COMPENDIUM OF INDIAN STANDARDS ON

PROTECTIVE DEVICES FOR HOUSEHOLD AND INDUSTRIAL APPLICATION

TABLE OF CONTENTS

Introduction

Bureau of Indian Standards (BIS) is the National Standards Body of India, responsible for formulating standards to ensure the quality, safety, and efficiency of products, systems, and services across various sectors.

This compendium presents a comprehensive overview of Indian Standards aligned with international standards such as IS 12640 Series, IS/IEC 60898 series, IS/IEC 60947 series, IS/IEC 60269-2, and IS/IEC 60269-3, all of which pertain to protective devices used in household, commercial, and industrial electrical installations. These standards specify the constructional, performance, and safety requirements for key protective components such as Residual Current Devices (RCDs), Miniature Circuit Breakers (MCBs), Low Voltage Switchgear and Controlgear, and Low Voltage Fuses. Each of these devices is essential in preventing electric shock, overload, short circuits, and other electrical faults that can endanger lives and property.

The document serves as a practical reference for manufacturers, electrical engineers, installers, quality assurance professionals, academic experts, regulatory authorities, and end-users, aiming to enhance understanding, promote correct application, and ensure compliance with national and international safety standards.

By consolidating these essential standards into a single resource, this compendium supports effective implementation, harmonization with global best practices, and strengthened electrical safety across residential, commercial, and industrial environments.

Protective Devices for Household and Similar Installation

Residual Current Circuit Breaker

IS 12640 (Part 1): 2024/IEC 61008-1: 2013 Residual current operated circuit Breakers without integral overcurrent protection for household and similar uses RCCbs: Part 1 general rules

The Standard applies to residual current operated circuit-breakers functionally independent of, or functionally dependent on, line voltage, for household and similar uses, not incorporating overcurrent protection for rated voltages not exceeding 440 V a.c. with rated frequencies of 50 Hz, 60 Hz or 50/60 Hz and rated currents not exceeding 125 A, intended principally for protection against shock hazard.

These devices are intended to protect persons against indirect contact, the exposed conductive parts of the installation being connected to an appropriate earth electrode. They may be used to provide protection against fire hazards due to a persistent earth fault current, without the operation of the overcurrent protective device.

IS 12640 (Part 2): 2016/IEC 61009-1: 2012 Residual current operated circuit - Breakers with integral overcurrent protection for household and similar uses (Rcbos): Part 2 general rules

This Standard applies to residual current operated circuit-breakers with integral overcurrent protection functionally independent of, or functionally dependent on, line voltage for household and similar uses, for rated voltages not exceeding 440 V a.c. with rated frequencies of 50 Hz, 60 Hz or 50/60 Hz and rated currents not exceeding 125 A and rated short-circuit capacities not exceeding 25000 A for operation at 50 Hz or 60 Hz.

This standard applies to devices performing simultaneously the function of detection of the residual current, of comparison of the value of this current with the residual operating value and of opening of the protected circuit when the residual current exceeds this value, and also of performing the function of making, carrying and breaking over currents under specified conditions.

Miniature Circuit Breaker

IS/IEC 60898-1: 2015 Electrical accessories - Circuit - Breakers for overcurrent protection for household and similar installations: Part 1 circuit - Breakers for a.c. operation

The standard applies to a.c. air-break circuit-breakers for operation at 50 Hz, 60 Hz or 50/60 Hz, having a rated voltage not exceeding 440 V (between phases), a rated current not exceeding 125 A and a rated short-circuit capacity not exceeding 25000 A.

This standard also applies to circuit-breakers having more than one rated current, provided that the means for changing from one discrete rating to another is not accessible in normal service and that the rating cannot be changed without the use of a tool.

This standard outlines the essential characteristics and performance requirements for circuit-breakers used in electrical installations. It specifies their expected behavior under normal conditions, overload, and short-circuit scenarios, as well as their dielectric properties. The standard also details the types of tests to verify compliance, methods of testing, required product markings, test sequences, sample quantities, coordination with other short-circuit protective devices, and routine testing procedures to ensure consistent safety and manufacturing quality.

IS/IEC 60898-2: 2016 Electrical accessories Circuit-breakers for overcurrent protection for household and similar installations Part 2: Circuit-breakers for AC and DC operation

This standard applies to a.c. air-break circuit-breakers for operation at 50 Hz, 60 Hz or 50/60 Hz, having a rated voltage not exceeding 440 V (between phases), a rated current not exceeding 125 A and a rated short-circuit capacity not exceeding 25000 A.
These circuit-breakers are intended for the protection against over currents of wiring installations of buildings and similar applications; they are designed for use by uninstructed people and for not being maintained.
This standard gives additional requirements for single- and two-pole circuit-breakers which are suitable for operation with direct current, and have a rated DC voltage not exceeding 220 V for single-pole and 440 V for two-pole circuit-breakers, a rated current not exceeding 125 A and a rated DC short-circuit capacity not exceeding 10000 A.

IS/IEC 60898-3: 2019 Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 3: Circuit-breakers for DC operation

This standard applies to DC circuit-breakers, having a rated DC voltage not exceeding 440 V, a rated current not exceeding 125 A and a rated short-circuit capacity not exceeding 10 000 A. These circuit-breakers are intended for the protection against over currents of wiring installations of buildings and similar applications; they are designed for use by uninstructed people and for not being maintained. They are intended for use in an

environment with pollution degree 2.
Circuit breakers according to this document have a high resistance against unwanted tripping, regardless whether caused by in-rush currents through loading of electronic loads or by switching operations in the circuit.

Distribution Board

IS/IEC 61439-3: 2012 Low - Voltage switchgear and controlgear assemblies: Part 3 distribution boards intended to be operated by ordinary persons (Dbo)

The standard defines the specific requirements for distribution boards intended to be operated by ordinary persons (DBO).

- DBOs have the following criteria:
- intended to be operated by ordinary persons (e.g. switching operations and replacing fuse-links), e.g. in domestic (household) applications;
- outgoing circuits contain protective devices, intended to be operated by ordinary persons; – rated voltage to earth does not exceed 300 V a.c.;
- rated current of the outgoing circuits does not exceed 125 A and the rated current of the DBO does not exceed 250 A;
- intended for the distribution of electrical energy;
- enclosed, stationary;
- for indoor or outdoor use.

The standard defines the specific requirements for distribution boards intended to be operated by ordinary persons (DBO). DBOs also include control and/or signalling devices associated with the distribution of electrical energy. This standard applies to all DBOs

Fuse for Use by Unskilled Persons

IS/IEC 60269-3: 2010: Low-Voltage Fuses Part 3 Supplementary Requirements for Fuses for Use by Unskilled Persons

This standard is divided into six four fuse systems, each dealing with a specific example of standardized fuses for use by unskilled persons:

- Fuse system A: D type fuse system
- Fuse system B: Cylindrical fuses (NF cylindrical fuse system)
- Fuse system C: Cylindrical fuses (BS cylindrical fuse system)
- Fuse system F: Cylindrical fuse-links for use in plugs (BS plugtop fuse system)

Protective Devices for Industrial Application

IS/IEC 60947-2: 2016 Low - Voltage switchgear and controlgear: Part 2 circuit – Breakers

The standard applies to circuit-breakers, the main contacts of which are intended to be connected to circuits, the rated voltage of which does not exceed 1 000 V a.c. or 1 500 V d.c.; it also contains additional requirements for integrally fused circuit-breakers.

IS/IEC 60947-3: 2020 Low-Voltage Switchgear and Controlgear: Part 3 Switches Disconnectors Switch-Disconnectors and Fuse-Combination Units

This standard applies to switches, disconnectors, switch-disconnectors and fuse combination units and their dedicated accessories to be used in distribution circuits and motor circuits of which the rated voltage does not exceed 1 000 V AC or 1 500 V DC.

IS/IEC 60947-4-1: 2012 Low - Voltage switchgear and controlgear: Part 4 contactors and motor - Starters: Sec 1 electromechanical contactors and motor - Starters

This standard applies to semiconductor motor controllers, starters and soft-starters which can include a series mechanical switching device, intended to be connected to circuits the rated voltage of which does not exceed 1 000 V AC.

IS/IEC 60947-4-2: 2020 Low-Voltage switchgear and Controlgear: Part 4-2 Contactors and Motor starters semiconductor motor controllers starters and Soft starters

This standard applies to semiconductor motor controllers, starters and soft-starters which can include a series mechanical switching device, intended to be connected to circuits the rated voltage of which does not exceed 1 000 V AC.

IS/IEC 60947-5-1: 2016 Low-Voltage Switchgear and Control Gear: Part 5-1 Control Circuit Devices And Switching Elements Electromechanical Control Circuit Devices

This standard applies to control circuit devices and switching elements intended for controlling, signalling, interlocking, etc., of switchgear and controlgear. It applies to control circuit devices having a rated voltage not exceeding 1 000 V a.c. (at a frequency not exceeding 1 000 Hz) or 600 V d.c.

IS/IEC 60947-5-2: 2019 Low-Voltage Switchgear and Controlgear Part 5 Control Circuit Devices and Switching Elements Section 2 Proximity Switches

This standard applies to inductive and capacitive proximity switches that sense the presence of metallic and/or non-metallic objects, ultrasonic proximity switches that sense the presence of sound reflecting objects, photoelectric proximity switches that sense the presence of objects and non-mechanical magnetic proximity switches that sense the presence of objects with a magnetic field.

IS/IEC 60947-5-5: 2016 Low - Voltage switchgear and controlgear: Part 5 control circuit devices and switching elements: Sec 5 electrical emergency stop devices with mechanical latching function

This standard provides detailed specifications relating to the electrical and mechanical construction of emergency stop devices with mechanical latching function and to their testing. This standard is applicable to electrical control circuit devices and switching elements which are used to initiate an emergency stop signal. Such devices may be either provided with their own enclosure, or installed according to the manufacturer's instructions.

IS/IEC 60269-2: 2016 Low-Voltage Fuses Part 2 Supplementary Requirements for Fuses for Use by Authorized Persons

This standard is divided into fuse systems, each dealing with a specific example of standardized fuses for use by authorized persons:

- *Fuse system A: Fuses with fuse-links with blade contacts (NH fuse system)*
- *Fuse system B: Fuses with striker fuse-links with blade contacts (NH fuse system)*
- *Fuse system C: Fuse-rails (NH fuse system)*
- *Fuse system D: Fuse-bases for busbar mounting (NH fuse system)*
- *Fuse system E: Fuses with fuse-links for b olted connections (BS bolted fuse system)*
- *Fuse system F: Fuses with fuse-links having cylindrical contact caps (NF cylindrical fuse*
- *system)*
- *Fuse system G: Fuses with fuse-links with offset blade contacts (BS clip-in fuse system)*
- *Fuse system H: Fuses with fuse-links having "gD" and "gN" characteristic (class J class L*
- *and class T time delay and non-time delay fuse types)*
- *Fuse system I: gU fuse-links with wedge tightening contacts*
- *Fuse system J: Fuses with fuse-links having "gD class CC" and "gN class CC"*
- *characteristics (class CC time delay and non-time delay fuse types)*
- *Fuse system K: gK fuse-links with blade for bolted connections – High fuse-link ratings*
- *from 1 250 A up to 4 800 A (master fuse-links)*

Installation

SP 30: 2023 NATIONAL ELECTRICAL CODE OF INDIA 2023 (Second Revision)

The installation requirements for various types of protective devices used in household and industrial applications are covered in the National Electrical Code of India, 2023.

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CONTACT DETAILS

Shri Ashok Kumar, Sc. C (ETD)

Mob. 7755839773, Email id: ashok9413@bis.gov.in

BUREAU OF INDIAN STANDARDS

Manak Bhawan 9, Bahadur Shah Zafar Marg, New Delhi 110002