International Standard

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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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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 document 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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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 14343:2017), which has been technically revised.

The main changes are as follows:

— addition of 19 L Mo Nb Si Ti, 18 L Ti for the alloy type 439, 27 7 5 N L and 29 8 2 N L in Table 1 and Table A.1;

— adjustment of chemical compositions in Table 1;

— change of Table 1 footnote c on the symbol classifications in parentheses;

— Addition of C classification in Table 1 for System B and new footnote;

— revision of Clause 10, Example 5.

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 of ISO/TC 44 documents, where they exist, are available from this page: https://committee.iso.org/sites/tc44/home/interpretation.html.

Introduction

This document provides a classification system for wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels. It recognizes that there are two somewhat different approaches in the global market to classifying a given welding consumable, and allows for either or both to be used, to suit a particular market need. Many, but not all, commercial products addressed by this document can be classified using both approaches, and suitable products can also be marked.

System A uses the nominal composition approach with 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. System B uses the alloy type approach with three- or four-digit designations for certain grades, sometimes followed by one or more chemical element symbols indicating compositional modifications of the grade. 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.

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.

Classification in accordance with system A, by nominal composition, was based mainly on EN 12072 which has been withdrawn and replaced by this document. Classification in accordance with system B, by alloy type, is mainly based upon standards used around the Pacific Rim.

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

1 Scope

This document 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 document 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 "system 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 "system 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 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 14344, *Welding consumables — Procurement of filler materials and fluxes*

ISO 80000-1:2022, *Quantities and units — Part 1: General*

3 Terms and definitions

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

ISO and IEC maintain terminology 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/

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 in accordance with 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

4.2.1 Classification by nominal composition – system A

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.

4.2.2 Classification by alloy type – system B

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 second “S” indicates that the alloy system is stainless or heat-resisting steel.

The symbol for strip electrodes for use in submerged arc welding or electroslag welding shall be the letters "BS". "B" indicates a strip electrode, and "S" 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		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [b]	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	0,08	1,0	0,8	0,04	0,03	10,5 to 13,5	0,6	0,50	—	0,75	10 × C to 0,75	—
13	(410) [c]	0,15	1,0	1,0	0,03	0,02	12,0 to 15,0	0,5	0,5	—	0,5	—	—
(13) [c]	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) [c]	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) [c]	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	0,6	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) [c]	0,12	1,0	1,0	0,03	0,02	16,0 to 19,0	0,5	0,5	—	0,5	—	—
(17) [c]	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) [c]	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) [c]	0,03	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) to 0,6	—
18 L Nb Si	—	0,03	0,5 to 1,5	1,0	0,03	0,03	17,5 to 19,5	0,5	0,5	0,02	0,5	0,05 + 7(C+N) to 0,6	—
18 L Nb Ti	—	0,03	1,5	1,0	0,03	0,03	17,5 to 19,5	0,5	0,5	0,02	0,5	8 × C to 0,8	Ti 10 × C to 0,5

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [b]	Other
18 L Ti	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
19 L Mo Nb Si Ti	—	0,03	1,5	1,0	0,03	0,03	18,5 to 20,5	0,5	1,75 to 2,25	0,02	0,5	8 × C to 0,6	Ti 6 × C to 0,5
—	446LMo	0,015	0,4	0,4	0,02	0,02	25,0 to 27,5	[d]	0,75 to 1,00	0,015	[d]	—	—
Austenitic types													
—	209	0,05	0,90	4,0 to 7,0	0,03	0,03	20,5 to 24,0	9,5 to 12,0	1,5 to 3,0	0,10 to 0,30	0,75	—	V 0,10 to 0,30
—	218	0,10	3,5 to 4,5	7,0 to 9,0	0,03	0,03	16,0 to 18,0	8,0 to 9,0	0,75	0,08 to 0,18	0,75	—	—
—	219	0,05	1,00	8,0 to 10,0	0,03	0,03	19,0 to 21,5	5,5 to 7,0	0,75	0,10 to 0,30	0,75	—	—
—	240	0,05	1,00	10,5 to 13,5	0,03	0,03	17,0 to 19,0	4,0 to 6,0	0,75	0,10 to 0,30	0,75	—	—
—	308	0,08	0,30 to 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) [c]	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) [c]	308L	0,03	0,30 to 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) [c]	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) [c]	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	—	—
—	308N2	0,10	0,90	1,0 to 4,0	0,03	0,03	20,0 to 25,0	7,0 to 11,0	0,75	0,12 to 0,30	0,75	—	—
19 9 Nb	(347) [c]	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	—

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [b]	Other
(19 9 Nb) [c]	347	0,08	0,30 to 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 0,2 min.	—
19 9 Nb Si	(347Si) [c]	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) [c]	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 0,2 min.	—
—	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 0,2 min.	—
—	347H	0,04 to 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	—
—	316	0,08	0,30 to 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) [c]	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) [c]	316L	0,03	0,30 to 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) [c]	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	—	—
(19 12 3 L Si) [c]	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) [c]	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) [c]	318	0,08	0,30 to 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; 0,2 min.	—

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	**Alloy type ISO 14343-B**	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Ni**	**Mo**	**N**	**Cu**	**Nb [b]**	**Other**
—	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; 0,2 min.	—
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	0,30 to 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) [c]	317L	0,03	0,30 to 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	0,30 to 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; 0,2 min.
Ferritic-austenitic types (sometimes referred to as austenitic-ferritic types)													
22 9 3 N L	(2209) [c]	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) [c]	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	2307	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
—	2394L	0,03	0,90	0,5 to 2,5	0,03	0,03	23,0 to 27,0	8,0 to 11,0	3,0 to 4,5	0,08 to 0,30	1,0	—	—
27 7 5 N L	—	0,03	1,0	2,5	0,03	0,02	26,0 to 28,0	5,5 to 7,5	4,0 to 5,5	0,35 to 0,50	0,75	—	—
29 8 2 N L	—	0,03	1,0	2,5	0,03	0,02	27,5 to 30,5	6,0 to 8,0	1,5 to 3,0	0,30 to 0,40	0,75	—	—
Fully austenitic types [e]													
18 15 3 L [e]	(317L) [c 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	—	—

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [b]	Other
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) [c 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) [c 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) [c 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 5,0	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	0,30 to 0,65	5,0 to 9,0	0,03	0,03	19,0 to 22,0	15,0 to 18,0	2,5 to 3,5	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) [c 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) [c 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	—

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [b]	Other
—	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[e]	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	—	—
Special types (often used for dissimilar metal joining)													
—	307[e]	0,04 to 0,14	0,30 to 0,65	3,30 to 4,75	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) [c]	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) [c]	308Mo	0,08	0,30 to 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	0,04	0,30 to 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) [c]	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) [c]	309L	0,03	0,30 to 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) [c]	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) [c]	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) [c]	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	—

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [b]	Other
(23 12 Nb) [c]	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; 0,2 min.	—
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 × C to 1,2; 0,2 min.	—
—	309Mo	0,12	0,30 to 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) [c]	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) [c]	309LMo	0,03	0,30 to 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	—	—
(21 13 3 L) [c]	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) [c]	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) [c]	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) [c]	312	0,15	0,30 to 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) [c]	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) [c]	16–8-2	0,10	0,30 to 0,65	1,0 to 2,0	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) [c]	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) [c]	19–10H	0,04 to 0,08	0,30 to 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

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	C	Si	Mn	P	S	Cr	Ni	Mo	N	Cu	Nb [b]	Other
—	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	—	—
(19 9 H) [c]	308H	0,04 to 0,08	0,30 to 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) [c]	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) [c]	316H	0,04 to 0,08	0,30 to 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) [c]	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) [c]	309	0,12	0,30 to 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	—	—
25 20 [e]	(310) [c 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) [c e]	310 [c e]	0,08 to 0,15	0,30 to 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	—	—

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

Table 1 *(continued)*

Alloy designation		Chemical composition, % by mass [a]											
Nominal composition ISO 14343-A	**Alloy type ISO 14343-B**	**C**	**Si**	**Mn**	**P**	**S**	**Cr**	**Ni**	**Mo**	**N**	**Cu**	**Nb [b]**	**Other**
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) [c e]	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) [c e=]	330	0,18 to 0,25	0,30 to 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	—	—
—	3556 [e]	0,05 to 0,15	0,20 to 0,80	0,50 to 2,00	0,04	0,015	21,0 to 23,0	19,0 to 22,5	2,5 to 4,0	0,10 to 0,30	–	0,30	Co 16,0 to 21,0 W 2,0 to 3,5 Ta 0,30 to 1,25 Al 0,10 to 0,50 Zr 0,001 to 0,100 La 0,005 to 0,100 B 0,02
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	—
Other compositions													
Z [g]	G [h]	Any other agreed composition											

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

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

[c] Alloy designations in parentheses shall not be used as part of a classification. Alloy designations in parentheses [e.g. (308L) or (19 9 L)] indicate 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, by having a more restricted chemical composition that fulfils both sets of designation requirements, may be assigned both designations independently.

[d] Ni + Cu ≤ 0,5 %.

[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.

[g] 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 products with the same Z classification are not interchangeable.

[h] Consumables for which the chemical composition is not listed shall be symbolized by the letter G. The chemical composition ranges are not specified, and it is possible that two products with the same G classification are not interchangeable.

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 is 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 are 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 or the stock from which it is made. Any analytical technique may be used, but in case of dispute, reference shall be made to established published methods.

7 Rounding procedure

Actual test values obtained shall be subject to ISO 80000-1:2022, B.3, Rule A. If the measured values are obtained by equipment calibrated in units other than those of this document, the measured values shall be converted to the units of this document before rounding. If an average value is to be compared to the requirements of this document, rounding shall be done only after calculating the average. The rounded results shall fulfil the requirements of the appropriate table for the classification under test.

8 Retesting

If any test fails to meet the requirement, that test shall be repeated twice. The results of both retests shall meet the requirement. Specimens for the retest may be taken from the original sample or from a new sample. For chemical analysis, retesting need only be for those specific elements that failed to meet their testing requirement. If the results of one or both retests fail to meet the requirement, 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 tests, 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 proper 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.

10 Examples of designation

The designation of the welding consumable shall follow the principle given in the examples below.

EXAMPLE 1 A wire electrode for gas-shielded metal arc welding, also applicable to submerged arc welding, having a chemical composition within the limits for the alloy symbol 20 10 3 and within the limits for the alloy symbol 308Mo of Table 1:

Classification by nominal composition – System A

ISO 14343-A - G 20 10 3 and/or **S 20 10 3**

Classification by alloy type – system B

ISO 14343-B - SS308Mo

EXAMPLE 2 A rod for gas tungsten arc welding having a chemical composition within the limits for the alloy symbol 20 10 3 and within the limits for the alloy symbol 308Mo of Table 1:

Classification by nominal composition – System A

ISO 14343-A - W 20 10 3

Classification by alloy type – System B

ISO 14343-B - SS308Mo

EXAMPLE 3 A wire electrode for gas-shielded metal arc welding having a chemical composition within the limits for the alloy symbol 19 12 3 L Si and within the limits for alloy symbol 316LSi of Table 1:

Classification by nominal composition – System A

ISO 14343-A - G 19 12 3 L Si

Classification by alloy type – System B

ISO 14343-B - SS316LSi

EXAMPLE 4 A strip electrode for submerged arc welding or electroslag welding has a chemical composition within the limits for the alloy symbol 23 12 2 L and within the limits for alloy symbol 309LMo of Table 1:

Classification by nominal composition – System A

ISO 14343-A - B 23 12 2 L

Classification by alloy type – System B

ISO 14343-B - BS 309LMo

where, in all four examples:

— System A:
  — ISO 14343-A is the number of this document, classification by nominal composition (system A);
  — G or S or W or B indicates product or process symbol (see 4.2.1);
  — 20 10 3, 19 12 3 L Si or 23 12 2 L is the chemical composition of the product (see Table 1).
— System B:
  — ISO 14343-B is the number of this document, classification by alloy type (system B);
  — SS or BS indicates product or process symbol (see 4.2.2);
  — 308Mo, 316LSi or 309LMo indicates the chemical composition of the product (see Table 1).

EXAMPLE 5 A wire rod for gas tungsten arc welding has a chemical composition (21 % Cr and Ti stabilized) not listed in Table 1 and therefore designated with “Z” (System A) or “G” (System B):

Classification by nominal composition – System A

ISO 14343-A – W Z 21Ti

where,

ISO 14343-A is the number of this document, classification by nominal composition (system A);

W indicates the product or process symbol (see 4.2.1);

Z indicates the chemical composition of the product is not specified (see Table 1);

21Ti is the nominal chemical composition of the product as agreed between manufacturer and customer (see Table 1).

Classification by alloy type – System B

ISO 14343-B – SS G

where,

ISO 14343-B is the number of this document, classification by nominal composition (system B);

SS indicates product or process symbol (see 4.2.2);

G indicates the chemical composition of the product is not specified (see Table 1);

Annex A
(informative)

Expected minimum tensile properties of all-weld metal

See Table A.1.

Table A.1 — Expected minimum tensile properties of all-weld metal

Alloy symbol classification according to		Mechanical property			Postweld heat treatment [b]
Nominal composition ISO 14343-A	Alloy type ISO 14343-B	Proof strength $R_{p0,2}$ MPa	Tensile strength R_m MPa	Elongation [a] %	
—	409	180	380	15	None
—	409Nb	250	450	15	[c]
13 [d]	410 [c]	250	450	15	[d] or [c]
13 L	—	250	450	15	[d]
13 4	410NiMo	500	750	15	[e]
—	420	250	450	15	[d]
16 5 1	—	400	600	15	None
17	430	300	450	15	[f]
—	430Nb	250	450	15	[f]
18 L Nb	430LNb	220	410	15	None
18 L Nb Si	—	220	410	15	None
18 L Nb Ti	—	N/A	N/A	N/A	N/A
18 L Ti	439	220	410	15	None
19 L Mo Nb Si Ti	—	220	410	15	None
—	446LMo	N/A	N/A	N/A	N/A
—	209	350	690	15	None
—	218	550	760	15	None
—	219	490	620	15	None
—	240	350	690	15	None
—	308	350	550	25	None
—	308Si	350	550	25	None
19 9 L	308L	320	510	25	None

[a] Gauge length is equal to five times the specimen diameter.

[b] The values shown only reflect one condition. However, many alloys are used in both post weld heat treated and as welded conditions depending, for example, on application, material thickness and other variables.

[c] 730 °C/760 °C for 1 h, furnace cooling down to 600 °C, then air cooling.

[d] 840 °C/870 °C for 2 h, furnace cooling down to 600 °C, then air cooling.

[e] 580 °C/620 °C for 2 h, air cooling.

[f] 760 °C/790 °C for 2 h, furnace cooling down to 600 °C, then air cooling.

[g] These wire electrodes, strip electrodes, wires and rods deposit high carbon weld metal for service at high temperatures. Room temperature elongation has little relevance to such applications. Weld metal can have elongation lower than that of the parent metal.

[h] 1 025 °C/1 050 °C for 1 h, air cool to ambient, then 610 °C/630 °C for 4 h, air cool.