

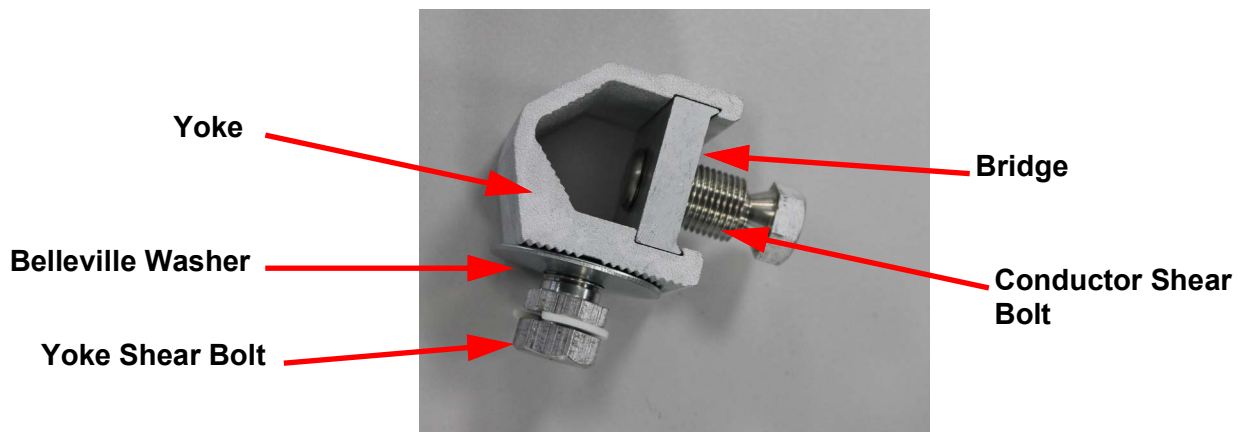
Use of aluminium and brass mechanical shear off connectors in above ground applications (cabinets, feeder pillars etc.)

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

Principle of operation

Typically, the shear bolts are designed to deliver consistent torque (i.e. clamping force) to a conductor placed in a connector without needing to use a torque wrench. **It is imperative that only a standard issue insulated ratchet hand spanner is used as battery powered impact wrenches can deliver the torque in an uncontrolled way causing the shear head to break off prematurely.** During the tightening process as the bolt approaches its design torque, the material of the bolt will start to be overstressed and begin to shear at the specially designed thinned down neck section under the bolt head. At this point, the fitter should prepare for the head to give way and break off, the risk obviously being a bruised knuckle. After one or two attempts, the fitter will become familiar with the process and learn to anticipate the shearing of the bolt head thereby avoiding any minor bruises.

Constituent parts of a Sicame UT4F connector for Aluminium Waveform conductors



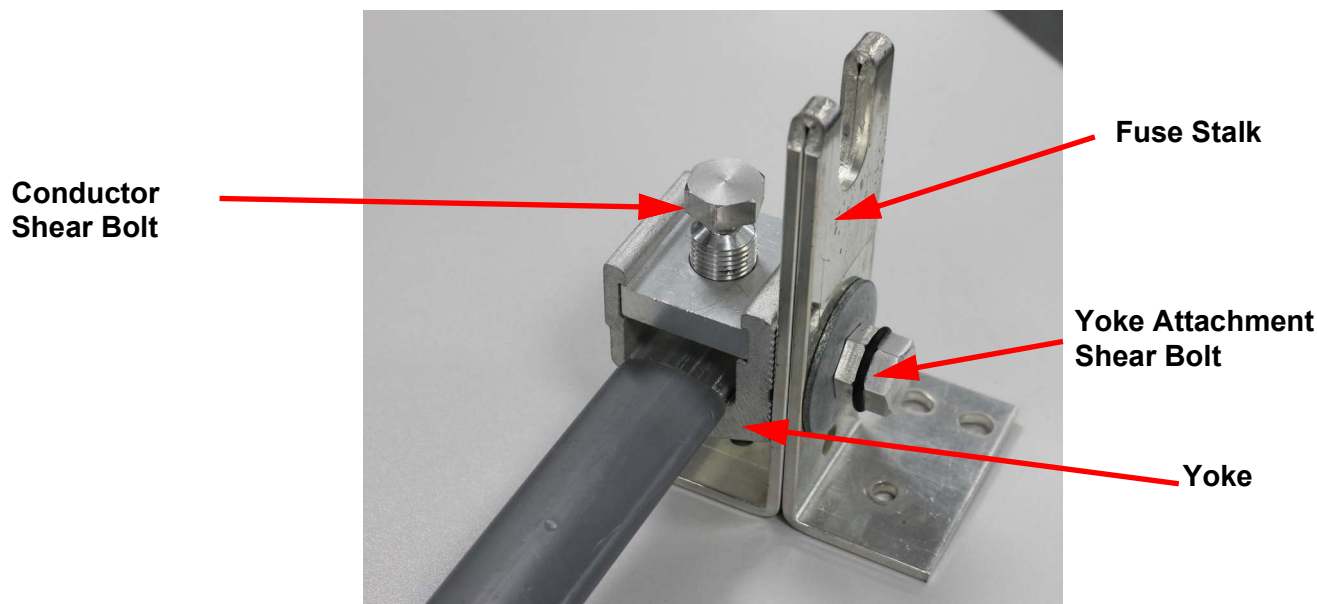
Yoke - This is the main 'U' shaped body. It will be fixed to a busbar.

Bridge - This component fits into slots in the yoke body and provides a firm point from which the shear-off bolt can exert pressure on the conductor.

Shear Bolt - Component designed with a weak section that will shear when the correct torque is reached. There will be one or two shear bolts for the conductor and possibly another to secure the yoke to the busbar.

Belleville Washer - Domed washer that spreads the pressure and acts as a spring washer.

Termination Procedure



Shear Off Sequence

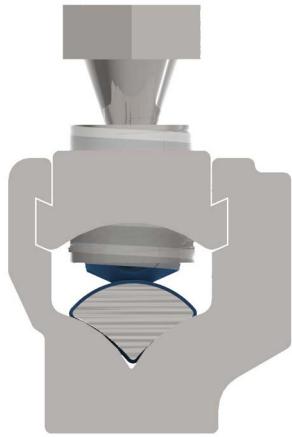
- 1 : With conductor correctly prepared, 'nip-up' the conductor shear bolt and the yoke attachment shear bolt.
- 2 : Proceed to shear off the conductor bolt head.
- 3 : Shear off the (outer) yoke attachment bolt head.

During the initial termination phase, it is highly recommended to 'nip up' the conductor shear bolt and then the yoke shear bolt 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 rather than attempt the more problematic converse operation. With the connector and conductor comfortably in situ and under no stress, proceed to shear off the conductor bolt. The yoke bolt can then be sheared off using only the outer head of this twin head bolt. The purpose of this second head is to allow yoke bolt removal for replacement of the yoke itself. **This yoke bolt, even though it has a head, should never be reused once removed.**

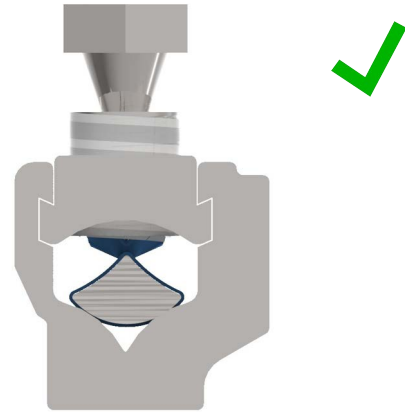
General rules for Sicame Aluminium UT4 type connectors

- 1 : The UT4F/M connectors supplied in MSDBs are principally designed for use with solid aluminium 3 core (120° section) or 4 core (90° section) conductors. However, they may be converted for use with stranded copper cables (see "Compatibility with Copper stranded conductors" on page 3).

- 2 : The connectors should only be used with the constituent parts (bridges, pressure plates, shear bolts and fixing accessories) with which they are supplied. Parts from other connectors should never be used even if from the same manufacturer.
- 3 : Solid sectorial conductors can be placed in the yokes either delta up or delta down and will perform identically. They can never be placed in any other orientation.



Conductor - Delta Down



Conductor - Delta Up

- 4 : The supplied yoke fixing shear bolt is machined to a specific length and should be flush with the inside edge of the threaded yoke BUT NOT PROTRUDE further inside the body where it would clash with the conductor.
- 5 : The Belleville 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 bolt.
- 6 : The core should be perfectly flat where it sits in the yoke i.e. not be in the middle of a straightened out bend.
- 7 : The bridge should always be centrally located in the yoke.
- 8 : No part of the connector assembly should be modified in any way.
- 9 : Connectors are range taking with minimum and maximum capacities which must be respected.
- 10 : Standard mechanical shear off connectors are not designed to be reused after the shearing operation has been executed.

Compatibility with Copper stranded conductors

Aluminium Sicame UT4 connectors supplied in their standard format are not suitable for use with copper stranded conductors. The standard yokes can be converted to receive copper stranded conductors both round section and sectorial by the addition of a special kit which contains the following:

- A new bridge and conductor shear bolt
- A pressure pad to consolidate the conductor strands
- A piece of brass gauze



Copper connector and kit

Sicame kit part numbers

51812-01	(UT4F single shear bolt) 70-150mm ² stranded copper cable
51812-02	(UT4F single shear bolt) 185-300mm ² stranded copper cable
51812-03	(UT4M double shear bolt) 70-150mm ² stranded copper cable
51812-04	(UT4M double shear bolt) 185-300mm ² stranded copper cable

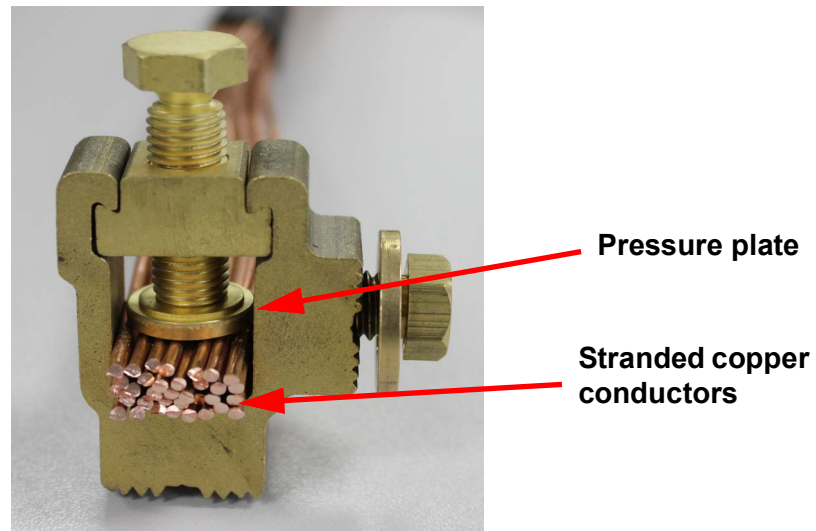
Copper Stranded Cable Utilization Procedure

- 1 : Ensure that the conductors are neatly prepared and that above all, the strands are perfectly aligned i.e. as they were when the insulation was removed.
- 2 : Wrap the brass gauze around the copper strands.
- 3 : Place conductor in the yoke, lay the pressure pad on the strands concave side facing downwards and slide the bridge and shear bolt into position.
- 4 : Complete the conductor shear bolt operation.

General rules for Brass Neutral earth connectors

- 1 : Brass connectors are only suitable for stranded copper conductors.
- 2 : The supplied yoke fixing bolt (non-shear off) is of a specific length and should be flush with the inside edge of the threaded yoke BUT NOT PROTRUDE further inside the body where it would clash with the conductor. It is usually factory fitted and pre-torqued. If the connector has to be repositioned for any reason, the side fixing bolt should be re-torqued to 28Nm.
- 3 : The connectors should only be used with the constituent parts (bridges, pressure plates, shear bolts and fixing accessories) they are supplied with. Parts from other connectors should never be used even if from the same manufacturer.
- 4 : Connectors are range taking with minimum and maximum capacities which must be respected.

- 5 : No part of the connector assembly should be modified in any way.
- 6 : The bridge should always be centrally located in the yoke.
- 7 : Always use the supplied pressure plate.



Typical Brass CNE connector

NOTE: Image shows bolt not sheared off