SLOVENSKI STANDARD
SIST EN 14700:2014

01-junij-2014

Nadomešča:
SIST EN 14700:2005

Dodajni materiali za varjenje - Dodajni materiali za trdo navarjanje

Welding consumables - Welding consumables for hard-facing

Schweißzusätze - Schweißzusätze zum Hartauftragen

Produits consommables de soudage - Produits consommables pour le rechargement dur

Ta slovenski standard je istoveten z: EN 14700:2014

ICS:

25.160.20 Potrošni material pri varjenju Welding consumables

SIST EN 14700:2014 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14700

April 2014

ICS 25.160.20

Supersedes EN 14700:2005

English Version

Welding consumables - Welding consumables for hard-facing

Produits consommables de soudage - Produits consommables pour le rechargement dur

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 14700:2014 E

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Foreword

This document (EN 14700:2014) has been prepared by 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of an identical text or by endorsement, at the latest by October 2014 and conflicting national standards shall be withdrawn at the latest by October 2014.

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This document supersedes EN 14700:2005.

The main following changes have been made:

a) the classification is now divided in two compulsory parts and 3 optional parts;

b) 4.3 “Designation of the typical composition” added;

c) 4.4 “Symbol for the range of hardness” added;

d) 4.5 “Symbol for the auxiliary material” added;

e) new alloys added;

f) in Table A.3 “Form of supply of consumables and applicable processes for hard-facing” the welding processes are updated according to EN ISO 4063:2010;

g) in Table A.4 “Examples of application”;

h) normative references updated.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard applies to welding consumables for hardfacing. The range of application includes surfaces of new structural components, semi-finished products as well as repair of surfaces of structural components which have to resist to mechanical, chemical, thermal or combined stress.

This European Standard specifies requirements for classification of the consumables based on their chemical composition of the all weld metal of covered electrodes, cored wires, cored rods, cored strips, sintered strips, sintered rods and metal powders and on the chemical composition of solid wires, solid rods, solid strips and cast rods.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 544, *Welding consumables - Technical delivery conditions for filler materials and fluxes - Type of product, dimensions, tolerances and markings (ISO 544:2011)*

EN ISO 6847, *Welding consumables - Deposition of a weld metal pad for chemical analysis (ISO 6847:2013)*

EN ISO 14174:2012, *Welding consumables - Fluxes for submerged arc welding and electroslag welding - Classification (ISO 14174:2012)*

EN ISO 14175:2008, *Welding consumables - Gases and gas mixtures for fusion welding and allied processes (ISO 14175:2008)*

EN ISO 14344, *Welding consumables - Procurement of filler materials and fluxes (ISO 14344:2010)*

EN ISO 80000-1:2013, *Quantities and units - Part 1: General (ISO 80000-1:2009 + Cor 1:2011)*

3 Classification

The classification is divided in two compulsory parts and 3 optional parts:

Compulsory part:

a) the first part gives a symbol indicating the product form, see 4.1;

b) the second part gives an alloy symbol indicating the range of composition and the suitability, see Table 2.

Optional part:

c) the third part indicates the typical composition, see 4.3;

d) the fourth part indicates the range of hardness of the all weld metal, see 4.4;

e) the fifth part indicates the welding auxiliary material (shielding gas and fluxes), see 4.5.

The parts c), d) and e) will be hyphenated from the compulsory part.

4 Symbols and requirements

4.1 Symbol for the product form

The following symbols for the product forms shall be used (see Table 1).

Table 1 — Symbols for the product form

Symbol	Product form (consumable)
E	covered electrode
S	solid wire and solid rod
T	cored wire and cored rod
R	cast rod
B	solid strip
C	sintered rod, cored strip and sintered strip
P	metal powder

NOTE See also Table A.3.

4.2 Symbol for the chemical composition

The alloy symbols in Table 2 indicate the chemical composition of the all weld metal of covered electrodes, cored wires, cored strips, sintered strips, sintered rods and metal powder or the chemical composition of solid wires, solid rods, solid wires and cast rods.

4.3 Designation of the typical composition

Additional to the alloy symbols in Table 2 the typical chemical composition of the all weld metal of covered electrodes, cored wires, cored strips, sintered strips, sintered rods and metal powder or the chemical composition of solid wires, solid rods, solid wires and cast rods will be indicated. The designation of the typical composition will be indicated by the chemical symbol of the most important alloying elements, except the base, followed by their percentage.

Table 2 — Alloy symbols and chemical composition

Alloy symbol	Suitability	Chemical composition in % (by mass)[c]												
		C	Cr	Ni	Mn	Mo	W	V	Nb	Fe	Co	Cu	Al	Other
Fe1	p	≤ 0,4	≤ 3,5	≤ 3	≤ 4,5	≤ 1	≤ 1	≤ 1	–	Balance	–	–	–	Si, Ti
Fe2	p (g) (s)	0,4 to 1,5	≤ 7	≤ 1	≤ 3	≤ 4	≤ 1	≤ 1	–	Balance	≤ 1	≤ 1	–	Si, Ti
Fe3	s t	0,1 to 0,5	1 to 15	≤ 5	≤ 3	≤ 5	≤ 10	≤ 1,5	≤ 3	Balance	≤ 13	–	–	Si, Ti
Fe4	s t (p)	0,2 to 1,5	2 to 10	≤ 4	≤ 3	≤ 10	≤ 20	≤ 4	–	Balance	≤ 5	–	–	Si, Ti
Fe5	c p s t w	≤ 0,5	≤ 0,1	17 to 22	≤ 1	3 to 5	–	–	–	Balance	10 to 15	–	≤ 1	Si, Ti
Fe6	g p s	≤ 2,5	≤ 10	–	≤ 3	≤ 3	–	–	≤ 10	Balance	–	–	–	Si, Ti
Fe7	c p t	≤ 0,2	11 to 30	≤ 6	≤ 3	≤ 2	–	≤ 1	≤ 1	Balance	–	–	–	Si, N
Fe8	g p t	0,2 to 2	5 to 20	–	≤ 3	≤ 5	≤ 2	≤ 2	≤ 10	Balance	–	–	–	Si, Ti
Fe9	k p (n)	≤ 1,2	≤ 20	≤ 5	9 to 20	≤ 2	–	≤ 1	–	Balance	–	–	–	Si, Ti
Fe10	c k p z (n)	≤ 0,25	17 to 22	7 to 11	3 to 8	≤ 1,5	–	–	≤ 1,5	Balance	–	–	–	Si
Fe11	c n z	≤ 0,3	17 to 32	8 to 20	≤ 3	≤ 4	–	–	≤ 1,5	Balance	–	–	–	Si, Cu
Fe12	c n (z)	≤ 0,12	17 to 27	9 to 26	≤ 3	≤ 4	–	–	≤ 1,5	Balance	–	–	–	Si
Fe13	g	≤ 1,5	≤ 7	≤ 4	≤ 3	≤ 4	–	–	–	Balance	–	–	–	Si, B, Ti
Fe14	g (c)	1,5 to 4,5	25 to 40	≤ 4	≤ 3	≤ 4	–	–	–	Balance	–	–	–	Si
Fe15	g	3 to 7	20 to 40	≤ 4	≤ 3	≤ 2	–	–	≤ 10	Balance	–	–	–	Si, B
Fe16	g z	4 to 8	10 to 40	–	≤ 3	≤ 10	≤ 10	≤ 10	≤ 10	Balance	–	–	–	Si, B
Fe17	c k p v	≤ 0,3	≤ 20	≤ 5	8 to 20	≤ 2	≤ 0,3	–	–	Balance	10 to 15	–	–	Si
Fe20	c g t z	–	–	–	–	–	–	–	–	Balance	–	–	–	hard material[b]
Ni1	c p t	≤ 1	15 to 30	Balance	≤ 1	≤ 6	≤ 2	≤ 1	–	≤ 5	–	–	–	Si, B
Ni2	c k p t z	≤ 0,1	14 to 30	Balance	≤ 1,5	10 to 30	≤ 8	≤ 1	≤ 5	≤ 10	≤ 5	–		Si, Ti
Ni3	c p t	≤ 1	≤ 15	Balance	≤ 1	≤ 6	≤ 2	≤ 1	–	≤ 5	–	–	–	Si, B
Ni4	c k p t z	≤ 0,1	1 to 20	Balance	≤ 1,5	≤ 30	≤ 8	≤ 1	≤ 5	≤ 3	≤ 15	–	≤ 3	Si, Ti
Ni20	c g t z	–	–	Balance	–	–	–	–	–	–	–	–	–	hard material[b]
Co1	c k t z	≤ 0,6	20 to 35	≤ 10	0,1 to 2	≤ 10	≤ 15	–	≤ 1	≤ 5	–	–	–	Si
Co2	t z (c) (s)	0,6 to 3	20 to 35	≤ 4	0,1 to 2	–	4 to 10	–	–	≤ 5	–	–	–	Si
Co3	t z (c) (s)	1 to 3	20 to 35	≤ 4	≤ 2	≤ 1	6 to 15	–	–	≤ 5	–	–	–	Si
Cr1	g n	1 to 5	Balance	–	≤ 1	–	–	15 to 30	–	≤ 5	–	–	–	Si, B, Zr
Cu1	c (n)	–	–	≤ 6	≤ 2	–	–	–	–	≤ 5	–	Balance	7 to 15	Sn
Cu2	c (n)	–	–	≤ 6	≤ 15	–	–	–	–	≤ 5	–	Balance	≤ 9	Sn
Al1	c n	–	–	10 to 35	≤ 0,5	–	–	–	–	–	–	≤ 6	Balance	Si
Z	–	Any other agreed composition[a]												

Suitability:
- c: resistance to rusting
- g: resistance to abrasion
- k: work hardenable
- (): limited suitability or may not apply to all alloys of this type
- n: cannot be magnetised
- p: impact resistance
- s: edge retention
- v: cavitation resistance
- t: heat resistance
- z: scaling resistance
- w: precipitation hardened

[a] Consumables for which the chemical composition is not listed in the table shall be symbolized similarly and prefixed by the letter Z. The chemical composition ranges are not specified and therefore it is possible that two products with the same Z classification are not interchangeable.

[b] Tungsten fused carbide or tungsten carbide broken or spherical.

[c] Single values shown in the table are maximum values.

4.4 Symbol for the range of hardness

The symbol (see Table 3) indicates the range of hardness of the all weld metal without post-treatment. The following symbol for the maximal range of hardness after post weld heat treatment or cold work hardening can be indicated in brackets.

Table 3 — Symbol for the range of hardness

Symbol	Range of hardness
150	125 HB and ≤ 175 HB
200	> 175 HB and ≤ 225 HB
250	> 225 HB and ≤ 275 HB
300	> 275 HB and ≤ 325 HB
350	> 325 HB and ≤ 375 HB
400	> 375 HB and ≤ 450 HB
40	37 HRC and ≤ 42 HRC
45	> 42 HRC and ≤ 47 HRC
50	> 47 HRC and ≤ 52 HRC
55	> 52 HRC and ≤ 57 HRC
60	> 57 HRC and ≤ 62 HRC
65	> 62 HRC and ≤ 67 HRC
70	> 67 HRC

4.5 Symbol for the auxiliary material

The designation of the symbol for the auxiliary material shall follow the EN ISO 14175:2008, Table 2, for shielding gases and the EN ISO 14174:2012, Table 1, for fluxes. If metal or flux cored wires will be used without gas protection, the symbol “NO” is applicable.

5 Alloy types, form of supply, requirements and applications

The most usual alloy types are listed in Table 2. Typical application is given in Table A.1. The forms of supply listed in Tables A.2 and A.3 may support the decision making as regards applicable welding processes.

The applications shown in Table A.4 give reference to the suitability of individual alloy types for different kind of requirements and system structures. It may be concluded that other alloy types may also be considered with regard to complex kind of requirements.

6 Chemical composition

The chemical analysis shall be performed on specimens of solid wires, solid rods and solid strips according to EN ISO 6847 respectively or on any suitable all-weld metal specimen and cast rods (covered electrodes, cored wires, cored strips, sintered rods, sintered strips and metal powder). Any analytical technique can be used, but in case of dispute reference shall be made to established published methods.

NOTE See Bibliography.

7 Rounding off procedure

For purposes of determining compliance with the requirements of this European Standard, the actual test values obtained shall be subjected to the rounding-off rules of EN ISO 80000-1:2013, Annex B, Rule A. If the measured values are obtained by equipment calibrated in units other than those of this standard, the