

BS EN ISO 14172:2015



BSI Standards Publication

Welding consumables — Covered electrodes for manual metal arc welding of nickel and nickel alloys — Classification

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National foreword

This British Standard is the UK implementation of EN ISO 14172:2015. It supersedes BS EN ISO 14172:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/39, Welding consumables.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Amendments issued since publication

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English Version

**Welding consumables - Covered electrodes for manual
metal arc welding of nickel and nickel alloys -
Classification (ISO 14172:2015)**

Produits consommables pour le soudage - Électrodes
enrobées pour le soudage manuel à l'arc du nickel et
des alliages de nickel - Classification (ISO 14172:2015)

Schweißzusätze - Umhüllte Stabelektroden zum
Lichtbogenhandschweißen von Nickel und
Nickellegierungen - Einteilung (ISO 14172:2015)

This European Standard was approved by CEN on 10 July 2015.

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European foreword

This document (EN ISO 14172:2015) 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of an identical text or by endorsement, at the latest by March 2016, and conflicting national standards shall be withdrawn at the latest by March 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 14172:2008.

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.

Endorsement notice

The text of ISO 14172:2015 has been approved by CEN as EN ISO 14172:2015 without any modification.

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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.

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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 3 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

This third edition cancels and replaces the second edition (ISO 14172:2008), which has been technically revised.

Welding consumables — Covered electrodes for manual metal arc welding of nickel and nickel alloys — Classification

1 Scope

This International Standard prescribes requirements for the classification of nickel and nickel-alloy covered electrodes for manual metal arc welding and overlaying. It includes those compositions in which the nickel content exceeds that of any other element.

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.

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 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*

3 Classification

A covered electrode shall be classified in accordance with the chemical composition of the all-weld metal as given in [Table 1](#) and the mechanical properties listed in [Table 2](#). The symbol for the classification is divided into two parts:

- a) the first part gives a symbol indicating the product/process to be used;
- b) the second part gives a symbol indicating the chemical composition of the all-weld metal.

4 Symbols and requirements

4.1 Symbol for the product/process

The symbol for covered electrodes used for manual metal arc welding shall be the letter “E”.

4.2 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 digit is an indicator of the class of alloy deposited, where

- 2 indicates no significant alloy addition,
- 4 indicates significant copper addition (nickel-copper alloys),
- 6 indicates significant chromium addition, with iron less than 25 % (nickel-chromium-iron and nickel-chromium-molybdenum alloys),
- 8 indicates significant chromium addition, with iron more than 25 % (nickel-iron-chromium alloys),
- 10 indicates significant molybdenum addition without significant chromium addition (nickel-molybdenum alloys).

The remaining digits indicate the particular alloy deposited. The basis of the system of designation is described in [Annex A](#).

NOTE In addition, the chemical symbol can be used.

4.3 Rounding procedure

For purposes of determining compliance with the requirements of this International Standard, the actual test values obtained shall be subject to ISO 80000-1:2009, B.3, Rule A. If the measured values are obtained by equipment calibrated in units other than those of this International Standard, the measured values shall be converted to the units of this International Standard before rounding. If an arithmetic average value is to be compared to the requirements of this International Standard, rounding shall be done only after calculating the arithmetic average. If the test method cited in [Clause 2](#) contains instructions for rounding that conflict with the instructions of this International Standard, the rounding requirements of the test method standard shall apply. The rounded results shall fulfil the requirements of the appropriate table for the classification under test.

5 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 can be used; but, in case of dispute, reference shall be made to established published methods.

6 Mechanical properties of the all-weld metal

Mechanical properties are not part of the designation, but they are required for classification. The mechanical properties of the all-weld metal, deposited using covered electrodes in accordance with [Table 1](#), shall be determined using a test assembly type 1.3 in accordance with ISO 15792-1:2000 with 4,0 mm electrodes. The minimum tensile properties shall be in accordance with [Table 2](#).

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

Alloy symbol		Chemical composition % (by mass) ^a														
Numer- ical symbol	Chemical symbol	C	Mn	Fe	Si	Cu	Ni ^b	Co	Al	Ti	Cr	Nb ^c	Mo	V	W	Notes ^{d, e}
Nickel																
Ni 2061	NiTi3	0,10	0,7	0,7	1,2	0,2	min. 92,0	—	1,0	1,0 to 4,0	—	—	—	—	—	—
Nickel-Copper																
Ni 4060	NiCu30Mn3Ti	0,15	4,0	2,5	1,5	27,0 to 34,0	min. 62,0	—	1,0	1,0	—	—	—	—	—	—
Ni 4061	NiCu27Mn3NbTi	0,15	4,0	2,5	1,3	24,0 to 31,0	min. 62,0	—	1,0	1,5	—	3,0	—	—	—	—
Nickel-Chromium																
Ni 6082	NiCr20Mn3Nb	0,10	2,0 to 6,0	4,0	0,8	0,5	min. 63,0	—	—	0,5	18,0 to 22,0	1,5 to 3,0	2,0	—	—	—
Ni 6172	NiCr50Nb	0,10	1,5	1,0	1,0	0,25	min. 41,0	—	—	—	48,0 to 52,0	1,0 to 2,5	—	—	—	0,02P 0,02S
Ni 6231	NiCr22W14Mo	0,05 to 0,10	0,3 to 1,0	3,0	0,3 to 0,7	0,5	min. 45,0	5,0	0,5	0,1	20,0 to 24,0	—	1,0 to 3,0	—	13,0 to 15,0	—
Nickel-Chromium-Iron																
Ni 6025	NiCr25Fe10AlY	0,10 to 0,25	0,5	8,0 to 11,0	0,8	—	min. 55,0	—	1,5 to 2,2	0,3	24,0 to 26,0	—	—	—	—	0,15Y
Ni 6045	NiCr27Fe23Si	0,05 to 0,20	2,5	21,0 to 025,0	2,5 to 3,0	0,30	min. 38,0	1,0	0,30	—	26,0 to 29,0	—	—	—	—	0,04P 0,03S
Ni 6062	NiCr15Fe8Nb	0,08	3,5	11,0	0,8	0,5	min. 62,0	—	—	—	13,0 to 17,0	0,5 to 4,0	—	—	—	—
Ni 6093	NiCr15Fe8NbMo	0,20	1,0 to 5,0	12,0	1,0	0,5	min. 60,0	—	—	—	13,0 to 17,0	1,0 to 3,5	1,0 to 3,5	—	—	—
Ni 6094	NiCr14Fe4NbMo	0,15	1,0 to 4,5	12,0	0,8	0,5	min. 55,0	—	—	—	12,0 to 17,0	0,5 to 3,0	2,5 to 5,5	—	1,5	—
Ni 6095	NiCr15Fe8NbMoW	0,20	1,0 to 3,5	12,0	0,8	0,5	min. 55,0	—	—	—	13,0 to 17,0	1,0 to 3,5	1,0 to 3,5	—	1,5 to 3,5	—
Ni 6132	NiCr15Fe9Nb	0,08	3,5	11,0	0,75	0,50	min. 62,0	—	—	—	13,0 to 17,0	1,5 to 4,0	—	—	—	0,03P 0,015S