## Distribution Switchgear

Distribution switchgear to BS EN 60947-3 defines the requirements for low-voltage switchgear and control gear, specifically: switches, disconnectors, Switch-disconnectors and switch-fuse disconnectors. For Example, this applies to equipment used in distribution circuits and motor circuits up to 1000 V AC.

**Types of Distribution Switchgear:**




**Switch-fuse-disconnector**

These integrate a switch-disconnector and fuse holders, allowing load switching, overcurrent protection and safe isolation.

Functions: Making and breaking load current, Overcurrent and short-circuit protection via fuses, safe isolation with visible or verifiable separation e.g. positive indication of contact position.

Characteristics: Typically fitted with NH or BS88 fuse links, lockable in the off position for maintenance safety, Suitable for AC-22 or AC-23 duties depending on rating, provides discrimination through fuse selection.

**Switch-disconnector**

These combine the functions of a switch and disconnector capable of load switching and providing safe isolation.

Functions: On-load switching (subject to utilisation category), isolation of circuits for safety and maintenance.

Characteristics: Rated according to utilisation categories AC-21, AC-22, or AC-23. May incorporate visible isolation or mechanically linked contacts, lockable handles are common, typically installed upstream or downstream of protective devices.

**Switches**

These are mechanical switching devices capable of making, carrying and breaking current under defined circuit conditions. Depending on their utilisation category, they may or may not be suitable for on-load switching.

Functions: Routine switching of circuits, operational control.

Characteristics: Load breaking capacity depends on utilisation category, does not provide isolation i.e. see switch disconnector. Not all switches are suitable for breaking inductive loads.

**Disconnectors**

Designed for circuit isolation. A disconnector must provide positive indication of contact position or verifiable air gap so circuits can be safely worked on.

Functions: Safe electrical isolation, protection of personnel during maintenance

Characteristics: Not designed to make or break load current, provides visible or verifiable isolation, typically rated AC-20 (isolation only), often lockable to prevent inadvertent operation.

**Utilization categories to BS EN 60947-3**

BS EN 60947-3 defines utilisation categories which describe the type of load and duty under which a switch, disconnector, or switch-disconnector is designed to operate. These categories are critical for correct product selection and compliance with BS 7671**.**

**AC-20A / AC-20B – Isolation Only.**

Function: Isolation of a circuit without making or breaking load current.

Characteristics: Devices are not intended to switch load current, operation must only take place when the circuit is off-load, designed to provide safe isolation with visible or verifiable separation.

Applications: Maintenance isolation points, lockable isolators upstream of protective devices, circuits were switching under load is prevented by design. Note: Using an AC-20 device for on-load switching would be non-compliant and potentially unsafe.

**AC-21A / AC-21B – Switching of Resistive Loads**

Function: Making and breaking resistive or slightly inductive loads. Load Type: Heaters, Incandescent lighting, low inductance circuits.

Applications: Heating circuits, general resistive distribution loads, control panels with stable load conditions. This category represents light switching duty. Electrical Characteristics: Low inrush current, minimal arcing compared to inductive loading.

**AC-22A / AC-22B – Switching of Mixed Resistive and Inductive Loads**

Function: Making and breaking mixed resistive and inductive loads, including moderate overload conditions. Load Type: Distribution boards, Transformers (lightly loaded), Mixed panel circuits

Electrical Characteristics: Moderate inrush current, higher breaking capacity required than AC-21, Typical duty for distribution switchgear. Most common category for main switches in low-voltage installations.

**AC-23A / AC-23B – Switching of Highly Inductive Loads**

Function: Making and breaking highly inductive loads, including motor loads.

Load Type: Motors, motor feeders, large solenoids, high inductance devices. Electrical Characteristics: Very high inrush currents, significant arcing during breaking, mechanically and electrically demanding duty.

Applications: Motor isolators, duty switches for motor circuits, industrial production equipment. Required where a switch is expected to break full motor load current and occasional locked rotor current.

Meaning of “A” and “B” Suffixes. A: Frequent operation, normal service duty. B: Infrequent operation or emergency duty. This relates to endurance testing and operational expectation

Selection Guidance, isolation only AC-20**,** resistive loads AC-21**,** distribution / mixed loads AC-22**,** motors / inductive loads AC-23

Note:

BS7671 462.1.201: A main linked switch or linked circuit-breaker shall be provided as near as practicable to the origin of every installation as a means of switching the supply on load and as a means of isolation.

For selection refer to BS 7671 table 537.4

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