
Welding consumables — Test methods —
Part 1:
Test methods for all-weld metal test
specimens in steel, nickel and nickel alloys

Produits consommables pour le soudage — Méthodes d'essai —

Partie 1: Méthodes d'essai pour les éprouvettes de métal fondu hors dilution pour le soudage de l'acier, du nickel et des alliages de nickel



Reference number
ISO 15792-1:2000(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 15792-1 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

ISO 15792 consists of the following parts, under the general title *Welding consumables — Test methods*:

- *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

It should be noted that the mechanical properties of all-weld metal test specimens used to classify welding consumables could vary from those obtained in production joints because of differences in welding procedure such as electrode diameter, width of weave, welding position and material composition.

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

Welding consumables — Test methods —

Part 1:

Test methods for all-weld metal test specimens in steel, nickel and nickel alloys

1 Scope

This part of ISO 15792 specifies the preparation of test piece and specimens. The purpose is to determine mechanical properties of all-weld metal where required by the consumable classification standard or for other purposes, in arc welding of steel, nickel and nickel alloys.

This part of ISO 15792 is not applicable to single- or two-pass welding or fillet welding. For these cases, ISO 15792-2 and ISO 15792-3 apply.

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 5178, *Destructive tests on welds in metallic materials — Longitudinal tensile test on weld metal in fusion welded joints.*

ISO 9016:2000, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination.*

ISO 13916:1996, *Welding — Guidance on the measurement of preheating temperature, interpass temperature and preheat maintenance temperature.*

3 General requirements

Welding consumables to be tested shall be representative of the manufacturer's products to be classified or tested. Test pieces shall be prepared as described below.

4 Test plate material

The material to be used for the test piece shall be compatible with the weld metal provided by the welding consumable tested. Alternatively, the groove edges and the backing strip shall be built up with at least two layers using the welding consumable being tested.

5 Preparation of test piece

The test piece shall be prepared in the form of a single V-groove on a backing strip. The backing strip shall be tack welded to the test piece on the reverse side. See Figure 1 and Table 1.

The plates of the test piece shall be pre-set or restrained in such a way that a sufficiently flat test piece is produced for extraction of specimens. The welded test piece shall not be straightened.

The type of test piece defines the dimensions, see Table 1. The type selected for classification purpose is specified in the relevant consumable standard.

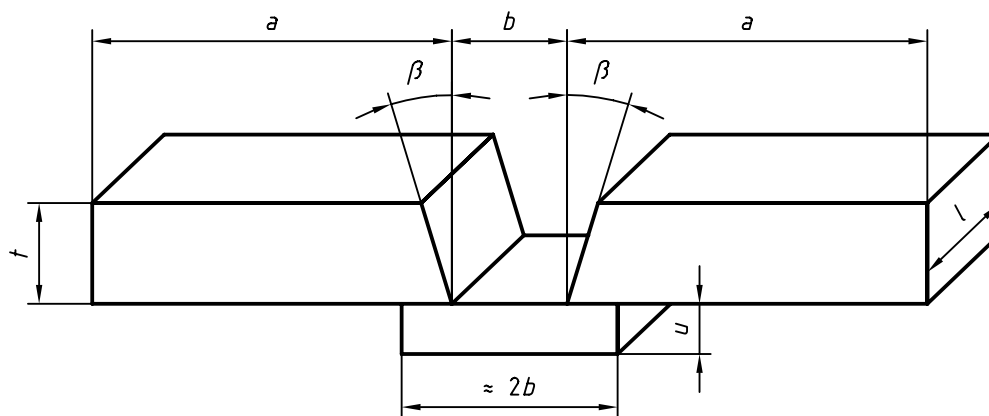


Figure 1 — Test piece dimensions

Table 1 — Type and dimensions of the test piece

Dimensions in millimetres

Type	t	a	b	u	β Degree	l
1.0	12	≥ 80	10			
1.1	12	≥ 90	12			
1.2	16	≥ 100	14			
1.3	20	≥ 150	16	≥ 6	$10^{+2,5}_0$	≥ 150
1.4	25	≥ 150	20			
1.5	30	≥ 200	25			
1.6	20	≥ 150	20			
1.7	25	≥ 150	24			

6 Welding conditions

The test piece shall be welded in the flat position except for consumables which are designed exclusively for welding in another position in which case that position shall be used for welding. The welding shall be started after applying any preheating requirements given in the consumable standard. The interpass temperature shall also be in accordance with the consumable standard.

The preheat and interpass temperatures shall be measured using temperature indicator crayons, surface thermometers or thermocouples, see ISO 13916.

The welding conditions used, such as current, voltage, travel speed, weld run sequence, weld bead size, shall be in accordance with the limits specified in the relevant consumable standard.

7 Heat treatment

All heat treatments required for the weld metal, except hydrogen removal treatment, shall be carried out on the test piece, or on sections thereof with a machining allowance.

The heat treatments are specified in standards relating to welding consumables.

Hydrogen removal treatment may be carried out on the test piece for tensile testing before or after final machining. The test piece may be held at a temperature not exceeding 250 °C for up to 16 h.

8 Position of test specimens and test specimen dimensions

Figures 2 and 3 respectively show the position of the tensile test specimen and of the notched impact specimens. The test pieces shall be divided by cutting (machining) or by thermal cutting. In the case of thermal cutting, machining allowances of 10 mm at least on either side shall be provided for the subsequent machining of the specimens.

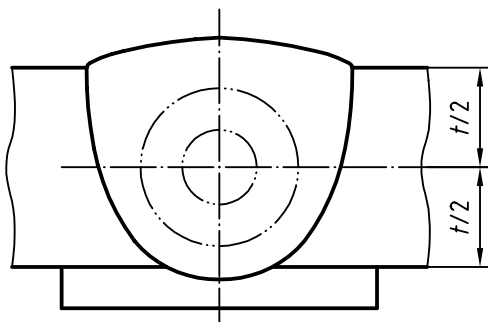


Figure 2 — Position of the tensile specimen in the test piece

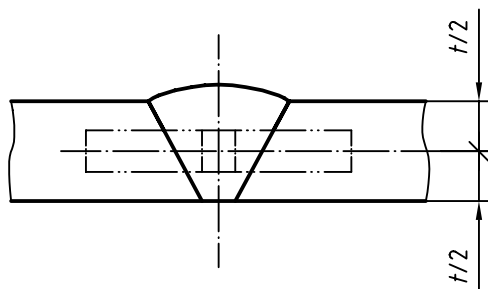


Figure 3 — Position of the notched bar impact specimen in the test pieces

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The tensile test specimens shall be in accordance with ISO 5178. Apart from type 1.0 and 1.1 test pieces, for which the diameter shall be 8 mm, the specimens shall have a diameter of 10 mm in the gauge length.

The impact specimens shall be in accordance with the designation VWT 0/b in ISO 9016:2000. The position of the impact specimen shall be at the midline of the plate thickness.

The size of impact specimens shall be 10 mm × 10 mm.

9 Retests

If any test fails, repeat tests shall be performed in accordance with relevant requirements.

10 Test report

The following data shall be reported:

a) test piece and welding consumables:

- test piece type and unique identification;
- test plate material;
- backing strip material;
- standard designation and trade name of the welding consumables and number of buttering layers, if any;
- redrying conditions for welding consumables;
- heat or lot number of the welding consumables;
- diameter of the welding consumables;

b) welding conditions as applicable:

- welding process;
- welding position;
- power source;
- current type and polarity;
- current (and/or wire feed speed), voltage and travel speed;
- distance from contact tube to surface of plate (stick-out);
- type and flow rate of shielding gas;
- number of runs/number of layers;
- stringer bead or weave bead;
- preheating temperature;
- interpass temperature;

c) heat treatment (including hydrogen removal treatment):

- temperature;
- holding time;
- cooling conditions;

d) deviations from this part of ISO 15792;

e) tests results:

- testing temperature;
- radiographic examination, if required;
- yield strength, tensile strength, elongation;
- impact strength;
- imperfections.

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