CARBON STRUCTURAL STEEL

GOST 1050-74*

Supersedes GOST 1050-60 **

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This standard pertains to carbon structural hot rolled and forged steel of grades 08, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 58 (55pp) and 60 of diameter or thickness upto 250mm, of grades 65, 70, 75, 80, 85, 60G, 65G and 70G of diameter or thickness upto 80 mm and also sized and silver steel of all grades.

As regards norms of chemical composition the standard pertains to all other types of rolled products, ingots, forgings, stampings made from steel of grades, mentioned above and also from the steel of grades 05 kp, 08kp, 08ps, 10kp, 10ps, 11kp, 15kp, 15ps, 18kp, 20kp and 20ps.

(Revised edition "Inform. standards catalogue" No. 5 (1977)).

1. CLASSIFICATION

1.1. As regards method of manufacture, the steel is classified into:

hot rolled and forged;

sized;

round steel with special surface finish-silver steel.

* Reedition (October 1977) with amendment No. 1, published in May 1977.

** partially as regards carbon steels of group 1 and steels of grades 60G, 65G and 70G of group 2.

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1.2. As regards the requirements for the tests of mechanical properties, steel is classified into categories : 1, 2, 3, 4 and 5.

1.3. As regards condition of material the steel is produced:

without heat treatment;

with heat treatment - T;

work-hardened - H (for sized steel and silver steel).

1.4. Depending upon the purpose, the hot rolled and forged steel is classified into sub-groups:

a - for hot working under pressure;

b - for cold machining (turning, shaping, milling etc.) along the whole surface;

c - for cold drawing (rolled stock).

Designation of steel (sub-group) should be indicated in the order.

Note:- As per the requirement of the customer the round bars intended for hot working under pressure and cold-drawing, are produced with turned or stripped surface.

2. GRADES.

2.1. The grades and chemical composition of steel should correspond to table 1.

TABLE 1.

Grade of steel	Content of elements, %			
	Carbon	Silicon	Manganese	Chromium, maximum
05kp	Maximum 0.06	Maximum 0.03	Maximum 0.40	0.10
08kp	0.05-0.11	Maximum 0.03	0.25-0.50	0.10
08ps	0.05-0.11	0.05-0.17	0.35-0.65	0.10
08	0.05-0.12	0.17-0.37	0.35-0.65	0.10
10kp	0.07-0.14	Maximum 0.07	0.25-0.50	0.15
10ps	0.07-0.14	0.05-0.17	0.35-0.65	0.15
10	0.07-0.14	0.17-0.37	0.35-0.65	0.15
11kp	0.05-0.12	Maximum 0.05	0.30-0.50	0.15
15kp	0.12-0.19	Maximum 0.07	0.25-0.50	0.25
15ps	0.12-0.19	0.05-0.17	0.35-0.65	0.25
15	0.12-0.19	0.17-0.37	0.35-0.65	0.25
18kp	0.15-0.20	Maximum 0.06	0.30-0.50	0.15
20kp	0.17-0.24	Maximum 0.07	0.25-0.50	0.25
20ps	0.17-0.24	0.05-0.17	0.35-0.65	0.25
20	0.17-0.24	0.17-0.37	0.35-0.65	0.25
25	0.22-0.30	0.17-0.37	0.50-0.80	0.25
30	0.27-0.35	0.17-0.37	0.50-0.80	0.25
35	0.32-0.40	0.17-0.37	0.50-0.80	0.25
40	0.37-0.45	0.17-0.37	0.50-0.80	0.25
45	0.42-0.50	0.17-0.37	0.50-0.80	0.25
50	0.47-0.55	0.17-0.37	0.50-0.80	0.25
55	0.52-0.60	0.17-0.37	0.50-0.80	0.25
58(65pp)	0.55-0.63	0.10-0.30	Maximum 0.80	0.15
60	0.57-0.65	0.17-0.37	0.50-0.80	0.25
65	0.62-0.70	0.17-0.37	0.50-0.80	0.25
70	0.67-0.75	0.17-0.37	0.50-0.80	0.25
75	0.72-0.80	0.17-0.37	0.50-0.80	0.25
80	0.77-0.85	0.17-0.37	0.50-0.80	0.25
85	0.82-0.90	0.17-0.37	0.50-0.80	0.25
60G	0.57-0.65	0.17-0.37	0.70-1.00	0.25
65G	0.62-0.70	0.17-0.37	0.90-1.20	0.25
70G	0.67-0.75	0.17-0.37	0.90-1.20	0.25

Note:- 1. Steel of grades 65, 70, 75, 80, 85, 60G, 65G and 70G is manufactured till 1-1-1979.

2. In the designation of the grade of steel the code stands for average carbon content in hundredth fraction of percentage, the letter G- manganese content (about 1%).

As regards degree of deoxidation the steel is designated as rimmed - kp, semikilled-ps, killed-without index.

3. In steel of all grades, content of sulphur can be maximum-0.040% and content of phosphorus -maximum 0.035 %. Maximum content of sulphur upto 0.035% and of phosphorus upto 0.030% is allowed for steel of grades 11kp and 18kp used for plating.

4. Residual content of copper and nickel should not exceed 0.25% each. Content of copper and nickel upto 0.30% each is allowed in the steel to be produced by scrap process. Residual content of copper should not exceed 0.20% in the steels of grades 11kp and 18kp.

5. Steel of grades from 35 to 85 having manganese content of 0.35-0.60%, and of grades 65G and 70G having manganese content of 0.70-1.00% is used for manufacturing patented wire. Chromium content in steel, used for manufacturing the patented wire should not exceed 0.10%, of nickel 0.15%, of copper-0.20%. Content of sulphur and phosphorus - corresponding to the requirements of the standards on wire, but not more than the norms, indicated in note 3.

6. Manganese content upto 0.25% as regards lower limit is allowed in the steel of grades 08ps, 10ps, 15ps, 20ps, meant for production of sheet steel for cold stamping.

7. In steel of grades 08ps, 10ps, 15ps, 20ps the silicon content of minimum 0.05% is allowed while using other deoxidizers (except silicon) in the required quantities, whose quality should be indicated in the document.

8. Maximum 0.08% arsenic content is allowed in the steel.

9. Nitrogen content in oxygen-Bessemer steel should not exceed:

for thin-sheet rolled stock and band - 0.008%;

for rolled stock of remaining types - 0.008%.

(Revised edition - "Inform. standards catalogue" No. 5, 1977).

2.2. In rolled product and forgings while adhering to the mechanical properties and other requirements of the standard, deviations as regards chemical composition from the norms, shown in table 1 are allowed:

for steel of all grades as regards carbon	±0.01%
for killed steel of all grades as regards silicon	±0.03%
for steel of all grades as regards manganese	±0.03%
for steel of all grades as regards phosphorus, maximum..	+0.005%

(Revised edition - "Inform. standards catalogue" No. 5 1977.).

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3. ASSORTMENT.

3.1. Assortment of steel should correspond to the requirements:

hot rolled round - as per GOST 2590-71;

hot rolled square - as per GOST 2591-71 and GOST 4693-77;

forged round and square - GOST 1133-71;

hot-rolled hexagonal - GOST 2879-69;

hot rolled strip - GOST 103-76 and GOST 9147-59*;

* In force till 1-1-78.

sized round - GOST 7417-75;

sized square - GOST 8559-75;

sized hexagonal - GOST 8560-67;

sized strip - the documents approved in an established order

silver steel - GOST 14955-69.

NOTE:- It is allowed to produce hot rolled steel with the side of square upto 100 mm. as per GOST 2591-71 with corners rounded off to radius not exceeding 0.15 of the side of square.

Method of calling:

Hot rolled steel of common accuracy of rolling V, having side of square 50 mm., grade 30, 2nd category, subgroup a, without heat treatment:

Square $\frac{V\text{-}50\ 2\text{-}V\ GOST\ 2591\text{-}71}{30\text{-}2\text{-}a\ GOST\ 1050\text{-}74}$.

-do- strip, of thickness 36 mm, width 90 mm., grade 45, 4th category, diameter of the blank (circle) , subjected to heat treatment 60 mm., subgroup b, heat treated T:

Strip $\frac{36X90\ GOST\ 103\text{-}57}{45\text{-}4\ (60)\text{-}b\text{-}T\ GOST\ 1050\text{-}74}$.

Sized steel with diameter 10 mm., class of accuracy 4 as per GOST 7417-75, grade 35, cold hardening N, 5th category, surface quality group B as per GOST 1051-73:

Round $\frac{10\text{-}4\text{-}GOST\ 7417\text{-}75}{35\text{-}N\text{-}5\text{-}B\text{-}GOST\ 1050\text{-}74}$.

(Revised edition - Uniform standards catalogue No. 5, 1977.).

4. TECHNICAL REQUIREMENTS.

4.1. Steel is produced in basic converters having blowing of oxygen from the top, in open-hearth or electric furnaces.

Method of melting the steel (open-hearth or converter) is selected by manufacturing plant, if the method is not specified specially in the order.

(Revised edition - "Unbrm. standards catalogue" No. 5, 1977.).

4.2. Hot rolled and forged steel are produced as heat treated (annealed, highly tempered or normalized) and as well as non heat treated, and sized steel and silver steel-work-hardened or heat treated (annealed, highly tempered, normalized, normalized with tempering, hardened with tempering).

4.3. Hardness of hot rolled and forged steel, meant for cold machining and cold drawing rolled stock, subgroup V), should correspond to the norms specified in table 2.

TABLE 2.

Grade of steel.	Diameter of impression, mm, minimum	HBW maximum	Diameter of impression, mm., minimum	HBW maximum
	Without heat treatment		After annealing or high tempering.	
08	5.2	131	—	—
10	5.0	143	—	—
15	4.9	149	—	—
20	4.7	163	—	—
25	4.6	170	—	—
30	4.5	179	—	—
35	4.2	207	—	—
40	4.1	217	4.4	187
45	4.0	229	4.3	197
50	3.9	241	4.2	207
55	3.8	255	4.1	217
58(55pp)	3.8	255	4.1	217
60	3.8	255	4.0	229
65	3.8	255	4.0	229
70	3.7	269	4.0	229
75	3.6	285	3.9	241
80	3.6	285	3.9	241
85	3.5	302	3.8	255
60G	3.7	269	4.0	229
65G	3.6	285	4.0	229
70G	3.6	285	4.0	229

NOTE: 1. HBW of steel of grades 08, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 58(55pp), 60, 65, which are agant for hot working under pressure, should not exceed 255.

2. Norms of hardness of normalised steel are set by the agreement between the parties.

(Revised edition - "Unform, standards catalogue" No. 5, 1977).

4.4. Hardness of sized steel and silver steel, annealed, highly tempered and work-hardened having diameter or thickness above 5 mm, should correspond to the norms indicated in table 3.

Norms of hardness of sized steel and silver steel normalized with tempering and hardened with tempering is set by an agreement between manufacturer and customer.

Hardness of steel having diameter or thickness less than 5 mm is not determined. Ultimate tensile strength is determined. The norm are set by an agreement between manufacturer and customer.

TABLE 3 :

Grade of steel	Diameter of impression, mm. minimum	BHN maximum	Diameter of impression, mm. minimum	BHN maximum
	Work-hardened		Annealed or highly tempered	
08	4.5	179	5.2	131
10	4.4	187	5.0	143
15	4.3	197	4.9	149
20	4.2	207	4.7	163
25	4.1	217	4.6	170
30	4.0	229	4.6	179
35	4.0	229	4.4	187
40	3.9	241	4.3	197
45	3.9	241	4.2	207
50	3.8	255	4.1	217
55	3.7	269	4.0	229
60	3.7	269	4.0	229
65G	—	—	4.0	229

NOTE:-

1. On an agreement between the parties, sized work-hardened steel, meant for cold machining, can be produced with hardness by 15 just more than values more/in comparison with table 3.

2. Hardness of sized work-hardened steel of grades 65, 70, 75, 80, 85, 65G, 65G, 70G should not be more than 260 HB, diameter of impression-minimum 3.7 mm. or is set by an agreement between the parties.

3. Hardness of sized annealed steel of grades 65, 70, 75, 80, 85, 60G, 70G should correspond to the norms indicated in table 2.

4. MBM of sized steel meant for subsequent hot working under pressure, should not be more than 269.

(Revised edition of "Inform. standards catalogue" No. 5, 1977.).

4.5. Rolled blisters, rolled seams, laps, cracks, contaminations, stress cracks should not be there on the surface of bars, strips, coils meant for hot working under pressure (subgroup a) and for cold drawing (rolled stock, subgroup v).

The local defects on the surface of bars should be eliminated by smooth punching out or dressing, the width of which should not be less than five times the depth.

The depth of dressing the defects should not exceed the following values:

6% of diameter or thickness - for the bars of size above 200 mm.;

5% of diameter or thickness - for the bars of size from 140 to 200 mm.;

sums of permissible deviations - for the bars of size from 90 to 140 mm.;

half the sum of permissible deviations - for the bars of size lesser than 90 mm.;

Depth of the dressing the defects is considered from actual size.

Not more than two dressings of maximum depth are allowed on one cross-section of bar of size (diameter or thickness) above 140 mm.

Without dressing separate small grooves, dents, rippled mass in the limits of half the tolerances

and also small cracks of depth, not exceeding 1/2 the sum of tolerances or dimensions, but not more than 0.70 mm. are allowed on the surface of rods, strips and [illegible] rods.

Small cracks are not allowed on the surface of rods and bars, meant for fabrication of parts by the method of hot upsetting or swaging (which should be shown in the order).

(Revised edition - "Inform. standards catalogue" [illegible], 1977.).

4.6. On the surface of hot rolled and forged bars, meant for cold machining (subgroup b), local defects are not allowed, if their depth exceeds:

sum of permissible deviations - for bars of diameter 100 mm. and above;

negative tolerance on diameter or thickness - for the bars of size less than 100 mm.

NOTE:- Depth of the defects is considered from the nominal size.

4.7. Surface quality of sized steel should correspond to the requirements of GOST 1051-73 groups B and V, silver steel - GOST 14955-69, groups V, G and D.

4.8. The bars should be uniformly trimmed.

NOTE: While cutting on the presses, shears and with hammers washed off ends and burrs are allowed. On customer's request, hot rolled and forged bars of diameter upto 140 mm. inclusively are supplied without burrs and warped ends.

4.9. The steel, meant for hot upsetting, swaging and stamping, is tested for upsetting in hot condition.

Ruptures and cracks should not be there on the upset specimens.

4.10. Depending on the requirements of the test of mechanical properties, steel is categorized as per table No.4

Category of steel is to be mentioned in the order. If it is not indicated, steel of 2nd category is supplied.

TABLE : 4

Category.	Requirements for testing the mechanical properties.	Type of processing for steel.
1.	Without testing the mechanical properties for tension and impact strength.	Hot rolled forged, sized and with silver finish.
2.	With testing of mechanical properties for tensile strength on specimens, prepared from normalised blanks of size 25 mm. (diameter or side of a square) and impact strength, determined as per customer's requirement on heat-treated specimens.	- do -
3.	With testing of mechanical properties for tensile strength on specimens, prepared from normalised blanks of size indicated in the order, but not more than 100 mm.	Hot rolled, forged and sized.
4.	With testing of mechanical properties for tensile strength and impact strength on specimens, prepared from heat-treated (hardening + tempering) blanks of size given in the order, but not more than 100 mm.	- do -
5.	With testing of mechanical properties for tensile strength on specimens, prepared from steel in cold-hardened or heat-treated condition (annealed or tempered at high temperature).	Sized.

4.11. The mechanical properties, as regards tensile strength and impact strength of steel of 2nd category, should meet the requirements given in table 5.

4.12. The norms of mechanical properties of steel of 3rd and 4th categories are set by mutual agreement of both sides.

4.13. The mechanical properties of sized steel of 5th category should correspond to the norms given in table 5.

4.14. The macrostructure of steel, when checked on fracture or on etched templates, should not have shrinkage cavities, porousness, blisters, peeling off, internal cracks, slag inclusionsand flakes, visible without using magnifying devices.

TABLE NO. 5

Steel grade.	Heat treatment of blanks.	Yield point σ_t, kg./mm.²	Ultimate tensile strength σ_b, Kg./mm.²	Percentage elongation δ_5, %	Reduction of area ψ, %	Impact strength a_n, kg.m/cm.²
		not less than				
08	Normalising	20	33	33	60	-
10	- do -	21	34	31	55	-
15	"	23	38	27	55	-
20	"	25	42	25	55	-
25	"	28	45	23	50	9
30	"	30	50	21	50	8
35	"	32	54	20	45	7
40	"	34	58	19	45	6
45	"	36	61	16	40	5
50	"	38	64	14	40	4
55	"	39	66	13	35	-
58	"	32	61	12	28	-
60 (pri)	"	41	69	12	35	-
65	"	42	71	10	30	-
70	"	43	73	9	30	-
75	Hardening + tempering	90	110	7	30	-
80	- do -	95	120	6	30	-
85	"	100	130	6	30	-
60G	Normalising	42	71	11	35	-
65G	- do -	44	75	9	-	-
70G	"	46	80	8	-	-

NOTE:

1. The norms of mechanical properties, indicated in table 5, pertain to steel of diameter or thickness upto 80 mm. Decrease in percentage elongation by 2 abs.% is allowed for steel of diameter or thickness above 80 mm.

2. The norms of mechanical properties for blanks, reforged from bars of diameter or thickness above 120 to 250 mm. to

bars of diameter or thickness from 90 to 100 mm., should correspond to the data given in table 5 and reduction of area by 5 abs.%.

2. The impact strength is determined, as per customer's requirement, on heat-treated (hardening + tempering) specimens of type IX.

3. For steel of grades 35-35, 50G, 65G, 70G, decrease of ultimate strength by 2 kg/mm.^{2}, as compared to the norms given in table 5, is allowed if at the same time the norms of percentage elongation decrease by 2 abs.%.

4. Reduction of area need not be determined if such an agreement has been made by both sides.

(Revised edition - "Standards information catalogue" No. 5 of 1977.).

Table 6

Steel grade.	Ultimate tensile strength σ_B, kg./mm.^{2}	Percentage elongation, δ_5, %	Reduction of area ψ, %	Ultimate tensile strength σ_B, kg./mm.^{2}	Percentage elongation, δ_5, %	Reduction of area ψ, %
	Work-hardened			Annealed or tempered at high temperature.		
	Minimum.					
10	42	6	50	30	26	55
15	45	6	45	35	23	55
20	50	7	40	40	21	50
25	55	7	40	42	19	50
30	57	7	35	45	17	45
35	60	6	35	48	15	45
40	63	6	35	52	14	40
45	65	6	30	55	13	40
50	67	6	30	57	12	40

NOTE:

The norms of mechanical properties of steel grades, which are not specified in table 6, are set by mutual agreement between the parties.

4.15. As per customer's requirement, in steel having carbon content more than 0.3% (for lower limit), meant for surface hardening with high-frequency currents, their depth of decarburized layer (ferrite + transition zone) is checked, which should not exceed 0.5% of diameter or thickness of bar.

4.16. Decarburization is not allowed in steel having turned or cut surface and in silver steel.

4.17. As per customer's requirement, steel is produced:

a) with reduced, when compared to the value given in table 1, limit of carbon content to a minimum value of 0.05% (for orders of automobile and tractor industry without considering the permissible deviations on carbon, specified in point 2.2);

b) with decreased, in comparison with the value given in table 1, sulphur and phosphorus content;

c) with limitation of sulphur content as regards lower limit - 0.020% minimum;

d) with decreased chromium and nickel content in comparison with the values given in table 1;

e) with copper content not more than 0.20%;

f) with standardised content of boron 0.002-0.006 % in steel of grades from 20 to 50. In this case the letter "R" should be written after the designation of steel grade;

g) with determination of impact strength at temperature + 20°C on specimens of type IV and at temperature - 40°C on specimens of types I and IV;

h) in pickled condition;

i) with standardised austenite grain size;

j) with standardised hardenability for steel of grades 35, 40, 45 in the limits of mark (grade) hardenability band.

The hardenability bands and diameters of bars, having the same hardness (after full hardening in water and oil) as that of the side specimen for corresponding distance from the cooled side of specimen, and the place of hardness measurement on bar section are given in appendix 1.

The limits of variation of hardness (maximum and minimum) along the length of side specimens for mark hardenability band are given in appendix 2.

For steel of grades, which contain boron, determination of hardenability followed by entry in quality certificate is compulsory;

k) with standardised finish as regards surface and internal hairline cracks;

l) with controlled weldability;

m) with standardised finish as regards non-metallic inclusions;

n) with silicon content in grades of killed steel in the limits of 0.17 - 0.37.

NOTE:

Norms as per subpoints a, b, d, g, i, k, ℓ, m, methods of testing the steel for hairline cracks (subpoint k), checking the weldability (subpoint ℓ) and checking the finish of steel as regards non-metallic inclusions (subpoint m) are set by mutual agreement of both parties or by authoritative documents approved in established order. (Revised edition - "Standards information catalogue" No.5 of 1977.).

6. ACCEPTANCE RULES:

5.1. General acceptance rules of steel as per GOST 7566-69.

5.2. The steel is supplied in batches consisting of steel of same melt, size and heat-treatment condition.

5.3. For checking the quality of steel from the batch of bars, strips and coils, selection is done as follows:

a) for chemical analysis - as per GOST 7565-68;

b) for checking the hardness - not more than 2% bars, strips and coils, but at least 3 places;

c) for checking the surface quality and dimensions - all bars, strips and coils. While checking the coiled steel the batch is considered suitable if the quantity of metal, having hairtracks of depth exceeding 0.2 mm., does not exceed 2% by weight;

d) for upsetting test - 3 specimens from different bars, strips and coils. The unsetting test of bars of size exceeding 90 mm. need not be done by manufacturing plant;

e) for tensile test - one specimen from steel of 2nd category and 2 specimens from different bars, strips and coils for steel of 3rd, 4th and 5th categories;

f) for determining impact strength - 2 specimens from different bars, strips or coils of steel of 2nd and 4th categories;

g) for checking the macrostructure on fracture or by etching - 2 templates from different bars, strips or coils;

h) for determining the depth of decarburized layer - 2 specimens from different bars, strips or coils;

i) for determining hardenability - one specimen from melt-ladle for carbon steel and 2 specimens from melt-ladle for steel of grades which contain boron;

j) for determining grain size-one specimen from melt-ladle.

(Revised edition - "Standards information catalogue" No.5 of 1977.).

6. TEST METHODS.

6.1. The chemical analysis of steel is done as per GOST - 9391-72, GOST 11855-65 to GOST 11869-65 or by other methods, which ensure corresponding accuracy.

Nitrogen content is determined by the method adopted by manufacturing plant.

Analysis of steel for content of arsenic, nitrogen and other elements is done at least twice in a year.

(Revised edition - "Standards information catalogue" No.5 of 1977.).

6.2. Brinell hardness is determined as per GOST 9012-59.

6.3. The surface quality is checked by examining the bars without using magnifying lenses. If necessary, brightening or etching of surface is done, and for silver steel of diameter upto 3 mm. inclusively the examination is done with 10 x magnification. Nondestructive methods of inspection may be used.

The depth of defects on the bar surfaces is determined by check dressing or filing.

6.4. Selection of samples for upsetting tests - as per GOST 7564-73.

6.5. Upsetting test in hot condition is done as per GOST 8817-73.

The specimens are heated to forging temperature and upsetting is done to 1/3 of its initial height.

6.6. Selection of samples for testing the mechanical properties of steel of 2nd and 4th categories is done as per GOST 7564-73 (version 1).

Selection of samples (blanks) for testing the mechanical properties of steel of 3rd and 4th categories is done as per GOST 7564-73 (version 2).

6.7. Selection of samples from coils for all types of tests is done at a minimum distance of 1.5 turns from the coil end.

6.8. Tensile test is done as per GOST 1497-73 on specimens having length multiple of 5 and diameter 5 or 10 mm.

Tests on specimens without machining are allowed for steel of diameter or thickness upto 25mm. inclusively.

It is allowed to use non-destructive test methods as per the approved method including statistical control methods.

Impact strength test at temperature +20°C is done as per GOST 9454-60, and at temperature -40°C as per GOST 9455-60.

Direction of axis of specimens - along the direction of rolling.

(Revised edition - "Standards information catalogue" No.8 of 1977.).

6.9. Specimens for tensile strength tests of steel of 2nd category are cut from normalised blanks having cross-section (diameter or side of square) 20 mm.

For bars of diameter less than 25 mm, normalisation is done in finished section - bar (without cutting the bar).

NOTES:

1) Heat-treatment (hardening + tempering) of specimens from steel of grade 75, 80, 85 for tensile strength and impact strength tests is done in section of finished specimen.

2) For bars of size exceeding 120 mm, selection of samples for mechanical tests can be done from reforged or redrawn blanks with section 90-100 mm.

(Revised edition - "Standards information catalogue" No.8 of 1977.).

6.10. The specimens for testing of mechanical properties of steel of 3rd and 4th categories are cut from blanks subjected to heat-treatment (normalising or hardening + tempering).

The diameter or dimensions of blank section, subjected to heat treatment, should be indicated in the order.

6.11. The recommended heating temperature during heat-treatment of blanks (specimens) for carrying out the tests of mechanical properties of steel of 2nd, 3rd and 4th categories is given in appendix 3.
(Revised edition - "Standards information catalogue "No. 5 of 1977.).

6.12. Checking the macrostructure by etching method is done as per GOST 10243-75. It is allowed to use ultrasonic test methods as per procedure, adopted by manufacturing plant, and other non-destructive test methods.

6.13. Determination of depth of decarburized layer is done as per GOST 1763-68.

6.14. Hardenability is determined by surface hardening as per GOST 5657-69.

6.15. Determination of grain size is done as per GOST 5639-65.

6.16. Determination of non-metallic inclusions is done as per GOST 1778-70.

6.17. Steel of same melt, which has passed the tests of macrostructure, hardenability and mechanical properties on large rolled profiles are not subjected to the above mentioned tests if thinner rolled profiles are supplied.

7. MARKING AND PACKING.

7.1. Packing, marking and sampling of documents - as per GOST 7566-69. Packing of sized steel - as per GOST 1051-73, silver steel - as per GOST 14955-69.

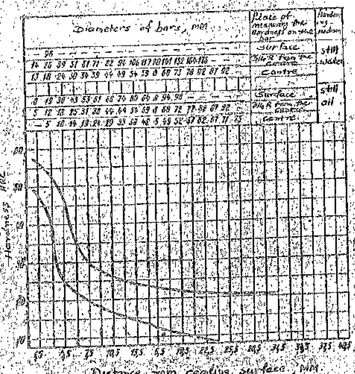
7.2. The state quality mark (GOST 1.9-67) should be put on the product, which is assigned the State quality mark in the established order.

(Introduced additionally - "Standards information catalogue" No. 5 of 1977.).

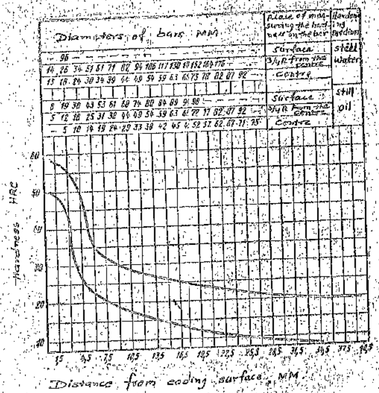
APPENDIX "J".

HARDENABILITY BANDS OF STRUCTURAL CARBON STEEL.

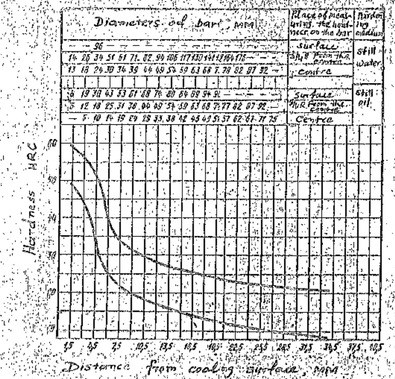
Steel of Grade 36.



Steel of grade 40



Steel of Grade 45.



APPENDIX 2.

PARAMETERS OF MARK BANDS (LIMITS OF VARIATION OF HARDNESS HRC & HRB ALONG LENGTH OF SPECIMEN)

Distance from face, mm.	Hardness for hardenability bands. Steel grades.					
	35		40		45	
	maximum	minimum	maximum	minimum	maximum	minimum
1.5	HRC 56	HRC 48	HRC 57	HRC 49	HRC 58	HRC 40
3.0	HRC 54	HRC 43	HRC 56	HRC 44	HRC 56	HRC 40
4.5	HRC 48	HRC 25	HRC 51	HRC 38	HRC 53	HRC 27
6.0	HRC 36	HRC 21	HRC 36	HRC 24	HRC 41	HRC 23
7.5	HRC 32	HRC 18	HRC 32	HRC 22	HRC 35	HRC 21
9.0	HRC 29	HRB 94	HRC 30	HRC 20	HRC 31	HRC 20
10.5	HRC 27	HRB 93	HRC 28	HRC 18	HRC 30.5	HRC 19
12.0	HRC 26	HRB 92	HRC 27	HRB 94	HRC 29	HRC 18
13.5	HRC 25.5	HRB 91	HRC 26	HRB 93	HRC 28	HRB 94
15.0	HRC 25	HRB 90	HRC 25.5	HRB 92	HRC 27.5	HRB 93
16.5	HRC 24.5	HRB 89	HRC 25	HRB 91	HRC 27	HRB 92
18.0	HRC 24	HRB 88	HRC 24.5	HRB 89	HRC 26.5	HRB 91
19.5	HRC 23.5	HRB 87	HRC 24	HRB 88	HRC 26	HRB 90
21.0	HRC 23	HRB 86	HRC 23.5	HRB 87	HRC 25	HRB 89
24.0	HRC 22	HRB 85	HRC 23	HRB 86	HRC 24	HRB 88
27.0	HRC 21	HRB 84	HRC 22	HRB 85	HRC 23	HRB 87
30.0	HRC 20	HRB 83	HRC 21	HRB 84	HRC 22	HRB 86
33.0	—	—	HRC 20.5	HRB 83	—	—
36.0	—	—	HRC 20	HRB 82	—	—
39.0	—	—	—	—	—	—

(Revised edition - "Standards information catalogue" No.6 of 1977.).

APPENDIX : 3

Recommended.

Steel Grades	Heating temperature, °C			Steel Grades	Heating temperature, °C		
	Normalising	Hardening	Tempering		Normalising	Hardening	Tempering
10	920	900	200	58(55pp)	850		
15	900	880	200	60	840	820	600
20	900	880	600	65	830	-	-
25	890	870	600	70	820	-	-
30	880	860	600	75	-	820	480
35	880	850	600	80	-	820	480
40	870	840	600	85	-	820	480
45	860	840	600	60G	840	-	-
50	850	830	600	65G	830	-	-
55	850	820	600	70G	820	-	-

Recommended minimum holding period:

in case of normalising or hardening - 30 minutes;

in case of tempering at 200°C - 2 hrs.;

in case of tempering at 600°C - 1 hr.;

Cooling medium in case of hardening - water, and for steel grades 75, 80, 85 - oil.

Other standards referred to in this standard :

GOST	2590-71 ✓ -70	GOST	2591-71
"	4693-77	"	1133-71
"	2879-69	"	103-76 - 57 ✓
"	9137-59	"	7417-75 ✓ -57
"	8559-75	"	8560-67
"	12355-66	"	1051-73 ✓
"	7566-69	"	7565-69
"	2831-63 ✓		
GOST	11655-65 to	GOST	11659-65
"	9012-59 ✓	"	8817-73
"	7564-73	"	1497-73
"	9454-60	"	9565-60
"	10243-75	"	1763-68
"	5687-69	"	5639-65
"	1778-70	"	1.9-67.