

SVENSK STANDARD

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Welding consumables – Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels – Classification (ISO 26304:2017)

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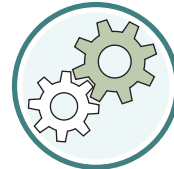
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Denna standard ersätter SS-EN ISO 26304:2011, utgåva 2.

The European Standard EN ISO 26304:2018 has the status of a Swedish Standard. This document contains the official version of EN ISO 26304:2018.

This standard supersedes the Swedish Standard SS-EN ISO 26304:2011, edition 2.

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EUROPEAN STANDARD

EN ISO 26304

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2018

ICS 25.160.20

Supersedes EN ISO 26304:2011

English Version

Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels - Classification (ISO 26304:2017)

Produits consommables pour le soudage - Fils-électrodes pleins, fils-électrodes fourrés et couples électrodes-flux pour le soudage à l'arc sous flux des aciers à haute résistance - Classification (ISO 26304:2017)

Schweißzusätze - Massivdrahtelektroden, Fülldrahtelektroden und Draht-Pulver-Kombinationen zum Unterpulverschweißen von hochfesten Stählen - Einteilung (ISO 26304:2017)

This European Standard was approved by CEN on 9 January 2018.

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COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

SS-EN ISO 26304:2018 (E)

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European foreword

This document (EN ISO 26304:2018) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 "Welding and allied processes", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2018, and conflicting national standards shall be withdrawn at the latest by August 2018.

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Endorsement notice

The text of ISO 26304:2017 has been approved by CEN as EN ISO 26304:2018 without any modification.

SS-EN ISO 26304:2018 (E)

Introduction

This document recognizes that there are two somewhat different approaches in the global market to classifying a given solid wire electrode, tubular cored electrode, and electrode-flux combination, and allows for either or both to be used, to suit a particular market need. Application of either type of classification designation (or of both where suitable) identifies a product as classified in accordance with this document. The classification in accordance with system A was originally based on EN 14295. The classification in accordance with system B is mainly based on standards used around the Pacific Rim. Future revisions aim to merge the two approaches into a single classification system.

This document provides a classification for the designation of solid wire electrodes in terms of their chemical composition, tubular cored electrodes in terms of the deposit composition obtained with a particular submerged arc flux, and, where required, electrode-flux combinations in terms of the yield strength, tensile strength, elongation, and impact properties of the all-weld metal deposit. The ratio of yield to tensile strength of weld metal is generally higher than that of parent material. Users should note that matching weld metal yield strength to parent metal yield strength does not necessarily ensure that the weld metal tensile strength matches that of the parent material. Thus, where the application requires matching tensile strength, selection of the consumable should be made by reference to column 3 of Table 1A or Table 1B, as appropriate.

Although combinations of electrodes and fluxes supplied by individual companies can have the same classification, it is possible that the combination of an electrode with a flux from one manufacturer and the same electrode with the flux from another manufacturer — both fluxes having the same classification — might not be interchangeable unless verified in accordance with this document. Two tubular cored wires of the same classification can likewise produce different results with the same flux.

The mechanical properties of the all-weld metal test specimens used to classify the electrode-flux combinations vary from those obtained in production joints because of differences in welding procedures such as electrode size, width of weave, welding position, and material composition.

Welding consumables — Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels — Classification

1 Scope

This document specifies requirements for classification of solid wire electrodes, tubular cored electrodes, and electrode-flux combinations (the all-weld metal deposits) in the as-welded condition and in the post-weld heat-treated condition for submerged arc welding of high strength steels with a minimum yield strength greater than 500 MPa or a minimum tensile strength greater than 570 MPa. One flux can be tested and classified with different electrodes. One electrode can be tested and classified with different fluxes. The solid wire electrode is also classified separately based on its chemical composition.

This document is a combined specification providing for classification utilizing a system based on the yield strength and average impact energy of 47 J for the all-weld metal, or utilizing a system based on the tensile strength and average impact energy of 27 J for the all-weld metal.

- a) Clauses, subclauses and tables which carry the suffix letter “A” are applicable only to solid wire electrodes, tubular cored electrodes and the all-weld metal deposits classified to the system based on the yield strength and the average impact energy of 47 J for the all-weld metal obtained with electrode-flux combinations in accordance with this document.
- b) Clauses, subclauses and tables which carry the suffix letter “B” are applicable only to solid wire electrodes, tubular cored electrodes and the all-weld metal deposits classified to the system based on the tensile strength and the average impact energy of 27 J for the all-weld metal obtained with electrode-flux combinations in accordance with this document.
- c) Clauses, subclauses and tables which do not have either the suffix letter “A” or the suffix letter “B” are applicable to all solid wire electrodes, tubular cored electrodes and electrode-flux combinations classified in accordance with this document.

For comparison purposes, some tables include requirements for electrodes classified in accordance with both systems, placing individual electrodes from the two systems, which are similar in composition and properties, on adjacent lines in the particular table. In a particular line of the table that is mandatory in one system, the symbol for the similar electrode from the other system is indicated in parentheses. By appropriate restriction of the formulation of a particular electrode, it is often, but not always, possible to produce an electrode that can be classified in both systems, in which case the electrode, or its packaging, can be marked with the classification in either or both systems.

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 544, *Welding consumables — Technical delivery conditions for filler materials and fluxes — Type of product, dimensions, tolerances and markings*

ISO 3690, *Welding and allied processes — Determination of hydrogen content in arc weld metal*

ISO 6847, *Welding consumables — Deposition of a weld metal pad for chemical analysis*

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

ISO 14174, *Welding consumables — Fluxes for submerged arc welding and electroslag welding — Classification*

ISO 14344, *Welding consumables — Procurement of filler materials and fluxes*

ISO 15792-1:2000, *Welding consumables — Test methods — Part 1: Test methods for all-weld metal test specimens in steel, nickel and nickel alloys*. Amended by ISO 15792-1:2000/Amd 1:2011

ISO 80000-1:2009, *Quantities and units — Part 1: General*. Corrected by ISO 80000-1:2009/ Cor 1:2011

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 Classification

4.1 General

Classification designations are based on two approaches to indicate the tensile properties and the impact properties of the all-weld metal obtained with a given electrode-flux combination. The two designation approaches include additional designators for the chemical composition of a solid wire electrode or the chemical composition of the all-weld metal deposit obtained with a tubular cored electrode and a specific flux. The two designation approaches include additional designators for some other classification requirements, but not all, as is clear from the following clauses. A given commercial product may be classified to the classification requirements in both systems; then either or both classification designations may be used for the product.

The classification includes the all-weld metal properties obtained with a specific electrode-flux combination as given in 4.1A and 4.1B. A solid wire electrode shall be classified in accordance with its chemical composition in [Table 3](#).

A tubular cored electrode shall be classified in accordance with the all-weld metal deposit composition in [Table 4](#), obtained with a specific flux.

When the solid wire electrode or tubular cored electrode is classified in combination with a flux for submerged arc welding, the classification shall be prefixed with a symbol in accordance with [Clause 5](#) as appropriate.

4.1A Classification by yield strength and 47 J impact energy

The classification is divided into seven parts:

- 1) the first part gives a symbol indicating the product or process to be identified;

4.1B Classification by tensile strength and 27 J impact energy

The classification is divided into six parts:

- 1) the first part gives a symbol indicating the product or process to be identified;

- 2) the second part gives a symbol indicating the tensile properties of the all-weld metal (see Table 1A);
 - 3) the third part gives a symbol indicating the impact properties of the all-weld metal (see [Table 2](#));
 - 4) the fourth part gives a symbol indicating the type of flux used (see [5.4](#));
 - 5) the fifth part gives a symbol indicating the chemical composition of the solid wire electrode used (see [Table 3](#)) or of the all-weld metal deposited by a tubular cored electrode-flux combination (see [Table 4](#));
 - 6) the sixth part gives a symbol indicating the stress relief treatment if this is applied;
 - 7) the seventh part gives an optional symbol indicating the diffusible hydrogen content of the weld metal determined in accordance with ISO 3690.
- 2) the second part gives a symbol indicating the strength and elongation of the all-weld metal in either the as-welded or the post-weld heat-treated condition (see Table 1B);
 - 3) the third part gives a symbol indicating the impact properties of the all-weld metal in the same condition as specified for the tensile strength (see [Table 2](#)). The letter "U" after this designator indicates that the deposit meets an average optional requirement of 47 J at the designated impact test temperature;
 - 4) the fourth part gives a symbol indicating the type of flux used (see [5.4](#));
 - 5) the fifth part gives a symbol indicating the chemical composition of the solid wire electrode used (see [Table 3](#)), or of the all-weld metal deposited by a tubular cored electrode-flux combination (see [Table 4](#));
 - 6) the sixth part gives an optional symbol indicating the diffusible hydrogen content of the weld metal determined in accordance with ISO 3690.

5 Symbols and requirements

5.1 General

A solid wire electrode can be classified separately based on its chemical composition, as specified in [Table 3](#). The all-weld metal deposit composition and mechanical properties obtained with a particular solid wire electrode or tubular cored electrode vary somewhat depending on the flux used. Accordingly, the classification of the all-weld metal deposit obtained with a particular solid wire electrode or tubular cored electrode can be different for different fluxes. However, deposit composition is only a classification requirement for tubular cored electrode-flux combinations.

5.2 Symbol for the product or process

The symbol for the electrode-flux combination or weld deposit produced by a solid wire electrode or by a tubular cored electrode using the submerged arc welding process with a specific flux, shall be the letter "S" placed at the beginning of the designation.