

COMMON QUALITY CARBON STEEL GRADES

COMMON QUALITY CARBON STEEL TECHNICAL DATA

GOST 380-2005

Grades, chemical composition, mechanical properties, marking and test methods

STEEL GRADES

CHEMICAL COMPOSITION

MECHANICAL PROPERTIES

MARKING CLASSES

TEST METHODS

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Technical data navigation

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REFERENCE NOTE

Source dimensional values and footnotes are retained. Confirm the applicable material, grade, schedule and project specification before ordering.

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I N T E R S T A T E S T A N D A R D

COMMON QUALITY CARBON STEEL**Grades**

Date of Introduction — 2008—07—01**1 Scope**

This Standard applies to common quality carbon steel designed for manufacturing of hot rolled stock: bars, structural shapes, plates, sheets, wide flats and cold-rolled sheets as well as ingots, blooms, slabs, billets, rolled stocks and continuously casted castings, pipes, forgings and stampings, tapes, wire, hardware, and so on.

2 Normative References

The following interstate standards are referred to in this Standard:

- GOST 7565-81 (ISO 377-2:1989) Pig-iron, Steel and Alloys. Method for Sampling for Chemical Composition Determination
- GOST 7566-94 Metal Production. Acceptance, Marking, Packing, Transportation and Storage
- GOST 12359-99 (ISO 4945:1977) Carbon, Alloyed and High-Alloy Steels. Methods for Nitrogen Determination
- GOST 17745-90 Steels and Alloys. Methods for Gases Determination
- GOST 18895-97 Steel. Method for Photoelectric Spectral Analysis
- GOST 22536.0-87 Carbon Steel and Unalloyed Pig-iron. General Requirements for Analysis Methods
- GOST 22536.1-88 Carbon Steel and Unalloyed Pig-iron. Methods for General Carbon and Graphite Determination
- GOST 22536.2-87 Carbon Steel and Unalloyed Pig-iron. Methods for Sulphur Determination
- GOST 22536.3-88 Carbon Steel and Unalloyed Pig-iron. Methods for Phosphorus Determination
- GOST 22536.4-88 Carbon Steel and Unalloyed Pig-iron. Methods for Silicon Determination
- GOST 22536.5-87 (ISO 629:1982) Carbon Steel and Unalloyed Pig-iron. Methods for Manganese Determination
- GOST 22536.6-88 Carbon Steel and Unalloyed Pig-iron. Methods for Arsenic Determination
- GOST 22536.7-88 Carbon Steel and Unalloyed Pig-iron. Methods for Chrome Determination
- GOST 22536.8-87 Carbon Steel and Unalloyed Pig-iron. Methods for Copper Determination
- GOST 22536.9-88 Carbon Steel and Unalloyed Pig-iron. Methods for Nickel Determination
- GOST 22536.10-88 Carbon Steel and Unalloyed Pig-iron. Methods for Aluminum Determination
- GOST 22536.11-87 Carbon Steel and Unalloyed Pig-iron. Methods for Titan Determination
- GOST 27809-95 Pig-iron and Steel. Methods for Spectrographic Analysis
- GOST 28033-89 Steel. Method for X-ray Fluorescence Assay

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Note — When using this Standard it is advisable to check up validity of the reference standards according to the guide "National Standards" drawn up as of January 1st of the current year as well as according to corresponding information guides which were published in the current year. If any reference standard has been replaced (amended), it is necessary to be guided by the replacing (amended) standard. If any reference standard has been revoked without replacement, the provision, where the reference to it is given, shall be applied in the part not touching that reference.

3 Steel Grades

3.1 Common quality carbon steel is manufactured in the following grades: Ст0, Ст1кп, Ст1пс, Ст1сп, Ст2кп, Ст2пс, Ст2сп, Ст3кп, Ст3пс, Ст3сп, Ст3Гпс, Ст3Гсп, Ст4кп, Ст4пс, Ст4сп, Ст5пс, Ст5сп, Ст5Гпс, Ст6пс, Ст6сп.

Letters "Ст" designate "Steel", numerals — a conventional number of a grade depending on a chemical composition, letter "Г" — manganese when its mass fraction in steel is equal to 0.80 % and more, letters "кп", "пс", "сп" — degrees of steel deoxidation: "кп" — rimmed steel, "пс" — semikilled steel, "сп" — killed steel.

3.2 Comparison of steel grades under this Standard with steel grades under International Standards ISO 630 and ISO 1052 is given in Appendix A.

3.3 The requirements for the steel chemical composition of grades E 185 (Fe 310), E 235 (Fe 360), E 275 (Fe 430), E 355 (Fe 510), Fe 490, Fe 590, Fe 690 under the International Standards ISO 630 [1] and ISO1052 [2] are given in Appendix B.

3.4 Degree of steel deoxidation shall be specified by the manufacturer if it has not been given in the order.

4 Requirements for Steel Chemical Composition

4.1 The steel chemical composition (basic elements) under ladle sample analysis shall conform to the norms given in Table 1.

Table 1

In percentage

Steel Grade	Mass Fraction of Chemical Elements		
	Carbon	Manganese	Silicon
Ст0	No more than 0.23	to	to
Ст1кп	0.06 to 0.12	0.25 to 0.50	No more than 0.05
Ст1пс	0.06 to 0.12	0.25 to 0.50	0.05 to 0.15
Ст1сп	0.06 to 0.12	0.25 to 0.50	0.15 to 0.30
Ст2кп	0.09 to 0.15	0.25 to 0.50	No more than 0.05
Ст2пс	0.09 to 0.15	0.25 to 0.50	0.05 to 0.15
Ст2сп	0.09 to 0.15	0.25 to 0.50	0.15 to 0.30
Ст3кп	0.14 to 0.22	0.30 to 0.60	No more than 0.05
Ст3пс	0.14 to 0.22	0.40 to 0.65	0.05 to 0.15
Ст3сп	0.14 to 0.22	0.40 to 0.65	0.15 to 0.30
Ст3Гпс	0.14 to 0.22	0.80 to 1.10	No more than 0.15
Ст3Гсп	0.14 to 0.20	0.80 to 1.10	0.15 to 0.30
Ст4кп	0.18 to 0.27	0.40 to 0.70	No more than 0.05
Ст4пс	0.18 to 0.27	0.40 to 0.70	0.05 to 0.15
Ст4сп	0.18 to 0.27	0.40 to 0.70	0.15 to 0.30
Ст5пс	0.28 to 0.37	0.50 to 0.80	0.05 to 0.15
Ст5сп	0.28 to 0.37	0.50 to 0.80	0.15 to 0.30
Ст5Гпс	0.22 to 0.30	0.80 to 1.20	No more than 0.15
Ст6пс	0.38 to 0.49	0.50 to 0.80	0.05 to 0.15
Ст6сп	0.38 to 0.49	0.50 to 0.80	0.15 to 0.30

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4.2 For steels of grades Ст3кп, Ст3пс, Ст3сп, Ст4кп, Ст4пс, Ст4сп, Ст5пс and Ст5сп decrease of the lower limit of the manganese mass fraction by 0.10 % for rolled stock sheets and plates up to 10 mm in gage is permitted provided that the required grade of mechanical properties is supported.

For steels of grades Ст3кп, Ст3пс and Ст3сп intended for manufacturing of rolled stock bars and structural shapes, except for delivered for shipbuilding and car building, decrease of the lower limit of the manganese mass fraction down to 0.25 % is permitted, and the lower limit of the carbon mass fraction is not normalized provided that the required grade of mechanical properties is supported.

For steels of grades Ст2кп, Ст3кп and Ст4кп intended for manufacturing of rolled stock bars and structural shapes, increase of the silicon mass fraction up to 0.07 % is permitted.

4.3 During deoxidation of semikilled steel with aluminum, titan or other deoxidants free from silicon as well as with several deoxidants (ferrosilicon and aluminum, ferrosilicon and titan, etc.) the silicon mass fraction in the steel less than 0.05 % is permitted. Deoxidation with aluminum, titan and other deoxidants which are free from silicon shall be indicated in a quality certificate.

4.4 Chrome, nickel and copper mass fractions in steel of all grades, except for Ст0, shall be no more than 0.30 % each. For steel of grade Ст0 the chrome, nickel and copper mass fractions are not normalized.

For steel made by skrap practice the mass fraction of copper is permitted to be up to 0.40 %, of chrome and nickel — up to 0.35 % each. At the same time for steel of grades Ст3кп, Ст3пс, Ст3сп, Ст3Гпс and Ст3Гсп the carbon mass fraction shall be no more than 0.20 %.

4.5 The sulphur mass fraction in steel of all grades, except for Ст0, shall be no more than 0.050 %, the phosphorus mass fraction — no more than 0.040 %. For steel of grade Ст0 the sulphur mass fraction shall be no more than 0.060 %, the phosphorus mass fraction — no more than 0.070 %.

4.6 The nitrogen mass fraction in steel shall be no more than:

- for steel melted in electric furnaces — 0.012 %;
- for steel melted in open-hearth and converter furnaces — 0.010 %.

Increase of the nitrogen mass fraction in steel is permitted up to 0.013 %, provided that the norm of the phosphorus mass fraction under 4.5 is decreases no less than by 0.005 % at every increase of the nitrogen mass fraction by 0.001 %.

4.7 The arsenic mass fraction in steel of all grades, except for Ст0, shall be no more than 0.080 %. The arsenic mass fraction in steel of grade Ст0 is not normalized.

4.8 Maximum deviations on a chemical composition of finished steels, ingots, bars, forgings and products for any further process stage shall conform to the norms specified in Table 2.

Table 2

In percentage

Element	Maximum Deviation by Chemical Composition	
	Rimmed Steel	Semikilled and Killed Steel
Carbon	+0.03	+0.03 -0.02
Manganese	+0.05 -0.04	+0.05 -0.03
Silicon	—	+0.03 -0.02
Phosphorus	+0.006	+0.005
Sulphur	+0.006	+0.005
Nitrogen	+0.002	+0.002

5 Test Methods

5.1 Methods for sampling for steel chemical composition determination shall be in accordance with GOST 7565.

5.2 Chemical analysis of steel shall be in accordance with GOST 12359, GOST 17745, GOST 18895, GOST 22536.0-GOST 22536.11, GOST 27809, GOST 28033 or other methods that have been approved in accordance with established procedure and providing a necessary precision.

In case any discrepancies between a manufacturer and a customer have arisen, an evaluation shall be carried out by the test methods of this Standard.

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5.3 Determination of chrome, nickel, copper, arsenic, nitrogen mass fractions and of a silicon mass fraction in addition to them for rimmed steel is permitted not to be performed on condition that it was assured that the manufacturer shall provide conformance to the norms.

6 Marking

6.1 Marking of products from common quality carbon steel shall be performed according to standard documents for a specific type of metal products taking the requirements of GOST 7566 into account.

At the customer's request or in the presence of requirements for color marking in standard documents for rolled stocks, the color code shall be additionally marked with indelible paint by the colors that are indicated in Table 3.

Table 3

Steel Grades	Marking Colors
Ст0	Red and Green
Ст1	Yellow and Black
Ст2	Yellow
Ст3	Red
Ст3Гпс	Red and Brown
Ст3 Гсп	Dark Blue and Brown
Ст4	Black
Ст5	Green
Ст5Гпс	Green and Brown
Ст6	Dark Blue

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Appendix A
(Reference)

Designation for steel grades according to this Standard and International Standards
ISO 630:1995, ISO 1052:1982

Table A.1

Steel Grade according to			Steel Grade according to		
GOST 380:2005	ISO 630:1995	ISO 1052:1982	GOST 380:2005	ISO 630:1995	ISO 1052:1982
Ст0	E 185 (Fe 310)	—	Ст3Гпс	E 235-B (Fe 360-B)	—
Ст1кп	—	—	Ст3Гсп	E 235-C (Fe 360-C) E 235-D (Fe 360-D)	—
Ст1пс	—	—	Ст4кп	E 275 (Fe 430-A)	—
Ст1сп	—	—	Ст4пс	E 275-B (Fe 430-B)	—
Ст2кп	—	—	Ст4сп	E 275-C (Fe 430-C) E 275-D (Fe 430-D)	—
Ст2пс	—	—	Ст5пс	—	Fe 490
Ст2сп	—	—	Ст5сп	E355-C (Fe510-C)	Fe 490
Ст3кп	E 235 A (Fe 360-A)	—	Ст5Гпс	—	Fe 490
Ст3пс	E 235-B (Fe 360-B)	—	Ст6пс	—	Fe 590
Ст3сп	E 235-C (Fe 360-C)	—	Ст6сп	—	Fe 590 Fe 690

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Appendix B (Recommended)

Requirements for steel according to International Standards ISO 630:1995 and ISO 1052:1982

B.1 Steel chemical composition by the ladle sample analysis shall conform to the norms indicated in Table B.1.

Table B.1

Steel Grade	Quality Category	Gage of Rolled Stock Product, mm	Mass Fraction of Chemical Elements, %, no more than					Degree of deoxidation
			Carbon	Phosphorus	Sulfurs	Manganese	Silicon	
E 185 (Fe 310)	0	—	—	—	—	—	—	—
E 235 (Fe 360)	A	Up to 16 Over 16 to 25 Up to 40 Over 40	0.22	0.050	0.050	—	—	—
	B		0.17	0.045	0.045	1.40	0.40	—
			0.20	0.045	0.045	1.40	0.40	—
			0.17	0.045	0.045	1.40	0.40	UN
			0.20	0.045	0.045	1.40	0.40	UN
			0.17	0.040	0.040	1.40	0.40	UN
	C		0.17	0.035	0.035	1.40	0.40	FG
E 275 (Fe 430)	A	Up to 40	0.24	0.050	0.050	—	—	—
	B	Over 40	0.21	0.045	0.045	1.50	0.40	UN
			0.22	0.045	0.045	1.50	0.40	UN
			0.20	0.040	0.040	1.50	0.40	UN
	D		0.20	0.035	0.035	1.50	0.40	FG
E 355 (Fe 510)	C	Up to 30	0.20	0.040	0.040	1.60	0.55	UN
		Over 30	0.22	0.040	0.040	1.60	0.55	UN
		Up to 30	0.20	0.035	0.035	1.60	0.55	FG
		Over 30	0.22	0.035	0.035	1.60	0.55	FG
Fe 490	—	—	—	0.050	0.050	—	—	—
Fe 590	—	—	—	0.050	0.050	—	—	—
Fe 690	—	—	—	0.050	0.050	—	—	—
Note 1 — the sign "—" means that the value is not normalized. Note 2 — UN — unrimmed steel. Note 3 — FG — fine-grained killed steel. The recommended mass fraction of general aluminum — no less than 0.020 %.								

B.2 Steel grades Fe 490, Fe 590 and Fe 690 are manufactured as semikilled and killed ones.

B.3 Chemical composition maximum deviations of finished steels shall conform to the values given in Table B.2.

Table B.2

In percentages

Element	Chemical Composition Maximum Deviation
Carbon	+0.03
Manganese	+0.10
Silicon	+0.05
Phosphorus	+0.010
Sulphur	+0.010

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