

Specification for

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

Part 1: Fusion welding of steel

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 National Coal Board
 Power Generation Association (BEAMA)
 Stainless Steel Fabricators' Association of Great Britain
 United Kingdom Atomic Energy Authority

This British Standard, having been prepared under the direction of the Welding Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 November 1982

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Foreword

This revision of this Part of BS 4872 has been prepared under the direction of the Welding Standards Committee. It incorporates technical and editorial changes developed from experience gained in the use of the standard since it was first published in 1972. This Part of BS 4872 supersedes BS 4872-1:1972 which is withdrawn.

This revision does not invalidate welder approvals previously accepted according to the requirements of the 1972 edition of the standard, provided the details of such approvals are still relevant to the production work on which the welders are to be employed. The extent of approval given by a previous test in accordance with the 1972 edition may now be related to those ranges indicated in this revised edition. All new approval testing of welders should be made in accordance with the requirements of this revised edition.

Welders already approved in accordance with the requirements of BS 4871-1 should thereby be considered to be also approved in accordance with the requirements of BS 4872-1 for the same test conditions without undergoing further tests.

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 (see BS 4870 “*Approval testing of welding procedures*” — Part 1: “*Fusion welding of steel*”);
- b) welder approval when approval of the welding procedure is required (see BS 4871 “*Approval testing of welders working to approved welding procedures*” — Part 1: “*Fusion welding of steel*”);
- c) welder approval when approval of the welding procedure is not required (for either technical or contract reasons).

The simple approval of welders on sheet, plate and pipe¹⁾ when no welding procedure approval is required is covered by this standard. For the purposes of this Part of this standard, welders are considered to be already capable of passing training tests such as those given in BS 1295 “*Tests for use in the training of welders. Manual metal-arc and oxy-acetylene welding of mild steel*”.

To complete the philosophy behind the 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 covered in this series of standards 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 sub-contractor) may have proved, by actual test pieces, every weld form he wishes to use, in every thickness and material; or
- 2) each individual contractor (or sub-contractor) 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; or
- 3) each individual contractor (or sub-contractor) need not make procedure test pieces, providing he can prove by appropriate authentic documentation of an independent nature that he has previously satisfactorily welded the type of joint and material in question.

¹⁾ 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.

In respect of 1) and 2) 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 by agreement between the contracting parties 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 to iv, 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.

Section 1. General

1 Scope

This Part of this British Standard specifies requirements for the approval testing of welders to be engaged on the manual or semi-automatic fusion welding of those ferritic steel or austenitic stainless steel fabrications for which the welding procedure does not itself have to be approved.

NOTE Users of this standard should be aware that some steels may require special treatment during welding if defects, such as cracks and porosity, are to be avoided. This may entail careful selection of welding consumables, their drying or conditioning prior to use, applying preheat and/or post-weld heat treatment and control of welding heat input. When such a steel is encountered consideration should be given to the provision of a detailed welding procedure with corresponding approval of the procedure and welders in accordance with the companion standards mentioned in the foreword.

2 Information to be given to the welder

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

- a) parent metal (ferritic steel or austenitic stainless steel);
- b) welding process and polarity;
- c) welding consumables (electrode or filler material specification, type of flux, shielding gas composition);
- d) welding position;
- e) metal thickness and, for pipe, the outside diameter or dimension;
- f) joint type, with sketch of weld preparation;
- g) weld dimensions required.

Other factors shall be left to the choice of the welder but the relevant details shall be recorded.

3 Test welds

3.1 Selection of test welds. The selection of a test weld, or welds, for the welder shall be made from the tests given in section 2, 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 2 as to make the test weld or welds, on which he is already approved no longer representative of the new work.

In addition, the thickness and type of the parent metal, the welding process, and the consumables chosen shall be of the same type as is used on the work which the test weld or welds represent, and all test welds shall be made with normal production equipment where possible.

A test butt weld in pipe shall also cover for a butt weld in plate for the same test conditions, but the converse shall not apply.

3.2 Test conditions. Tack welds shall be made from the side to be welded and their location shall be marked on the test piece. The location of stop/starts shall be marked on the test piece.

No method of restraint other than by tack welding shall be used.

NOTE Distortion or mis-alignment caused by tacking may be corrected before the test weld is made.

3.3 Submission of test welds. If the welder realizes that for some reason the test weld he has made is likely to fail the subsequent examination and testing, he shall have the option to withhold the test piece and make a second test weld. If the welder does choose to make a second test weld, it is the second test piece that shall be examined and tested, the first test piece being scrapped.

Weld tests shall be submitted in the as-welded condition without any grinding or peening.

4 Assessment of test welds

4.1 Sequence of assessment. The sequence of assessment of completed test welds shall be:

- a) visual examination and assessment of the test piece in accordance with clause 17;
- b) selection of the appropriate destructive tests for the particular test weld(s) in accordance with clause 18;
- c) implementation and assessment of the appropriate destructive tests as given in clause 19.

4.2 Repeat tests. If a test piece fails to meet the requirements of clause 17 or 19, two further test pieces of the type which failed shall be welded and assessed. The option given in 3.3 shall not apply in this case. If either of these repeat test welds fail to satisfy the requirements of clause 17 or 19, the welder shall be regarded as incapable of meeting the requirements of this standard for the particular type of test weld without further training.

5 Statement of results of welder testing

A statement of the results of assessing each test piece, including repeat tests, shall be made for each welder, preferably on a form of the type recommended in Appendix A. The items required under clause 2 shall be included, together with details of any features that would fail to meet the acceptance criteria of clauses 17 and 19.

NOTE 1 The welder's employer should hold and regularly maintain adequate records of all approval tests for each welder.

NOTE 2 If an independent inspecting authority or test house witnesses the welder approval tests carried out in accordance with this standard and all the relevant provisions are fulfilled, it is recommended that such approval should be accepted by others.

6 Reapproval of welder

The reapproval of a welder shall be required if any of the following apply:

- a) the welder is to be employed on work outside the extent of his current approval (see **3.1**);
- b) the welder changes his employer without the transfer of his approval test certificate;
- c) six months or more have elapsed since the welder undertook any welding;
- d) there is some specific reason to question the welder's ability.

NOTE Reapproval every two years is recommended.

Section 2. Test weld details

7 Test 1. Butt weld in sheet

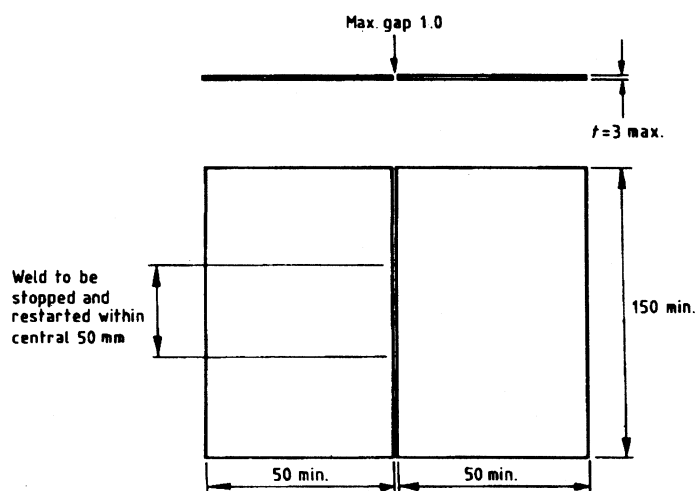
7.1 Extent of approval and test conditions. The extent of approval for this test shall be as given in Table 1 provided that the test conditions listed have been met.

7.2 Deposition of test weld. The test weld shall be made in a single run and shall be stopped and restarted within the central 50 mm of its length. In the case of manual metal-arc welding the restart shall be made with a fresh electrode. A sealing run on the reverse side shall not be deposited.

Table 1 — Butt weld in sheet

	Test conditions	Extent of approval
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 2	Material, welding process and welding consumables of types used for the test, except that approval using a basic covered electrode includes approval for a rutile covered electrode
Welding position ^a	Flat	Flat
	Vertical-up	Vertical-up and flat
	Vertical-up and horizontal-vertical (2 test welds)	Vertical-up, horizontal-vertical and flat
	Vertical-up and overhead (2 test welds)	Vertical-up, overhead, horizontal-vertical and flat
	Vertical-down	Vertical-down
Thickness, t	3 mm max.	$0.75 t$ to $1.5 t$
Joint type	Square butt as Figure 1	Any butt 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.



All dimensions are in millimetres.

Figure 1 — Test piece for butt weld in sheet