

GUIDANCE ON THE USE AND APPLICATION OF BS EN IEC 61238-1-1

Mechanical connectors for terminal bars



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.

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This publication has been produced by BEAMA's Building Electrical Systems Sector and specifically by BEAMA's Cut-out & Feeder Pillar Group.

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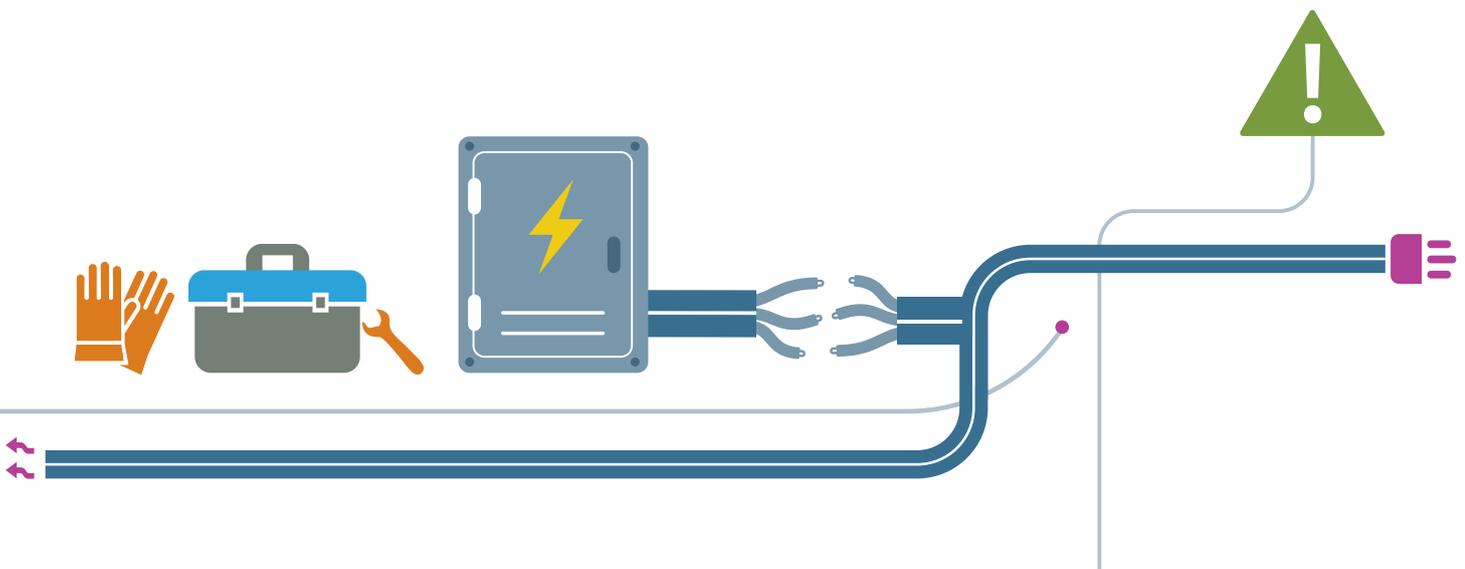
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Scope of guidance

This BEAMA guide is for the use of aluminium and brass mechanical shear off connectors in above ground applications such as LV cabinets and feeder pillars.

Note: *The following products are not within scope of this guide:*

Compression connectors to BS EN 61238-1-1

Brass tunnel terminals to BS 4579

Introduction

For many years mechanical shear off connectors have been used by installers in LV distribution pillars and similar devices. They offer numerous advantages foremost of which is consistency of results, but certain limitations need to be taken into account, and these are described below.

Principle of operation

Typically, the shear-off screws are designed to deliver consistent torque (i.e. clamping force) to a conductor placed or inserted into a connector without needing to use a torque wrench.

It is imperative that only approved ratchet hand spanners are used as battery powered impact driver / wrenches can deliver the torque in an uncontrolled way causing the shear head to break off prematurely.

During the tightening process as the screw approaches its design torque, the material of the screw will start to be overstressed and begin to shear at the specially designed thinned down neck section under the screw head.

During the initial termination phase, it is highly recommended to 'hand-tighten' the cable conductor shear screw and then if appropriate the yoke shear screw to properly seat the conductor in the base of the yoke before shearing either one off. The purpose is to bring the connector in line with the conductor to create a stress-free alignment.

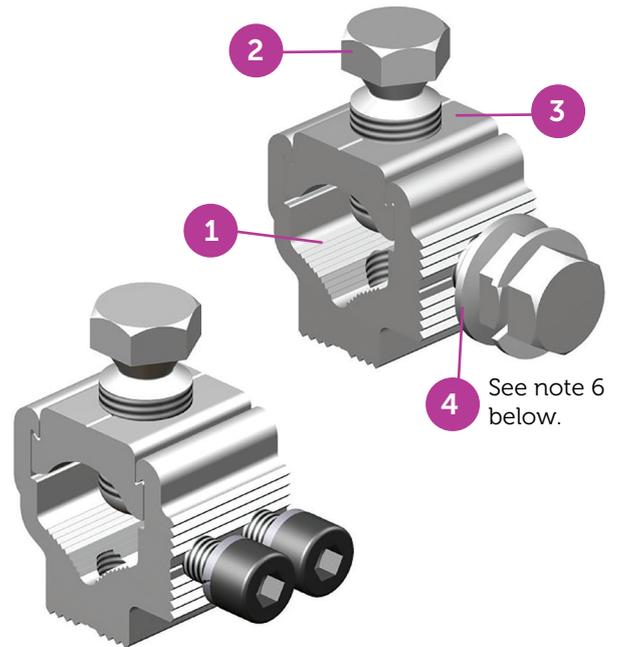
With the connector and conductor comfortably in situ and under no stress, proceed to shear off the cable conductor shear screw.

If appropriate the yoke shear screw can then be sheared off. When using a twin head screw only the outer head of this screw is intended to be sheared off. The purpose of the second head is to permit replacement of the whole connector assembly should this become necessary.

Shear screws should never be reused once removed as there is no means to accurately reapply the correct torque.

Constituent parts of a typical connector

- 1. Yoke:** This is the main 'U' shaped body. It will be fixed to a terminal bar or similar.
- 2. Shear off screw:** This component is designed with a weak section that will shear when the correct torque is reached. There will be one (or two) for the conductor and possibly another one to secure the yoke to the terminal bar.
- 3. Bridge:** This component fits into slots in the yoke body and provides a firm point from which the shear-off screw can exert pressure on the conductor.
- 4. Disc spring washer:** A domed washer that spreads the pressure and acts as a spring washer.



General rules for mechanical connectors for terminal bars

1. Always refer to manufacturer's specific installation instructions.
2. Mechanical connectors are suitable for solid and stranded aluminium or copper conductors as advised by the connector manufacturer.
3. The connectors should only be used with the constituent parts (bridges, shear screws and fixing accessories) as advised by the connector manufacturer. Parts from other connectors should never be used even if from the same manufacturer.
4. Solid sectorial conductors can be placed in the yokes either 'Apex up' or 'Apex down' (Apex can also be referred to as 'Delta'). Both meet the performance requirements of BS EN IEC 612381-1. Conductors should never be placed in any other orientation.
5. The supplied side fixing shear off is machined to a specific length and should arrive at the inside edge of the threaded yoke BUT NOT PROTRUDE further inside the body where it would clash with the conductor. The terminal thickness shall be within the range specified by the manufacturer of the connector.
6. The 'Disc Spring' washer used for the side fixing of the yoke must only be used with its domed side in contact with the head of the side shear off screw.
7. The core of the cable should be perfectly straight and directly in line with the connector where it sits in the yoke.
8. The bridge should always be centrally positioned within the yoke.
9. No part of the connector assembly should be modified in any way.
10. The cable to be terminated should be within the capacity range of the connector as specified by the connector manufacturer.
11. Standard mechanical shear off connectors are **not** designed to be reused after the shearing operation has been executed and shall be replaced if disturbed.



Rotherwick House
3 Thomas More Street
London E1W 1YZ

www.beama.org.uk