

Specification for

Permanent anchors for industrial safety belts and harnesses

Spécification des ancrages permanents de
sangles et ceintures de sécurité industrielles

Spezifikation für Festaufhängungen für
industrielle Sicherheitsgurte

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Personal Safety Equipment Standards Policy Committee (PSM/-) to Technical Committee PSM/5, upon which the following bodies were represented:

- Amalgamated Engineering Union
- Arboricultural Safety Council
- British Coal Corporation
- British Constructional Steelwork Association Ltd.
- British Leather Confederation
- British Narrow Fabrics Association
- British Telecommunications plc
- Construction Health and Safety Group
- Cordage Manufacturers' Institute
- Department of the Environment (Property Services Agency)
- Department of Trade and Industry (National Engineering Laboratory)
- Electricity Supply Industry in England and Wales
- Gauge and Tool Makers' Association
- Health and Safety Executive
- Independent Broadcasting Authority
- Industrial Safety (Protective Equipment) Manufacturers' Association
- Institution of Mechanical Engineers
- National Federation of Master Steeplejacks and Lightning Conductor Engineers
- Royal Society for the Prevention of Accidents

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Forging Industry Association
- Federation of British Hand Tool Manufacturers
- Lifting Equipment Engineers' Association

This British Standard, having been prepared under the direction of the Personal Safety Equipment Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 May 1991

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Foreword

This new edition of BS 5845 has been prepared under the direction of the Personal Safety Equipment Standards Policy Committee. It supersedes BS 5845 : 1980, which is withdrawn.

This edition introduces technical changes but it does not reflect a full review or revision of the standard, which will be undertaken in due course.

This edition incorporates amendment 1 (dated June 1985) to BS 5845 : 1980, and introduces a new appendix giving recommendations concerning the connection of safety lanyards to eyebolts. Differences in the text between this edition and BS 5845 : 1980 are indicated by a line in the margin.

The first (1980) edition of this standard replaced appendix D of the 1967 version of BS 1397 'Industrial safety belts and harnesses', which had been overtaken by developments in the construction industry and in the methods available for making fixed anchorages for industrial safety belts and harnesses.

This standard provides a specification for the anchors themselves and recommendations for their installation and for the connection of safety lanyards.

It is emphasized that safety belts and harnesses should be used only when it is impracticable to ensure a reasonable degree of safety by other means such as travelling cradles or the erection of staging.

A bibliography is included in appendix D listing further sources of technical information on permanent anchors for industrial safety belts and harnesses.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Specification

1 Scope

This British Standard specifies requirements for eyebolts and ancillary fittings for use as permanent, fixed anchorages for the direct attachment of safety lanyards of industrial safety belts and harnesses and of devices complying with the requirements of BS 5062 : Part 1 and for no other purpose. Recommendations on the fixture of such anchorages to existing buildings and new construction are included together with methods of test and test requirements for assessing the suitability of anchorages.

Recommendations concerning connection of safety lanyards are given in appendix C.

This standard is based on the use of safety belts and harnesses with lanyards made of 12 mm diameter polyamide, or nylon, rope complying with the requirements of BS 4928. The requirements and recommendations in this standard do not necessarily cover eyebolts and ancillary fittings for use as permanent, fixed anchorages for the direct attachment of lanyards of other sizes or lanyards made of other materials, e.g. chains. If such other lanyards are to be used, the user, manufacturer and installer should consult together.

2 References

The titles of the standards publications referred to in this standard are listed on the inside back cover.

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 anchorage

A complete fitting set into or attached to a structure and to which a safety lanyard may be attached.

3.2 anchor

A complete fitting before installation, e.g. eyebolt and socket; eyebolt, backplate and nut.

4 General requirements for anchors

4.1 Anchors shall be designated so that each part is capable of sustaining an axial tensile force of 10 kN and the design shall be verified by the manufacturer testing to that value.

4.2 The manufacturer of the anchor or of any component part of the anchor shall carry out four drop tests to evaluate the design of the anchor when it is inserted in each of the types of construction in which it is intended for use. The test is designed to ensure that a peak vertical force in excess of 10 kN is imposed on the anchorage. When the test is carried out as described in appendix B, the anchorage shall safely sustain the load.

4.3 The manufacturer or supplier shall provide written instructions with each consignment of anchors or parts of anchors, detailing the recommended method of installation for the purpose described in the manufacturer's statement (see 5.11, 6.6, 7.6 and 8.6). These instructions shall be passed by the supplier to the installer.

5 Requirements for eyebolts

5.1 Materials

Eyebolts shall be made of steel and shall be capable of meeting the requirements of 4.2. Steel of grade 070M26 of BS 970 : Part 1 and stainless steel of grade 316S13 or 316S31 of BS 970 : Part 1 are recommended.

Eyebolts shall be heat treated in accordance with the heat treatment specified in the standard relevant to the material used. Carbon steel eyebolts shall be hardened and tempered as specified in BS 970 : Part 1. Stainless steel eyebolts shall be softened as specified in BS 970 : Part 1.

When analysis of the steel in the eyebolts is required by the purchaser, he shall state so at the time of the enquiry and order.

Carbon steel eyebolts, including the threads, shall be galvanized in accordance with BS 729. Before being galvanized the threads shall be machined undersize to ensure subsequent mating with standard threaded sockets.

5.2 Form and dimensions

The form and minimum dimensions of the eyebolt shall be in accordance with figures 1, 2, 3, 4 and 5, as appropriate. The internal diameter of the eye shall not exceed 19 mm.

5.3 Screw threads

The shank shall be threaded with an ISO metric screw thread complying with the requirements of BS 3643 : Part 2 and having a minimum diameter of 12 mm. The minimum length of full thread shall be 18 mm.

NOTE. Other threads should be used where necessary for existing sockets and should not be of smaller cross-sectional area than those specified in 5.3.

5.4 Workmanship

The whole of each eyebolt, including the shank, shall be cleanly drop forged in one piece (but see 9.2) and shall be free from patent defect.

The underside of the collar shall be in true alignment at right angles to the axis of the shank.

5.5 Tolerances

Quality F tolerances of BS 4114 shall be applied to drop forging dimensions.

5.6 Hardness

When tested after heat treatment, carbon steel eyebolts shall have a Brinell hardness of not less than 179. When practicable the test shall be made in accordance with BS 240 using a 10 mm ball and 3000 kg. If another method is employed, conversion to the corresponding Brinell hardness shall be made in accordance with BS 860.

The surface on which the impression is to be made shall be obtained by filing, grinding or smooth machining.

Suitable precautions shall be taken to ensure that the surface tested is representative of the material and that its hardness is not affected by decarburization or the method used for the preparation of the test surface.

5.7 Proof loading

Each eyebolt after manufacture and subsequent heat treatment shall be subjected to an axial tensile load of 10 kN and it shall withstand this load without showing permanent set.

After removal of the proof load, each eyebolt shall be thoroughly examined by a competent person and shall be accepted only if found to be free from visible flaw or defect.

5.8 Testing facilities

The manufacturer shall provide all labour and appliances required for tests in accordance with 5.7 of this standard. In the absence of facilities at his own works for proof loading, the manufacturer shall bear the cost of proof loading by a recognized testing authority.

5.9 Additional tests

If the purchaser requires tests or chemical analysis of the material, or additional tests on finished eyebolts, the requirements shall be stated at the time of enquiry and order and, if the purchaser desires, the samples shall be selected by a person representing or approved by him.

5.10 Inspection

The representative of the purchaser shall have access to the manufacturer's works at any reasonable time and shall be at liberty to inspect the eyebolts at any stage of manufacture, and the methods of examination.

5.11 Manufacturer's statement

With each consignment of eyebolts the manufacturer shall provide the following.

(a) A statement containing:

(1) the purpose for which the eyebolts are intended;

NOTE. This statement should include, as appropriate, information on the orientation in which the anchor is intended to be used (see B.2).

(2) a declaration of the material of which the eyebolts are made and that each eyebolt was proof loaded in accordance with this standard and subsequently examined by a competent person;

(3) the name and address of the testing establishment;

(4) the status of the signatory of the statement.

(b) A reference to the identification with which each of the eyebolts covered by the statement is marked (see 5.12).

5.12 Marking

Each eyebolt claimed to comply with the requirements of this standard shall be stamped on the periphery of the collar with a mark to identify it with the manufacturer's statement, and on the eye shall be embossed the number of this British Standard, i.e. BS 5845¹⁾.

6 Requirements for cast-in sockets in reinforced concrete

6.1 Materials

6.1.1 The socket shall be made of steel and shall be capable of meeting the requirements of 4.2. For cast sockets, carbon steel of grade A2, A4 or A5 of BS 3100 or stainless steel of grade 420C29 of BS 3100 is suitable.

6.1.2 Sockets shall be heat treated in accordance with the heat treatment specified in the standard relevant to the material used. Carbon steel sockets shall be hardened and tempered as specified in BS 970 : Part 1. Stainless steel sockets shall be softened as specified in BS 970 : Part 1.

6.2 Workmanship

The components of the socket shall be in all respects sound and free from laps and holes. Surfaces of castings shall be clean, non-porous and free from sand. Castings shall be neatly dressed and shall not be burned, stopped, patched or plugged.

¹⁾ Marking BS 5845 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity which may also be desirable.