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Welding consumables — Test methods —

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

Produits consommables pour le soudage — Méthodes d'essai —

Partie 2: Préparation 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*.

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 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.

A list of all parts in the ISO 15792 series can be found on the ISO website.

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

— To be completed before publication

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 specimens in steel

1 Scope

This document specifies the preparation of butt weld test pieces and specimens. The purpose is to define test methods in order to determine strength and impact strength of the welded joint when testing welding consumables with single-run and two-run technique, not suitable for electro-slag or electro-gas welding.

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

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*

ISO 13916, *Welding — Measurement of preheating temperature, interpass temperature and preheat maintenance temperature*

3 Terms and definitions

No terms and definitions are listed in this document.

The list below is always included after each option:

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.

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, see 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 must 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.

The size of impact specimens shall be 10 mm ´ 10 mm. If impact testing is required for types 2.3 and 2.4 subsize specimens 5 mm ´ 10 mm shall be used.

The specimens for transverse tensile tests (see Figure 1 a)) and testing shall be in accordance with ISO 4136. The specimen dimensions shall be in accordance with ISO 4136:2012, Table 2.

For type 2.6, the all weld tensile test specimen (see Figure 1 b)) shall be in accordance with ISO 5178 and shall a nominal diameter of 6,0 mm. The reduced section of the longitudinal tensile specimen shall be located entirely within the weld.

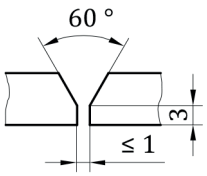
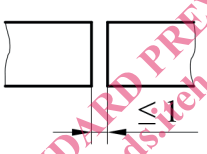
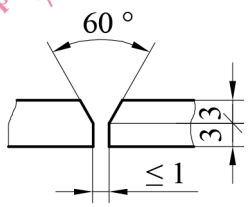
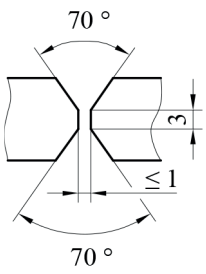
Prior to the preparation of test specimens, it is recommended that the prepared and etched surface of the test piece be subjected to radiographic and/or macrographic examination to ascertain if there are any defects in the weld

10 Retests

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

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

Dimensions in millimetres

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

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

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