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Cast non-alloy and low alloy steels for general applications

Aciers moulés non alliés et faiblement alliés pour applications générales
[Revision of first edition (ISO 14737:2003)]

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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 14737 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 11, *Steel castings*.

This second edition cancels and replaces the first edition (ISO 14737:2003), which has been technically revised. This second edition replaces also the second edition of ISO 3755:1991.

Cast non-alloy and low alloy steels for general applications

1 Scope

This International Standard specifies requirements for carbon and low alloy cast steel grades for general applications.

NOTE Annex C gives information on ISO grade designation and available UNS numbers which are similar to the ISO grade designation.

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 148-1, *Metallic materials – Charpy pendulum impact test – Part 1: Test method*

ISO 4990, *Steel castings – General technical delivery requirements*

ISO 6892-1, *Metallic materials – Tensile testing – Part 1: Method of test at room temperature*

3 General conditions for delivery

Steel castings supplied in accordance with this International Standard shall conform to the applicable requirements of ISO 4990, including the supplementary requirements that are indicated in the inquiry and purchase order.

4 Chemical composition

The chemical composition shall conform to the values given in Table 1.

5 Heat treatment

The type of heat treatment is left to the discretion of the manufacturer unless otherwise agreed upon at the time of inquiry and order. The information for heat treatment described in Table 2 is for information only.

6 Mechanical properties

Mechanical properties are given in Table 2 and shall be subject to an agreement at the time of inquiry and order.

Unless otherwise specified (see ISO 4990) the thickness of the test block shall be 28 mm minimum.

Properties at thicknesses greater than the maximum thickness in Table 2 may be lower and are subject to an agreement between manufacturer and purchaser.

7 Test methods

7.1 Tensile testing shall be performed in accordance with ISO 6892-1.

7.2 Impact testing shall be performed in accordance with ISO 148-1.

8 Supplementary requirements

This international standard also specifies a group of supplementary requirements, which may be applied to steel castings. These requirements are provided for use when additional testing or inspection is desired and apply only when individually specified by the purchaser.

A list of supplementary requirements which may be used at the option of the purchaser is given in ISO 4990.

9 Marking

Marking shall be as specified in ISO 4990.

Table 1 — Steel grades and chemical composition (cast analysis), % by mass[c]

Grade designation		Analyses									
Name	Number	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu
GE 200	1.0420	-	-	-	0,035	0,030	-	-	-	-	-
GS 200	1.0449	0,18	0,60	1,20	0,030	0,025	-	-	-	-	-
GE 240	1.0446	-	-	-	0,035	0,030	-	-	-	-	-
GS 240	1.0455	0,23	0,60	1,20	0,030	0,025	-	-	-	-	-
GS 270	1.0454	0,24	0,60	1,30	0,030	0,025	0,30 [a]	0,12 [a]	0,40 [a]	0,03 [a]	0,30 [a]
GS 340	1.0467	0,30	0,60	1,50	0,030	0,025	0,30 [a]	0,12 [a]	0,40 [a]	0,03 [a]	0,30 [a]
G21Mn5	1.1138	0,17 to 0,24	0,60	1,10 to 1,30	0,020	0,025	0,30	0,15	0,80	0,05	0,30
G28Mn6	1.1165	0,25 to 0,32	0,60	1,20 to 1,80	0,035	0,030	0,30	0,15	0,40	0,05	0,30
G28MnMo6	1.5433	0,25 to 0,32	0,60	1,20 to 1,60	0,025	0,025	0,30	0,20 to 0,40	0,40	0,05	0,30
G20Mo5	1.5419	0,15 to 0,23	0,60	0,50 to 1,00	0,025	0,020[b]	0,30	0,40 to 0,60	0,40	0,05	0,30
G10MnMoV6-3	1.5410	0,12 max.	0,60	1,20 to 1,80	0,025	0,020	0,30	0,20 to 0,40	0,40	0,05 to 0,10	0,30
G20NiCrMo2-2	1.6741	0,18 to 0,23	0,60	0,60 to 1,00	0,035	0,030	0,40 to 0,60	0,15 to 0,25	0,40 to 0,70	0,05	0,30
G25NiCrMo2-2	1.6744	0,23 to 0,28	0,60	0,60 to 1,00	0,035	0,030	0,40 to 0,60	0,15 to 0,25	0,40 to 0,70	0,05	0,30
G30NiCrMo2-2	1.6778	0,28 to 0,33	0,60	0,60 to 1,00	0,035	0,030	0,40 to 0,60	0,15 to 0,25	0,40 to 0,70	0,05	0,30
G17CrMo5-5	1.7357	0,15 to 0,20	0,60	0,50 to 1,00	0,025	0,020[b]	1,00 to 1,50	0,45 to 0,65	-	-	-
G17CrMo9-10	1.7379	0,13 to 0,20	0,60	0,50 to 0,90	0,025	0,020[b]	2,00 to 2,50	0,90 to 1,20	-	-	-
G26CrMo4	1.7221	0,22 to 0,29	0,60	0,50 to 0,80	0,025	0,020[b]	0,80 to 1,20	0,15 to 0,30	-	-	-
G34CrMo4	1.7230	0,30 to 0,37	0,60	0,50 to 0,80	0,025	0,020[b]	0,80 to 1,20	0,15 to 0,30	-	-	-
G42CrMo4	1.7231	0,38 to 0,45	0,60	0,60 to 1,00	0,025	0,020[b]	0,80 to 1,20	0,15 to 0,30	-	-	-
G50CrMo4	1.7232	0,46 to 0.54	0,25 to 0,50	0,50 to 0,80	0,035	0,035	0,90 to 1,20	0,15 to 0,25	-	-	-
G30CrMoV6-4	1.7725	0,27 to 0,34	0,60	0,60 to 1,00	0,025	0,020[b]	1,30 to 1,70	0,30 to 0,50	-	0,05 to 0,15	-
G35CrNiMo6-6	1.6579	0,32 to 0,38	0,60	0,60 to 1,00	0,025	0,020[b]	1,40 to 1,70	0,15 to 0,35	1,40 to 1,70	-	-
G30NiCrMo7-3	1.6572	0,28 to 0,33	0,60	0,60 to 0,90	0,035	0,030	0,70 to 0,90	0,20 to 0,30	1,65 to 2,00	0,05 max.	0,30
G40NiCrMo7-3	1.6573	0,38 to 0,43	0,60	0,60 to 0,90	0,035	0,030	0,70 to 0,90	0,20 to 0,30	1,65 to 2,00	0,05 max.	0,30
G32NiCrMo8-5-4	1.6570	0,28 to 0,35	0,60	0,60 to 1,00	0,020	0,015	1,00 to 1,40	0,30 to 0,50	1,60 to 2,10	0,05 max.	0,30

[a] Cr+Mo+Ni+V+Cu max. 1,00 %.

Grade designation		Analyses									
Name	Number	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu

[b] For castings of ruling thickness < 28 mm, S ≤ 0,030 % is permitted.

[c] Single values indicate maximum

Table 2 — Mechanical properties at room temperature (heat treatment for information only)

Grade designation		Heat treatment			Mechanical properties				
		Symbol	Normalizing or Austenitizing °C	Tempering °C	Thickness t mm	Tensile test			Impact test
Name	Number					$R_{p0,2}$ min. MPa	R_m MPa	A min. %	KV min. J
GE 200	1.0420	+N	900 to 980		≤ 300	200	380 to 530	25	27
GS 200	1.0449	+N	900 to 980		≤ 100	200	380 to 530	25	35
GE 240	1.0446	+N	900 to 980		≤ 300	240	450 to 600	22	27
GS 240	1.0455	+N	880 to 980		≤ 100	240	450 to 600	22	31
GS 270	1.0454	+N	880 to 960		≤ 100	270	480 to 630	18	27
GS 340	1.0467	+N	880 to 960		≤ 100	340	550 to 700	15	20
G21Mn5	1.1138	+N	900 to 980		≤ 30	300	480 to 620	20	50
		+QT	900 to 980	610 to 660	≤ 100	300	500 to 650	22	60
G28Mn6	1.1165	+N	880 to 950		≤ 250	260	520 to 670	18	27
		+QT1		630 to 680	≤ 100	450	600 to 750	14	35
		+QT2		580 to 630	≤ 50	550	700 to 850	10	31
G28MnMo6	1.5433	+QT1	880 to 950	630 to 680	≤ 50	500	700 to 850	12	35
					≤100	480	670 to 830	10	31
		+QT2		580 to 630	≤100	590	850 to 1000	8	27
G20Mo5	1.5419	+QT	920 to 980	650 to 730	≤100	245	440 to 590	22	27
G10MnMoV6-3	1.5410	QT1	950 to 980	640 to 660	≤ 50	380	500 to 650	22	60
					50 < t ≤ 100	350	480 to 630	22	60
					100 < t ≤ 150	330	480 to 630	20	60
					150 < t 250	330	450 to 600	18	60
		QT2			t ≤ 50 ≤ 100	500	600 to 750	18	60
					50 < t ≤ 100	400	550 to 700	18	60
					100 < t ≤ 150	380	500 to 650	18	60
					150 < t ≤ 250	350	460 to 610	18	60
		QT3[a]		740 to 760 + 600 to 650	t ≤ 100	400	520 to 650	22	27[b]
									60
G20NiCrMo2-2	1.6741	+NT	900 to 980	610 to 660	t ≤ 100	200	550 to 700	18	10
		+QT1		600 to 650		430	700 to 850	15	25
		+QT2		550 to 500		540	820 to 970	12	25
G25NiCrMo2-2	1.6744	+NT	900 to 980	580 to 630	t ≤100	240	600 to 750	18	10
		+QT1		500 to 650		500	750 to 900	15	25
		+QT2		550 to 500		600	850 to 1000	12	25
G30NiCrMo2-2	1.6778	+NT	900 to 980	600 to 650	t ≤ 100	270	630 to 780	18	10
		+QT1		600 to 650		540	820 to 970	14	25
		+QT2		550 to 600		630	900 to 1050	11	25
G17CrMo5-5	1.7357	+QT	920 to 960	680 to 730	t ≤ 100	315	490 to 690	20	27
G17CrMo9-10	1.7379	+QT	930 to 970	680 to 740	t ≤ 150	400	590 to 740	18	40
G26CrMo4	1.7221	+QT1	880 to 950	600 to 650	t ≤ 100	450	600 to 750	16	40
					100 < t ≤ 250	300	550 to 700	14	27
		+QT2	880 to 950	550 to 600	t ≤100	550	700 to 850	10	18
G34CrMo4	1.7230	+NT	880 to 950	600 to 650	t ≤100	270	630 to 780	16	10
		+QT1				540	700 to 850	12	35
					100 < t ≤ 150	480	620 to 770	10	27
					150 < t ≤ 250	330	620 to 770	10	16
		+QT2		550 to 600	t ≤ 100	650	830 to 980	10	27
G42CrMo4	1.7231	+NT	900 to 980	630 to 680	t ≤ 100	300	700 to 850	15	10
		+QT1	880 to 950	600 to 650		600	800 to 950	12	31
					100 < t ≤ 150	550	700 to 850	10	27
					150 < t ≤ 250	350	650 to 800	10	16
		+QT2		550 to 600	t ≤ 100	700	850 to 1000	10	27