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Welding consumables — Test methods —

Part 2: Preparation of single-run and two-run technique test pieces and specimens in steel

Produits consommables pour le soudage — Méthodes d'essai — Partie 2: Préparation de pièces d'essai et d'éprouvettes en une ou deux passes en acier

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: https://committee.iso.org/sites/tc44/home/interpretation.html.

This second edition cancels and replaces the first edition (ISO 15792-2:2000), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the title and scope of this document have been changed;

— Clause 10 and Clause 11 have been deleted consequently;

— a new type 2.6 has been added to Table 1 reflecting usage in the USA;

— in Table 1, the angles in column 3, preparation, have been revised to show the bevel angle with a footnote giving tolerances for 2.1, 2.4 and 2.5;

— in Figure 1 b), effective weld length has been added;

— Figure 2 has been revised and split into Figure 2a and Figure 2b with titles showing restrictions for use.

Introduction

Consumables for both submerged arc welding and metal arc welding with tubular cored electrodes can be suitable for welding by the single- or two-run technique and the methods for testing and classification are specified. When a welding consumable is offered for use by these techniques, it should be noted that all-weld metal test pieces may not be required by the consumable classification standard.

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

Welding consumables — Test methods —

Part 2: Preparation of single-run and two-run technique test pieces and specimens in steel

1 Scope

This document specifies the preparation of butt weld test pieces and specimens.

The test pieces and specimens are used to determine the strength and impact properties of welded joints when testing welding consumables with single-run and two-run techniques.

This document is applicable to welding consumables for arc welding of steel.

This document is not suitable for electro-slag or electro-gas welding.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4136:2012, *Destructive tests on welds in metallic materials — Transverse tensile test*

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

ISO 9016:2012, *Destructive tests on welds in metallic materials — Impact tests — Test specimen location, notch orientation and examination*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 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.

5 Test plate material

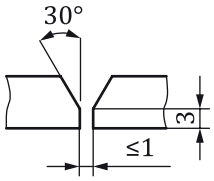
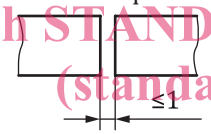
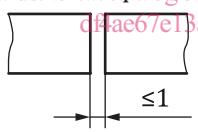
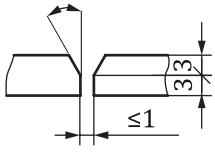
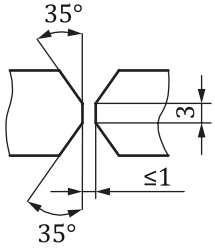
The material to be used shall be in accordance with the appropriate consumable classification standard.

6 Preparation of the test piece

The plates of the test piece shall be preset 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. A suitable backing system for single-run technique may be used. Run-on and run-off plates may be used (see Table 1).

Table 1 — Butt weld test piece for single-run or two-run technique

Dimensions in millimetres

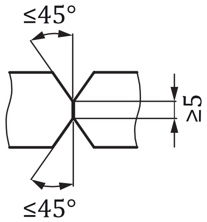
Type	Plate thickness	Preparation[a]	Diameter of wire electrode for submerged arc welding	Diameter of tubular cored electrode[b]
2.1	12	single-run technique 	4	—
2.2	12	two-run technique 	4	—
2.3	6	single-run technique 	—	See welding consumable classification standard
2.4	6	single-run technique 	—	1,6[c]
2.5	20	two-run technique 	5[b]	—

[a] The bevel angle is the same for both sides of the joint. Tolerance is ±2,5 for 2.1, 2.4 and 2.5.

[b] Other diameters may be used for tests other than classification tests.

[c] Or largest diameter offered by the welding consumable manufacturer for single run technique.

Table 1 *(continued)*

Type	Plate thickness	Preparation[a]	Diameter of wire electrode for submerged arc welding	Diameter of tubular cored electrode[b]
2.6	12	two-run technique 	4 [b]	—

a The bevel angle is the same for both sides of the joint. Tolerance is ±2,5 for 2.1, 2.4 and 2.5.

b Other diameters may be used for tests other than classification tests.

c Or largest diameter offered by the welding consumable manufacturer for single run technique.

7 Welding conditions

The test piece shall be welded in the flat position. Welding shall start at room temperature or after application of any preheating required by the welding consumable standard. The interpass temperature shall be in accordance with the welding consumable standard.

The preheating and interpass temperatures shall be measured using temperature indicator crayons, surface thermometers or thermocouples, for example in accordance with ISO 13916.

The welding conditions used, such as current, voltage, travel speed, weld bead size, shall be:

— within the range recommended by the welding consumable manufacturer; and

— where the test is performed for classification purposes, in accordance with the limits specified in the relevant consumable standard.

8 Heat treatment

All heat treatments required for the butt weld, except hydrogen removal treatment shall be carried out on the completed 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.

9 Position of specimens, specimen dimensions and testing

Figure 1 and Figure 2 show the position of the notched impact specimens, the transverse tensile test specimens and the all weld metal tensile test specimens as appropriate. The test piece 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 subsequent machining of the specimens.

When applicable, the specimens for the impact test (see Figure 1 and Figure 2) and testing shall be in accordance with ISO 9016. The impact specimen shall be in accordance with ISO 9016:2012, designation VWT 0/*b*. The position of the impact specimens shall be at the midline of the plate thickness for types 2.1, 2.2 and 2.6, and from the last welded run as shown in Figure 2 for type 2.5. Impact specimens are not applicable for type 2.3 and 2.4.

