TECHNICAL REPORT

ISO/TR 20172

Third edition
2021-04

Welding — Grouping systems for materials — European materials

Soudage — Systèmes de groupement des matériaux — Matériaux européens

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 10, *Quality management in the field of welding*, 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 third edition cancels and replaces the second edition (ISO 20172:2009), which has been technically revised.

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

— Tables 1 to 5 have been revised;

— new Table 6 has been added for nickel and nickel alloys.

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.

Introduction

This document reflects the situation at the time of publication.

Lists of former designations can be found in the relevant European materials standards.

For the materials not listed in this document, ISO/TR 20173:2018 and ISO/TR 20174:2020 are applicable.

Welding — Grouping systems for materials — European materials

1 Scope

This document establishes a European grouping system for materials for welding purposes, classified in accordance with the grouping system of ISO/TR 15608.

It is also applicable for other purposes such as heat treatment, forming and non-destructive testing.

This document covers grouping systems for the following standardized materials:

a) steel;

b) aluminium and its alloys;

c) copper and its alloys;

d) cast irons;

e) nickel and nickel alloys.

For materials that are not assigned to a group in this document, the criteria of ISO/TR 15608 apply.

2 Normative references

There are no normative references in this document.

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 http://www.electropedia.org/

4 International grouping system for European materials

4.1 Types of steel in accordance with the grouping system of ISO/TR 15608:2017, Table 1

See Table 1.

Materials grouped according to this document based on chemical composition and mechanical properties but with specific delivering conditions outside ISO/TR 15608:2017 are qualified separately.

Table 1 — Steel materials, classification according to the grouping of material

Designation		Group	Standard(s)
Name	Number		
10CrMo5-5	1.7338	5.1	EN 10216-2
10CrMo9-10	1.7380	5.2	EN 10028-2, EN 10216-2, EN 10273
11CrMo9-10	1.7383	5.2	EN 10028-2, EN 10216-2, EN 10222-2, EN 10273
11MnNi5-3	1.6212	9.1	EN 10028-4, EN 10216-4
12Ni14	1.5637	9.2	EN 10028-4, EN 10216-4, EN 10222-3
12Ni19	1.5680	9.2	EN 10028-4
13CrMo4-5	1.7335	5.1	EN 10028-2, EN 10216-2, EN 10222-2, EN 10273
13MnNi6-3	1.6217	9.1	EN 10028-4, EN 10216-4, EN 10222-3
14MoV6-3	1.7715	6.1	EN 10216-2, EN 10222-2
15MnCrMoNiV5-3	1.6920	4.1	EN 10222-2
15MnMoV4-5	1.5402	1.2	EN 10222-2
15NiCuMoNb5-6-4	1.6368	4.2	EN 10216-2
15NiMn6	1.6228	9.1	EN 10028-4, EN 10222-3
16Mo3	1.5415	1.2	EN 10222-2, EN 10216-2, EN 10217-2, EN 10217-5, EN 10273, EN 10028-2
18MnMoNi5-5	1.6308	3.1	EN 10222-2
20CrMoV13-5-5	1.7779	6.3	EN 10216-2
20Mn5	1.1133	1.4	EN 10250-2
20MnB5	1.5353	3.2	EN ISO 683-2, EN ISO 683-3
20MnNb6	1.0471	1.2	EN 10216-2
20NiCrMo2-2	1.6523	3.1	EN 10297-1
20NiCrMoS2-2	1.6526	3.1	EN 10297-1
24CrMo13-6	1.8516	5.2	EN 10085
25CrMo4	1.7218	5.1	EN ISO 683-2, EN ISO 683-3, EN 10132-2, EN 10216-2, EN 10297-1
25CrMoS4	1.7213	5.1	EN ISO 683-2, EN ISO 683-3, EN 10277
25Mn4	1.1177	1.3	EN 10132-2
26CrMo4-2	1.7219	5.1	EN 10216-4
27MnCrB5-2	1.7182	11.1	EN ISO 683-2, EN ISO 683-3
28Mn6	1.1170	1.4 [a]	EN 10083-2, EN 10250-2
30CrMo4	1.7216	5.1 [a]	EN 10297-1
30MnB5	1.5531	11.1	EN ISO 683-2, EN ISO 683-3
30NiCrMo16-6	1.6747	9.2 [a]	EN ISO 683-2, EN ISO 683-3
31CrMo12	1.8515	5.2 [a]	EN 10085
31CrMoV9	1.8519	6.2 [a]	EN 10085
32CrAlMo7-10	1.8505	5.1 [a]	EN 10085

[a] The classification of materials is for informational purposes only, as the strength values or limits of chemical composition specified in this document can be outside the limits of ISO/TR 15608. But these materials have not exactly the same behaviour during welding as his sub-group material. Welding conditions should be specifically adapted.

Table 1 *(continued)*

Designation		Group	Standard(s)
Name	Number		
33CrMoV12-9	1.8522	6.2 [a]	EN 10085
34Cr4	1.7033	5.1 [a]	EN ISO 683-2, EN ISO 683-3, EN 10250-3
34CrAlMo5-10	1.8507	5.1 [a]	EN 10085
34CrAlNi7-10	1.8550	5.1 [a]	EN 10085
34CrMo4	1.7220	11.2 [a]	EN ISO 683-2, EN ISO 683-3, EN 10297-1
34CrMoS4	1.7226	11.2 [a]	EN ISO 683-2, EN ISO 683-3
34CrNiMo6	1.6582	5.2 [a]	EN 10277
34CrS4	1.7037	5.1 [a]	EN ISO 683-2, EN ISO 683-3
35NiCr6	1.5815	9.1 [a]	EN ISO 683-2, EN ISO 683-3
36NiCrMo16	1.6773	9.2 [a]	EN ISO 683-2, EN ISO 683-3
37Cr4	1.7034	5.1 [a]	EN ISO 683-2, EN ISO 683-3
37CrS4	1.7038	5.1 [a]	EN ISO 683-2, EN ISO 683-3
38Cr2	1.7003	5.1 [a]	EN ISO 683-2, EN ISO 683-3
38Mn6	1.1127	11.2 [a]	EN 10297-1
39MnCrB6-2	1.7189	5.1 [a]	EN ISO 683-2, EN ISO 683-3
39NiCrMo3	1.6510	9.2 [a]	EN ISO 683-2, EN ISO 683-3
40CrMoV13-9	1.8523	6.2 [a]	EN 10085
41Cr4	1.7035	11.2 [a]	EN ISO 683-2, EN ISO 683-3
41CrAlMo7-10	1.8509	5.1 [a]	EN 10085
41CrS4	1.7039	11.2 [a]	EN ISO 683-2, EN ISO 683-3
42CrMo4	1.7225	5.1 [a]	EN ISO 683-2, EN ISO 683-3, EN 10132-2, EN 10297-1
42CrMoS4	1.7227	5.1 [a]	EN ISO 683-2, EN ISO 683-3, EN 10277
46Cr2	1.7006	11.2 [a]	EN ISO 683-2, EN ISO 683-3
50CrMo4	1.7228	5.1 [a]	EN ISO 683-2, EN ISO 683-3
51CrV4	1.8159	6.1 [a]	EN ISO 683-2, EN ISO 683-3
8MoB5-4	1.5450	1.3	EN 10216-2
C10	1.0301	1.1	EN 10277
C10E	1.1121	1.1	EN 10132-2, EN 10297-1
C15	1.0401	1.1	EN 10277
C15E	1.1141	1.1	EN 10132-2, EN 10297-1
C15R	1.1114	1.1	EN 10297-1
C16	1.0407	1.1	EN 10277
C22	1.0402	1.1	EN 10250-2
C22E	1.1151	1.1	EN 10132-2, EN 10083-2, EN 10297-1
C22R	1.1149	1.1	EN 10083-2
C25	1.0406	1.1	EN 10250-2
C25E	1.1158	1.1	EN 10250-2

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Table 1 *(continued)*

Designation		Group	Standard(s)
Name	Number		
C30	1.0528	11.1	EN 10250-2
C30E	1.1178	11.1	EN 10132-2
C35	1.0501	11.1	EN 10083-2, EN 10250-2, EN 10277
C35E	1.1181	11.1	EN 10083-2, EN 10250-2, EN 10297-1, EN 10132-2, EN 10277
C35R	1.1180	11.1	EN 10277
C35R	1.1180	11.2	EN 10083-2
C40	1.0511	11.2	EN 10083-2, EN 10250-2, EN 10277
C40E	1.1186	11.2	EN 10083-2, EN 10132-2, EN 10277
C40R	1.1189	11.2	EN 10083-2, EN 10277
C45	1.0503	11.2 [a]	EN 10083-2, EN 10250-2, EN 10277
C45E	1.1191	11.2 [a]	EN 10083-2, EN 10250-2, EN 10297-1, EN 10132-2
C45R	1.1201	11.2 [a]	EN 10083-2, EN 10277
C50	1.0540	11.2	EN 10250-2, EN 10277
C50E	1.1206	11.3 [a]	EN 10277, EN 10083-2
C50R	1.1241	11.3	EN 10083-2, EN 10277
C55	1.0535	11.3	EN 10250-2, EN 10083-2
C55E	1.1203	11.3	EN 10083-2, EN 10250-2, EN 10132-2
C55R	1.1209	11.3	EN 10083-2
C60	1.0601	11.3	EN 10083-2, EN 10277, EN 10250-2
C60E	1.1221	11.3	EN 10083-2, EN 10132-2, EN 10250-2, EN 10297-1, EN 10277
C60R	1.1223	11.3	EN 10083-2, EN 10277
E155	1.0033	1.1	EN 10296-1, EN 10305-2, EN 10305-3, EN 10305-6
E190	1.0031	1.1	EN 10296-1, EN 10305-3
E195	1.0034	1.1	EN 10296-1, EN 10305-3, EN 10305-6, EN 10305-2
E215	1.0212	1.1	EN 10305-1, EN 10305-4
E220	1.0215	1.1	EN 10296-1, EN 10305-3, EN 10305-5
E235	1.0308	1.1	EN 10296-1, EN 10297-1, EN 10305-1, EN 10305-2, EN 10305-3, EN 10305-4, EN 10305-6
E260	1.0220	1.1	EN 10296-1, EN 10305-3
E275	1.0225	1.1	EN 10296-1, EN 10297-1, EN 10305-2, EN 10305-3, EN 10305-5, EN 10305-6
E275K2	1.0456	1.1	EN 10296-1, EN 10297-1
E275M	1.8895	1.1	EN 10296-1
E295GC	1.0533	1.2	EN 10277

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Table 1 *(continued)*

Designation		Group	Standard(s)
Name	Number		
E315	1.0236	1.2	EN 10297-1
E320	1.0237	1.2	EN 10296-1, EN 10305-3, EN 10305-5
E335GC	1.0543	1.2	EN 10277
E355	1.0580	1.2 [a]	EN 10296-1, EN 10305-2, EN 10305-3, EN 10305-4, EN 10305-6, EN 10305-1, EN 10297-1
E355K2	1.0599	1.2	EN 10297-1
E355K2	1.0920	1.2	EN 10296-1
E355M	1.8896	1.2	EN 10296-1
E370	1.0261	1.3	EN 10296-1, EN 10305-3, EN 10305-5
E420	1.0575	1.3	EN 10305-3, EN 10305-5
E420J2	1.0920	1.3	EN 10297-1
E420M	1.8897	2.1	EN 10296-1
E460K2	1.8891	1.3	EN 10296-1, EN 10297-1
E460M	1.8898	2.1	EN 10296-1
E470	1.0536	1.3	EN 10297-1
E590K2	1.0644	1.3	EN 10297-1
E730K2	1.8893	1.3	EN 10297-1
G12MoCrV5-2	1.7720	6.1	EN 10213
G17CrMo5-5	1.7357	5.1	EN 10213
G17CrMo9-10	1.7379	5.2	EN 10213
G17CrMoV5-10	1.7706	6.2	EN 10213
G17Mn5	1.1131	1.1	EN 10213
G17NiCrMo13-6	1.6781	9.2	EN 10213
G18Mo5	1.5422	1.2	EN 10213
G20Mn5	1.6220	1.2	EN 10213
G20Mo5	1.5419	1.2	EN 10213
G9Ni10	1.5636	9.1	EN 10213
G9Ni14	1.5638	9.2	EN 10213
GP240GH	1.0619	1.1	EN 10213
GP240GR	1.0621	1.1	EN 10213
GP280GH	1.0625	1.2	EN 10213
GX15CrMo5	1.7365	5.3	EN 10213
GX23CrMoV12-1	1.4931	6.4	EN 10213
GX2CrNi19-11	1.4309	8.1	EN 10213
GX2CrNiMo19-11-2	1.4409	8.1	EN 10213
GX2CrNiMoCuN25-6-3-3	1.4517	10.2	EN 10213
GX2CrNiMoN22-5-3	1.4470	10.1	EN 10213
GX2CrNiMoN26-7-4	1.4469	10.2	EN 10213

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Table 1 *(continued)*

Designation		Group	Standard(s)
Name	Number		
GX2NiCrMo28-20-2	1.4458	8.2	EN 10213
GX3CrNi13-4	1.6982	7.2	EN 10213
GX4CrNi13-4	1.4317	7.2	EN 10213
GX4CrNiMo16-5-1	1.4405	7.2	EN 10132-2
GX5CrNi19-10	1.4308	8.1	EN 10213
GX5CrNiMo19-11-2	1.4408	8.1	EN 10213
GX5CrNiMoNb19-11-2	1.4581	8.1	EN 10213
GX5CrNiNb19-11	1.4552	8.1	EN 10213
GX8CrNi12	1.4107	7.2	EN 10213
HC180B	1.0395	1.1	EN 10268
HC180P	1.0342	1.1	EN 10268
HC180Y	1.0922	1.1	EN 10268
HC220B	1.0396	1.1	EN 10268
HC220I	1.0346	1.1	EN 10268
HC220P	1.0397	1.1	EN 10268
HC220Y	1.0925	1.1	EN 10268
HC260B	1.0400	1.1	EN 10268
HC260I	1.0349	1.1	EN 10268
HC260LA	1.0480	1.1	EN 10268
HC260P	1.0417	1.1	EN 10268
HC260Y	1.0928	1.1	EN 10268
HC300B	1.0444	1.2	EN 10268
HC300I	1.0447	1.2	EN 10268
HC300LA	1.0489	1.2	EN 10268
HC300P	1.0448	1.2	EN 10268
HC340LA	1.0548	1.2	EN 10268
HC380LA	1.0550	1.3	EN 10268
HC420LA	1.0556	1.3	EN 10268
L210GA	1.0319	1.1	EN ISO 3183
L235	1.0252	1.1	EN 10224
L235GA	1.0458	1.1	EN ISO 3183
L245GA	1.0459	1.1	EN ISO 3183
L245MB	1.0418	1.1	EN ISO 3183
L245NB	1.0457	1.1	EN ISO 3183
L275	1.0260	1.1	EN 10224
L290GA	1.0483	1.2	EN ISO 3183
L290MB	1.0429	1.2	EN ISO 3183
L290NB	1.0484	1.2	EN ISO 3183
L355	1.0419	1.2	EN 10224
L360GA	1.0499	1.2	EN ISO 3183

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Table 1 *(continued)*

Designation		Group	Standard(s)
Name	Number		
L360MB	1.0578	1.2	EN ISO 3183
L360NB	1.0582	1.2	EN ISO 3183
L360QB	1.8948	1.2	EN ISO 3183
L415MB	1.8973	2.1	EN ISO 3183
L415NB	1.8972	1.3	EN ISO 3183
L415QB	1.8947	3.1	EN ISO 3183
L450MB	1.8975	2.1	EN ISO 3183
L450QB	1.8952	3.1	EN ISO 3183
L485MB	1.8977	2.2	EN ISO 3183
L485QB	1.8955	3.1	EN ISO 3183
L550QB	1.8957	3.1	EN ISO 3183
L555MB	1.8978	2.2	EN ISO 3183
P195GH	1.0348	1.1	EN 10216-2, EN 10217-2
P195TR1	1.0107	1.1	EN 10216-1, EN 10217-1
P195TR2	1.0108	1.1	EN 10216-1, EN 10217-1
P215NL	1.0451	1.1	EN 10216-4, EN 10217-4, EN 10217-6
P235GH	1.0345	1.1	EN 10216-2, EN 10217-2, EN 10217-5, EN 10273, EN 10028-2
P235S	1.0112	1.1	EN 10207
P235TR1	1.0254	1.1	EN 10216-1, EN 10217-1
P235TR2	1.0255	1.1	EN 10216-1, EN 10217-1
P245GH	1.0352	1.1	EN 10222-2
P245NB	1.0111	1.1	EN 10120
P250GH	1.0460	1.1	EN 10273
P255QL	1.0452	1.1	EN 10216-4
P265GH	1.0425	1.1	EN 10216-2, EN 10217-2, EN 10217-5, EN 10273, EN 10028-2
P265NB	1.0423	1.1	EN 10120, EN 10149-3
P265NL	1.0453	1.1	EN 10216-4, EN 10217-4, EN 10217-6
P265S	1.0130	1.1	EN 10207
P265TR1	1.0258	1.1	EN 10216-1, EN 10217-1
P265TR2	1.0259	1.1	EN 10216-1, EN 10217-1
P275N	1.0486	1.1	EN 10028-3
P275NH	1.0487	1.1	EN 10273, EN 10028-3
P275NL1	1.0488	1.1	EN 10216-3, EN 10217-3, EN 10028-3
P275NL2	1.1104	1.1	EN 10216-3, EN 10217-3, EN 10028-3
P275S	1.1100	1.1	EN 10207

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