. While a testing instrument may have been considered, and perhaps certified, separately as intrinsically safe under specified conditions, the intrinsic safety of the system formed by the test instrument and the equipment to which it is connected will depend upon the combined effects of voltage, current, inductance and capacitance of the test instrument and equipment. To maintain intrinsic safety of the system, therefore, the certification documentation for the equipment has either to specify the exact type of instrument(s) that can be used for testing or to specify, in general terms, limits for relevant input/output circuit parameters of the instrument, as seen by the circuit under test. This standard specifies the limits for such circuit parameters, thereby enabling intrinsically safe equipment to be designed which is capable of being tested by a range of instruments without the intrinsic safety of either the equipment or the test instrument being impaired.

Guidance on the use of instruments complying with this standard is given in section 4 of BS 6704:1987.

Attention is drawn to the Health and Safety at Work etc. Act 1974, the Factories Act 1961, the Mines and Quarries Act 1954, the Regulations made under these Acts, and also any other appropriate statutory requirements or bye-laws. These place responsibility for complying with certain specific safety requirements on the manufacturer and the user. The address of the recognized certification authority in the UK for Group I (coal mining) apparatus for intrinsic safety purposes is as follows:

Health and Safety Executive
HSE (M) Certification Support Unit
Harpur Hill
Buxton
Derbyshire
SK 17 9JN

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 and 2, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies limiting parameters for input/output circuits of portable electrical measuring instruments for testing intrinsically safe circuits used in coal mines. It applies to the following types of test circuits when connected to intrinsically safe circuits having a voltage not exceeding 60 V peak at the point of test.

a) *Voltage dependent circuits.* These are high impedance circuits contained in instruments such as voltmeters, oscilloscopes, frequency meters and similar instruments that depend upon voltage for their operation.

b) *Current dependent circuits.* These are low impedance circuits contained in instruments such as ammeters, and similar instruments that depend upon current for their operation.

c) *Current injection circuits.* These are circuits which inject a current into the circuit under test generally for the purpose of measuring resistance or impedance.

This standard is not applicable to intrinsically safe instruments that provide a high voltage for testing insulation nor to instruments used to measure the resistance or continuity of shot-firing circuits. Nor does it specify operational performance requirements of testing instruments.

Instruments specified in this standard are intended for use in accordance with BS 6704 and with any condition of the applicable certification to either the instrument or the circuit to which it is connected for test purposes.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 General

The circuits associated with the test leads shall be in accordance with BS 5501-7 for category "ia" apparatus. When used in hazardous areas, the electrical measuring instrument shall have a recognized type of protection.

3 Limiting parameters for electrical measuring circuits

3.1 General

In addition to the requirement for the electrical measuring circuit, at its terminals, to comply with BS 5501-7, the maximum input/output parameters under countable fault conditions for category "ia" apparatus shall be as specified in **3.2**, **3.3** or **3.4**.

3.2 Voltage dependent circuits

3.2.1 The minimum resistance shall be 1 000 Ω/V and the minimum resistance in any range shall be 1 000 Ω.

3.2.2 The maximum inductance shall be 20 mH.

3.2.3 The maximum capacitance shall be 0.7 μF.

3.3 Current dependent circuits

3.3.1 The maximum inductance shall be 16 μH unless the effect of the inductance is limited by the use of infallible shunts, e.g. diodes.

3.3.2 The maximum voltage drop shall be 1.2 V.

NOTE Maximum capacitance is not specified because capacitance is normally insignificant in relation to intrinsic safety at the value of voltage drop specified.

3.4 Current injection circuits

3.4.1 The maximum open circuit voltage shall be 2.0 V.

3.4.2 The maximum short circuit current shall be 2.5 mA.

NOTE Maximum capacitance and inductance are not specified because capacitance and inductance of the internal circuits of the instrument are normally insignificant in relation to intrinsic safety at the values of voltage and current specified.

4 Marking

In addition to any marking required by a certification authority, electrical measuring instruments containing circuits in accordance with this standard shall be marked with the number of this standard, i.e. BS 6705:1987[1)], together with the types of measurements for which the instrument can be used.

5 Documentation

The supplier of an electrical measuring instrument complying with this standard shall produce and make available

a) such information as is necessary for its safe and correct use; and

b) descriptive documents which specify the maximum capacitance and maximum inductance of the circuits that may be connected to the instrument.

[1)] Marking BS 6705:1987 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification to support such claims should be addressed to the appropriate authority for other certification marks.

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Publications referred to

BS 5501, *Electrical apparatus for potentially explosive atmospheres.*

BS 5501-7, *Intrinsic safety "i".*

BS 6704, *Code of practice for selection, installation and maintenance of intrinsically safe electrical equipment.*

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