BRITISH STANDARD

BS EN 1011-1:1998
Incorporating Amendments Nos. 1 and 2

Welding — Recommendations for welding of metallic materials —

Part 1: General guidance for arc welding

焊接——焊接金属材料的推荐
第 1部分：电弧焊接的一般说明

The European Standard EN 1011-1:1998, with the incorporation of amendments A1:2002 and A2:2003, has the status of a British Standard

ICS 25.160.10

BSI British Standards

National foreword

This British Standard is the official English language version of EN 1011-1:1998, including amendments A1:2002 and A2:2003.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩. Tags indicating changes to CEN text carry the number of the amendment. For example, text altered by CEN amendment A1 is indicated by ⟨A1⟩ ⟨A1⟩.

The UK participation in its preparation was entrusted to Technical Committee WEE/17, Metal-arc welding of steel, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

Users of BS 5135:1984 should note that the BS EN 1011 series of standards use the concept of heat input to the weld (see BS EN 1011-1 Clause **19**) whereas in BS 5135 arc energy is used (see BS 5135 Clause **21.2.6**). These two terms are not interchangeable and care should be taken when transposing data from BS 5135 to the BS EN 1011 standards.

Furthermore, on publication of BS EN 1011-2, BS 5135 will be withdrawn and superseded by BS EN 1011-1 and BS EN 1011-2.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 12, an inside back cover and a back cover.

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

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 June 1998

ISBN 0 580 29659 8

Amendments issued since publication

Amd. No.	Date	Comments
13981	30 October 2002	See national foreword
14925	15 March 2004	Change to foreword and deletion of Annex ZA

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1011-1
February 1998
+ A1
February 2002
+ A2
December 2003

ICS 25.160.10

Descriptors: Welding, arc welding, fusion welding, metals, specifications

English version

Welding — Recommendations for welding of metallic materials — Part 1: General guidance for arc welding

(includes amendments A1:2002 and A2:2003)

Soudage — recommandations pour le soudage des matériaux métalliques —
Partie 1: Lignes directrices générales pour le soudage à l'arc
(inclut les amendements A1:2002 et A2:2003)

Schweißen — Empfehlungen zum Schweißen metallischer Werkstoffe —
Teil 1: Allgemeine Anleitungen für das Lichtbogenschweißen
(enthält Änderungen A1:2002 und A2:2003)

This European Standard was approved by CEN on 26 January 1998 and amendment A1 was approved by CEN on 1 April 2002; amendment A2 was approved by CEN on 30 November 2003.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 1011-1:1998 + A1:2002 + A2:2003 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 121, Welding, the secretariat of which is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 1998, and conflicting national standards shall be withdrawn at the latest by August 1998.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This standard is composed of the following parts:

— Part 1: General guidance for arc welding;

— Part 2: Arc welding of ferritic steels;

— Part 3: Arc welding of stainless steels;

— Part 4: Arc welding of aluminium and aluminium alloys;

— Part 5: Welding of clad steel;

— Part 6: Laser beam welding;

— Part 7: Electron beam welding.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A1

This document EN 1011-1:1998/A1:2002 has been prepared by Technical Committee CEN/TC 121, Welding, the Secretariat of which is held by DS.

This amendment to the European Standard EN 1011-1:1998 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A2

This document EN 1011-1:1998/A2:2003 has been prepared by Technical Committee CEN/TC 121, Welding, the Secretariat of which is held by DS.

This amendment to the European Standard EN 1011-1:1998 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Contents

		Page
Foreword		2
Introduction		4
1	Scope	4
2	Normative references	4
3	Definitions	5
4	Abbreviations and symbols	6
5	Provision of quality requirements	6
6	Storage and handling of parent materials	6
7	Fusion welding processes	6
8	Welding consumables	7
8.1	General	7
8.2	Supply, storage and handling	7
9	Equipment	7
10	Fabrication	7
10.1	General	7
10.2	Butt weld	7
10.3	Fillet weld	8
11	Preparation of joint	8
12	Assembly for welding	8
13	Preheat and inter-pass temperature	8
14	Tack welds	9
15	Temporary attachments	9
16	Run-on and run-off plates	9
17	Arcing	9
18	Inter-run cleaning and treatment	9
19	Heat input	10
20	Welding procedures	10
21	Traceability	10
22	Peening	10
23	Inspection and testing	10
24	Quality requirements	10
25	Correction of non-conformity	11
26	Distortion	11
27	Post-weld heat treatment	11
28	Post-weld cleaning	11
Annex A (informative) Information to be supplied prior to the start of fabrication and to be defined in the design specification		12

Introduction

This European Standard is being issued in several parts in order that it may be extended to cover the different types of metallic materials which will be produced to all European Standards for weldable metallic materials.

[A1] *Text deleted* [A1].

This standard gives general guidance for the satisfactory production and control of welding and details some of the possible detrimental phenomena which may occur, with advice on methods by which they may be avoided. [A1] It is generally applicable to fusion welding of metallic materials and is appropriate regardless of the type of fabrication involved, although the application standard or design specification can have additional requirements. [A1] More information is contained in other parts of this standard. Permissible design stresses in welds, methods of testing and acceptance levels are not included because they depend on the service conditions of the fabrication. These details should be obtained from the relevant application standard or [A1] design specification [A1].

It has been assumed in the drafting of this standard that the execution of its provisions is entrusted to appropriately qualified, trained and experienced personnel.

1 Scope

This European Standard gives general guidance for fusion welding of metallic materials in all forms of product (e.g. cast, wrought, extruded, forged).

The processes and techniques referred to in this part of EN 1011 may not all be applicable to all materials. Additional information relevant to specific materials is given in the relevant parts of the standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels.*

EN 287-2, *Approval testing of welders — Fusion welding — Part 2: Aluminium and aluminium alloys.*

prEN ISO 9606-3, *Approval testing of welders — Fusion welding — Part 3: Copper and copper alloys.*

prEN ISO 9606-4, *Approval testing of welders — Fusion welding — Part 4: Nickel and nickel alloys.*

prEN ISO 9606-5, *Approval testing of welders — Fusion welding — Part 5: Titanium and titanium alloys, zirconium and zirconium alloys.*

EN 288-2, *Specification and approval of welding procedures for metallic materials — Part 2: Welding procedure specification for arc welding.*

EN 439, *Welding consumables — Shielding gases for arc welding and cutting.*

EN 729-1, *Quality requirements for welding — Fusion welding of metallic materials — Part 1: Guidelines for selection and use.*

EN 729-2, *Quality requirements for welding — Fusion welding of metallic materials — Part 2: Comprehensive quality requirements.*

EN 729-3, *Quality requirements for welding — Fusion welding of metallic materials — Part 3: Standard quality requirements.*

EN 729-4, *Quality requirements for welding — Fusion welding of metallic materials — Part 4: Elementary quality requirements.*

EN 1418, *Welding personnel — Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials.*

EN ISO 13916, *Welding — Guidance for the measurement of preheating temperature, interpass temperature and preheat maintenance temperature during welding.*
(ISO 13916:996)

EN 22553, *Welded, brazed and soldered joints — Symbolic representation on drawings.*
(ISO 2553:1992)

EN 24063, *Welding, brazing, soldering and braze welding of metals — Nomenclature of processes and reference numbers for symbolic representation on drawings.*
(ISO 4063:1990)

3 Definitions

For the purposes of this standard the following definitions apply.

3.1
arc welding current I
current passing through the electrode

3.2
arc voltage U
electrical potential between contact tip or electrode holder and workpiece

3.3
interpass temperature T_i
temperature in a multi-run weld and adjacent parent metal immediately prior to the application of the next run

3.4
heat input Q
energy introduced into the weld region during welding per unit run length

3.5
preheat temperature T_p
temperature of the workpiece in the weld zone immediately prior to any welding operation

3.6
thermal efficiency k
ratio of heat energy introduced into the weld to the electrical energy consumed by the arc

3.7
welding speed v
travel speed of the weld pool

3.8
detrimental effect
imperfections and other harmful influences in the welded area

3.9
run-on plate
piece of metal so placed as to enable the full section of weld metal to be obtained at the beginning of a joint

3.10
run-off plate
piece of metal so placed as to enable the full section of weld metal to be maintained up to the end of a joint

3.11
wire feed rate w_f
length of wire consumed per unit time

[A1] *Text deleted* [A1]

3.12
welding consumables
materials consumed in the making of a weld, including filler metals, fluxes and gases

4 Abbreviations and symbols

Abbreviations and symbols	Term	Unit
I	Arc welding current	A
k	Thermal efficiency factor	—
l	Length of a run	mm
Q	Heat input	kJ/mm
d	Material thickness	mm
T_i	Interpass temperature	°C
T_p	Preheat temperature	°C
U	Arc voltage	V
v	Welding speed	mm/s
w_f	Wire feed rate	mm/min or m/min
WPS	Welding procedure specification	—

5 Provision of quality requirements

The contract shall give the information necessary for the execution of the welding. If the manufacturer [A1] chooses [A1] to have a quality system, the information should be in accordance with the appropriate part of EN 729 (see Annex A for further information).

6 Storage and handling of parent materials

Storage and handling shall be carried out so that the parent material is not adversely affected.

7 Fusion welding processes

This standard covers welds made by one of the following welding processes in accordance with EN 24063 or by a combination of those processes:

— 111 manual metal-arc welding with covered electrode;
— 114 flux-cored wire metal-arc welding without gas shield;
— 12 submerged arc welding;
— 131 metal-arc inert gas welding; MIG welding;
— 135 metal-arc active gas welding; MAG welding;
— 136 flux-cored wire metal-arc welding with active gas shield;
— 137 flux-cored wire metal-arc welding with inert gas shield;
[A1] *Text deleted* [A1]
— 141 tungsten inert gas arc welding; TIG welding;
— 15 plasma arc welding;
— other fusion welding processes by agreement.

8 Welding consumables

8.1 General

Welding consumables should be designated in accordance with the relevant European Standard. Consumables shall be selected with regard to the particular application, e.g. joint design, welding position and the properties required to meet the service conditions. Any special recommendations given by the manufacturer/supplier shall be observed.

In some cases it may be possible to weld without the addition of filler metal.

8.2 Supply, storage and handling

All consumables shall be stored and handled with care and in accordance with the relevant standards and/or the manufacturer's/supplier's recommendations.

Covered electrodes, wire electrodes, rods and fluxes, etc., as well as their packaging, which show signs of damage or deterioration shall not be used.

Examples of damage or deterioration are cracked or flaked coatings on covered electrodes, rusty or dirty wire electrodes and wire with flaked or damaged protective coatings.

Consumables returned to the stores shall be treated in accordance with the manufacturer's/supplier's recommendations before re-issue.

9 Equipment

The manufacturer carrying out the fabrication shall be responsible for ensuring that the capacity of the welding plant and ancillary equipment is adequate for the welding procedure to be used. The welding plant shall be regularly checked and maintained.

All electrical plant used in connection with the welding operation shall be adequately earthed. The welding return cable from the workpiece shall be of adequate cross-section, connected as close as possible to the point of welding.

Means of measuring the welding parameters shall be available, either as part of the welding equipment, or by the provision of portable instruments. Such parameters may include arc voltage, welding current, wire feed rate, welding speed, shielding/purging gas flow rates and temperature of parent/weld metal.

10 Fabrication

10.1 General

Fabrication facilities shall be protected from adverse weather, e.g. wind, rain, snow, draughts, etc. and shall be kept dry. Facilities shall be suitable for the work and adequate precautions shall be taken to ensure that contamination from other materials does not occur.

Surfaces shall be dry and free from condensation and any other material that would adversely affect the quality of the welds. If necessary, forming tools, welding fixtures, clamps or manipulators should be cleaned before use.

When using gas shielded welding processes, the weld zone shall be protected from the effects of draught or other air movements. Air currents even at low speed can remove the shielding gas and therefore welding zones shall be protected.

When inert gas backing is necessary to prevent oxidation of the reverse side of a weld, purging using a suitable gas supply in accordance with EN 439 shall be carried out.

10.2 Butt weld

The details of all butt welds, e.g. type of joint, which may include partial penetration joints, included angle and root gap between parts, shall be arranged to permit the use of a satisfactory welding technique and the combination of weld detail and welding technique shall be such that the resultant joint will comply with the requirements of the design.

The ends of butt joints shall be welded to provide the full weld thickness. This may be achieved by the use of run-off and/or run-on plates.

The material for the permanent weld pool backing shall be metallurgically compatible with the filler and parent metal. The backing may be either an integral part of a section or a separate component. The thickness of the backing material shall be such as to support the weld without burning through.

The material for the temporary weld pool backing where appropriate shall be chosen so that contamination of the parent/weld metal is avoided; see relevant part of this standard for further details.

In all full penetration butt welds where these are to be welded from both sides, certain welding procedures allow this to be done without back gouging, grinding or chipping, but where complete interpenetration cannot be achieved, the back of the first run shall be removed by suitable means to clean sound metal before welding is started on the second side.

In some cases it may be desirable to check that clean sound metal exists by application of a suitable non-destructive crack detection method.

10.3 Fillet weld

Unless otherwise specified, the fusion faces to be joined by fillet welds shall be in as close contact as possible.

A fillet weld, as deposited, shall be of not less than the specified dimensions which shall be clearly indicated as throat thickness and/or leg length, as appropriate, taking into account the use of deep penetration processes or partial preparations.

11 Preparation of joint

The preparation of the fusion faces shall be such that the limits of accuracy required by the appropriate welding procedure can be achieved.

Surfaces and edges shall be free from cracks and notches.

In the event of an imperfection in the preparation of the joint this may be corrected by methods [A1] detailed in the design specification. [A1]

NOTE See also the relevant European Standard for joint preparation.

12 Assembly for welding

Parts to be welded shall be assembled such that the joints are accessible and visible to the welders and/or operators involved. Jigs and manipulators shall be used, where practicable, so that the welding can be carried out in the most suitable welding position.

The sequence of assembly and welding shall be such that all welds can be examined in accordance with the relevant requirements, see Annex A.

To minimize distortion and/or residual stresses it may be necessary to pre-set joints or pre-bend parts of the structure prior to welding and/or to specify the weld sequence to assist in the control of distortion and shrinkage.

13 Preheat and inter-pass temperature

For measurement of temperature and further information, reference shall be made to EN ISO 13916.

Details of preheat and interpass temperatures depend on material specifications and are specified in the relevant parts of this standard.

14 Tack welds

When required tack welds shall be applied to retain the components in alignment during welding. The length of the individual tack weld and the frequency of such welds should be specified in the relevant weld procedure specification (WPS) or elsewhere. In joints welded by fully mechanized or automatic processes, the condition for deposition of tack welds shall be included in the WPS. The tack welds shall be applied in a balanced sequence to minimize the risk of distortion and maintain good fit-up.

Where a tack weld is incorporated in a welded joint, the shape of the tack weld shall be suitable for incorporation into the finished weld and shall only be carried out by approved welders. The tack weld shall be free from cracks and other unpermitted imperfections in the weld deposit and shall be cleaned thoroughly before final welding. Tack welds which have cracked and other imperfections such as cold starts and crater cracks shall be removed prior to welding. All tack welds not incorporated into the final weld shall be removed.

15 Temporary attachments

Where the assembly or erection procedure requires the use of temporary welded attachments, they shall be such that they can be easily removed without damage to the structure. Consideration shall be given to the location of temporary attachments. The material of attachment and consumables used shall be compatible with the parent metal.

When written weld procedure specifications are required all welds for temporary attachment shall be made in accordance with them. Care should be taken to ensure that such welding is carried out only if permitted by the ▌A1⟩ design specification ⟨A1▐ and that unintended detrimental effects are avoided, e.g. stress raisers and/or shrinkage stresses.

The surface of the parent metal shall be carefully ground smooth after removing the temporary attachment.

If necessary, surface inspection of the parent metal may be carried out to demonstrate that the material is free from unpermitted imperfections.

16 Run-on and run-off plates

Run-on and run-off plates, when required, shall be manufactured from a grade of metal compatible with that used for the fabrication, and shall have a thickness and edge preparation similar to those used for the joint. The length of the run-on and run-off plates depends on the thickness of the parent material and the weld procedure. The run-on and run-off plates shall be of sufficient length to ensure that start/stop imperfections are contained within them.

17 Arcing

All initial striking of the arc should be within the fusion faces or on run-on plates. Precautions shall be taken to avoid unintentional arcing.

Unintentional arcing between the workpiece and the welding earth return lead or any part at earth potential can be avoided by a firm earth connection located close to the weld joint. Good insulation of the cable and cable joints is essential. In the event of an accidental arc, the surface of the metal shall be lightly dressed and, if necessary, checked visually and/or by a crack detection method.

18 Inter-run cleaning and treatment

Where a process generates a slag protecting the weld metal, this slag shall be removed from each run of weld metal before a further run is superimposed unless otherwise permitted by the WPS. Attention shall also be paid to the junction between the weld metal and the fusion faces. Visible imperfections such as cracks, cavities and other unpermitted imperfections shall be removed before the deposition of further weld metal.

For welding processes using a shielding gas it may be necessary to remove adherent oxides before the deposition of further runs.

Appropriate tools shall be used for inter-run cleaning.

19 Heat input

The heat input during welding can be a main influencing factor on the properties of welds. It affects the temperature-time-cycles occurring during welding.

Where appropriate, the heat input value Q may be calculated as follows (see also Table 1):

$$Q = k\frac{U \times I}{v} \times 10^{-3} \quad \text{in kJ/mm}$$

Where the factor k differs from those shown in the Table 1, information will be given in the relevant parts of this standard.

Table 1 — Thermal efficiency factor k of welding process

Process No	Process	Factor k
121	Submerged arc welding with wire electrode	1,0
111	Metal-arc welding with covered electrode	0,8
131	MIG welding	0,8
135	MAG welding	0,8
114	Flux-cored wire metal-arc welding without gas shield	0,8
136	Flux-cored wire metal-arc welding with active gas shield	0,8
137	Flux-cored wire metal-arc welding with inert gas shield	0,8
138	Metal-cored wire metal-arc welding with active gas shield	0,8
139	Metal-cored wire metal-arc welding with inert gas shield	0,8
141	TIG welding	0,6
15	Plasma arc welding	0,6

20 Welding procedures

When written welding procedure specifications are required they shall cover all welding operations including temporary attachments and correction of non-conformities. The contents of the procedures shall comply with EN 288-2. Where applicable, the welding procedure approval shall be in accordance with the appropriate European Standard.

Welders/welding operators shall be provided with information to enable the welding procedure to be carried out in accordance with the requirements. Where appropriate, they shall be approved to the relevant part of EN 287, prEN ISO 9606 or EN 1418.

21 Traceability

[A1] Adequate means of identification, either by an identification mark or other methods, shall be provided to enable each weld to be traced to the welder/welders or welding operator/operators by whom it was made. [A1] Hard stamping should be avoided, but when it has to be used attention is drawn to its use in highly stressed areas and areas susceptible to corrosion.

22 Peening

Peening of welds shall be carried out only in accordance with the application standard or [A1] design specification. [A1]

23 Inspection and testing

The method and extent of inspection and testing shall be in accordance with the application standard or [A1] design specification [A1].

24 Quality requirements

Welded joints shall be free from unpermitted imperfections as they would impair the service performance of the structure. Acceptance levels shall be in accordance with the [A1] design specification. [A1]

25 Correction of non-conformity

Where welds do not comply with the acceptance level of Clause **24**, remedial action [A1] in accordance with the design specification [A1] and re-inspection shall be carried out to the original welding procedure or to [A1] a procedure in accordance with the design specification [A1].

If undercut or other defects are blended out by grinding or other mechanical methods, care shall be taken to ensure that the design thickness of parent material is not reduced.

In some circumstances, unacceptable undercut or large root gaps in fillet welds may be made acceptable by the deposition of additional weld metal in accordance with the relevant parts of this standard.

Incorrectly fitted parts may be cut apart and rewelded in accordance with this standard and the application standard where it exists.

26 Distortion

Parts distorted by welding, beyond the specified tolerances, may be corrected only by a method [A1] in accordance with the design specification [A1]. Any method to correct distortion should not be deleterious to the structure.

27 Post-weld heat treatment

When post-weld heat treatment and/or ageing is required, this shall be carried out in accordance with the [A1] design specification. [A1]

The effects on the properties of the parent material, heat affected zone (HAZ) and weld metal shall be taken into account.

28 Post-weld cleaning

Post-weld cleaning, if necessary, shall be carried out in accordance with the [A1] design specification. [A1]

The corrosion resistance is significantly affected by the surface quality. The method of post-weld cleaning depends upon the weld quality requirements.

Annex A (informative)
[A1] Information to be supplied prior to the start of fabrication and to be defined in the design specification [A1]

A.1 General

[A1] When EN 729 is applied, only the relevant clauses of that standard are to be observed. When EN 729 is not applied, the information detailed in **A.2** and **A.3** should be available. [A1]

A.2 [A1] Information to be supplied prior to the start of fabrication [A1]

[A1] The following information is to be supplied prior to the start of fabrication: [A1]

a) the application standard to be used together with any supplementary requirements;

b) the specification of welding procedures, non-destructive testing procedures and heat treatment procedures;

c) location of all the welds;

d) welds which are to be made in the workshop, or elsewhere;

e) the approach to be used for welding procedure approval;

f) whether approved welders are required;

g) selection, identification and/or traceability, e.g. for materials, welders and welds;

h) surface finish and weld profile;

i) quality and acceptance requirements for welds;

j) handling of non-conformities, e.g. correction of faulty welds or distortion.

NOTE [A1] The items referred to in this clause may have a significant effect upon the performance of the fabrication and it should be ensured that they relate appropriately to the particular joints and intended service of the final product. [A1]

A.3 [A1] Items to be defined in the design specification [A1]

[A1] The following items to be defined in the design specification are to be fully recorded: [A1]

a) dimensions, details and tolerance, i.e. type of joint, including angle, root gaps, etc. of all welds when not given in the application standard; when symbols are used for standard weld forms, they should conform to EN 22553;

b) use of special methods, e.g. to achieve full penetration without backing when welded from one side only;

c) the material for backing when backing is not part of the structure;

d) alternative methods for preparation or cutting of material;

e) other special requirements, e.g. acceptability of peening;

f) the method and extent of inspection and testing in the absence of a relevant application standard;

g) the acceptance criteria for welded joints in the absence of a relevant application standard;

h) the method of straightening distorted parts.

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL