

<p style="text-align: center;"><u>STANDARD/SPECIFICATION</u></p> <p style="text-align: center;"><u>QUALITY AND ORDINARY CARBON STEEL</u></p> <p style="text-align: center;"><u>PLATES FOR GENERAL PURPOSES</u></p>	<p style="text-align: center;">NUMBER</p> <p style="text-align: center;">GOST 16523 - 70</p> <hr/> <p>SUPERSEDES</p> <p style="text-align: center;">GOST 914-56, GOST</p> <p style="text-align: center;">1386-47, GOST 501-58</p> <hr/> <p>SHT 1 OF 18</p>
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The present standard covers hot-rolled and cold rolled quality and ordinary carbon-steel with thickness upto 3.9 mm, inclusive, and width not less than 500 mm, which is supplied in the form of plates and rolls.

1. CLASSIFICATION AND ASSORTMENT.

1.1. General purpose carbon sheet-steel is classified as follows:

- a) as per the types of product in supply:
 - plates,
 - rolls,
- b) as per standard characteristics in to catagory:
 - 1, 2, 3, 4 and 5:
- c) as per the quality of surface finish in to groups:
 - espècially high finish - I;
 - high finish - II;
 - superior finish - III,
 - ordinary finish - IV;

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d) as per capability to draw (steel of category 1-5)
into :

deep drawn - F

ordinary drawn - H

1.2 As regards the assortment, the steel should meet
the requirements.

hot rolled sheet steel - GOST 3680-57

cold rolled sheet steel - GOST 3680-57 & GOST 8075-56

hot rolled roll steel - GOST 8597-57

cold rolled roll steel - GOST 8596-57

1.2.1 A plate, is ordered as a multiple of width not
exceeding 500 mm.

2. TECHNICAL REQUIREMENTS

2.1 Plates and rolls should be manufactured :

a) from quality carbon steel of grades 05Kп , 08Kп ,
08 ПС, 08, 10Kп , 10 ПС, 10, 15Kп , 15 ПС, 15, 20Kп , 20 ПС,
20, 25, 30, 35, 40, 45 and 50 with chemical composition as per
GOST 1050-60;

b) from ordinary carbon steel of grades CT.0, CT1, CT2
CT3, CT4 (rimmed, semikilled and killed steel), CT5 (semikilled
and killed) with chemical composition as per GOST 380-71

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2.1.1. In steel, intended for remelting, carbon content should not be more than 0.12%, and as per the requirement of customer it should not be more than 0.10%. In this case the purpose of the steel is stated in the order.

2.2. Depending upon the standard characteristics, steel is supplied in the categories, in conformity with requirements of table 1.

Table No. 1.

Category of steel	Steel grades.										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Steel grades.	1. 15HC, 10HC, 10, 15KN, 20KN, C10, C11, C12, C13, C14, C15 (all the degrees of oxidation).	2. C10, C11, C12, C13, C14 (all the degrees of oxidation); C15 (semi-killed and killed).	3. C11, C12, C13, C14 (all the degrees of oxidation); C15 (semi-killed, killed).	Chemical composition.	X	X	X	X	X	X	X
				Mechanical Properties (tensile strength & relative elongation)	X	X	X	X	X	X	X
	Bending test through 180° in cold state.	X	X	X	X	X	X	X	X	X	X
	Cupping test	X	X	X	X	X	X	X	X	X	X
	Grain size	X	X	X	X	X	X	X	X	X	X
	Group of surface finish.	IV	III	II	I						

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
4.	08Kп, 08ПC, 08, 10Kп, 10ПC, 10, 15Kп, 15ПC, 15, 20Kп, 20ПC, 20, 25, 30, 35, 40, 45, 50 BC _T 1, BC _T 2, BC _T 3 BC _T 4 (all the degrees of deoxidation) BC _T 5 (semi-killed, killed)	X	X	X	-	-	X	X	X	X
5.	08Kп, 08ПC, 08, 10Kп, 10ПC, 10, 15Kп, 15ПC, 15, 20Kп, 20ПC, 20, BC _T 1 (all the degrees of deoxidation).	X	X	X	X	X	X	X	X	X

NOTES: 1. Sign "X" denotes that the characteristic is standardised, sign "-" denotes that the characteristic is not standardized.

2. Steel grades are not indicated in the order in case of fabrication of plates and rolls of 1st category, and they are selected by manufacturing plant.

3. Plates and rolls made of steel of grades 40, 45, 50 are not subjected to bending test.

2.3 Mechanical properties of steel with thickness 0.4mm and more should meet the requirements, given in table 2 for quality steel and table 3 in case of ordinary steel.

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Table No.2

Steel grades	Tensile strength σ_B , kgf/ mm ² .	Relative elongation δ , % not less than.			
		Hot rolled steel of thickness		Cold rolled steel of thickness	
		Upto 2mm inclusive	Above 2, upto 3.9mm inclusive	Upto 2mm inclusive	Above 2 upto 3.9mm inclusive
08Kп	27-39	25	28	26	29
08Пс, 08, 10Kп	28-40	24	26	25	28
10Пс, 10	30-42	24	26	25	28
15Kп, 15 Пс,	32-45	23	25	24	27
15, 20Kп	34-47	23	24	24	25
20 Пс, 20	36-51	22	23	23	24
25	40-55	21	22	22	23
30	45-60	19	20	20	21
35	50-65	17	18	18	19
40	52-67	16	17	17	18
45	55-70	14	15	15	16
50	55-73	12	13	13	14

NOTE: 1. Norms on relative elongation for steel of grade 08Kп are guaranteed by manufacturer for 10 days from the moment the steel is unloaded to customer.

2. It is permitted to supply cold rolled steel of grades 25, 30, 35, 40, 45, 50 with mechanical properties as per GOST 2284-69, in agreement with customer.

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Table No.3

Steel grades.	Relative elongation δ_5 % not less than			
	Hot rolled steel with thickness.		Cold rolled steel with thickness.	
	Upto 2 mm, inclusive.	Above 2, upto 3.9 mm, inclu- sive.	Upto 2 mm inclusive.	Above 2, upto 3.9 mm inclu- sive.
CT0	11	13	14	16
CT1Kп , CT1 ПС, CT1Сп	22	24	25	27
CT2Kп , CT2 ПС, CT2Сп	21	23	24	26
CT3Kп , CT3 ПС, CT3Сп	20	22	22	24
CT4Kп , CT4 ПС, CT4Сп	19	21	21	23
CT5 ПС, CT5Сп	17	19	19	21

Note:- Tensile strength should correspond to the require-
ments of GOST 380 - 71

2.4. For deep drawn steel, norms on tensile strength
are reduced by 2 kgf/mm², with the preservation of all
the remaining norms.

2.5. In agreement with the customer, it is permitted
to increase upper limit of tensile strength by 5 kgf/mm²
in case of quality steels and by 3 kgf/mm² in case of or-
dinary steel, as compared with the norms, given in table 2
and 3, provided that satisfactory results are obtained for
other tests.

2.6. On the demand of customer, deep drawn steel is
supplied with guaranteed yield point, hardness and in-
creased relative elongation. Norms are set by the agree-
ment between parties.

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2.7. Depth of spherical hole during cupping test of steel should correspond to the norms, given in table 4.

Table No. 5.

Thickness of plate	mm Depth of spherical hole, minimum, for steel.						
	Deep-drawing.			Ordinary drawing.			
	Category 5.		Category 1	Category 5		Category 1	
	08KП, 10KП	08, 08ПC, 10 10ПC, 15 15KП, 15ПC, 20, 20 KП, 20ПC	All the grades	08 KП 0.8ПC, 10KП	08, 10ПC 10, 15KП 15ПC, 15 20KП, 20ПC 20	CT1KП, CT1ПC CT1П	All the grades.
0.20	6.9	6.7	6.9	-	-	-	5.7
0.3	7.5	7.2	7.2	-	-	-	6.1
0.4	8.0	7.5	7.5	-	-	-	6.5
0.5	8.4	8.0	8.0	8.0	7.6	6.9	6.9
0.6	8.9	8.4	8.5	8.5	7.8	7.2	7.2
0.7	9.2	8.6	8.9	8.9	8.0	7.5	7.5
0.8	9.5	8.8	9.3	9.3	8.2	7.8	7.8
0.9	9.9	9.0	9.6	9.6	8.4	8.2	8.2
1.0	10.1	9.2	9.9	9.9	8.6	8.4	8.4
1.1	10.4	-	10.0	10.2	-	8.6	8.6
1.2	10.6	-	10.2	10.4	-	8.8	8.8
1.3	10.8	-	10.4	10.6	-	9.0	9.0
1.4	11.0	-	10.6	10.8	-	9.1	9.1
1.5	11.2	-	11.0	11.0	-	9.2	9.2
1.6	11.4	-	11.2	11.2	-	9.4	9.4
1.7	11.6	-	11.3	11.4	-	9.5	9.5
1.8	11.7	-	11.4	11.5	-	9.6	9.6
1.9	11.8	-	11.6	11.7	-	9.7	9.7
2.0	11.9	-	11.8	11.8	-	9.9	9.9

2.8 For steel of intermediate thickness, norms for the depth of spherical hole are taken for nearest least thickness, given in table 4.

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2.9. Grain size for hot rolled quality steel of category 5 of deep-drawn variety should not be coarser than 5th number and for cold-rolled steel-not coarser than 6th number.

2.10. Steel should withstand bending test over 180° in cold state with the thickness of packings (supports), given in table 5.

At the bending place, there should not be tearing, cracks and scalings. Net work of hairline cracks on inside the specimen after bending it back to the original position is not taken as a cause for rejection

Table No. 5.

Category of steel	Thickness of support a with the thickness of plate or strip - h .	
	Up to 2 mm inclusive	Above 2
1	$a=2h$, followed by unbending.	not tested
2, 3 and 5 (for steel of grade BCT1).	As per GOST 380-71,	
4 (except steel of grade 25, 30 and 35) and 5 (except steel of grade BCT1)	$a = 0$	$a = h$
4 (for steel of grades 25, 30 and 35).	$a = h$	$a = 2h$

2.10.1. During the supply of cold drawn plates and rolls of all the grades and hot rolled sheets and rolls of

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grades 08, 08Kb, 08Пс, 10, 10Kb, and 10Пс, with a thickness of sheets and rolls of 1st category, manufacturer plant is given the right not to carry out bending test, if it guarantees the test results as per the requirements of this standard.

While supplying steel, considering the requirements, given in points 2.4 and 2.5, bending test becomes essential.

2.11 Steel of category 1, 3, 4 and 5 should be supplied in heat treated condition. Type of heat treatment is to be determined by manufacturer plant. Hot rolled steel, manufactured in continuous rolling mills as well as hot rolled steel of 3rd category rolled in other mills are permitted to be supplied without heat treatment, if the steel meets all the requirements of this standard.

2.12 Hot rolled steel of 1st category with thickness upto 2mm. inclusive is supplied with pickled surface.

Hot rolled steel of 4th and 5th category is supplied with pickled surface, if it is mentioned in the order that the pickling is not required.

Hot rolled steel of remaining categories and thicknesses is permitted to be supplied with pickled as well as with unpickled surface if there is no special indication about it in the order.

2.13 The sheets should be cut from all the sides. Sheets, obtained from the plates, rolled in continuous rolling mill is permitted to be supplied with long edges rolled.

Rolled steel is supplied as per the order, with rolled as well as trimmed edges.

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2.13.1 On the rolled edge of sheets and rolls, it is permitted to have cuts, with depth not exceeding half the limiting deviation on width and which do not make the sheet and rolls to go beyond the nominal width.

2.14 Steel, supplied in rolls, should not have edges, bent at angle 90° and more as well as twisted ends and the ends gone out of shape. Length of ends of short width should not exceed the width of roll.

2.15 Surface of sheets and rolls should be clean, without splashes, bubbles, laps, cracks, rolled or corroded scales (for pickled sheets and rolls), foreign inclusions and dark spots. Scaling is not permitted.

2.15.1 Characteristic of surface finish and permissible surface defects are given in table 6.

Enumerated defects should not make the thickness of steel beyond negative limit deviation.

NOTE:- As per the agreement between the parties, surface of front side of sheets and rolls of I and II group can be made more precise with standards.

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2.15.2. It is permitted to remove surface defects by finishing with fine-grain-emery-wheel or felt-wheel with emery plate for the sheets of all groups with the exception of front side of sheets of 1st group of surface finish. Depth of finish should not make the thickness of sheets to go beyond the negative limit deviation.

Table No.6

Group of surface finish.	Characteristic of surface	Defects.
1.	<p><u>Cold Rolled Steel</u> Bright or dull surface without traces of corrosion and temper colours.</p> <p>On the demand of customer the sheets and rolls are supplied with standardised surface finish, in this case the dull surface should have finish $R_a = 0.8-1.6$ microns (class 6_B - 7B) as per GOST 2789-59 and additionally it is characterised by number of peaks (not less than 50 in 1 cm. length of profile, measured in any direction), bright surface should have finish not below class 6_B as per GOST 2789-59.</p> <p>As per the agreement between the parties, it is permitted to set other characteristics of surface.</p>	<p>Surface defects are not permitted on the face side (better as regards the quality) of sheet.</p> <p>It is permitted to have the defects, which do not spoil the entire surface, in the form of : different fine lines and scratches of mechanical process with length not more than 20 mm, portions of different colours without clear boundaries.</p> <p>On the opposite side, it is permitted to have light scratches, impressions within the limits of 1/4 the tolerances (1/4 the total absolute values of limit deviations) on the thickness of sheet as well as slight burn spots emulsion.</p>

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(1)

(2)

(3)

surface should not have the traces of incomplets pickling, over pickling. Incomplete pickled surface may retain unremovable thin layer of scale, which does not obstruct the appearance of surface defects.

IV. Hot rolled steel.

Pickled or unpickled surface. Traces of bending are not taken as the rejection cause. Pickled surface should not have; traces of incomplete pickling or over pickling. Incomplete pickled surface may retain unremovable thin layer of scale, which does not obstruct the appearance of surface defects.

On both sides, it is permitted to have overall ripples, mechanical damage of surface, pores and dents, roll-marks and tears.

Surface blisters are permitted on sheets and rolls of 1st category.

2.16. On the demand of customer, deep-drawing steel of grades 08K1 and 10K1 with thickness 0.6 mm. and less should be checked for the presence of structurally freccementile. The norms are set by the agreement between the parties.

2.17. On the demand of customer, sheets and rolls made of steel grades 35, 40, 45, 50 are supplied with guaranteed depth of decarburised layer.

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4. TEST METHODS

4.1 For checking the quality of sheet and roll steel, select inspection-sheets or rolls from each batch. Number of inspection sheets and rolls and place from which they are selected is decided by manufacturer plant.

4.2 For test, select from each inspection sheet or roll;

a) one cross specimen each for tensile test and bending test. Place of cutting - as per GOST 7564-64;

b) one specimen for cupping test. Cut the specimen for the length, corresponding to entire width of sheet or roll.

The tests should be carried out at the places, corresponding to middle and edge along the width of inspection sheet or roll (not nearer than 40mm from the edge).

c) two specimens for microstructure test-one from the edge, other from central portion of width of sheet.

4.3 Carry out;

tensile test-as per GOST 11701-66 on short specimens with width of working portion 20 mm;

bending test - as per GOST 14019-68;

cupping test - as per GOST 10510-63;

the test for grain size -as per GOST 5639-65;

the test for decarburization -as per GOST 1763-68;

4.4 Visual inspection of sheets should be carried out without using magnifying devices and if necessary, with initial brightening of surface.

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Depth of decarburized layer (as per part. ferrite) shall not exceed 2.5% per side, and on both sides - 4% of the actual thickness of sheet.

3. RULES OF ACCEPTANCE

3.1 General acceptance rules are as per GOST 7566-69.

3.2 Sheets and rolls are accepted in batches. A batch of sheets and rolls of category 2-5 should consist of steel of the same melt, same charge in the furnace or the same mode of heat treatment for continuous furnaces, the same group of drawing, the same dimensions as regards the thickness and the same class of surface finish.

3.2.1 As per the agreement with customer, the batches of sheets or rolls of 2nd and 3rd category from the steel of the same grade from different melts, which are very close as regards the chemical composition, are permitted.

3.2.2 For the sheets and rolls of 1st category, the batch should consist of steel having same drawing ability, the same thickness and the same group of surface finish.

3.3 In case of inspection-check by the customer on surface of rolled steel, a batch is considered to be corresponding to the requirements of this standard, if the mass of portions not corresponding to the requirements on surface, does not exceed 5% of the mass of batch.

NOTE:- As per the agreement between the parties, it is permitted to set some other mass (weight) of defective portions.

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4.5 Length, width and deviation of steel surface from the plane should be measured with template or other measuring instrument, thickness -with micrometer or gauge.

Thickness of sheets is measured at a distance of not less than 100mm from corners and 40mm from edges of the sheet. Thickness, measured at any point, should not exceed limiting deviations.

Width and thickness of roll steel are measured at a distance of not less than 2m. from the end and 40mm from the edge of roll.

4.6 Sampling for chemical analysis -as per GOST 7565-66.

5. MARKING AND PACKING

5.1 General rules of packing, marking and recording in document - as per GOST 7566-69.

5.2 Sheet steel is supplied in packets or rolls.

Internal diameter of roll, maximum and minimum weight of it, if necessary, are fixed by agreement between the parties. In case such agreement is not there, then given parameters should meet the requirements of GOST 8596-57 and GOST 8597-57.

One roll should not consists of more than two pieces. Ratio of the length of pieces in the same roll should not be less than 1:5. As per the agreement between the parties, it is permitted to supply rolls with more number of pieces.

5.3 Sheets and rolls with pickled surface should be supplied after smearing their both sides, with uniform thin layer or neutral grease, protecting them from corrosion.

On the demand of customer, sheets and rolls are supplied without grease also.

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5.4 Packing of cold rolled sheets and rolls should protect them from corrosion, mechanical damages and bending during transportation.

5.4.1 Packages are wrapped up by soft steel sheets or they are packed in metallic boxes, they are placed on wooden beams and tightly fastened with steel strips.

On the demand of customer, packages of sheets should be additionally wrapped up in moisture-proof paper.

5.4.2 Other methods of packing the sheets, which satisfy the requirements in point 5.4 are permitted.

5.5 Hot rolled sheets are packed in conformity with the requirements of GOST 7566-69.

5.6 Rolls should be rigidly tied with packing strip or wire.

5.7 All the sheets should be kept in packet with the face side upwards.

Besides the data, given in GOST 7566-69, dimensions of sheet, group of surface finish and drawing ability should also be marked on the top sheet of each package.

In addition to the requirements of GOST 7566-69, category of steel, group of surface finish and drawing ability are indicated on the tags and certificate.

5.8 Rolls are marked in indelible paint on the external surface at a distance of not more than 1mt. from the end of roll. Information in marking should correspond to the requirements of GOST 7566-69 with the additional data, as given in point 5.7 of this standard.

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Other standards referred to in this standard

GOST 3680-57	GOST 8075-56
GOST 8597-57	GOST 8596-57
GOST 1050-60	GOST 380-71
GOST 2284-69	GOST 2789-59
GOST 7566-69	GOST 7564-64
GOST 11701-66	GOST 10510-63
GOST 14019-68	GOST 1763-68
GOST 5639-65	
GOST 7565-66.	