



SLOVENSKI STANDARD
oSIST prEN ISO 12153:2022

01-marec-2022

Dodajni in pomožni materiali za varjenje - Strženske žice za obločno varjenje niklja in nikljevih zlitin, v zaščitnih plinih in brez zaščite - Razvrstitev (ISO/DIS 12153:2022)

Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of nickel and nickel alloys - Classification (ISO/DIS 12153:2022)

Schweißzusätze - Fülldrahtelektroden zum Metall-Lichtbogenschweißen mit und ohne Gasschutz von Nickel und Nickellegierungen - Einteilung (ISO/DIS 12153:2022)

Produits consommables pour le soudage - Fils-électrodes fourrés pour soudage à l'arc avec ou sans gaz de protection du nickel et des alliages de nickel - Classification (ISO/DIS 12153:2022)

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Ta slovenski standard je istoveten z: prEN ISO 12153

ICS:

25.160.20	Potrošni material pri varjenju	Welding consumables
77.120.40	Nikelj, krom in njune zlitine	Nickel, chromium and their alloys

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DRAFT INTERNATIONAL STANDARD

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Welding consumables — Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of nickel and nickel alloys — Classification

Produits consommables pour le soudage — Fils-électrodes fourrés pour soudage à l'arc avec ou sans gaz de protection du nickel et des alliages de nickel — Classification

ICS: 25.160.20

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Foreword

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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).

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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*.

This second edition cancels and replaces the first edition (ISO 12153:2011), which has been technically revised.

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

— xxx xxxxxxxx xxx xxxxx

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, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

Welding consumables — Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of nickel and nickel alloys — Classification

1 Scope

This document specifies requirements for the classification of tubular cored electrodes for metal arc welding with or without a gas shield of nickel and nickel alloys. It includes those compositions in which the nickel content exceeds that of any other element.

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

ISO 6947:2019, *Welding and allied processes — Welding positions*

ISO 14175, *Welding consumables — Gases and gas mixtures for fusion welding and allied processes*

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

ISO 15792-1:2020, *Welding consumables — Test methods — Part 1: Preparation of all-weld metal test pieces and specimens in steel, nickel and nickel alloys*

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

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 <https://www.electropedia.org/>

4 Classification

Tubular cored electrodes shall be classified according to the chemical composition of the all-weld metal as given in [Table 1](#) and the mechanical properties of the all-weld metal listed in [Table 2](#).

The classification designation is divided into five parts:

- the first part gives a symbol indicating the product/process to be identified;
- the second part gives a symbol indicating the chemical composition of the all-weld metal;
- the third part gives a symbol indicating the type of electrode core;

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- d) the fourth part gives a symbol indicating the type of shielding gas;
- e) the fifth part gives a symbol indicating the welding position.

5 Symbols and requirements

5.1 Symbol for the product/process

The symbol for the tubular cored electrode used in the metal arc welding process shall be the letter “T”.

5.2 Symbol for the chemical composition of the all-weld metal

The symbol for the chemical composition of the all-weld metal shall comprise “Ni” plus four digits, as shown in [Table 1](#). The first digits are an indicator of the class of alloy deposited, as follows:

- 4 indicates significant copper addition (nickel-copper alloys)
- 6 indicates significant chromium addition, with iron less than 25 % (by mass) (nickel-chromium-iron and nickel-chromium-molybdenum alloys)
- 10 indicates significant molybdenum addition without significant chromium addition (nickel-molybdenum alloys)

The remaining digits indicate the particular alloy deposited.

The tubular cored electrode classified in accordance with [Table 1](#) and produced as described in [Clause 5](#) and [Clause 6](#) shall also fulfil the requirements of [Table 2](#).

NOTE In addition, the chemical symbol can be used.

5.3 Symbol for the type of electrode core

The third part of the designation indicates the type of electrode core and the slag characteristics (see [Table 3](#)).

5.4 Symbol for the shielding gas

The symbols for shielding gases shall be in accordance with ISO 14175 except that the symbol NO shall be used for tubular cored electrodes without a gas shield.

5.5 Symbol for the welding position

The fifth part of the designation (see [Table 4](#)) describes the welding position in which the tubular cored electrode can be welded. PA, PB, PC, PD, PE, PF, and PG are the symbols of the welding positions in accordance with ISO 6947:2019.

6 Chemical analysis

Chemical analysis shall be performed on any suitable all-weld metal test specimen. In case of dispute, the test specimen specified in ISO 6847 shall be used. The test results shall meet the requirements of [Table 1](#) for the classification under test. Any analytical technique may be used, but in cases of dispute, reference shall be made to established published methods.

Table 1 — Symbols and all-weld metal chemical composition requirements

Alloy symbols		Chemical composition (% by mass) ^{a,b}												W	V	Oth- ers ^d	
Numerical	Chemical	C	Mn	Fe	Si	Cu	Ni	Co	Al	Ti	Cr	Nb ^c	Mo				
Nickel-Copper																	
Ni 4060	NiCu30Mn3Ti	0,15	4,0	2,5	1,5	27,0 to 34,0	≥62,0	—	1,0	1,0	—	—	—	—	—	—	
Ni 4061	NiCu27Mn3NbTi	0,15	4,0	2,5	1,3	24,0 to 31,0	≥62,0	—	1,0	1,5	—	3,0	—	—	—	—	
Nickel-Chromium																	
Ni 6082	NiCr20Mn3Nb	0,10	2,5 to 3,5	3,0	0,50	0,5	≥67,0	—	—	0,75	18,0 to 22,0	2,0 to 3,0	—	—	—	P 0,03	
Ni 6083	NiCr20Mn6Fe4Nb	0,10	4,0 to 8,0	4,0	0,8	0,5	≥60,0	—	—	0,5	18,0 to 22,0	1,5 to 3,0	2,0	—	—	—	
Nickel-Molybdenum																	
Ni 1013	NiMo17Cr7W	0,10	2,0 to 3,0	10,0	0,75	0,5	≥58,0	—	—	—	4,0 to 8,0	—	—	16,0 to 19,0	—	2,0 to 4,0	
Nickel-Chromium-Iron																	
Ni 6062	NiCr15Fe8Nb	0,08	3,5	11,0	0,75	0,5	≥62,0	—	—	—	13,0 to 17,0	1,5 to 4,0	—	—	—	P 0,03	
Ni 6133	NiCr16Fe12NbMo	0,10	1,0 to 3,5	12,0	0,75	0,5	≥62,0	—	—	—	13,0 to 17,0	0,5 to 3,0	0,5 to 2,5	—	—	P 0,03 S 0,02	
Ni 6182	NiCr15Fe6Mn	0,10	5,0 to 9,5	10,0	1,0	0,5	≥59,0	—	—	1,0	13,0 to 17,0	1,0 to 2,5	—	—	—	P 0,03	
Ni 6152	NiCr30Fe9Nb	0,05	5,0	7,0 to 12,0	0,8	0,5	≥50,0	—	0,5	0,5	28,0 to 31,5	1,0 to 2,5	0,5	—	—	—	
Nickel-Chromium-Molybdenum																	
Ni 6002	NiCr22Fe18Mo	0,05 to 0,15	1,0	17,0 to 20,0	1,0	0,5	≥45,0	0,5 to 2,5	—	—	20,5 to 23,0	—	—	8,0 to 10,0	—	0,2 to 1,0	P 0,04 S 0,03
Ni 6012	NiCr22Mo9	0,03	1,0	3,5	0,7	0,5	≥58,0	—	0,4	0,4	20,0 to 23,0	1,5	—	8,5 to 10,5	—	—	—
Ni 6022	NiCr21Mo13W3	0,02	1,0	2,0 to 6,0	0,2	0,5	≥49,0	2,5	—	—	20,0 to 22,5	—	—	12,5 to 14,5	0,35	2,5 to 3,5	P 0,03
Ni 6023	NiCr13Mo13W3	0,10	1,0 to 3,0	4,0 to 7,0	0,50	0,5	≥58,0	1,0	—	—	12,0 to 14,5	1,0	—	12,0 to 14,0	0,35	2,0 to 3,5	P 0,03 S 0,03
Ni 6059	NiCr23Mo16	0,02	1,0	1,5	0,2	0,5	≥56,0	—	—	—	22,0 to 24,0	—	—	15,0 to 16,5	—	—	—

^a Unless otherwise stated, single values are maxima.

^b Phosphorus 0,020 % (by mass) max., sulfur 0,015 % (by mass) max. unless otherwise stated.

^c Up to 20 % (by mass) of the amount of Nb can be replaced by Ta.

^d Total unspecified elements shall not exceed 0,5 % (by mass).

^e Symbols with R have more restricted chemical compositions compared to the symbols without R. Symbols with R meet the requirements of symbols without R but not vice versa.

^f Consumables for which the chemical composition is not listed shall be symbolized similarly and prefixed by the letter "Z". The chemical composition ranges are not specified and it is possible that two electrodes with the same Z classification are not interchangeable.

Table 1 (continued)

Alloy symbols		Chemical composition (% by mass) ^{a,b}														
Numerical	Chemical	C	Mn	Fe	Si	Cu	Ni	Co	Al	Ti	Cr	Nb ^c	Mo	V	W	Oth- ers ^d
Ni 6275	NiCr15Mo16Fe5W3	0,10	1,0	4,0 to 7,0	1,0	0,5	≥50,0	2,5	—	—	14,5 to 16,5	—	15,0 to 18,0	0,4	3,0 to 4,5	—
Ni 6276	NiCr15Mo15Fe6W4	0,02	1,0	4,0 to 7,0	0,2	0,5	≥50,0	2,5	—	—	14,5 to 16,5	—	15,0 to 17,0	0,35	3,0 to 4,5	P 0,03 S 0,03
Ni 6455	NiCr16Mo15Ti	0,02	1,5	3,0	0,2	0,5	≥56,0	2,0	—	0,7	14,0 to 18,0	—	14,0 to 17,0	—	0,5	—
Ni 6456	NiCr16Mo10Nb	0,10	5,0 to 8,0	10,0	0,8	0,5	≥58,0	—	—	1,0	15,0 to 18,0	1,5 to 3,0	9,0 to 11,0	—	—	—
Ni 6625	NiCr22Mo9Nb	0,10	0,50	5,0	0,50	0,5	≥58,0	—	—	0,40	20,0 to 23,0	3,15 to 4,15	8,0 to 10,0	—	—	—
Ni 6686	NiCr21Mo16W4	0,02	1,0	5,0	0,3	0,5	≥49,0	—	—	0,3	19,0 to 23,0	—	15,0 to 17,0	—	3,0 to 4,4	—
Nickel-Chromium-Cobalt-Molybdenum																
Ni 6117	NiCr22Co12Mo	0,05 to 0,15	2,5	5,0	0,75	0,5	≥45,0	9,0 to 15,0	—	—	21,0 to 26,0	1,0	8,0 to 10,0	—	—	P 0,03
Ni 6117 ^e	NiCr22Co12Mo	0,05 to 0,15	0,3 to 2,5	5,0	0,75	0,5	≥45,0	9,0 to 15,0	—	—	21,0 to 26,0	1,0	8,0 to 10,0	—	—	P 0,03
Ni 6617	NiCr22Co12MoAlTi	0,05 to 0,15	2,5	5,0	0,75	0,5	≥45,0	9,0 to 15,0	1,5	0,6	21,0 to 26,0	1,0	8,0 to 10,0	—	—	—
Zf																
Any other agreed composition																

^a Unless otherwise stated, single values are maxima.
^b Phosphorus 0,020 % (by mass) max., sulfur 0,015 % (by mass) max. unless otherwise stated.
^c Up to 20 % (by mass) of the amount of Nb can be replaced by Ta.
^d Total unspecified elements shall not exceed 0,5 % (by mass).
^e Symbols with R have more restricted chemical compositions compared to the symbols without R. Symbols with R meet the requirements of symbols without R but not vice versa.
^f Consumables for which the chemical composition is not listed shall be symbolized similarly and prefixed by the letter "Z". The chemical composition ranges are not specified and it is possible that two electrodes with the same Z classification are not interchangeable.