SLOVENSKI STANDARD
oSIST prEN ISO 17632:2013

01-december-2013

Dodajni materiali za varjenje - Polnjene žice za obločno varjenje nelegiranih in drobnozrnatih jekel po MIG/MAG - Razvrstitev (ISO/DIS 17632:2013)

Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels - Classification (ISO/DIS 17632:2013)

Schweißzusätze - Fülldrahtelektroden zum Metall-Lichtbogenschweißen mit und ohne Schutzgas von unlegierten Stählen und Feinkornstählen - Einteilung (ISO/DIS 17632:2013)

Produits consommables pour le soudage - Fils-électrodes fourrés pour soudage à l'arc avec ou sans gaz de protection des aciers non alliés et des aciers à grains fins - Classification (ISO/DIS 17632:2013)

Ta slovenski standard je istoveten z: **prEN ISO 17632**

ICS:

25.160.20 Potrošni material pri varjenju Welding consumables

oSIST prEN ISO 17632:2013 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 17632

ISO/TC **44**/SC **3**

Secretariat: **ANSI**

Voting begins on:
2013-09-12

Voting terminates on:
2014-02-12

Welding consumables — Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels — Classification

Produits consommables pour le soudage — Fils-électrodes fourrés pour soudage à l'arc avec ou sans gaz de protection des aciers non alliés et des aciers à grains fins — Classification

[Revision of first edition (ISO 17632:2004)]

ICS: 25.160.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Reference number
ISO/DIS 17632:2013(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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17632 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

Introduction

This International Standard provides a classification system for tubular cored electrodes in terms of tensile properties, impact properties, chemical composition of the all-weld metal, type of electrode core, shielding gas and welding position. The ratio of yield to tensile strength of weld metal is generally higher than that of parent metal. Users should note that matching weld metal yield strength to parent metal yield strength will not necessarily ensure that the weld metal tensile strength matches that of the parent metal. Where the application requires matching tensile strength, therefore, selection of the consumable should be made by reference to column 3 of Table 1A or Table 1B.

It should be noted that the mechanical properties of all-weld metal test specimens used to classify the tubular cored electrodes will vary from those obtained in production joints because of differences in welding procedure such as electrode size, width of weave, welding position and parent metal composition.

The classification according to system A is mainly based on EN 758:1997, *Welding consumables — Tubular cored electrodes for metal arc welding with and without a gas shield of non alloy and fine grain steels — Classification*. The classification according to system B is mainly based upon standards used around the Pacific Rim.

Welding consumables — Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels — Classification

1 Scope

This International Standard specifies requirements for classification of tubular cored electrodes with or without a gas shield for metal arc welding of non-alloy and fine grain steels in the as-welded condition or in the post-weld heat-treated condition with a minimum yield strength of up to 500 MPa or a minimum tensile strength of up to 570 MPa. One tubular cored electrode can be tested and classified with different shielding gases, if any.

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

1) Paragraphs and tables which carry the suffix letter “A” are applicable only to tubular cored electrodes classified to the system based upon the yield strength and the average impact energy of 47 J of all-weld metal in accordance with this International Standard.

2) Paragraphs and tables which carry the suffix letter “B” are applicable only to tubular cored electrodes classified to the system based upon the tensile strength and the average impact energy of 27 J of all-weld metal in accordance with this International Standard.

3) Paragraphs and tables which have neither the suffix letter “A” nor the suffix letter “B” are applicable to all tubular cored electrodes classified in accordance with this International Standard.

It is recognized that the operating characteristics of tubular cored electrodes can be modified by the use of pulsed current, but for the purposes of this International Standard, pulsed current is not permitted for determining the electrode classification.

2 Normative references

The following referenced documents are indispensable for the application 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*

ISO 6947:2011, *Welding and allied processes -- Welding positions*

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

ISO 14175:2008, *Welding consumables – Gases and gas mixtures for fusion welding and allied processes*

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

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

ISO 15792-2:2000, *Welding Consumables — Test methods — Part 2: Preparation of single-run and two-run technique test specimens in steel*

ISO 15792-3, *Welding Consumables — Test methods — Part 3: Classification testing of positional capacity and root penetration of welding consumables in a fillet weld*

ISO 80000-1:2009, *Quantities and units — Part 1: General*

3 Classification

Classification designations are based upon two approaches to indicate the tensile properties and the impact properties of the all-weld metal obtained with a given electrode. The two designation approaches include additional designators for some other classification requirements, but not all, as will be clear from the following. In most cases, a given commercial product can be classified in both systems. Then either or both classification designations can be used for the product. See Annex A.

The classification includes all-weld metal properties obtained with a tubular cored electrode and appropriate shielding gas combination as given below. With the exception of the symbol for welding position which is based on ISO 15792-3, the classification of gas shielded tubular cored electrodes is based on the 1,2 mm electrode size or, if this size is not manufactured, the next larger diameter manufactured. The classification of self-shielded tubular cored electrodes is based on the 2,4 mm diameter or the largest diameter manufactured if less than 2,4 mm.

3.1A Classification by yield strength and 47 J impact energy

The classification is divided into eight parts:

1) the first part (T) indicates a tubular cored electrode;

2) the second part gives a symbol indicating the strength and elongation of all-weld metal for multi-run technique or the strength of the parent material used in classification for the single-run technique (see Table 1A or Table 2A);

3) the third part gives a symbol indicating the impact properties of all-weld metal or welded joint (see Table 3);

4) the fourth part gives a symbol indicating the chemical composition of all-weld metal (see Table 4A);

5) the fifth part gives a symbol indicating the type of electrode core (see Table 5A);

3.1B Classification by tensile strength and 27 J impact energy

The classification is divided into nine parts:

1) the first part (T) indicates a tubular cored electrode;

2) the second part gives a symbol indicating the strength and elongation of all-weld metal for multi-run technique or the strength of the parent material used in classification for the single-run technique (see Table 1B or Table 2B);

3) the third part gives a symbol indicating the impact properties of all-weld metal (see Table 3). The symbol “U”, added as an optional supplemental designator at or near the end of the complete tubular cored electrode designation, indicates that the deposit meets an average optional requirement of 47 J at the designated Charpy test temperature;

4) the fourth part gives a symbol indicating the usability characteristics of the electrode (see Table 5B);

5) the fifth part gives a symbol indicating the welding position (see Table 6B);

6) the sixth part gives a symbol indicating the shielding gas (see 4.6);

7) the seventh part gives a symbol indicating the welding position (see Table 6A);

8) the eighth part gives a symbol indicating the hydrogen content of deposited metal (see Table 7).

6) the sixth part gives a symbol indicating the shielding gas (see 4.6). The letter “S” added to this designator indicates that the electrode is classified for single-pass welding;

7) the seventh part gives a symbol indicating whether the classification tests were conducted in the as-welded (A) or post-weld heat-treated condition (P). If the electrode has been classified in both conditions, the symbol AP shall be added to the classification. This designator is omitted in the classification for single-pass welding electrodes as these are tested only in the as-welded condition;

8) the eighth part gives a symbol indicating the chemical composition of all-weld metal (see Table 4B). The symbol is omitted for weld deposits conforming to the “No symbol” in Table 4B;

9) the ninth part gives a symbol indicating the hydrogen content of deposited metal (see Table 7).

Electrodes may be classified under any number of classifications for either or both the as-welded and post-weld heat-treated condition.

In both systems, the electrode classification shall include all compulsory sections and may include optional sections as outlined below.

3.2A Compulsory and optional sections in the classification by yield strength and 47 J impact energy

a) Compulsory section

This section includes the symbols for type of product, strength and elongation, impact properties, chemical composition, type of electrode core and shielding gas, i.e. the symbols defined in 4.1, 4.2.1A, 4.2.2, 4.3A, 4.4, 4.5A and 4.6.

b) Optional section

This section includes the symbols for the welding positions for which the electrode is suitable and the symbol for hydrogen content, i.e. the symbols defined in 4.7 and 4.8.

3.2B Compulsory and optional sections in the classification by tensile strength and 27 J impact energy

a) Compulsory section

This section includes the symbols for type of product, strength and elongation in the as-welded condition or post-weld heat-treated condition, welding positions for which the electrode is suitable, usability characteristics, shielding gas, impact properties and chemical composition, i.e. the symbols defined in 4.1, 4.2.1B, 4.2.2, 4.3B, 4.4, 4.5B, 4.6, 4.7 and 4.9B.

b) Optional section

This section includes the symbol “U” to indicate that the weld metal has an average of 47J impact energy at the classification test temperature and the symbol for hydrogen content, i.e. the symbol “U” defined in 4.3B and the symbols defined in 4.8.

The full designation shall comprise the compulsory symbols and may include optional symbols chosen by the manufacturer. The full designation (see Clause 10) shall be used on packages and in the manufacturer’s literature and data sheets.

4 Symbols and requirements

4.1 Symbol for the product/process

The symbol for the tubular cored electrode used in the metal arc welding process is the letter T.

4.2 Symbol for tensile properties of all-weld metal or welded joint

4.2.1 Multi-run technique

4.2.1A Classification by yield strength and 47 J impact energy

For products suitable for single- and multi-run welding, the symbol in Table 1A indicates yield strength, tensile strength and elongation of the all-weld metal in the as-welded condition determined in accordance with 5.1A.

4.2.1B Classification by tensile strength and 27 J impact energy

For electrodes suitable for single- and multi-run welding, the symbol in Table 1B indicates yield strength, tensile strength and elongation of the all-weld metal in the as-welded condition or in the post-weld heat-treated condition determined in accordance with 5.1B.

Classification of products suitable for both single- and multi-run welding does not require the single-run test of 5.2.

Table 1A — Symbol for tensile properties by multi-run technique (classification by yield strength and 47 J impact energy)

Symbol	Minimum yield strength [a] MPa	Tensile strength MPa	Minimum elongation [b] %
35	355	440 to 570	22
38	380	470 to 600	20
42	420	500 to 640	20
46	460	530 to 680	20
50	500	560 to 720	18

[a] For yield strength the lower yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength, $R_{p0,2}$, is used.

[b] Gauge length is equal to five times the test specimen diameter.

Table 1B — Symbol for tensile properties by multi-run technique (classification by tensile strength and 27 J impact energy)

Symbol	Minimum yield strength [a] MPa	Tensile strength MPa	Minimum elongation [b] %
43	330	430 to 600	20
49	390	490 to 670	18
55	460	550 to 740	17
57	490	570 to 770	17

[a] For yield strength the lower yield, R_{eL}, is used when yielding occurs, otherwise the 0,2 % proof strength , $R_{p0,2}$, is used.

[b] Gauge length is equal to five times the test specimen diameter.