

Specification for

Mining type flameproof gate-end boxes —

**Part 2: Gate-end boxes with air-break
circuit-breakers (for use on 3-phase a.c.
circuits up to 650 volts)**

Confirmed
January 2011

Co-operating organizations

The Colliery Requisites Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government and scientific and industrial organizations:

- Association of Mining Electrical and Mechanical Engineers*
- British Electrical and Allied Manufacturers' Association*
- British Steel Industry
- Federation of Associations of Mining Equipment Manufacturers
- Institution of Electrical Engineers
- Institution of Mechanical Engineers
- Institution of Mining Engineers
- Mechanical Handling Engineers' Association
- Ministry of Power*
- National Association of Colliery Managers
- National Coal Board*

The Government department and industrial organizations marked with an asterisk in the above list were directly represented on the committee entrusted with the preparation of this British Standard.

This British Standard, having been approved by the Colliery Requisites Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 30 August 1968

© BSI 01-2000

The following BSI references relate to the work on this standard:
Committee reference CRE/16
Draft for comment 66/9630

ISBN 0 580 00277 2

Amendments issued since publication

Amd. No.	Date of issue	Comments
422	February 1970	Indicated by a sideline in the margin

Contents

	Page
Co-operating organizations	Inside front cover
Foreword	ii
1 Scope	1
2 Definitions	1
3 Service conditions	3
4 Ratings	3
5 Marking	3
6 Design and construction	4
7 Tests	8
8 Information to be supplied to the manufacturer with the enquiry	10
Appendix A Metric values	12
Figure 1 — Arrangement of busbar chamber end flange, terminals and interconnections	13
Figure 2 — Busbar interconnecting trunk	14
Figure 3 — Skid coupling arrangement	15
Figure 4 — Busbar end cover	16

Foreword

This standard makes reference to the following British Standards:

BS 88, *Cartridge fuses of voltage ratings up to 660 volts.*

BS 159, *Busbars and busbar connections.*

BS 229, *Flameproof enclosure of electrical apparatus.*

BS 279, *100-ampere flameproof plugs and sockets (restrained type).*

BS 542, *Cable glands and sealing boxes for association with apparatus for use at mines.*

BS 862, *Air-break circuit-breakers (including totally-enclosed and flameproof types) for voltages not exceeding 660 volts.*

BS 936, *Oil circuit-breakers for medium-voltage alternating-current systems.*

BS 1259, *Intrinsically safe electrical apparatus and circuits for use in explosive atmospheres.*

BS 3101, *Intrinsically safe remote-control circuits associated with restrained plugs and sockets for use in coal mines.*

BS 3454, *3.3 kV 300 A interchangeable bolted flameproof cable couplers and adaptors (including 660 V 300 A adaptors) primarily for use in mines.*

This British Standard has been prepared, under the authority of the Colliery Requisites Industry Standards Committee, to standardize the main features of gate-end boxes used primarily in coal mining in the United Kingdom.

It is recognized that the term “gate-end box” is quite general and may be applied to boxes containing different essential components, such as contactors, circuit-breakers, lighting transformers etc., depending upon the purpose for which they are to be used.

BS 787 was first issued in 1938, and has been revised and re-issued as BS 787-1:1965 to cover gate-end boxes in which the essential apparatus is an air-break electrically operated contactor. This additional specification, designated as BS 787-2, extends the scope of the original BS 787 by covering gate-end boxes in which the essential apparatus is an air-break circuit-breaker.

It is envisaged that additional parts of this British Standard will be issued to cover other forms of gate-end boxes, such as lighting units and drill units.

NOTE Where metric equivalents have been given (see Appendix A), the figures in imperial units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on the tables in BS 350-1, “*Conversion factors and tables*”.

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 to 16 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 requirements for mining type flameproof gate-end boxes with air-break circuit-breakers for use on 3-phase a.c. circuits up to 650 volts.

2 Definitions

For the purposes of this British Standard the following definitions apply:

2.1

gate-end box

a flameproof enclosure containing electrical apparatus such as control gear, switchgear and/or protective gear, designed primarily for use underground

NOTE In this particular instance the apparatus is essentially an air-break circuit-breaker with associated equipment to provide control and protection of other electrical apparatus.

2.2

isolator

a mechanical device capable of opening or closing a circuit, under conditions of no load or negligible current

2.3

air-break circuit-breaker

a device, hand or power operated, capable of making, carrying and breaking currents in air, at substantially atmospheric pressure, under normal circuit conditions and also making, carrying for a specified time, and breaking currents under specified abnormal conditions such as those of short-circuit

2.4

cable sealing and dividing box

a box designed to receive and protect the end of the cable, with provision for sealing the conductors and the insulating material of the cable with a suitable compound, and having a cable gland for attaching the cable to the box, together with any terminals provided for connection to the conductors of the cable within the box. The box may form part of, or be detachable from, the apparatus with which it is associated

2.5

detachable cable sealing box

a cable sealing box so designed that it can be detached from associated apparatus without cutting the cable and without disturbing the sealing

2.6

cable coupling unit (flit plug)

a unit consisting of a cable sealing box and cable gland together with means for connecting the cable conductors to insulated contact tubes within the sealing box, which is designed to receive the cable; to provide room to spread and connect the cores; to protect the cores; to allow for the attachment of the cable gland; to provide for sealing the insulating materials of the cable, and to facilitate ready connection to or disconnection from a similar unit or other apparatus

2.7

cable coupler adaptor

a device used to connect a cable coupling unit to apparatus. It may either be separate from or integral with the flameproof enclosure of the apparatus to which the cable coupling unit is to be connected

for the purposes of this standard, the term “adaptor” also includes the unit to connect other types of cable terminations to apparatus

2.8

restrained plug and socket

a plug and socket, the two portions of which, when engaged, are designed to be held together by an operating bolt, or a screwed union ring, or some other equivalent device. Such a device enables the plug to be readily inserted or withdrawn

2.9

bolted plug and socket

a plug and socket, the two portions of which, when fully engaged, are designed to be held together by one or more bolts or screws, or studs and nuts, in such a way that they cannot be disengaged without the use of tools

2.10

flameproof enclosure

an enclosure for electrical apparatus that will withstand, without injury, any explosion of the prescribed flammable gas that may occur within it, under practical conditions of operation within the rating of the apparatus (and recognized overloads, if any, associated therewith) and will prevent the transmission of flame such as will ignite the prescribed flammable gas which may be present in the surrounding atmosphere (see 7.2.4)

2.11

intrinsically safe circuit

a circuit in which any electrical sparking that may occur in normal working under the conditions specified by the certifying authority, and with the prescribed components, is incapable of causing an ignition of the prescribed flammable gas or vapour (see 7.2.4)

2.12

rating

the value assigned by the maker to some limits of performance under certain specified conditions known as the “rated conditions”

2.13

local control

external control by means of an external handle for a hand operated circuit-breaker, or by push button for an electrically operated circuit-breaker

2.14

remote control

control by means of a manually operated switch or push button located at a point separate from the gate-end box

2.15

automatic control

control by means of any device other than a manually operated switch or push button

2.16

sequence interlocking

means by which operation is made dependent on the fulfilment of other prescribed conditions

2.17

overcurrent release

a device that causes the circuit-breaker to open the circuit automatically when the current exceeds the predetermined value at which the release has been adjusted to operate

2.18

inverse time lag overcurrent release

a device that retards the tripping of the circuit-breaker by a time inversely dependent upon the magnitude of the overcurrent

2.19

undervoltage release

a device which causes the circuit-breaker to open the circuit if the voltage falls below a predetermined value

2.20

shunt release

a device which causes the circuit-breaker to open when energized from a source of voltage that may be independent of the circuit in which the circuit-breaker is connected

3 Service conditions

Gate-end boxes in accordance with this specification are suitable, within the limits of their ratings, for installations where the service conditions are not more severe than the following:

- 1) *Ambient temperature.* A peak value not exceeding 40 °C with an average value not exceeding 35 °C over 24-hour periods.
- 2) *Altitude.* An altitude not exceeding 3 300 feet (1 000 m) above sea level.

NOTE When a gate-end box intended for service at high altitudes is tested near sea level, the limits of temperature rise, as indicated in 6.16, should be reduced by 1 % for each 1 000 feet (300 m) above sea level at which the circuit-breaker is intended to work in service. The correction does not apply for altitudes below 3 300 feet (1 000 m).

4 Ratings

4.1 Voltages. The maximum voltage shall be 650 volts.

The following supply voltages shall be regarded as standard:

400, 440, 500, 550, 600 and 650 volts.

Boxes designed for other than the standard voltages up to 650 volts, provided they satisfy all other requirements specified herein, shall be deemed to comply with this standard.

Standard boxes shall be suitable for a voltage variation at least 10 % below and at least 6 % above the declared voltages of the supply for which they are designed, subject again to the maximum of 650 volts.

4.2 Supply frequencies. The standard frequency shall be 50 Hz(c/s). Gate-end boxes designed for other frequencies within the range of 25–60 Hz(c/s), provided they satisfy all other requirements specified herein, shall be deemed to comply with this standard.

4.3 Currents

4.3.1 Current rating of boxes. The preferred continuous current ratings of boxes shall be:

200, 300, 400 amperes

Boxes designed for other ratings, provided they satisfy all other requirements specified herein, shall be deemed to comply with this standard.

4.3.2 Current rating of busbars. The current rating of busbars, where fitted, shall be at least equal to the circuit-breaker rating, with a minimum rating of 300 amperes.

5 Marking

5.1 Nameplates. All gate-end boxes shall be permanently marked with the following particulars:

- 1) The name of the manufacturer or his agent.
- 2) Manufacturer's type or reference.
- 3) Manufacturer's serial number.
- 4) Maximum rated current in amperes.
- 5) Making capacity peak (kA).
- 6) Breaking capacity (kA).
- 7) Voltage or voltage range.
- 8) Frequency.
- 9) The number of the flameproof certificate and the number or numbers indicating the group of gases and vapours covered by the certificate.
- 10) A reproduction of the registered flameproof mark (if the manufacturer holds a licence to apply this mark), or any other mark required by the Ministry of Power.
- 11) Where applicable the intrinsic safety certificate details as required by the Ministry of Power.
- 12) Additional marking as may be required by any other certifying authority.

5.2 Terminals. Terminal markings, if required, for incoming and outgoing connections shall be agreed between the manufacturer and the purchaser.

5.3 Busbar interconnecting trunks. All busbar interconnecting trunks (see 6.3) shall be permanently marked with the following particulars: