

Code of practice for

Installation and inspection of uninsulated compression and mechanical connectors for power cables with copper or aluminium conductors

ICS 29.120.20

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Foreword

This British Standard has been prepared under the direction of the Cables and Insulation Standards Policy Committee.

BS 7609 is intended to give guidance to manufacturers and contractors who use compression and mechanical connectors to enable power cables to be terminated using good engineering practice and to provide quality control guidance for the tools which are used to install connectors.

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

The start and finish of text introduced or altered by Amendments No. 1 and No.2 is indicated in the text by tags **A1** **A1** and **A2** **A2**.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard recommends methods and procedures applicable for the installation of uninsulated compression and mechanical connectors for use on copper or aluminium conductors of insulated cables conforming to **BS EN 60228:2005** having a cross-sectional area equal to or greater than 10 mm² for copper and equal to or greater than 16 mm² for aluminium.

2 References

2.1 Normative references

BS 7609 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this standard only when incorporated in it by updating or revision.

2.2 Informative references

BS 7609 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this British Standard, the following definitions apply.

3.1

connector

component or assembly of components designed to accept one or more conductor(s) for the purpose of making an electrical connection

3.2

mechanical connector

assembly designed to clamp conductors by mechanical screw force

3.3

insulation-piercing connector

mechanical connector which does not require removal of the conductor insulation to make an electrical connection

3.4

compression connector

component designed to make a connection by deformation of the barrel around the conductor

NOTE The term compression covers the term crimping.

3.5

barrel

part of a connector designed to accommodate the conductor

3.6

palm

part of a terminal lug formed flat to make a bolted connection to an equipment terminal

3.7

terminal lug

connector comprising a palm and a barrel, for connecting a conductor to an equipment terminal

4 Compression connectors

4.1 Selection of connectors and associated compression dies

Each connector should be clearly identified by a reference on the barrel or palm. This reference should enable the user to ascertain whether the fitting selected is of the correct size and type for the conductor(s) in question; it should also allow the correct die set and compression tool to be selected from the manufacturer's recommended list.

4.2 Preparation of a conductor

4.2.1 General

The insulation should be stripped back so that when assembled no insulation can be trapped in the barrel.

Care should be taken whilst stripping the insulation to avoid damaging the conductor strands with the stripping tool. The exposed conductor should be cleaned to remove any particles of the insulation material.

4.2.2 Aluminium conductors

Unless otherwise stated by the connector manufacturer, the conductor should be thoroughly abraded both to remove surface oxide and create a rough surface to ensure good electrical contact. Suitable abrasives are aluminium oxide cloth Grade 80 or a stainless steel wire brush; separate brushes should be kept for copper and aluminium. If cloth is employed, a fresh strip should be used for each connection made and if a wire brush is employed, the brush should be replaced when the wires are no longer sharp (indicated by the tendency for the brush to skate over the surface). During abrasion, care should be taken not to separate the strands of the conductor and the insulation should be protected from damage and particle ingress. For a conductor from mass impregnated non-draining (MIND) cables as much of the compound as possible should be removed from the surface strands using a suitable degreasing agent prior to abrasion.

To minimize further oxidation the insertion of the conductor into the connector and the subsequent compression should be carried out immediately in accordance with 4.3.

NOTE The use of jointing compounds is not generally required where the connection is to be encapsulated to prevent moisture ingress, e.g. under resin or heat shrink materials. However, for connections which may be open to the atmosphere, the manufacturer's instructions should be followed where adverse environmental conditions are anticipated.

4.2.3 Copper conductors

Unless there are obvious signs of oxidation or other surface contamination no conductor preparation is normally required.

Where the surface appears tarnished, abrade the conductor surface by following the same procedure as recommended for aluminium conductors (see 4.2.2) but excluding the coating procedure.

Separate brushes should be used for copper and for aluminium.

4.3 Compression

After cleaning, the conductor should be inserted into the barrel ensuring the palm is square to the equipment terminal thus avoiding excessive twisting of the completed termination.

NOTE For shaped stranded conductor and circular barrel connectors pre-rounding dies may be required prior to insertion; refer to manufacturer's data for information.

In an open ended terminal lug (see Figure 4) the conductor should protrude slightly at the palm end. With a closed ended terminal lug the conductor should be fully inserted as witnessed through the inspection hole (if provided). The connector should be compressed in accordance with the manufacturer's instructions with careful attention paid to the positioning of the die head on the barrel, the number and order of compression operations (if multiple) and whether overlapping is necessary or permissible.

Care should be taken to ensure the correct connector is chosen for the conductor and A_2 that the correct tool and die combination is used in order to achieve the same crimped connection as per the connector manufacturer's satisfactory type test.

- a) For hexagon and circumferential crimping of both copper and aluminium connectors the connector and die-set should be as specified by the manufacturer. The installer should ensure that the compression tool used is fully compatible with the crimp dies and that the dies fully close during the crimp operation.
- b) For indent type crimping of both copper and aluminium connectors the connector, die-set and tooling should be as specified by the manufacturer. Specific attention should be paid

to the servicing and calibration of the compression tool in order to guarantee the indent dies are compressed at the specified pressure. A_2

4.4 Inspection of completed compression connection

The completed connector should be examined to ensure:

- a) the correct connector reference relative to conductor size;
- b) that the correct die set has been used;
- c) a completed compression is free from excessive flash or burrs, caused by incorrect compression, which are detrimental to the performance of the joint;
- d) that no insulation is trapped in the barrel;
- e) that excess grease is wiped off the cable insulation and connector;
- f) that where inspection holes are provided, the conductor has been fully inserted.

NOTE 1 Examples of typical die sets, bolted terminations and good and poor compression connections are shown in Figure 1 to Figure 6.

NOTE 2 Reference should be made to the manufacturer's instructions to ascertain that the correct die set has been used.