

BRITISH STANDARD CODE OF PRACTICE

CP 1003 : Part 2 : 1966

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**ELECTRICAL APPARATUS
AND ASSOCIATED EQUIPMENT FOR USE IN
EXPLOSIVE ATMOSPHERES
OF GAS OR VAPOUR
OTHER THAN MINING APPLICATIONS**

**Part 2. Methods of meeting the explosion
hazard other than by the use of
flameproof or intrinsically-safe
electrical equipment**

**THE COUNCIL FOR CODES OF PRACTICE
BRITISH STANDARDS INSTITUTION**

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British Standards House, 2 Park Street, London, W.1

This part of the Code of Practice has been prepared by a Committee convened by the Codes of Practice Committee for Electrical Engineering. Having been endorsed by the Council for Codes of Practice, it was published under the authority of the General Council on 30th November, 1966.

This Code makes reference to the following British Standards:

- B.S. 31. Steel conduits and fittings for electrical wiring.
- B.S. 659. Light gauge copper tubes for water, gas and sanitation.
- B.S. 1387. Steel tubes and tubulars suitable for screwing to B.S. 21 pipe threads.
- CP 1003. Electrical apparatus and associated equipment for use in explosive atmospheres of gas or vapours other than mining applications.
Part 1. Choice, installation and maintenance of flameproof and intrinsically-safe equipment.

British Standard Codes of Practice are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users ascertain that they are in possession of the latest amendments or editions.

The following B.S.I. references relate to the work on this Code of Practice:
Committee reference ELCP/19
Draft for comment D62/7934

CP 1003: Part 2: 1966

CODE DRAFTING COMMITTEE ELCP/19
FLAMEPROOF AND INTRINSICALLY-SAFE ELECTRICAL
EQUIPMENT

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NOTE. The above figures are intended to show basic principles and do not purport to illustrate actual constructional details.

This Code of Practice represents a standard of good practice and takes the form of recommendations. Compliance with it does not confer immunity from relevant legal requirements including byelaws.

BRITISH STANDARD CODE OF PRACTICE ON ELECTRICAL APPARATUS AND ASSOCIATED EQUIPMENT FOR USE IN EXPLOSIVE ATMOSPHERES OF GAS OR VAPOUR (OTHER THAN MINING APPLICATIONS)

Part 2. Methods of meeting the explosion hazard other than by the use of flameproof or intrinsically-safe electrical equipment



FOREWORD

The need for the guidance covered by this Code of Practice has been reviewed and it has been decided that, in the interests of rationalization, it should be declared obsolescent. Its application for new installations is therefore not recommended. The Code of Practice will be withdrawn in due course.

Although this Code of Practice will continue in being, new installations should follow the recommendations of BS 5345 (see below).

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 1: 1976 Basic requirements for all Parts of the code

Part 2: 1983 Classification of hazardous areas

Part 3: 1979 Installation and maintenance requirements for electrical apparatus with type of protection 'd'. Flameproof enclosure

Part 4: 1977 Installation and maintenance requirements for electrical apparatus with type of protection 'i'. Intrinsically safe electrical apparatus and systems

Part 5: 1983 Installation and maintenance requirements for electrical apparatus protected by pressurization 'p' and by continuous dilution, and for pressurized rooms

Part 6: 1978 Installation and maintenance requirements for electrical apparatus with type of protection 'e'. Increased safety

Part 7: 1979 Installation and maintenance requirements for electrical apparatus with type of protection N

Part 8: 1980 Installation and maintenance requirements for electrical apparatus with type of protection 's'. Special protection

Documents

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FOREWORD

Part 1* of this Code is concerned with the technique of dealing with the risk arising from flammable gas or vapour by the use of flameproof and intrinsically-safe equipment.

In dealing with the risk of fire and explosion from the presence of flammable liquids, gases or vapours, three sets of conditions are recognized, viz., Division 0, 1 and 2. These are defined in Part 1, which should be read in conjunction with this Part.

The conditions described as appertaining to Division 0 are such as normally to require the total exclusion of any electrical equipment, except in such special circumstances as to render this impracticable; in this latter case, recourse may be had to special measures such as pressurization or the use of intrinsically-safe equipment.

A risk of the nature described under Division 1 can be met by the use of flameproof or intrinsically-safe equipment, with which Part 1 is concerned.

In this Part, some alternative methods of securing safety in such conditions are described; such methods may have an application where flameproof apparatus is not available or is economically undesirable, or if for some reason not acceptable or is excluded by the presence of any of the Group IV †gases or vapours, or where an explosive concentration persists.

For the purpose of this part of the Code, industrial Methane may be regarded as a Group II† gas.

The precautions appropriate to Division 2 areas are the subject of a further part of this Code, now in course of preparation.

*CP 1003: Part 1, 'Choice installation and maintenance of flameproof and intrinsically-safe equipment'.

†See Appendix A to Part 1.

It should be noted that temperature limitations in relation to ignition temperatures apply to any apparatus referred to in this Part equally with those applicable to flameproof apparatus under similar conditions.

Methods. The methods dealt with are as follows:

Segregation. In which electrical apparatus is isolated by being placed outside the area of risk, or in adequately ventilated compartments, or separated by impermeable barriers from exposure to a flammable concentration of gas or vapour.

The term is sometimes applied to the disposal of apparatus in a situation remote from the danger area but without physical separation.

Ventilation. In which the exposure of electrical apparatus to the presence of a flammable concentration of gas or vapour is prevented by the supply and extraction of a sufficient volume of fresh air.

Pressurization. In which an air or inert gas pressure slightly above atmospheric is maintained in electrical equipment, or air pressure in a room or compartment containing such equipment exposed to the risk of a flammable concentration of gas or vapour.

In view of the necessity of ensuring against the disruptive effects of short circuit or earth faults it is recommended that protective measures of as sensitive a character as the circumstances permit should be installed. The protection described in Clause 205 of Part 1 could appropriately be applied here.

Attention is drawn to the importance of avoiding possible hazard from incendive frictional sparks caused by impact or rubbing of metal on metal, rock or concrete, during the assembly or movement of equipment, or after it has been installed. Although such sparks can be produced by the impact of steel on steel, rock or concrete, it is particularly important to avoid those produced by the impact of rusty steel or iron on light alloys, or by impact on steel having coverings containing aluminium for the prevention of rust or corrosion (see Note 3 to Subclause 202*b* and Subclause 204*f*, both in Part 1).

All apparatus should be carefully checked before and after installation by a competent person. For examples of points to be noted, see Clause 606 of Part 1.

A number of diagrams made available by the courtesy of the Electrical Times and others, illustrating the methods described, are included, but they do not purport to give constructional details.

The methods of protection envisaged should not be regarded as exclusive of other techniques which may be in development but have not yet reached a stage at which methods of application can be formulated.

Attention is drawn to the advantages which in some cases may be derived from the application of flame arresters either to apparatus which does not lend itself to flameproof construction or to vessels containing flammable substances, as a means of safely liberating the pressure set up by internal ignition and

arresting the emergence of incandive flame, so that the risk of ignition of any ambient concentration is eliminated. Conversely, where the flammable concentration is generated within the enclosure the flame arrester acts to prevent the ingress of flame from an external source. Flame arresters commonly are applied to the vents of oil storage tanks for this purpose.

There are also applications to such apparatus as gas detectors in order to isolate flame, produced from the ignition of any gas mixture within the instrument, from the source from which it was drawn.

While the function of the flame arrester depends on the application of flameproof principles, classification in regard to various gas groups is at present in the experimental stage and application must rely on ad hoc tests related to the risk involved, in which the rate of flame propagation necessarily is an important factor. It is probable, however that a less empirical position may in the near future be attained as the consequence of research work now proceeding. The relevant Statutory and other Regulations are described in the Foreword to Part 1.

1. Segregation. Where practicable, switch and control equipment is best installed outside the area of risk, either in the open air or segregated in a room or compartment to which entrance is effected only from a safe space or through a ventilated space provided with an air-seal.

It may be possible to segregate a motor or motors in such a room; the driving shaft being extended through a packing gland in one of the enclosing walls. To provide against danger from the entry of any gas or vapour either through the gland or by diffusion through brickwork or other material, the room in which such electrical apparatus is segregated should either be effectively ventilated by air free from gas or vapour, or kept under slight positive air pressure (see Subclause 3b (iv)). A gas detector suitably positioned to detect the permissible concentration of gas can be installed as an additional precaution to give visual or audible alarm and, where desired, to cause interruption of the power supply to the room or space in question.

Switch or control equipment may be dealt with similarly where convenient and appropriate, but in some cases it may be necessary for apparatus intimately associated with the process giving rise to the flammable concentration to be of flameproof or intrinsically-safe construction, or be pressurized, according to the circumstances.

An example of segregation applied to motor-driven pumps dealing with flammable liquids is shown in Fig. 1. Another example of a method of segregation where safety is secured by adequate spacing in the open air, is shown in Fig. 2.

Where practicable, underground cellars or basements between motor and process rooms should be avoided. Apart from the inherent difficulties in sealing