INTERNATIONAL STANDARD

ISO 14343

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Welding consumables — Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels — Classification

Produits consommables pour le soudage — Fils-électrodes, électrodes en feuillard, fils d'apport et baguettes de soudage, pour le soudage à l'arc des aciers inoxydables et des aciers résistant aux températures élevées — Classification

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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 14343 was jointly prepared by the International Institute of Welding (IIW), Commission II, *Arc Welding and Filler Metals*, and Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*. IIW has been approved as an international standardizing body in the field of welding by the ISO Council.

This second edition cancels and replaces the first edition (ISO 14343:2002), which has been technically revised. It also incorporates the Amendment ISO 14343:2002/Amd.1:2006.

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 which can be found at http://www.iso.org/.

Introduction

It is recognized that there are two somewhat different approaches in the global market to classifying a given stainless steel welding consumable, and that either or both can be used to suit a particular market need. One is the *nominal composition* approach, which uses designators to indicate the principal alloying elements at their nominal levels, in a particular sequence, and which is sometimes followed by chemical element symbols to indicate compositional modifications to the original grade. The other is the *alloy type* approach, which uses tradition-based three- or four-digit designations for certain original grades, sometimes followed by one or more chemical element symbols indicating compositional modifications of the original. In both approaches, classification is based upon the chemical composition of the product. In many cases, a given product can be classified using both approaches, because the composition ranges, although slightly different, overlap to a considerable extent between the two.

Designation by either type of classification, or both where suitable, identifies a product as being classified according to this International Standard. Many, but not all, commercial products addressed by this International Standard can be classified using both approaches, and suitable products can be so marked. Classification according to system A, by nominal composition, is based mainly on EN 12072[1][1)], while that of system B, by alloy type, is mainly based upon standards used around the Pacific Rim.

For stainless steel welding consumables, there is no unique relationship between the product form (wire electrode, strip electrode, wire or rod) and the welding process used (gas-shielded metal arc welding, gas tungsten arc welding, plasma arc welding, submerged arc welding, electroslag welding and laser beam welding). For this reason, the wire electrodes, strip electrodes, wires or rods can be classified on the basis of any of the above product forms and can be used, as appropriate, for more than one of the above processes.

1) This was replaced by “EN ISO 14343:2007” when CEN adopted the previous edition of this International Standard.

Welding consumables — Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels — Classification

1 Scope

This International Standard specifies requirements for classification of wire electrodes, strip electrodes, wires and rods for gas-shielded metal arc welding, gas tungsten arc welding, plasma arc welding, submerged arc welding, electroslag welding and laser beam welding of stainless and heat-resisting steels. The classification of the wire electrodes, strip electrodes, wires and rods is based upon their chemical composition.

This International Standard is a combined specification providing for classification utilizing a system based upon nominal composition (system A), or utilizing a system based upon alloy type (system B).

a) Paragraphs which carry the label “classification according to nominal composition” and the suffix letter “A”, or “ISO 14343-A”, are applicable only to products classified according to system A;

b) Paragraphs which carry the label “classification according to alloy type” and the suffix letter “B”, or “ISO 14343-B”, are applicable only to products classified according to system B.

c) Paragraphs which carry neither label nor suffix letter are applicable to products that can be classified according to either system A or B or both.

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

ISO 544, *Welding consumables — Technical delivery conditions for welding filler materials — Type of product, dimensions, tolerances and markings*

ISO 14344, *Welding and allied processes — Flux and gas shielded electrical welding processes — Procurement guidelines for consumables*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
rod
form of welding filler metal, normally packaged in straight lengths, that does not conduct the welding current, used in gas tungsten arc and plasma arc welding

3.2
strip electrode
form of welding filler metal, normally packaged as coils, having a rectangular cross-section of width much greater than thickness, that becomes part of the welding circuit through which current is conducted, and that terminates at the arc for submerged arc welding, or at the slag bath for electroslag welding

3.3
wire
form of welding filler metal, normally packaged as coils, spools or drums, that does not conduct the welding current, for gas tungsten arc, plasma arc welding and laser beam welding

3.4
wire electrode
form of welding filler metal, normally packaged as coils, spools or drums, that becomes part of the welding circuit through which electrical current is conducted, and that terminates at the arc, used in gas-shielded metal arc and submerged arc welding

4 Classification

4.1 General

A wire electrode, strip electrode, wire or rod shall be classified according to its chemical composition as given in Table 1.

The classification is divided into two parts:

a) the first gives a symbol indicating the product/process to be identified;

b) the second gives a symbol indicating the chemical composition of the wire electrode, strip electrode, wire or rod.

4.2 Symbols for products/processes

4.2A Classification according to nominal composition

The symbol for the wire electrode, strip electrode, wire or rod used in the arc welding process shall be the letter

— “G” for gas metal arc welding,

— “W” for gas tungsten arc welding,

— “P” for plasma arc welding,

— “S” for submerged arc welding,

— “B” for submerged arc welding or electroslag welding with strip electrode, or

— “L” for laser beam welding,

placed at the beginning of the designation.

See Clause 10 for designation examples.

4.2B Classification according to alloy type

No symbol is used to indicate the welding process.

The symbol for solid stainless and heat-resisting steel wire electrodes, wires and rods for use in all welding processes shall be the letters “SS”. The initial “S” indicates solid wire as distinguished from covered electrodes or from tubular cored wires or tubular cored rods.

The symbol for strip electrodes for use in submerged arc welding or electroslag welding shall be the letters “BS”. The “B” indicates a strip electrode, while the second “S” in “SS” and the “S” in “BS” indicates that the alloy system is stainless or heat-resisting steel.

See Clause 10 for designation examples.

4.3 Symbols for chemical composition

The symbols presented in Table 1 indicate the chemical composition of the wire electrode, strip electrode, wire or rod determined using the analysis specified in Clause 6.

Table 1 — Chemical composition requirements

Alloy designation[a], classification according to		Chemical composition, % by mass[b]											
Nominal composition[c] ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb[d]	Other
Martensitic/ferritic types													
—	409	0,08	0,8	0,8	0,03	0,03	10,5 to 13,5	0,6	0,50	—	0,75	—	Ti 10 × C to 1,5
—	409Nb	0,12	0,5	0,6	0,03	0,03	10,5 to 13,5	0,6	0,75	—	0,75	8 × C to 1,0	—
13	(410)	0,15	1,0	1,0	0,03	0,02	12,0 to 15,0	0,5	0,5	—	0,5	—	—
(13)	410	0,12	0,5	0,6	0,03	0,03	11,5 to 13,5	0,6	0,75	—	0,75	—	—
13 L	—	0,05	1,0	1,0	0,03	0,02	12,0 to 15,0	0,5	0,5	—	0,5	—	—
13 4	(410NiMo)	0,05	1,0	1,0	0,03	0,02	11,0 to 14,0	3,0 to 5,0	0,4 to 1,0	—	0,5	—	—
(13 4)	410NiMo	0,06	0,5	0,6	0,03	0,03	11,0 to 12,5	4,0 to 5,0	0,4 to 0,7	—	0,75	—	—
—	420	0,25 to 0,40	0,5	0,6	0,03	0,03	12,0 to 14,0	0,75	0,75	—	0,75	—	—
16 5 1	—	0,04	0,2 to 0,7	1,2 to 3,5	0,02	0,01	15,0 to 17,0	4,5 to 6,5	0,9 to 1,5	—	0,5	—	—
17	(430)	0,12	1,0	1,0	0,03	0,02	16,0 to 19,0	0,5	0,5	—	0,5	—	—
(17)	430	0,10	0,5	0,6	0,03	0,03	15,5 to 17,0	0,6	0,75	—	0,75	—	—
—	430Nb	0,10	0,5	0,6	0,03	0,03	15,5 to 17,0	0,6	0,75	—	0,75	8 × C to 1,2	—
(18 L Nb)	430LNb	0,03	0,5	0,6	0,03	0,03	15,5 to 17,0	0,6	0,75	—	0,75	8 × C to 1,2	—
18 L Nb	(430LNb)	0,02	0,5	0,8	0,03	0,02	17,8 to 18,8	0,5	0,5	0,02	0,5	0,05 + 7(C+N) up to 0,5	—
—	439	0,04	0,8	0,8	0,03	0,03	17,0 to 19,0	0,6	0,5	—	0,75	—	Ti 10 × C to 1,1

Table 1 (*continued*)

Alloy designation[a], classification according to		Chemical composition, % by mass[b]											
Nominal composition[c] ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb[d]	Other
Austenitic types													
—	308	0,08	0,65	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
—	308Si	0,08	0,65 to 1,00	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
19 9 L	(308L)	0,03	0,65	1,0 to 2,5	0,03	0,02	19,0 to 21,0	9,0 to 11,0	0,5	—	0,5	—	—
(19 9 L)	308L	0,03	0,65	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
19 9 L Si	(308LSi)	0,03	0,65 to 1,2	1,0 to 2,5	0,03	0,02	19,0 to 21,0	9,0 to 11,0	0,5	—	0,5	—	—
(19 9 L Si)	308LSi	0,03	0,65 to 1,00	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,75	—	0,75	—	—
19 9 Nb	(347)	0,08	0,65	1,0 to 2,5	0,03	0,02	19,0 to 21,0	9,0 to 11,0	0,5	—	0,5	10 × C to 1,0	—
(19 9 Nb)	347	0,08	0,65	1,0 to 2,5	0,03	0,03	19,0 to 21,5	9,0 to 11,0	0,75	—	0,75	10 × C to 1,0	—
19 9 Nb Si	(347Si)	0,08	0,65 to 1,2	1,0 to 2,5	0,03	0,02	19,0 to 21,0	9,0 to 11,0	0,5	—	0,5	10 × C to 1,0	—
(19 9 Nb Si)	347Si	0,08	0,65 to 1,00	1,0 to 2,5	0,03	0,03	19,0 to 21,5	9,0 to 11,0	0,75	—	0,75	10 × C to 1,0	—
—	347L	0,03	0,65	1,0 to 2,5	0,03	0,03	19,0 to 21,5	9,0 to 11,0	0,75	—	0,75	10 × C to 1,0	—
—	316	0,08	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
—	316Si	0,08	0,65 to 1,00	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
19 12 3 L	(316L)	0,03	0,65	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,5	—	—
(19 12 3 L)	316L	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
19 12 3 L Si	(316LSi)	0,03	0,65 to 1,2	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,5	—	—

Table 1 (*continued*)

Alloy designation[a], classification according to		Chemical composition, % by mass[b]											
Nominal composition[c] ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb[d]	Other
(19 12 3 L Si)	316LSi	0,03	0,65 to 1,00	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
—	316LCu	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	1,0 to 2,5	—	—
19 12 3 Nb	(318)	0,08	0,65	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,5	10 × C to 1,0	—
(19 12 3 Nb)	318	0,08	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	8 × C to 1,0	—
—	318L	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	8 × C to 1,0	—
19 12 3 Nb Si	—	0,08	0,65 to 1,2	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,5 to 3,0	—	0,5	10 × C to 1,0	—
—	317	0,08	0,65	1,0 to 2,5	0,03	0,03	18,5 to 20,5	13,0 to 15,0	3,0 to 4,0	—	0,75	—	—
(18 15 3 L)	317L	0,03	0,65	1,0 to 2,5	0,03	0,03	18,5 to 20,5	13,0 to 15,0	3,0 to 4,0	—	0,75	—	—
—	321	0,08	0,65	1,0 to 2,5	0,03	0,03	18,5 to 20,5	9,0 to 10,5	0,75	—	0,75	—	Ti 9 × C to 1,0
Ferritic-austenitic types (sometimes referred to as austenitic-ferritic types)													
22 9 3 N L	(2209)	0,03	1,0	2,5	0,03	0,02	21,0 to 24,0	7,0 to 10,0	2,5 to 4,0	0,10 to 0,20	0,5	—	—
(22 9 3 N L)	2209	0,03	0,90	0,5 to 2,0	0,03	0,03	21,5 to 23,5	7,5 to 9,5	2,5 to 3,5	0,08 to 0,20	0,75	—	—
23 7 N L	—	0,03	1,0	2,5	0,03	0,02	22,5 to 25,5	6,5 to 9,5	0,8	0,10 to 0,20	0,5	—	—
25 7 2 L	—	0,03	1,0	2,5	0,03	0,02	24,0 to 27,0	6,0 to 8,0	1,5 to 2,5	—	0,5	—	—
25 9 3 Cu N L	—	0,03	1,0	2,5	0,03	0,02	24,0 to 27,0	8,0 to 11,0	2,5 to 4,0	0,10 to 0,20	1,5 to 2,5	—	—
25 9 4 N L	2594	0,03	1,0	2,5	0,03	0,02	24,0 to 27,0	8,0 to 10,5	2,5 to 4,5	0,20 to 0,30	1,5	—	W 1,0

Table 1 (*continued*)

Alloy designation[a], classification according to		Chemical composition, % by mass[b]											
Nominal composition[c] ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb[d]	Other
Fully austenitic types[e]													
18 15 3 L[e]	(317L)[e]	0,03	1,0	1,0 to 4,0	0,03	0,02	17,0 to 20,0	13,0 to 16,0	2,5 to 4,0	—	0,5	—	—
18 16 5 N L[e]	—	0,03	1,0	1,0 to 4,0	0,03	0,02	17,0 to 20,0	16,0 to 19,0	3,5 to 5,0	0,10 to 0,20	0,5	—	—
19 13 4 L[e]	(317L)[e]	0,03	1,0	1,0 to 5,0	0,03	0,02	17,0 to 20,0	12,0 to 15,0	3,0 to 4,5	—	0,5	—	—
19 13 4 N L[e]	—	0,03	1,0	1,0 to 5,0	0,03	0,02	17,0 to 20,0	12,0 to 15,0	3,0 to 4,5	0,10 to 0,20	0,5	—	—
20 25 5 Cu L[e]	(385)[e]	0,03	1,0	1,0 to 4,0	0,03	0,02	19,0 to 22,0	24,0 to 27,0	4,0 to 6,0	—	1,0 to 2,0	—	—
(20 25 5 Cu L)[e]	385[e]	0,025	0,50	1,0 to 2,5	0,02	0,03	19,5 to 21,5	24,0 to 26,0	4,2 to 5,2	—	1,2 to 2,0	—	—
20 25 5 Cu N L[e]	—	0,03	1,0	1,0 to 4,0	0,03	0,02	19,0 to 22,0	24,0 to 27,0	4,0 to 6,0	0,10 to 0,20	1,0 to 2,0	—	—
20 16 3 Mn L[e]	—	0,03	1,0	5,0 to 9,0	0,03	0,02	19,0 to 22,0	15,0 to 18,0	2,5 to 4,5	—	0,5	—	—
20 16 3 Mn N L[e]	316LMn[e]	0,03	1,0	5,0 to 9,0	0,03	0,02	19,0 to 22,0	15,0 to 18,0	2,5 to 4,5	0,10 to 0,20	0,5	—	—
25 22 2 N L[e]	—	0,03	1,0	3,5 to 6,5	0,03	0,02	24,0 to 27,0	21,0 to 24,0	1,5 to 3,0	0,10 to 0,20	0,5	—	—
26 23 5 N[e]	—	0,02	1,0	1,5 to 5,5	0,02	0,01	25,0 to 27,0	21,0 to 25,0	4,0 to 6,0	0,30 to 0,40	0,5	—	—
27 31 4 Cu L[e]	(383)[e]	0,03	1,0	1,0 to 3,0	0,03	0,02	26,0 to 29,0	30,0 to 33,0	3,0 to 4,5	—	0,7 to 1,5	—	—
(27 31 4 Cu L)[e]	383[e]	0,025	0,50	1,0 to 2,5	0,02	0,03	26,5 to 28,5	30,0 to 33,0	3,2 to 4,2	—	0,7 to 1,5	—	—
—	320[e]	0,07	0,60	2,5	0,03	0,03	19,0 to 21,0	32,0 to 36,0	2,0 to 3,0	—	3,0 to 4,0	8 × C to 1,0	—
—	320LR[e]	0,025	0,15	1,5 to 2,0	0,015	0,02	19,0 to 21,0	32,0 to 36,0	2,0 to 3,0	—	3,0 to 4,0	8 × C to 0,40	—
—	33-31	0,015	0,50	2,00	0,02	0,01	31,0 to 35,0	30,0 to 33,0	0,5 to 2,0	0,35 to 0,60	0,3 to 1,2	—	—

Table 1 (*continued*)

Alloy designation[a], classification according to		Chemical composition, % by mass[b]											
Nominal composition[d] ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb[e]	Other
Special types — Often used for dissimilar metal joining													
—	307[e]	0,04 to 0,14	0,65	3,3 to 4,8	0,03	0,03	19,5 to 22,0	8,0 to 10,7	0,5 to 1,5	—	0,75	—	—
18 8 Mn[e]	—	0,20	1,2	5,0 to 8,0	0,03	0,03	17,0 to 20,0	7,0 to 10,0	0,5	—	0,5	—	—
20 10 3	(308Mo)	0,12	1,0	1,0 to 2,5	0,03	0,02	18,0 to 21,0	8,0 to 12,0	1,5 to 3,5	—	0,5	—	—
(20 10 3)	308Mo	0,08	0,65	1,0 to 2,5	0,03	0,03	18,0 to 21,0	9,0 to 12,0	2,0 to 3,0	—	0,75	—	—
—	308LMo	0,03	0,65	1,0 to 2,5	0,03	0,03	18,0 to 21,0	9,0 to 12,0	2,0 to 3,0	—	0,75	—	—
23 12 L	(309L)	0,03	0,65	1,0 to 2,5	0,03	0,02	22,0 to 25,0	11,0 to 14,0	0,5	—	0,5	—	—
(23 12 L)	309L	0,03	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
22 11 L[f]	309LD[f]	0,03	0,65	1,0 to 2,5	0,03	0,03	21,0 to 24,0	10,0 to 12,0	0,75	—	0,75	—	—
23 12 L Si	(309LSi)	0,03	0,65 to 1,2	1,0 to 2,5	0,03	0,02	22,0 to 25,0	11,0 to 14,0	0,5	—	0,5	—	—
(23 12 L Si)	309LSi	0,03	0,65 to 1,00	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
23 12 Nb	(309LNb)	0,08	1,0	1,0 to 2,5	0,03	0,02	22,0 to 25,0	11,0 to 14,0	0,5	—	0,5	10 × C to 1,0	—
(23 12 Nb)	309LNb	0,03	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	10 × C to 1,0	—
22 12 L Nb[f]	309LNbD[f]	0,03	0,65	1,0 to 2,5	0,03	0,03	20,0 to 23,0	11,0 to 13,0	0,75	—	0,75	10 x C to 1,2	—
—	309Mo	0,12	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	2,0 to 3,0	—	0,75	—	—
23 12 2 L	(309LMo)	0,03	1,0	1,0 to 2,5	0,03	0,02	21,0 to 25,0	11,0 to 15,5	2,0 to 3,5	—	0,5	—	—
(23 12 2 L)	309LMo	0,03	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	2,0 to 3,0	—	0,75	—	—

Table 1 (*continued*)

Alloy designation[a], classification according to		Chemical composition, % by mass[b]											
Nominal composition[d] ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb[e]	Other
(21 13 3 L)	309LMoD[f]	0,03	0,65	1,0 to 2,5	0,03	0,03	19,0 to 22,0	12,0 to 14,0	2,3 to 3,3	—	0,75	—	—
21 13 3 L[f]	(309LMoD)	0,03	0,65	1,0 to 2,5	0,03	0,03	19,0 to 22,0	12,0 to 14,0	2,8 to 3,3	—	0,75	—	—
29 9	(312)	0,15	1,0	1,0 to 2,5	0,03	0,02	28,0 to 32,0	8,0 to 12,0	0,5	—	0,5	—	—
(29 9)	312	0,15	0,65	1,0 to 2,5	0,03	0,03	28,0 to 32,0	8,0 to 10,5	0,75	—	0,75	—	—
Heat resisting types													
16 8 2	(16-8-2)	0,10	1,0	1,0 to 2,5	0,03	0,02	14,5 to 16,5	7,5 to 9,5	1,0 to 2,5	—	0,5	—	—
(16 8 2)	16-8-2	0,10	0,65	1,0 to 2,5	0,03	0,03	14,5 to 16,5	7,5 to 9,5	1,0 to 2,0	—	0,75	—	—
19 9 H	(19-10H)	0,04 to 0,08	1,0	1,0 to 2,5	0,03	0,02	18,0 to 21,0	9,0 to 11,0	0,5	—	0,5	—	—
(19 9 H)	19-10H	0,04 to 0,08	0,65	1,0 to 2,0	0,03	0,03	18,5 to 20,0	9,0 to 11,0	0,25	—	0,75	0,05	Ti 0,05
(19 9 H)	308H	0,04 to 0,08	0,65	1,0 to 2,5	0,03	0,03	19,5 to 22,0	9,0 to 11,0	0,50	—	0,75	—	—
19 12 3 H	(316H)	0,04 to 0,08	1,0	1,0 to 2,5	0,03	0,02	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,5	—	—
(19 12 3 H)	316H	0,04 to 0,08	0,65	1,0 to 2,5	0,03	0,03	18,0 to 20,0	11,0 to 14,0	2,0 to 3,0	—	0,75	—	—
21 10 N[e]	—	0,06 to 0,09	1,0 to 2,0	0,3 to 1,0	0,02	0,01	20,5 to 22,5	9,5 to 11,0	0,5	0,10 to 0,20	0,5	—	Ce 0,03 to 0,08
22 12 H	(309)	0,04 to 0,15	2,0	1,0 to 2,5	0,03	0,02	21,0 to 24,0	11,0 to 14,0	0,5	—	0,5	—	—
(22 12 H)	309	0,12	0,65	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
—	309Si	0,12	0,65 to 1,00	1,0 to 2,5	0,03	0,03	23,0 to 25,0	12,0 to 14,0	0,75	—	0,75	—	—
25 4	—	0,15	2,0	1,0 to 2,5	0,03	0,02	24,0 to 27,0	4,0 to 6,0	0,5	—	0,5	—	—

Table 1 (*continued*)

Alloy designation[a], classification according to		Chemical composition, % by mass[b]											
Nominal composition[d] ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb[e]	Other
25 20[e]	(310)[e]	0,08 to 0,15	2,0	1,0 to 2,5	0,03	0,02	24,0 to 27,0	18,0 to 22,0	0,5	—	0,5	—	—
(25 20)[e]	310[e]	0,08 to 0,15	0,65	1,0 to 2,5	0,03	0,03	25,0 to 28,0	20,0 to 22,5	0,75	—	0,75	—	—
—	310S[e]	0,08	0,65	1,0 to 2,5	0,03	0,03	25,0 to 28,0	20,0 to 22,5	0,75	—	0,75	—	—
—	310L[e]	0,03	0,65	1,0 to 2,5	0,03	0,03	25,0 to 28,0	20,0 to 22,5	0,75	—	0,75	—	—
25 20 H[e]	—	0,35 to 0,45	2,0	1,0 to 2,5	0,03	0,02	24,0 to 27,0	18,0 to 22,0	0,5	—	0,5	—	—
25 20 Mn[e]	—	0,08 to 0,15	2,0	2,5 to 5,0	0,03	0,02	24,0 to 27,0	18,0 to 22,0	0,5	—	0,5	—	—
18 36 H[e]	(330)	0,18 to 0,25	0,4 to 2,0	1,0 to 2,5	0,03	0,02	15,0 to 19,0	33,0 to 37,0	0,5	—	0,5	—	—
(18 36 H)[e]	330	0,18 to 0,25	0,65	1,0 to 2,5	0,03	0,03	15,0 to 17,0	34,0 to 37,0	0,75	—	0,75	—	—
28 35 N[e]	—	0,03 to 0,09	0,5 to 1,0	1,0 to 2,0	0,02	0,02	26,5 to 29,0	33,0 to 36,0	0,5	—	0,5	—	—
Precipitation hardening type													
—	630	0,05	0,75	0,25 to 0,75	0,03	0,03	16,00 to 16,75	4,5 to 5,0	0,75	—	3,25 to 4,00	0,15 to 0,30	—
Any other agreed composition													
Z[c]		Any other agreed composition											

[a] A designation in parentheses, e.g. (308L) or (19 9 L) indicates a near match in the other designation system, but not an exact match. The correct designation for a given composition range is the one not in parentheses. A given product may, by having a more restricted chemical composition which fulfills both sets of designation requirements, be assigned both designations independently.

[b] Single values shown in the table are maximum values. Two values shown indicate minimum and maximum limits for a range.

[c] Wire electrodes, strip electrodes, wires or rods not listed in the table shall be symbolised similarly and prefixed by the letter "Z". The chemical composition ranges are not specified and therefore two electrodes with the same Z classification might not be interchangeable.

[d] Up to 20 % of the amount of Nb can be replaced by Ta.

[e] The all-weld metal is in most cases fully austenitic and therefore can be susceptible to microfissuring or hot cracking. The occurrence of fissuring/cracking is reduced by increasing the weld metal manganese level and in recognition of this the manganese range is extended for a number of grades.

[f] These compositions are mainly used in low dilution overlay welding such as electroslag strip cladding.

5 Properties of all-weld metal

Properties of the all-weld metal are not part of the classification.

NOTE 1 The influence of the shielding gas or flux on the chemical composition of the all-weld metal has to be considered. Differences between the chemical composition of the all-weld metal and the wire electrode, wire or rod can occur.

NOTE 2 Proof strength and tensile strength of the weld metal made by a consumable listed in Table 1 is expected to comply with the minimum requirements given in Annex A. Elongation and impact properties of the weld metal can deviate from the minimum values specified for the corresponding parent metal as a result of variations in the microstructure.

NOTE 3 Table A.1 lists expected minimum tensile properties of weld metal.

6 Chemical analysis

Chemical analysis shall be performed on specimens of the product. Any analytical technique may be used, but in case of dispute reference shall be made to established published methods.

7 Rounding procedure

For the purposes of determining compliance with the requirements of this International Standard, the actual test values obtained shall be subject to ISO 80000-1:2009, Clause 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 standard 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.

8 Retests

If any test fails to meet requirements, that test shall be repeated twice. The results of both retests shall meet the requirements. Specimens for the retest may be taken from the original test assembly or from a new test assembly. For chemical analysis, retest need be only for those specific elements that failed to meet their test requirement. If the results of one or both retests fail to meet requirements, the material under test shall be considered as not meeting the requirements of this specification for that classification.

In the event that, during preparation or after completion of any test, it is clearly determined that prescribed or proper procedures were not followed in preparing the weld test assembly or test specimen(s), or in conducting the test, the test shall be considered invalid, without regard to whether the test was actually completed, or whether the test results met, or failed to meet, the requirements. That test shall be repeated, following properly prescribed procedures. In this case, the requirement for doubling the number of test specimens does not apply.

9 Technical delivery conditions

Technical delivery conditions shall be in accordance with ISO 544 and ISO 14344.