BS 7668:2016

BSI Standards Publication

Weldable structural steels – Hot finished structural hollow sections in weather resistant steels – Specification

Documents
Document Sharing Hub

Full document details: BS 7668:2016

Publishing and copyright information

The BSI copyright notice displayed in this document indicates when the document was last issued.

© The British Standards Institution 2016

Published by BSI Standards Limited 2016

ISBN 978 0 580 93521 3

ICS 77.140.75

The following BSI references relate to the work on this document:
Committee reference ISE/103
Draft for comment 16/30338305

Publication history

First published, June 1994
Second edition, April 2004
Third (present edition), September 2016

Amendments issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS 7668:2016

Contents

Foreword *ii*

1 Scope *1*
2 Normative references *1*
3 Terms and definitions *2*
4 Information and requirements to be agreed and documented *3*
5 Classification and designation *4*
6 Technical requirements *5*
7 Inspection and testing *7*
8 Samples *8*
9 Test methods *10*
10 Marking *12*

Annexes
Annex A (normative) Chemical composition and mechanical properties *13*
Annex B (normative) Location of samples and test pieces *15*

Bibliography *17*

List of figures
Figure B.1 – Tensile test piece locations – Items tested in full section *15*
Figure B.2 – Location of tensile and impact test pieces – Circular or elliptical section *15*
Figure B.3 – Location of tensile and impact test pieces – Square and rectangular sections *16*

List of tables
Table 1 – Permissible limits on the product analysis from the ladle analysis specified in Table A.1 *4*
Table 2 – Example of product with designated impact properties at 0 °C *4*
Table 3 – Inspection and test programme *8*
Table 4 – Test units *9*
Table A.1 – Chemical composition (ladle analysis) *14*
Table A.2 – Maximum carbon equivalent value (CEV) *15*
Table A.3 – Mechanical properties *15*

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 18, an inside back cover and a back cover.

© The British Standards Institution 2016

Documents Document Sharing Hub
Full document details: BS 7668:2016

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 September 2016. It was prepared by Technical Committee ISE/103, *Structural steels other than reinforcements*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7668:2004, which is withdrawn.

Information about this document

This standard applies to hot finished structural hollow sections with enhanced atmospheric corrosion resistance and includes grades that are not currently covered by BS EN 10210-1:2006 and BS EN 10210-2:2006. The grades in BS 7668:2016 are compatible with those of similar strength level in BS EN 10025-5:2004.

This is a full revision of the standard, and introduces the following principal changes:

- inspection documentation requirements updated (**4.2**, **7.1** and **7.2**);
- new grades introduced to ensure compatibility with those of similar strength level specified in BS EN 10025-5 and to reflect currently proposed future updates to BS EN 10210-1:2006;
- classification and designation updated to reflect the new grades;
- the use of open hearth steel prohibited where secondary steelmaking is not also applied;
- impact testing now based on BS EN ISO 148-1 using a 2 mm radius striker (**6.5.3**, **8.2.3.3** and **9.2.2**);
- repair of the weld in SAW hollow sections permitted;
- welding procedures updated;
- test unit requirements revised;
- tensile testing now based on BS EN ISO 6892-1 (**8.2.3.2** and **9.2.1**);
- amendments made to specified NDT requirements (**9.4.2** and **9.4.3**).

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause **J.1.1**, which states, "Requirements should be expressed using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

Documents
Document Sharing Hub

Full document details: BS 7668:2016

Contractual and legal considerations

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.

Documents
Document Sharing Hub

Full document details: BS 7668:2016

This page deliberately left blank

Documents
Document Sharing Hub
Full document details: BS 7668:2016

1 Scope

This British Standard specifies the technical delivery requirements for weldable weather resistant hot finished seamless, electric welded and submerged arc welded (longitudinal or helical) steel structural hollow sections of circular, square, rectangular or elliptical forms. It applies to hollow sections formed hot with or without subsequent heat treatment, or formed cold with a subsequent full body heat treatment to obtain equivalent metallurgical conditions to those obtained in a hot formed product.

The products are equally suitable for welded, bolted and riveted structures. The hollow sections specified in this British Standard are intended for use in construction or for general engineering purposes. Requirements for tolerances, dimensions and sectional properties are specified in BS EN 10210-2.

NOTE Four material grades are specified in this standard and the user should select the grade appropriate to the intended use and service conditions.

This British Standard does not apply to products currently covered by, BS EN 10210-1, BS EN 10219-1, BS EN 10219-2 or BS EN 10225. However, the grades in BS 7668:2016 are compatible with those of similar strength level specified in BS EN 10025-5.

In addition to the definitive requirements, this standard also requires the items detailed in Clause **4** to be documented. For compliance with this standard, both the definitive requirements and the documented items are to be satisfied.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN 287-1, *Qualification test of welders — Fusion welding — Part 1: Steels*

BS EN 1011-1, *Welding — Recommendations for welding of metallic materials — Part 1: General guidance for arc welding*

BS EN 1011-2, *Welding — Recommendations for welding of metallic materials — Part 2: Arc welding of ferritic steels*

BS EN 10021, *General technical delivery requirements for steel products*

BS EN 10027-1, *Designation systems for steel — Part 1: Steel names*

BS EN 10052, *Vocabulary of heat treatment terms for ferrous products*

BS EN 10079, *Definition of steel products*

BS EN 10168, *Steel products — Inspection documents — List of information and description*

BS EN 10204, *Metallic products — Types of inspection documents*

BS EN 10210-2, *Hot finished structural hollow sections of non-alloy and fine grain steels — Part 2: Tolerances, dimensions and sectional properties*

BS EN ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

BS EN ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing*

BS EN ISO 2566-1, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels*

Documents
Document Sharing Hub

Full document details: BS 7668:2016

BS EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

BS EN ISO 10893-2, *Non-destructive testing of steel tubes — Part 2: Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections*

BS EN ISO 10893-3, *Non-destructive testing of steel tubes — Part 3: Automated full peripheral flux leakage testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for the detection of longitudinal and/or transverse imperfections*

BS EN ISO 10893-6, *Non-destructive testing of steel tubes — Part 6: Radiographic testing of the weld seam of welded steel tubes for the detection of imperfections*

BS EN ISO 10893-7, *Non-destructive testing of steel tubes — Part 7: Digital radiographic testing of the weld seam of welded steel tubes for the detection of imperfections*

BS EN ISO 10893-11, *Non-destructive testing of steel tubes — Part 11: Automated ultrasonic testing of weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections*

BS EN ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules*

BS EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

BS EN ISO 15614-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN 10021 (inspection and testing), BS EN 10052 (heat treatment), BS EN 10079 (hollow section), BS EN 10204 and BS EN 10168 (inspection documents), and the following apply.

3.1 hot finished

final forming process of the hollow section carried out at a temperature above 700 °C, or where the hollow section is cold formed and then subsequently full body heat treated at a temperature above 580 °C

NOTE 1 Normalized and normalized formed hollow sections (+N) can be regarded as hot finished but hot finished hollow sections cannot be regarded as normalized unless they are processed or full body heat treated in the normalizing temperature range.

NOTE 2 Cold formed electric welded tubes supplied with heat treatment only of the weld seam are not in accordance with this standard as they cannot be classified as hot finished.

3.2 test unit

quantity of hollow sections from one or more cast(s) of the same grade and dimensions, manufactured by the same process in the same supply and, if applicable, heat treatment, condition, submitted for acceptance or verification testing at the same time

NOTE The hollow sections can be manufactured by electric welding, submerged arc welding, etc.

Documents
Document Sharing Hub
Full document details: BS 7668:2016