
Welding consumables — Test methods —

Part 3:

**Classification testing of positional capacity
and root penetration of welding
consumables in a fillet weld**

Produits consommables pour le soudage — Méthodes d'essai —

*Partie 3: Évaluation de l'aptitude au soudage en position et de la
pénétration en racine des produits consommables pour les soudures
d'angle*



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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 15792 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15792-3 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

- *Part 1: Test methods for all-weld metal test specimens in steel, nickel and nickel alloys*
- *Part 2: Preparation of single-run and two-run technique test specimens in steel*
- *Part 3: Classification testing of positional capacity and root penetration of welding consumables in a fillet weld*

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Introduction

This part of ISO 15792 describes preparation and assessment of a fillet weld test piece.

Test conditions prescribed and results required should not be considered to be requirements or expectations for a procedure qualification.

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Welding consumables — Test methods —

Part 3:

Classification testing of positional capacity and root penetration of welding consumables in a fillet weld

1 Scope

This part of ISO 15792 applies, when invoked by the classification standard, to the classification of arc welding electrodes and wires for welding carbon-manganese steels, low alloy steels, stainless steels and nickel base alloys. It describes the preparation of the test piece and the evaluation of the test results, for assessing conformance to requirements of positional usability and root penetration set forth by the classification standard for electrode or wire.

This part of ISO 15792 does not set forth the acceptance requirements.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 15792. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15792 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 5817, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*.

ISO 6947, *Welds — Working positions — Definition of angles of slope and rotation*.

3 General requirements

Samples of welding consumables (electrodes or wires) to be tested shall be representative of the manufacturer's products being classified. Test pieces shall be prepared and tested as described below and in the classification standard. The test results shall fulfil the requirements of the classification standard.

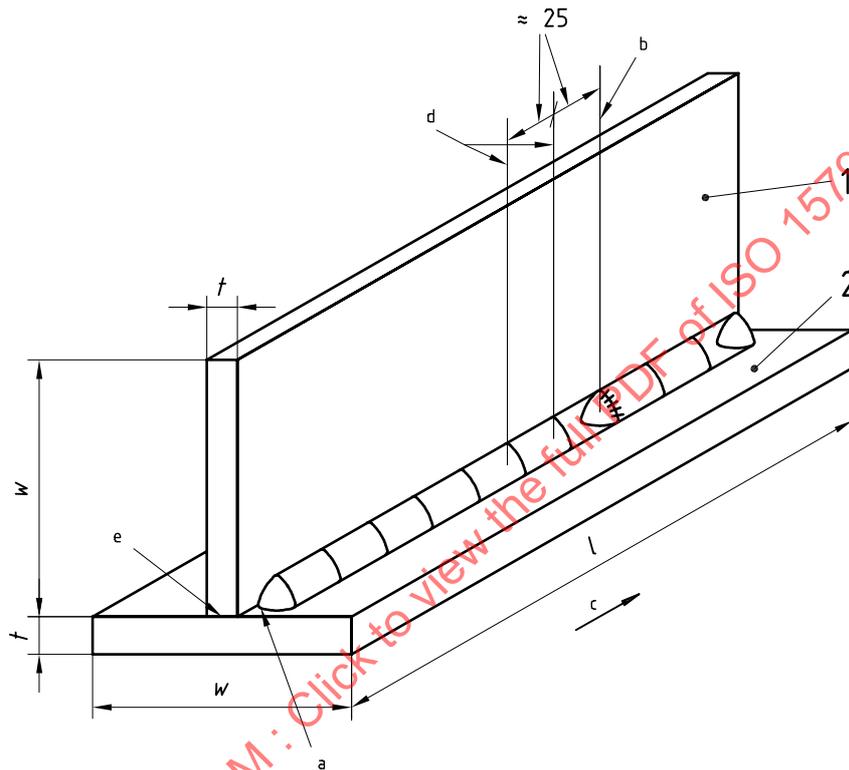
4 Test plate material

The plate material shall be selected from the range of materials and material thicknesses prescribed by the classification standard. The surfaces to be welded shall be free of scale, rust and other contaminants.

5 Preparation of the test piece

5.1 Before assembling, the web piece of the assembly shall have one edge of the web flat and square throughout its length so that, when the web is set on the flange, which shall be straight and smooth, there will be intimate contact along the entire length of the joint. The web and flange shall be assembled as shown in Figure 1. Both ends of the joint shall be secured by tack welds to maintain intimate contact along the length of the joint and to maintain the 90° angle between the web and flange. The web and flange dimensions shall be in accordance with those given in the electrode classification standard.

Dimensions in millimetres



Key

- 1 Web
- 2 Flange

NOTE If not given in the classification standard the following values can be used for t , w and l : $t = 10$ mm to 12 mm, $w = 75$ mm (min.) and $l = 300$ mm (min.).

- a Start
- b End of deposit made with first electrode
- c Direction of welding
- d Cut here for macrosection
- e Flange to be straight and in intimate contact with the flat square edge of web member along entire length

Figure 1 — Preparation of fillet weld test piece

5.2 The position of welding and conditions of welding shall be as prescribed in the classification standard for the classification and size of consumable under test, and as defined in ISO 6947. A single pass fillet weld shall be deposited on one side of the joint for approximately the full length of the test piece. The minimum temperature of the assembly shall be 5 °C. For covered electrodes, at least one electrode (and as many more as the weld permits) shall be continuously consumed to within the permissible stub length of 50 mm. For electrodes longer than 450 mm, designed specifically for use in gravity welding, the fillet weld may be made either manually or with a device designed specifically for gravity welding. For wire electrodes, tubular cored electrodes and wires, welding shall be continuous from start to finish of the fillet weld.

5.3 The fillet shall be deposited using welding speeds compatible with the consumable classification and tested to provide the fillet weld size required by the electrode classification standard.

5.4 If welding of the second side of the test piece is required by the consumable classification standard, the test piece shall be cooled to room temperature by any convenient means, before commencing to weld the second side of the joint.

If water is used as the coolant, care shall be taken that all water has been thoroughly removed from the joint before beginning welding on the second side.

6 Examination of the test piece

6.1 The completed fillet weld test piece shall be examined visually, and the weld shall be free of cracks, undercut, overlap, trapped slag and surface porosity. Throat thickness and leg length shall be measured by an appropriate gauge at least three points along the weld to demonstrate conformity with the requirements of the classification standard. For covered electrodes, where two or more electrodes are used, a macrosection, approximately 25 mm wide, shall be removed from a point approximately 25 mm back from the crater end of the deposit made with the first electrode. For continuous consumables and covered electrodes where only one electrode is used, a macrosection, approximately 25 mm wide, shall be removed from approximately the midpoint of the weld length.

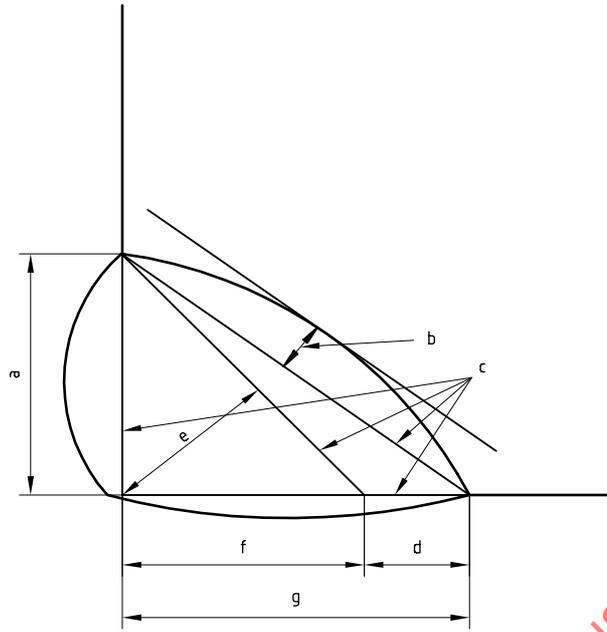
6.2 One surface of the macrosection shall be polished, etched, and scribed as shown in Figure 2. The throat, convexity or concavity, and leg lengths of the fillet weld shall be determined to the nearest 0,5 mm by actual measurement of the polished and etched macrosection.

If fillet welds are required by the consumable classification standard on both sides of the test piece, then both fillet welds shall be measured on the same macrosection.

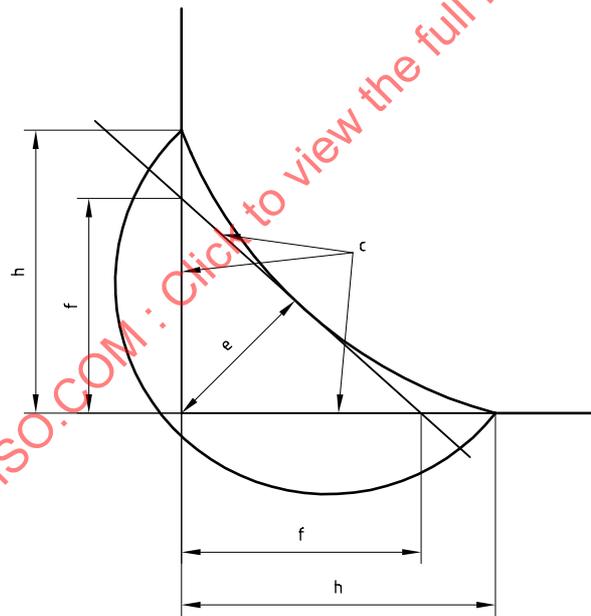
6.3 For fillet weld test pieces welded from one side only, when required by the consumable classification standard, the remaining two joint sections shall be broken longitudinally through the fillet weld by a force exerted in the direction shown in Figure 3. The fractured surfaces shall be examined and shall meet the requirements of ISO 5817, Level B. If, during bending, the weld pulls out of the test plate, it shall be considered as no test, and the test shall be repeated without penalty.

6.4 If necessary to facilitate fracture through the throat of the fillet weld, one or more of the following procedures may be used:

- a) reinforcing welds, as shown in Figure 3 a), may be added to each leg of the weld;
- b) the position of the web on the flange may be changed as shown in Figure 3 b);
- c) the face of the weld may be notched as shown in Figure 3 c);
- d) the test piece may be cooled down below 0 °C.



a) Convex fillet weld

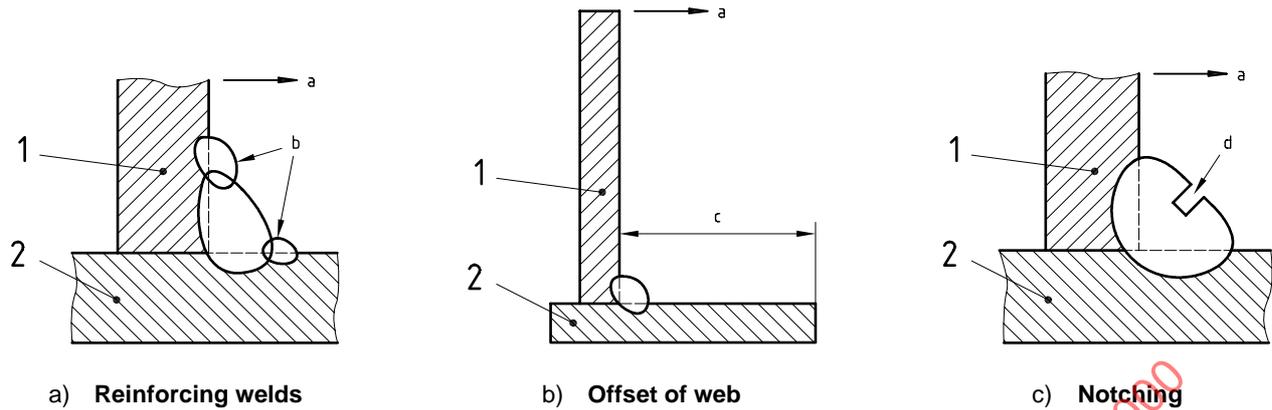


b) Concave fillet

Size of fillet weld — leg length of largest inscribed isosceles right angle. Fillet weld size, convexity and leg lengths shall be determined by actual measurement (to nearest 0,5 mm) on a section laid out with scribe lines as shown.

- | | | | |
|---|-------------------------------|---|------------------------------------|
| a | Leg length = fillet weld size | e | Theoretical throat |
| b | Convexity | f | Fillet weld size |
| c | Scribe lines | g | Leg length \neq fillet weld size |
| d | Difference in leg length | h | Leg of fillet |

Figure 2 — Dimensions of fillet welds



a) Reinforcing welds

b) Offset of web

c) Notching

Key

- 1 Web
- 2 Flange
- a Fracturing force
- b Reinforcing welds
- c 3/4 width of flange
- d Maximum depth of notch = 1/2 actual throat

Figure 3 — Alternative methods for facilitating fillet weld fracture**7 Test report**

The test report shall include all of the following items which are applicable:

- a) welding consumable(s) and test assembly:
 - the classification standard to which the consumable(s) is (are) being tested;
 - base metal from which the test piece is made;
 - the trade name(s) and intended classification(s) of the consumable(s) being tested;
 - heat or lot number(s) of the consumable(s) being tested;
 - redrying conditions for the consumable(s);
- b) welding conditions:
 - welding process;
 - power source;
 - electrode diameter;
 - electrode polarity;
 - welding current;
 - wire feed speed;
 - arc voltage;