

Specification

Approval testing of welders when welding procedure approval is not required —

Part 2: TIG or MIG welding of
aluminium and its alloys

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- Associated Offices Technical Committee*
- British Constructional Steelwork Association*
- British Mechanical Engineering Confederation
- British Railways Board
- British Steel Industry*
- Crown Agents for Oversea Governments and Administrations
- Department of Employment
- Department of Trade
- Institution of Civil Engineers
- Institution of Electrical Engineers
- Institution of Production Engineers
- Institution of Structural Engineers
- Lloyd's Register of Shipping
- London Transport Executive
- Ministry of Defence*
- Process Plant Association
- Shipbuilders' and Repairers' National Association*
- Society of British Aerospace Companies Limited
- Welding Institute*
- Welding Manufacturers' Association*

The Government department and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

- Electricity Supply Industry in England and Wales
- Engineering Equipment Users' Association
- Heating and Ventilating Contractors' Association
- Lloyds Register of Industrial Services
- National Coal Board
- Oil Companies' Materials Association
- Stainless Steel Fabricators Association of Great Britain
- United Kingdom Atomic Energy Authority
- Water-tube Boilermakers' Association

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Foreword

This British Standard is one of a series of standards on the approval testing of welders and welding procedures, the latter having a bearing on the former for certain applications. This link has been used as a means of arranging the series of standards into

- a) approval testing of welding procedures,
- b) welder approval when welding procedure approval is required,
- c) welder approval when the welding procedure is not required to be approved for either technical or contract reasons.

This standard covers the simple approval of welders on sheet¹⁾, plate¹⁾ and pipe²⁾ when no welding procedure approval is required. For the purposes of this standard, welders are considered to have already received training in the welding of aluminium and its alloys.

To complete the philosophy behind this series of standards, it is considered useful to give details of the practices relating to welding procedure approval even though they are not strictly relevant to this standard. Depending upon the emphasis placed on quality control in the production of welded components, the approval of welding procedures may be administered in one of several ways, which should be stipulated at the enquiry and/or order stage. The alternatives currently employed are the following.

1. Each individual contractor (or subcontractor) may have proved by actual test pieces every weld form he wishes to use, in every thickness and material.
2. Each individual contractor (or subcontractor) may have proved by actual test pieces a set of welds representative on a group basis, of all the various thicknesses and materials to be used in production.
3. Each individual contractor (or subcontractor) need not make procedure test pieces provided that he can prove, by appropriate authentic documentation of an independent nature, that he has previously welded the type of joint and material in question satisfactorily.

In respect of 1 and 2 above, it should be appreciated that once the welding procedure tests have been approved, they need never be repeated unless there is a change in certain variables. As an extension beyond 3, it may be possible in the future for fully documented welding procedures, developed independently of the particular contractor, to be employed without the need for further approval tests. A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their 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, pages i and ii, pages 1 to 20, 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⁾ In this standard the words “sheet” and “plate” are not used to indicate any precise difference in the thickness of the material.

²⁾ In this standard the word “pipe”, alone or in combination, is used to mean “pipe” or “tube” or “structural hollow section” (circular or rectangular), although these terms are often used for different categories of product by different industries.

1 Scope

This British Standard specifies requirements for the approval testing of welders to be engaged on the TIG or MIG welding of those aluminium and aluminium alloy fabrications for which the welding procedure itself does not have to be approved.

NOTE This link to the non-mandatory approval of the welding procedure will result in the use of this standard becoming defined more closely in respect of the particular fabrication, e.g. with regard to material, thickness and joint configuration.

2 References

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

3 Information to be given to the welder

The welder shall be provided with written instructions and information covering the following details:

- a) parent metal (alloy type and condition);
- b) welding process;
- c) welding consumables (filler material specification and diameter, shielding gas composition and flow rate);
- d) for TIG welding, the electrode diameter and type;
- e) welding position;
- f) metal thickness and, for pipe, the outside diameter or dimension;
- g) pre-weld cleaning;
- h) joint type, with sketch of weld preparation;
- i) weld dimensions required.

The pulsed-arc versions of TIG and MIG welding shall be treated as separate welding processes for which minor changes may be necessary to the weld preparations for the test welds given in clause 4.

Other factors shall be left to the choice of the welder but the relevant details shall be recorded (see also clause 5).

4 Test welds³⁾

4.1 General. The welder shall make the test weld or welds from the following tests according to which is most representative of the type of work on which he will be employed. The welder shall make a further test weld or welds whenever the work on which he will be employed changes sufficiently (in respect of the items listed in clause 3 and as specified for the relevant test) to make the test weld or welds on which he has already obtained approval no longer representative of the new work.

Where tack welds are used, their location shall be identifiable after the test weld has been completed. Distortion or mis-alignment caused by tacking may be corrected before the test weld is made.

4.2 Parent metal. For the purposes of this standard, parent metals have been grouped as shown below. The approval of a welder to weld a particular type of material shall include approval for all the other materials in the same group. Approval between groups of materials is not permitted.

Group number	Parent metal (according to BS 1470 to BS 1475 inclusive and BS 4300 series)
1	1, 1A, 1B, 1C, N3
2	H9, H20, H30
3	N4, N41, N5, N51, N8
4	H17

4.3 Test 1: butt weld in sheet (without permanent backing)

4.3.1 Applicability of test and test conditions. The applicability of this test shall be as given in Table 1 provided that the test conditions listed have been met.

4.3.2 Deposition of test weld. The test weld shall be stopped and restarted within the central 50 mm of its length.

A sealing run on the reverse side is not permitted.

³⁾ The test welds given in this standard permit the use of whatever sizes of material are readily available. The types of joint, however, are not necessarily the same as those that are met in practice.

Table 1 — Butt weld in sheet (without permanent backing)

	Test conditions	Applicability of test
Parent metal, welding process and welding consumables	As to be used for work on which welder will be employed and to be specified in accordance with clause 3	Only material group (see 4.2) welding process and welding consumables of types used for the test
Welding position ^a	Flat	Flat
	Vertical-up	Vertical-up and flat
	Vertical-up and horizontal-vertical (two test welds)	Vertical-up, horizontal-vertical and flat
	Vertical-up and overhead (two test welds)	Vertical-up, overhead, horizontal-vertical and flat
Thickness t	3 mm max.	$0.75t$ to $1.5t$
Joint type	Square butt (see Figure 1)	Any butt weld without permanent backing in sheet in above thickness range

^a If a combination of test positions other than those specified is used, the welder is approved only for that combination.

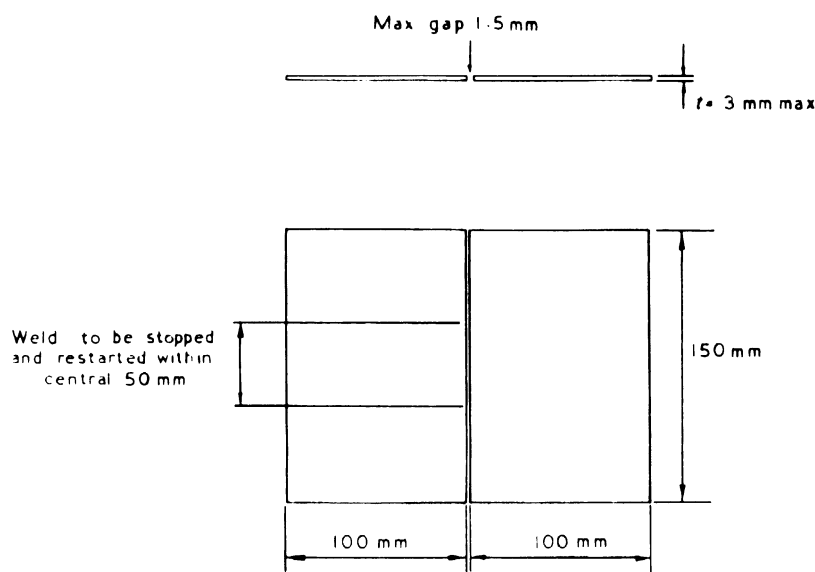


Figure 1 — Test piece for butt weld in sheet (without permanent backing)

4.4 Test 2: fillet weld in sheet

4.4.1 Applicability of test and test conditions. The applicability of this test shall be as given in Table 2 provided that the test conditions listed have been met.

4.4.2 Deposition of test weld. The test weld shall be made in a single run on only one side of the joint, with equal leg lengths of approximately 4 mm. The weld shall be stopped and restarted at about 75 mm from one end.

4.5 Test 3: butt weld in plate (without backing, welded from one side)

4.5.1 Applicability of test and test conditions. The applicability of this test shall be as given in Table 3 provided that the test conditions listed have been met.

4.5.2 Deposition of test weld. The final run of the test weld shall be stopped and restarted within the central 50 mm of its length.

A sealing run on the reverse side is not permitted.

Table 2 — Fillet weld in sheet

	Test conditions	Applicability of test
Parent metal, welding process and welding consumables	As to be used for work on which welder will be employed and to be specified in accordance with clause 3	Only material group (see 4.2) welding process and welding consumables of types used for the test
Welding position ^a	Horizontal-vertical	Horizontal-vertical and flat
	Vertical-up	Vertical-up, horizontal-vertical and flat
	Overhead	Overhead, horizontal-vertical and flat
	Vertical-up and overhead (two test welds)	Vertical-up, overhead, horizontal-vertical and flat
Thickness t	3 mm max.	$0.75t$ to $1.5t$
Joint type	T joint (see Figure 2)	Any fillet weld in sheet in above thickness range

^a If a combination of test positions other than those specified is used, the welder is approved only for that combination.

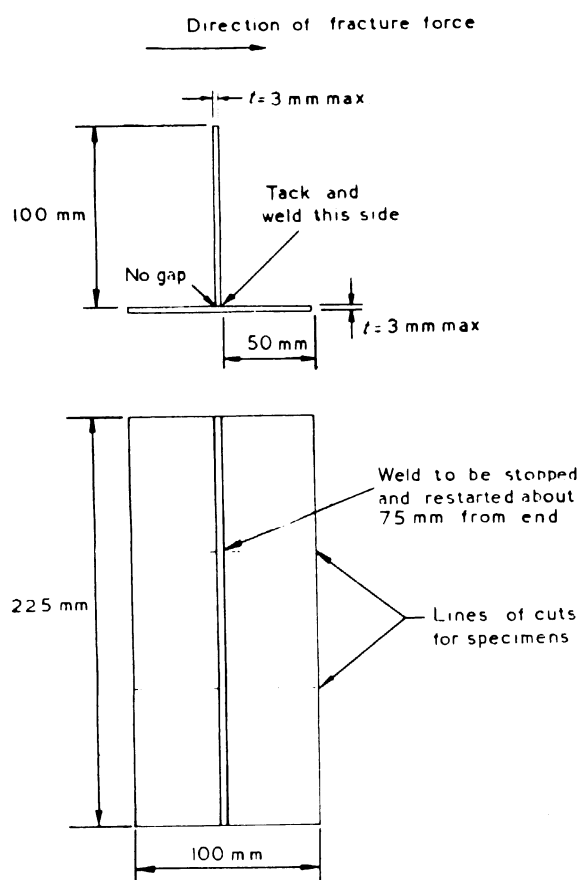


Figure 2 — Test piece for fillet weld in sheet

Table 3 — Butt weld in plate (without backing, welded from one side)

	Test conditions	Applicability of test
Parent metal, welding process and welding consumables	As to be used for work on which welder will be employed and to be specified in accordance with clause 3	Only material group (see 4.2) welding process and welding consumables of types used for the test
Welding position ^a	Flat	Flat
	Vertical-up	Vertical-up and flat
	Vertical-up and horizontal-vertical (two test welds)	Vertical-up, horizontal-vertical and flat
	Vertical-up and overhead (two test welds)	Vertical-up, overhead, horizontal-vertical and flat
Thickness <i>t</i>	At least 6 mm but less than 12 mm	0.75 <i>t</i> to 1.5 <i>t</i>
	12 mm or thicker	8 mm and thicker
Joint type	Single-V butt, without backing (see Figure 3 ^b)	For plate in above thickness ranges:
		a) any single-sided butt weld preparation, with or without temporary backing, welded from one side only;
		b) any single-sided butt weld preparation welded from both sides without back gouging;
		c) any double-sided butt weld preparation

^a If a combination of test positions other than those specified is used, the welder is approved only for that combination.

^b The dimensions of the weld preparation are typical for welding in the flat position, but for other positions it may be necessary for modifications to be made. In all cases the details shall be recorded (see clause 3 and appendix B).

