SLOVENSKI STANDARD
kSIST FprEN 14700:2013

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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: FprEN 14700

ICS:

25.160.20 Potrošni material pri varjenju Welding consumables

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English Version

Welding consumables - Welding consumables for hard-facing

Produits consommables de soudage - Produits consommables pour le rechargement dur

Schweißzusätze - Schweißzusätze zum Hartauftragen

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (FprEN 14700:2013) has been prepared by Technical Committee CEN/TC 121 “Welding and allied processes”, the secretariat of which is held by DIN.

This document is currently submitted to the Formal Vote.

This document will supersede 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.

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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)*

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

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)*

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.

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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.

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Table 2 — Alloy symbols and chemical composition

Alloy symbol	Suita-bility	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 symbolised 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.