

Specification for

A.C. voltage-operated earth-leakage circuit breakers

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The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

This British Standard, having been approved by the Electrical Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 15 November 1965

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The following BSI references relate to the work on this standard:
Committee references ELE/10 and ELE/10/18
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- Association of Short-circuit Testing Authorities
- Engineer Surveyors' Association
- Lloyd's Register of Shipping
- London Transport Board
- National Coal Board

Amendments issued since publication

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Foreword

This standard makes reference to the following British Standards:

BS 2757, *Classification of insulating materials for electrical machinery and apparatus on the basis of thermal stability in service*.

BS 3042, *Standard test finger (for checking protection against electric shock)*.

This British Standard for voltage-operated air-break earth-leakage circuit-breakers is an extensive revision of the 1939 edition to take account of modern developments in earth-leakage protection and in the design and production of small circuit-breakers.

The voltage-operated type of earth-leakage circuit-breaker is intended to prevent a dangerous potential difference persisting between the general mass of earth and accessible installation metal work. The operation of the device will depend not only upon this potential difference but also upon the earth-leakage circuit-breaker earth-electrode resistance (see Appendix E).

A voltage-operated earth-leakage circuit-breaker may incorporate over-current protection. In such instances it is necessary for the earth-leakage circuit-breaker to comply with the requirements of this standard and also with the relevant requirements in the appropriate circuit-breaker standard. In this connection, attention is drawn to BS 3871-1¹⁾ and BS 862²⁾.

Appendices have been included to assist users in the proper application of voltage-operated earth-leakage circuit-breakers and attention is particularly directed to these.

A British Standard for the current-operated type of earth-leakage circuit-breaker is in the course of preparation and this type of circuit-breaker will be more suitable for low-values of earth-loop impedance.

NOTE In place of the customary, but incorrect use of the ounce as a unit of force, the unit called ounce-force (abbreviation ozf) has been used in this standard. This is the force which, when acting on a body of mass one ounce, gives it an acceleration equal to that of standard gravity.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 14 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⁾ BS 3871, "Miniature and moulded-case circuit-breakers", Part 1, "Miniature air-break circuit-breakers for a.c. circuits".

²⁾ BS 862, "Air-break circuit-breakers (including totally enclosed and flameproof types) for voltages not exceeding 660 volts".

1 Scope

This British Standard specifies requirements for a.c. voltage-operated earth-leakage circuit-breakers having rated voltages not exceeding 500 volts and rated currents not exceeding 200 amperes (see Appendix B, Appendix C and Appendix E).

2 Definitions

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

2.1

voltage-operated earth-leakage circuit-breaker (hereinafter referred to as circuit-breaker)

a device for making and breaking a circuit, and for breaking a circuit automatically when the potential difference between protected metal work of the electrical installation and the general mass of earth exceeds the values specified in Clause 12

2.2

number of poles

the number of main conducting paths which the circuit-breaker is required to open or close simultaneously

2.3

switched neutral

contacts not intended to make or break current and arranged to close before and open after the main contacts for the purpose of isolating the neutral

2.4

prospective current

the current (r.m.s. value of the a.c. component) that would flow in a circuit due to the applied voltage if the circuit-breaker were replaced by a link or links of negligible impedance but without any other circuit change

NOTE For the purpose of this definition the term *circuit-breaker* includes the short length of cable used to connect the circuit-breaker to the test circuit.

2.5

main contacts

the fixed and moving contacts in the main current-carrying circuit

2.6

auxiliary contacts

contacts working in conjunction with, and actuated by the circuit-breaker, and serving to control the operation of auxiliary devices such as trip coils or audible alarms

2.7

leakage trip coil

a coil energized directly by voltage between earth and the protected metal work and which directly or indirectly operates the mechanism when this voltage exceeds a specified value

2.8

mains-operated trip coil

a coil energized by the supply voltage controlled by a leakage trip coil (acting as a relay) to operate the mechanism

2.9

test device

a device to enable the protective function of the circuit-breaker to be checked

2.10

rating of a circuit-breaker

the values assigned by the manufacturer to define the working conditions for which the circuit-breaker is made

2.11

applied voltage

the r.m.s. value of the voltage applied to a test circuit immediately before the initiation of current

3 Service conditions

(See Appendix A)

Voltage-operated earth-leakage circuit-breakers shall be suitable for use in the following conditions of service:

- 1) An ambient temperature not less than $-5\text{ }^{\circ}\text{C}$ and not exceeding $35\text{ }^{\circ}\text{C}$ and having an average value not exceeding $30\text{ }^{\circ}\text{C}$ measured over a 24-hour period.

NOTE Circuit-breakers complying with this standard may not be suitable for exposure to direct radiation from the sun or other sources of heat likely to raise temperature above the designated ambient.

- 2) An earth-loop impedance not exceeding 500 ohms.
- 3) An altitude not exceeding 2 000 m above sea level.
- 4) An atmosphere not subject to conditions giving rise to excessive pollution.

4 Rating

Circuit-breakers shall be rated in the following terms:

- 1) Number of poles.
- 2) Voltage.
- 3) Current.
- 4) Frequency.