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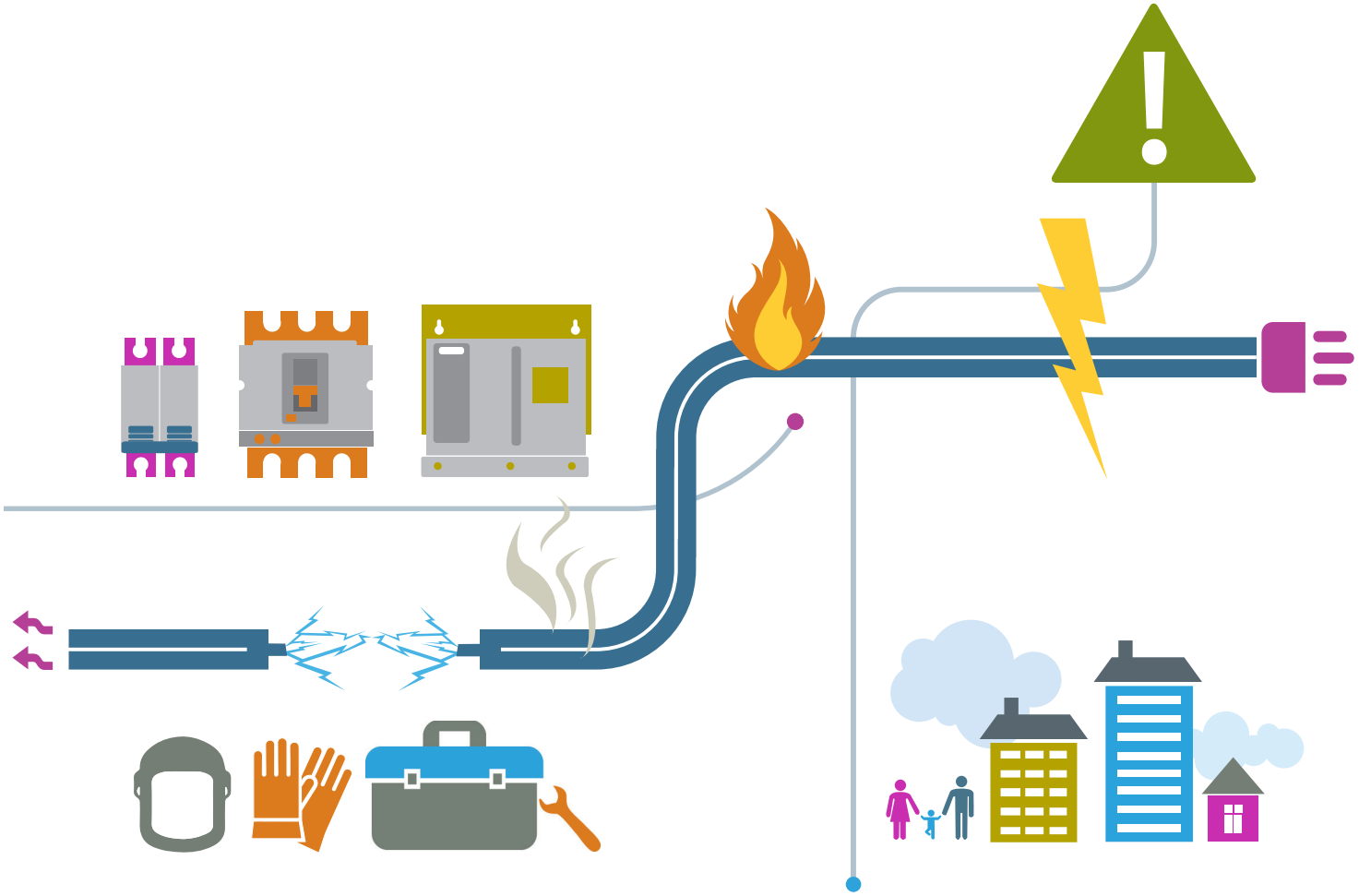
The trade association for energy infrastructure & systems

BEAMA GUIDE
SPECIFYING A LOW-VOLTAGE AND CONTROLGEAR ASSEMBLY



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ABOUT BEAMA

BEAMA is the UK manufacturing trade association for the electrotechnical sector, providing leadership, expertise and independent influence in the areas of product safety, performance, energy efficiency, digitalisation and sustainability. Our activities span a broad spectrum of technology groups, from energy networks through to electrical infrastructure and service technologies in the built environment.

The association has a strong history in the development and implementation of standards to promote safety and product performance for the benefit of manufacturers and their customers.

This publication provides guidance to specifiers and purchasers on key considerations when specifying low-voltage and controlgear assemblies and selecting competent manufacturers.

It complements, rather than duplicates, existing standards and guidance documents by drawing attention to additional practical and safety critical considerations.

This publication has been produced by BEAMA's Building Electrical Systems Sector and specifically by BEAMA's Low Voltage Switch Board Committee.

Details of other BEAMA Guides can be found on the BEAMA website www.beama.org.uk

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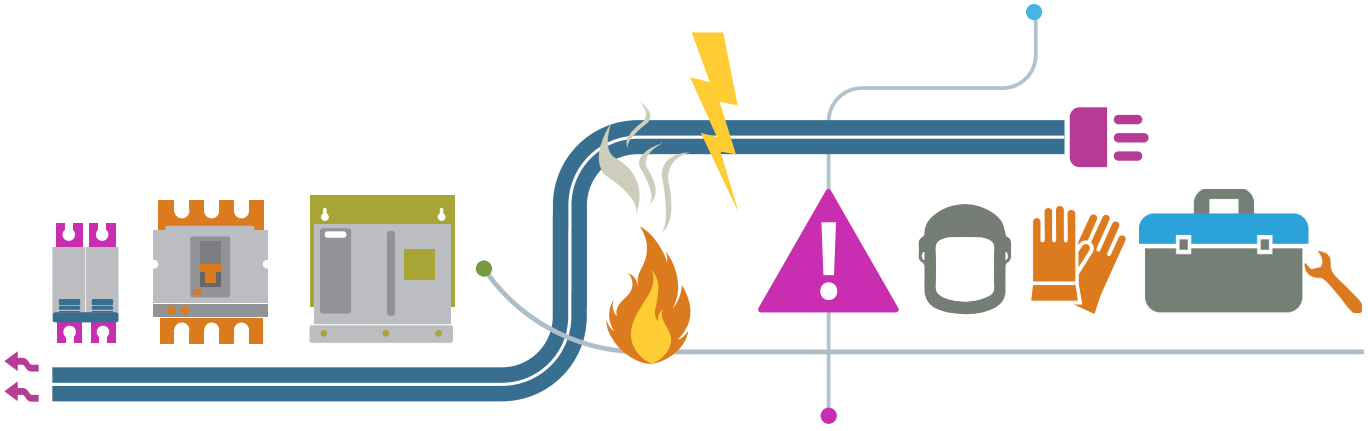


1. INTRODUCTION

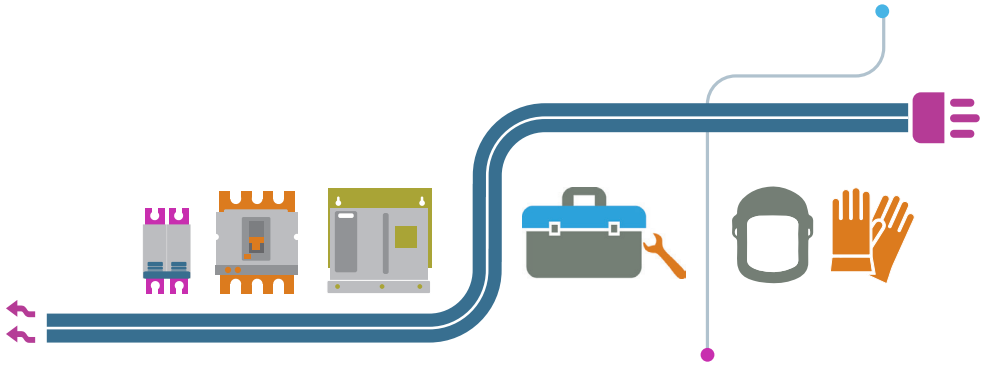
This publication provides guidance to specifiers and purchasers on key considerations when specifying low-voltage and controlgear assemblies and selecting competent manufacturers. It complements, rather than duplicates, existing standards and guidance documents by drawing attention to additional practical and safety critical considerations.

Low-voltage switchgear and controlgear assemblies are fundamental components of electrical distribution networks, typically ranging from a 40 A consumer unit to Panelboards, Switchboards and Motor Control Centres rated up to 6 300 A. Correct specification is critical to ensure that assemblies are safe, appropriately rated for their intended duty, and not unnecessarily over engineered.

When specifying an assembly, the specifier should recognise that the assembly frequently performs a dual role i.e. overload and short-circuit protection to the distributed circuits and energy management of the installation.

A fault may never occur throughout the life of the electrical installation. However, when a fault does arise, it is typically without warning, and the assembly must therefore remain continuously ready and capable of acting to safely disconnect the fault.

Readily available documents provide a lot of guidance of specifying the correct assembly. PD BSI IEC 61439-0, *'Low-voltage switchgear and controlgear assemblies. Guidance to specifying assemblies,'* provides much detail on how to specify an assembly with, for many criteria, background information to aid understanding. In addition, all the product parts of the BS EN IEC 61439- series for assemblies, include a check list detailing the parameters to be defined. It is not the intention of this Technical Bulletin to duplicate the content of these readily available documents but to augment them by additional and vital considerations.



2. CONFORMANCE WITH THE APPROPRIATE PART OF BS EN IEC 61439 SERIES

All assemblies must conform to the appropriate part of the BS EN IEC 61439 series of standards and be fully design verified as conforming to the current edition of standard before or after the previous editions are withdrawn. This ensures the assembly is safe, state of the art and fit for purpose.

3. DESIGN VERIFICATION

The necessary design verifications for conformance with a product part of the BS EN IEC 61439 series are summarised in an annex in the product part. All design verifications can be conducted by the manufacturer. The verifications do not have to be conducted on the exact arrangement to be supplied, but on a representative sample.

The standard clearly defines when testing is required for verification and when alternative verification methods, subject to their limitations, may be used. For example, a short-circuit test conducted at 50 kA for 3.0 seconds does not accurately represent performance at 70 kA for 1.0 second.

Specifiers and purchasers should ensure that the tested sample closely matches, and is representative of, the assembly being offered. They should also confirm that the manufacturer possesses the necessary expertise and capability to conduct the stated design verifications.

4. ASSEMBLY MARKING

In addition to the marking mandated by the product standard of the BS EN IEC 61439 series, every assembly placed on the GB market must carry UKCA or CE marking and in Northern Ireland CE marking or CE UKNI marking. This indicates that the assembly meets the essential safety requirements of the appliable Directives and/or Legislation.

If the appropriate part of the BS EN IEC 61439 series is cited in the Official Journal of the European Union (OJ) or in the UK as a Designated Standard, the manufacturer can benefit from a presumption of conformity with the corresponding essential requirements of the applicable legislation, assuming the assembly conforms to the applicable requirements in the cited standard. When the standard is not cited, conformity with the standard is of assistance, but the manufacturer must refer to the Directives/Legislation to ensure all safety aspects are fully covered. Again, the specifier/purchaser should ensure the manufacturer fully understands the implications of UKCA, CE or CE UKNI marking and that they have the necessary capability to apply the marking.

Current standards such as BS EN IEC 61439-2: 2021 are not always cited as Designated or Harmonized standards for the purposes of presumption of conformity with relevant legislation and a withdrawn version may still be cited. A withdrawn standard may not reflect state of the art. A manufacturer must prove conformity with legislation. This can be achieved by using the latest but undesignated/uncited standard.

It is important to note that a withdrawn standard is no longer current; it is no longer maintained by a National Standards Body and does not have 'standard' status, therefore, it cannot automatically reflect "state of the art" even if it is cited for presumption of conformity. A superseded standard can continue to have standards status during the transition period up to its withdrawal date.

5. OPERATING CONDITIONS AND ENVIRONMENT

The BS EN IEC 61439 series considers typical operating conditions and environments for the assembly covered by the particular product part. It does not cover the extremes applicable in some applications. For example, an outdoor assembly installed in a shoreline environment requires better corrosion protection than that for an average climate as required by BS EN IEC 61439-1. Similarly, assemblies to be used in electric vehicle charging hubs require higher group rated current than a typical application, since all chargers are likely to be drawing full load current at the same time.

The specifier should ensure that any operating or environmental conditions that are more demanding than those of the standard are highlighted in their specifications.

6. DESIGN CURRENT

Knowing the design current (I_b) and load characteristics (continuous, intermittent, duration of load etc.) of each circuit that is connected to an assembly is significant if the manufacturer is to offer the most appropriate and economic assembly. It enables the manufacturer to consider the group rated current of individual circuits, and as the group rated current of a circuit can vary depending on what is adjacent to it and its position, allowing the manufacturer to arrange the assembly in the most efficient and cost-effective manner. If available, design currents should be included in the assembly specification. If the information is not available, assumption will be made by the manufacturer. These may lead to an over or under rated assembly for the application.

7. PROSPECTIVE SHORT-CIRCUIT CURRENT

Every assembly should be capable of withstanding and safely managing the prospective short-circuit current at its point of installation within the electrical distribution network. This prospective current must take into account factors such as the characteristics of upstream protection, the presence and type of current-limiting devices, the magnitude and duration of the fault current, and the number of incoming supplies that may operate in parallel.

Specifying, for example, that busbars must have a short-time current rating of 50 kA for 1.0 second – when the assembly is supplied via a 250 A current-limiting MCCB, can lead to unnecessary overdesign and confusion. It may also raise ambiguity about whether the incoming circuit itself is required to meet the same 50 kA for 1.0 second rating specified.

Instead, the specifier should define only the prospective short-circuit current at the incoming terminals of the supply circuit(s), along with their modes of operation. It is then the responsibility of the assembly manufacturer to ensure the assembly provides fully coordinated protection from the incoming terminals through to all outgoing circuits.

8. EXTERNAL CONNECTIONS

Without further clarification, all assemblies in accordance with the BS EN IEC 61439 series assume that each circuit must be suitable for the termination of nominal cross-sectional areas of copper conductors and cable(s). For circuits rated up to 400 A the standard defines the range of cables. However, to ensure no difficulties on site, specifiers should always define the cables to be terminated on each circuit. In addition, temperature rise verification of an assembly is carried out with a specified cross-sectional area of a conductor and it assumes the conductor operating temperature of any cable will not exceed 70 °C.

Specifiers should always define the conductor type and cross-sectional area of cables to be accommodated. If the cables are large relative to the current rating of the circuit the manufacturer may have to make special provisions to accommodate them. Equally, if cables with a 90 °C conductor operating temperature capability are to be used at their maximum operating temperature, the assembly manufacturer should be consulted.

When, as an alternative to cables, for example, busbar trunking is to be used, the specifier should provide full details of the trunking proposed. This will enable the manufacture to make suitable provision for connection to the trunking and conduct any necessary design verifications.

9. REQUIREMENTS RELATED TO ASSEMBLY LOCATION AND OPERATION

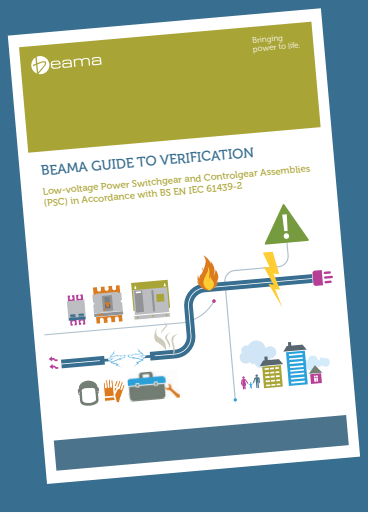
Specifiers should note that the relevant product standard within the BS EN IEC 61439 series defines the category of person associated with the operation of an assembly such as an ordinary person or an authorised person and may also specify particular arrangements or requirements for safe use.

For example, consumer units and distribution boards conforming to BS EN IEC 61439-3 are intended for operation by ordinary persons. In contrast, panel boards and switchboards for industrial, commercial, and similar applications are generally not intended to be operated by ordinary persons. However, this does not preclude them from being installed in locations that are accessible to ordinary persons.

Specifiers should also be aware that certain short-circuit protective devices are not suitable for operation by ordinary persons. Examples include circuit-breakers conforming to BS EN IEC 60947-2 and some fuses manufactured in accordance with BS EN IEC 60269-2.

10. RESPONSIBILITY

All parties from specification, throughout the manufacture, installation, use, maintenance to ultimately decommissioning and appropriate disposal of an assembly have legally obliged responsibilities. For manufactures this includes ensuring the assembly is fit for purpose and meets all the essential safety requirements of applicable Regulation and Legislation. As there is no formerly recognised approval systems for manufacturers of assemblies, specifier and purchasers must ensure that their suppliers of assemblies have the necessary capability and evidence to ensure that the assemblies they provide fully meet the appropriate part of the BS EN IEC 61439 series and any addition legally obliged essential safety requirements.



For further details see *BEAMA Guide to Verification – Low-voltage Power Switchgear and Controlgear Assemblies (PSC) in Accordance with BS EN IEC 61439-2.*

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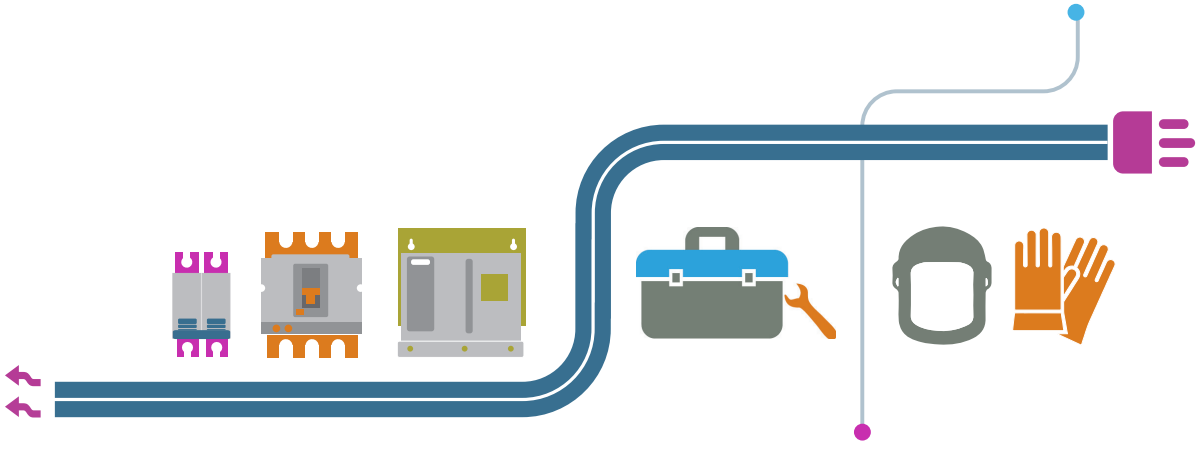

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