

Technical Bulletin

Further guidance from BSI Technical Committee PH/5 - Personal Fall Protection on eyebolts for rope access

Eyebolts to BS EN 795:1997, BS EN 795:2012 and PD CEN/TS 16415:2013 when used for rope access purposes in light of increased strength recommendations of BS 7985:2013 and the IRATA International code of practice 2013.

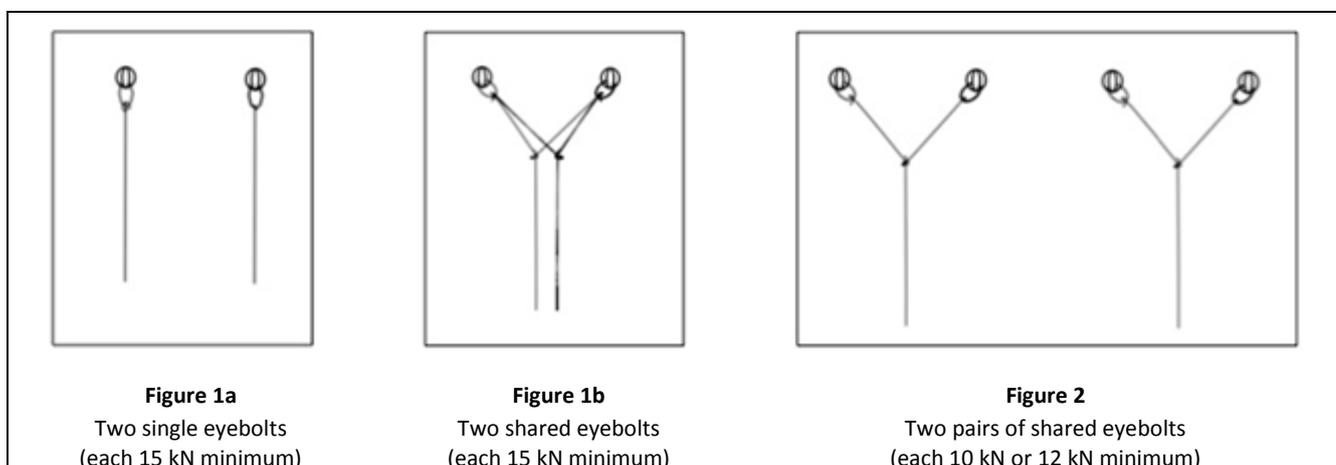
1 Introduction

Rope access codes have for some years recommended double protection in the form of a working line and a safety line with the recommendation that when eyebolts are used as anchor devices they should a) be eyebolts conforming to BS EN 795 and b) have a minimum static strength of 15 kN.

As eyebolts to BS EN 795:1997 were required to have a static strength of only 10 kN, advice contained in BS 7883:2005 and BS 7985:2009 suggested that the recommendations of double protection and the use of anchors with a minimum static strength of 15 kN could be satisfied by providing two such eyebolts and ensuring that both lines were attached to both eyebolts. This was based on the assumption that lines could be rigged to share the load equally between both eyebolts. It has since been acknowledged, in BS 7985:2013 and in the IRATA International code of practice for industrial rope access 2013, that despite the best intentions this is not always possible and that a static strength of 15 kN is recommended for each eyebolt. This produces a potential dilemma for all users in assessing how to treat installations using eyebolts that are rated to only 10 kN as set out in BS EN 795:1997, or 12 kN, as BS EN 795:2012.

It is the intention of BS 7985:2013 and the IRATA code of practice 2013 that eyebolts are used in the following configurations to achieve a minimum static strength of 15 kN for both the working line anchor and the safety line anchor:

- a pair of eyebolts, each eyebolt rated with a static strength of 15 kN, which are not linked together. See **Figure 1a**. However, it is recommended that, where possible, eyebolts are linked together for additional safety, as shown in **Figure 1b**;
- a pair of eyebolts, each eyebolt rated with a static strength of 15 kN, which are linked together (e.g. with a Y-hang) for additional security or flexibility of working positions. See **Figure 1b**;
- two pairs of eyebolts (one pair for the working line and one pair for the safety line), each eyebolt rated with a static strength of 10 kN or 12 kN, where each pair is linked together to achieve a minimum static strength of 15 kN. See **Figure 2**.



The most commonly encountered configuration is that shown in **Figure 1b** but often with each eyebolt rated to only 10 kN (EN 795:1996) or 12 kN (EN 795:2012).

2 Purpose

This Technical Bulletin provides guidance to all stakeholders (e.g. manufacturers, installers, building owners, examining bodies and users) involved with the use of eyebolts used as anchor devices for rope access purposes in the light of changes in recommendations regarding load capacities for such anchor devices contained in the latest versions of BS 7985:2013 and the IRATA International code of practice 2013.

In this Technical Bulletin, the term eyebolt means eyebolts to BS EN 795:1997 and BS EN 795:2012 when installed, including the structural anchor and any fixing elements, see **Figure 3**.

This Technical Bulletin does not cover eyebolts when they are used for rescue where there is more than one person, e.g. rescuer and casualty, suspended from an anchor line. In these scenarios, it is necessary to consider the increased loads and corresponding eyebolt static strength requirements. See IRATA International code of practice 2013, 2.11.2.

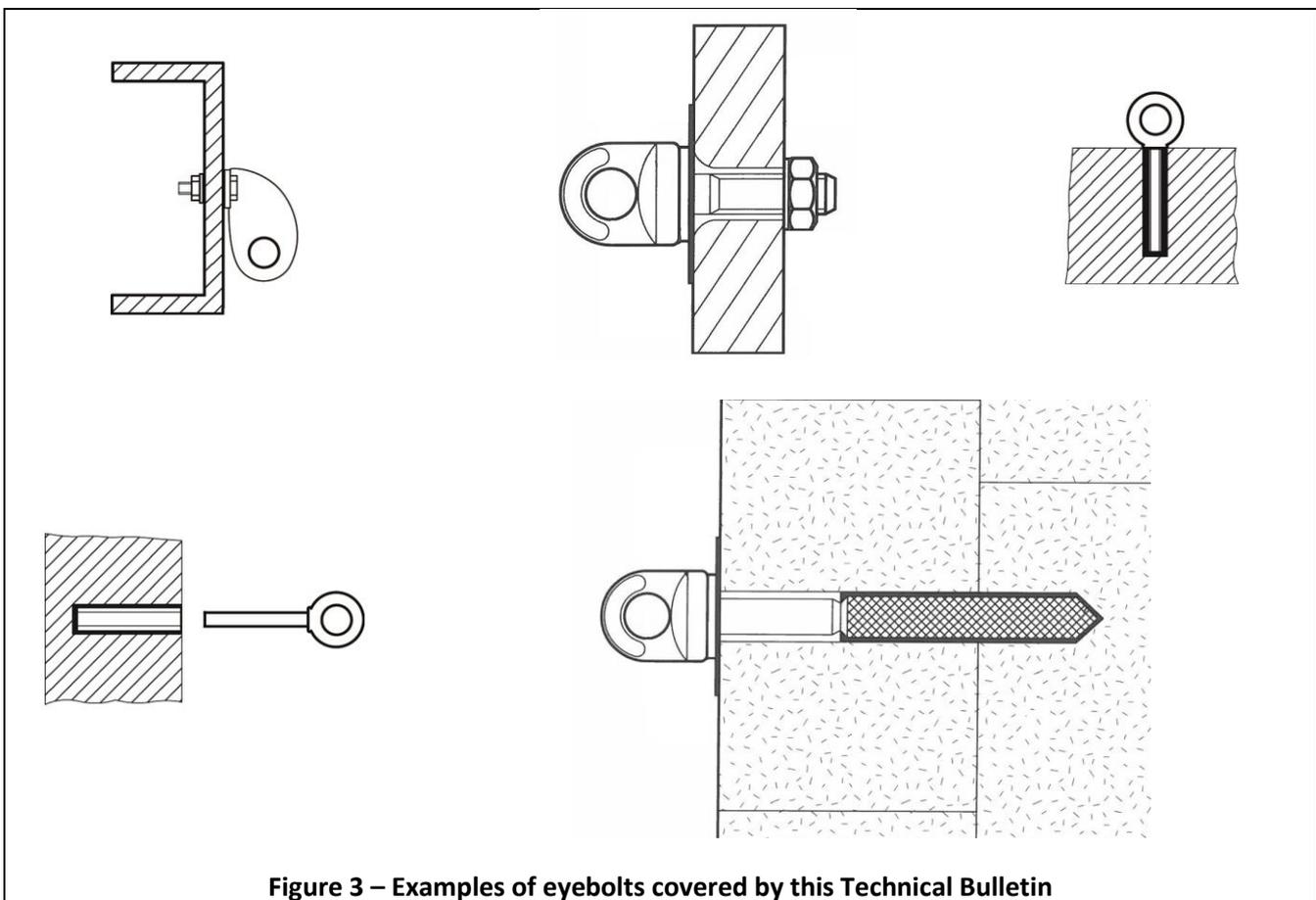


Figure 3 – Examples of eyebolts covered by this Technical Bulletin

3 Guidance

The following guidance has been agreed by PH/5, the BSI committee responsible for fall protection.

3.1 Guidance for manufacturers

When eyebolts to BS EN 795 are used to satisfy the requirements of rope access, they are currently not qualified by that standard to a static strength of 15 kN. In order to satisfy this additional strength recommendation, the manufacturer should be able to demonstrate that the eyebolt for use in rope access is capable of holding a minimum static load of 15 kN for three minutes in each of the intended directions of use and in the base material in which they claim the product may be installed, taking into account minimum base material strength; minimum structural thickness; minimum edge and spacing distances. Additionally, it is recommended that the manufacturer detail s whether this covers only currently manufactured eyebolts and/or previously manufactured eyebolts.

Where the manufacturer's installed eyebolts cannot sustain a minimum static strength of 15 kN, e.g. when installed in soft brickwork, the manufacturer should refer users and installers to BS 7985:2013 and IRATA International code of practice 2013 for further information. An alternate solution is shown in **Figure 2**.

3.2 Guidance for new installations

3.2.1 General

Where possible, only eyebolts that have a rated minimum static strength of 15 kN should be installed, e.g. in concrete or strong masonry, as shown in **Figure 1a** and **Figure 1b**.

Where an eyebolt strength of 15 kN cannot be achieved, e.g. in weak brickwork, two pairs of eyebolts, each eyebolt with a rated minimum static strength of 12 kN may be used, e.g. as shown in **Figure 2**.

Installers should only install eyebolts in the types of base material approved by the manufacturer, e.g. concrete; solid brickwork; stonework; and steelwork, with a strength claimed by the manufacturer (see **3.1**) in the intended directions of loading in use.

3.2.2 Testing and installation scenarios

3.2.2.1 General

With the exception of the recommendations detailed below in **3.2.2.3** and **3.2.2.4**, all procedures for installation and tests should be in accordance with BS 7883:2005.

3.2.2.2 Trial tests and proof tests

Trial tests should be undertaken where the installer is in any doubt as to the ability of the base material to sustain the relevant test load, as indicated in **3.2.2.3** and **3.2.2.4**, and only in the base material allowed by the manufacture, e.g. when brickwork is allowed but is possibly weak. They should be carried out on three sample eyebolts installed solely for the purpose of this test and never on eyebolts intended to be used in the rope access system.

Trial tests should not be used to "approve" the use of eyebolts in base materials of a category not allowed by the manufacturer.

Where "proof tests" are referred to in this document, these are the tests described in BS 7883:2005, 11.1.1.

3.2.2.3 Applications where the proposed eyebolt has a rated minimum static strength of 15 kN in the base material as claimed by the manufacturer

Note These eyebolts should be in accordance with EN 795:2012 and also have satisfied the 15 kN static load test described in 3.1.

Where the installer is satisfied that the base material can sustain a load of 15 kN, or where all three eyebolts of the trial test satisfy the 15 kN trial test load, the eyebolts to be used for rope access may be installed as in **Figure 1a** and **Figure 1b** and should then be proof tested to 6 kN.

Where any of the three eyebolts under trial test cannot sustain a load of 15 kN, but all three can sustain a load of at least 12 kN, e.g. one or more eyebolts fails at loads between 12 kN and 15 kN, eyebolts intended to be used for rope access should be always installed in two pairs, see **Figure 2** as an example, so as to share the load. This should be done in such a manner that a minimum combined strength of 15 kN is achieved for each pair of eyebolts with a Y-hang angle of less than 70°, while respecting the manufacturer's recommended minimum spacing between all eyebolts. All eyebolts intended to be used for rope access should then be proof tested to 6 kN.

Where any of the three eyebolts under trial test cannot sustain a load of 12 kN, an alternative approach should be sought.

3.2.2.4 Applications where the proposed eyebolt has a rated minimum static strength of 12 kN in the base material as claimed by the manufacturer

NOTE These eyebolts should be in accordance with EN 795:2012.

Where the installer is satisfied that the base material can sustain a load of 12 kN, or where all three eyebolts of the trial test satisfy the 12 kN trial test load, the eyebolts to be used for rope access should be installed in pairs, e.g. as in **Figure 2**, and should be done in such a manner that a minimum of 15 kN is achieved for each pair of eyebolts with a Y-hang angle of less than 70°, while respecting the manufacturer's recommended minimum spacing between all eyebolts. All eyebolts intended to be used for rope access should then be proof tested to 6 kN.

Where any of the three eyebolts under trial test cannot sustain a load of 12 kN, an alternative approach should be sought.

3.3 Guidance for existing installations

3.3.1 General

Pre-installed eyebolts are likely to have a rated minimum static strength of 10 kN (BS EN 795:1997) or 12 kN (BS EN 795:2012) per eyebolt. However, some eyebolts may have a rated minimum static strength of 15 kN.

Possible installations include:

- Scenario 1** Two eyebolts used individually or as a pair, each eyebolt with a rated minimum static strength of 15 kN (see **Figure 1a** and **Figure 1b**)
- Scenario 2** Four eyebolts used as two pairs, each eyebolt with a rated minimum static strength of 10 kN or 12 kN (see **Figure 2**)
- Scenario 3** Two eyebolts used as a pair, each eyebolt with a rated minimum static strength of 10 kN or 12 kN (similar to **Figure 1b**)

3.3.2 Scenario 1

Where two such eyebolts are installed in a structure and are each rated to 15 kN, then no further action is required. Eyebolts should be examined in accordance with BS 7883:2005.

Where two eyebolts are installed in a structure where there is doubt a) as to whether 15 kN can be achieved in that structure, or b) that the structure is on the manufacturer's approved list, the examiner should contact the manufacturer to seek clarification of their strength in the particular base material in which they are installed. If no information is available, the rated strength should be down-rated to 12 kN and two additional eyebolts each with a minimum static strength of 12 kN are required.

NOTE Installers and examiners should note that the test requirements of anchor devices certified as having the increased load capacity of 15 kN should be subject to the same test load requirements as recommended by BS 7883:2005 for fall arrest, i.e. proof tests on all installations to 6 kN. This test load should not be exceeded.

3.3.3 Scenario 2

Where four eyebolts used as two pairs are installed in a structure and are rated to 10 kN or 12 kN, then no further action is required. One pair of eyebolts is used for the working line and one pair for the safety line. Eyebolts should be examined in accordance with BS 7883:2005.

Consideration should be given to the spacing and location of anchor devices to minimise any pendulum effect.

3.3.4 Scenario 3

Where two eyebolts are installed in a structure and are each rated to 10 kN or 12 kN, the examiner should seek clarification of the minimum rated strength of the installed eyebolt in the type of structure into which it is installed. The manufacturer may have undertaken additional tests (see 3.1) to prove increased strength of the eyebolts when installed in the base material in use over and above EN 795 requirements and to the minimum of 15 kN. In this case, no further action is required.

If no such re-rating has taken place then:

- a) trial tests in accordance with BS 7883:2005 to 15 kN could be undertaken and if successful, no further action is needed;
- b) alternatively, if permitted by the structure/eyebolt spacing and building owner, the installation of two additional eyebolts each with a minimum static strength of 12 kN could be undertaken. Consideration should be given to the spacing and location of anchor devices to minimise any pendulum effect.

NOTE The minimum spacing, recommended in BS 7883:2005, between eyebolts in brickwork is 350 mm and 300 mm in concrete, meaning the minimum overall spacing of four eyebolts is 1050 mm in brickwork and 900 mm in concrete. Individual manufacturers' spacings may be larger.

If the above recommendations are not possible, the existing installations may be allowed to remain in service provided the following conditions are met:

- a) the eyebolts are only rigged and used such that the loading on both eyebolts is intended to be equal;
- b) the Y-angle in the Y-hang is never more than 70° prior to loading, i.e. loading by the mass of the user;

- c) examinations of existing installations are carried out by people not just qualified in examining anchor devices but, in addition, have a thorough understanding of the requirements of rope access;
- d) there is a thorough risk assessment by the rope access safety supervisor or the rope access manager, which takes into account the recommendations in this document, before any rope access manoeuvres are carried out on the anchor lines;
- e) the eyebolts have been installed in a base material specified by the manufacturer of the eyebolt or his authorised representative;
- f) that rope access technicians may attach to an existing installed adjacent pairs of eyebolts for additional back-up;
- g) that rope access technicians may attach to other structural elements for additional back-up;
- h) that eyebolts are suitably marked and labelled and that the labelling includes the requirement that the user reads the recommendations as detailed in 3.5 before rigging and using any anchor lines attached to the eyebolts.

3.4 Guidance for building owners

Building owners responsible for eyebolts for rope access purposes should ensure that all such eyebolts are assessed and labelled in accordance with this Technical Bulletin and that a periodic examination report allowing eyebolts to remain in service has been issued. Where new instructions for use have been issued, these should be drawn to the attention of users.

3.5 Guidance for users

Users should ensure that eyebolts are assessed in accordance with this Technical Bulletin by reference to the labelling and the current periodic examination report. Where compliance is in doubt, eyebolts should not be used.

3.6 Labelling

For all installations, labels, generally in accordance with the recommendations of BS 7883:2005, should be attached or adjacent to eyebolts following installation or periodic examination and should include a statement to the effect that these eyebolts comply with this Technical Bulletin and the requirements of BS 7985:2013 and IRATA International code of practice 2013, e.g. "Compliant with BS 7985:2013, IRATA ICOP:2013 and PH/5_16_0102" and if to be used as one of a pair, it should say so.

3.7 Information to be supplied

A technical file should be left with the building owner, which should make clear how the installations comply with this Technical Bulletin and how the eyebolts should be used and examined.

The guidance contained in this bulletin represents the agreed position of BSI Technical Committee PH/5 Personal Fall Protection, approved by the membership. It does not represent the view of BSI and is offered to readers for the purpose of providing interim guidance pending the update of BS 7883, and of summarising the key differences arising from the publication of BS EN 795: 2012.