

STANDARD STRUCTURAL STEEL

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STATE  
GOST 1080-71  
GOST 1080-60  
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MINISTRY OF DEFENCE  
Book No. 91  
Standard 50000

### COPY-8

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 (59pp) and 60 of diameter or thickness upto 250mm, of grades 65, 70, 75, 80, 85, 90G, 95G and 70G of diameter or thickness upto 60 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 05kp, 08kp, 08ps, 10kp, 10ps, 11kp, 11ps, 12kp, 12ps, 20kp and 20ps.

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

#### E. CLASSIFICATION

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 - W (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	0.7-0.37	0.25-0.65	0.10
10kp	0.07-0.14	Maximum 0.07	0.25-0.50	0.15
10p	0.07-0.14	0.15-0.17	0.35-0.65	0.15
10	0.07-0.14	0.7-0.37	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	0.7-0.37	0.35-0.65	0.25
18kp	0.12-0.20	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
55 (55pp)	0.55-0.63	0.10-0.30	Maximum 0.20	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
90G	0.57-0.65	0.17-0.37	0.70-1.00	0.25
95G	0.62-0.70	0.17-0.37	0.90-1.20	0.25
70G	0.57-0.75	0.17-0.37	0.90-1.20	0.25

Note: - 1. Steel of grades 65, 70, 75, 80, 85, 90G, 95G 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 0.20% 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 0.30-0.60%, 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 0.02% arsenic content is allowed in the steel.

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

for thin-sheet rolled stock and band -0.003%;

for rolled stock of remaining types - 0.002%.

(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 +0.02%

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.).

3. ASSERTMENT.

3.1. Assertion 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 4603-77;

forged round and square - GOST 1133-71;

hot-rolled hexagonal - GOST 2279-69;

hot rolled strip - GOST 103-76 and GOST 9137-59\*;

\* In force till 1-1-78.

sized round - GOST 7417-75;

sized square - GOST 2591-71;

sized hexagonal - GOST 3560-67;

sized strip - the documents approved in an established order

silver steel - GOST 14865-69.

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 V-50 20-V 2591-71  
30-2-a GOST 1050-74

-do- strip, of thickness 30 mm, width 90 mm., grade 45, 4th category, diameter of the blank (strip) subjected to heat treatment 60 mm., subgroup b, heat treated T:

Strip 35X90 GOST 103-67  
45-1 (CO)-b-T GOST 1050-74

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 10-1- GOST 7417-75  
35-N-5-B- GOST 1050-74

(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 - "Instr. 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	BHN	
		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
45	4.0	223	4.3
50	3.9	241	4.2
55	3.8	255	4.1
58(55pr)	3.8	255	4.1
60	3.8	255	4.0
65	3.8	255	4.0
70	3.7	269	4.0
75	3.6	285	3.9
80	3.6	285	3.9
85	3.5	302	3.8
60G	3.7	269	4.0
65G	3.6	285	4.0
70G	3.6	285	4.0

NOTE: - 1. BHN of steel of grades 08, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 58(55pr), 60, 65, which are meant for hot working under pressure, should not exceed 255.  
 2. Norms of hardness of normalized steel are set by the agreement between the parties.  
 (Revised edition - "Inform. 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 norms are set by an agreement between manufacturer and customer.

TABLE 3 :

Grade of steel	Diameter of Impression, mm. minimum	BRH maximum	Diameter of Impression, mm. minimum	
			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	161
25	4.1	217	4.6	170
30	4.0	229	4.6	179
35	4.0	239	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 a hardness <sup>more than the values</sup> 15% more in comparison with table 3.

2. Hardness of sized work-hardened steel of grades 65, 70, 75, 80, 85, 90G, 95G, 100G should not be more than 260 HB, diameter of impression minimum 37 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. BHN of sized steel meant for subsequent hot working under pressure, should not be more than 200.

(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 50 to 140 mm.

half the sum of permissible deviations - for the bars of size lesser than 50 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, pitted areas in the limits of half the tolerances

and also small cracks of depth, not exceeding 1/10th the size of tolerances or dimensions, but not more than 0.70 mm. are allowed on the surface of rods, strips and coils.

Small cracks are not allowed on the surface of rods and coils, 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" No. 10, 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:

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

... the 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 1051-78 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 <sup>upsetting</sup> 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.

(Revised edition - "Iron and steel standards catalogue" No. 5 of 1977.)

TABLE NO. 5

Steel grade	Heat treatment of blanks	Yield point, kg./mm. <sup>2</sup>	Ultimate tensile strength, kg./mm. <sup>2</sup>	Percentage elongation, %	Reduction of area, %	Impact strength, kg.m/cm.
08	Normalising	20	31	33	60	-
10	do	21	31	31	55	-
15	"	23	35	27	55	-
20	"	25	42	25	55	-
25	"	28	43	23	50	9
30	"	30	5	21	50	8
35	"	32	"	20	45	7
40	"	34	"	19	45	6
45	"	36	"	16	40	5
50	"	39	"	14	40	4
55	"	39	"	13	35	-
58	"	32	"	12	28	-
60	"	41	"	12	35	-
61	"	42	"	10	30	-
70	"	43	"	9	30	-
75	Hardening + tempering	90	120	7	30	-
80	do	95	120	6	30	-
85	"	100	135	6	30	-
60C	Normalising	42	"	11	35	-
65C	do	44	"	9	-	-
70C	"	46	"	8	-	-

**NOTE:**  
 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.  
 The norms of mechanical properties for blanks, reformed 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 T<sub>2</sub>.

3. For steel of grades 35-35, 60G, 65G, 70G, decrease of ultimate strength by 2 kg/mm.<sup>2</sup>, as compared to the norms given in table 5, is allowed if at the same time the norms of percentage elongation increase 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.).

*Category 6*

Table 5

Steel grade.	Ultimate tensile strength, $\sigma_u$ , kg./mm. <sup>2</sup>	Percentage elongation, $\delta_5$ , %	Reduction of area, $\psi$ , %	Ultimate tensile strength, $\sigma_u$ , kg./mm. <sup>2</sup>	Percentage elongation, $\delta_5$ , %	Reduction of area, $\psi$ , %
	Work-hardened		Annealed or tempered at high temperature.			
	Minimum					
10	42	8	50	30	26	55
15	45	8	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 2.3);

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 <sup>not more</sup> than 0.20%;

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

g) with determination of impact strength at temperature  $+20^{\circ}\text{C}$  on specimens of type IV and at temperature  $-40^{\circ}\text{C}$  on specimens of types I and IV;

h) in pickled condition;

l) 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 - 0.27.

NOTE:

Norms as per subpoints a, b, d, e, i, k, l, m, methods of testing the steel for hairline cracks (subpoint k), checking the weldability (subpoint e) and checking the finish of steel as regards non-metallic inclusions (subpoint m) are set by mutual agreement of both parties or by appropriate 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 7565-69;
  - b) for checking the hardness - not more than 2% bars, strips and coils, but at least 3 pieces;
  - 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 haircracks 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 upsetting test of bars of size exceeding 30 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 - 9331-73, GOST 11455-65 to GOST 11659-65, 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 devices. 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 6th 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 1.8 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 9454-80, and at temperature -40°C as per GOST 9455-80.

Direction of axis of specimens - along the direction of rolling.  
(Revised edition - "Standards information catalogue" No. 5 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) 25 mm.

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

NOTES:

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

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

(Revised edition - "Standards information catalogue" No. 5 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 editions "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 5667-69.

6.15. Determination of grain size is done as per GOST 5630-69.

6.16. Determination of non-metallic inclusions is done as per GOST 1779-70.

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 compiling 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.

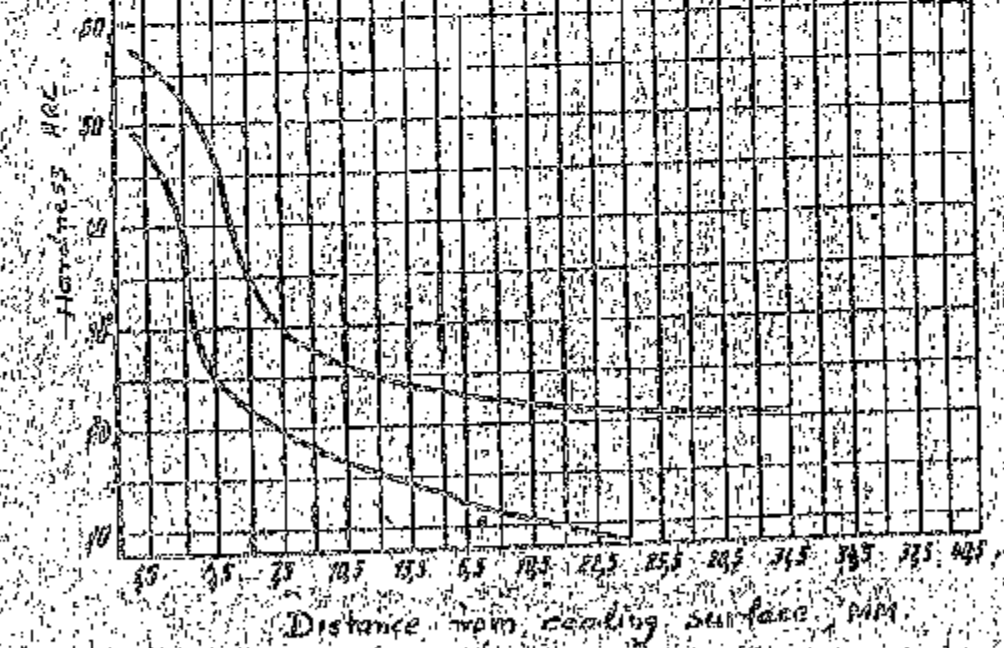
(Introduced additionally "Standards information catalogue" No. 5 of 1977.)

APPENDIX I

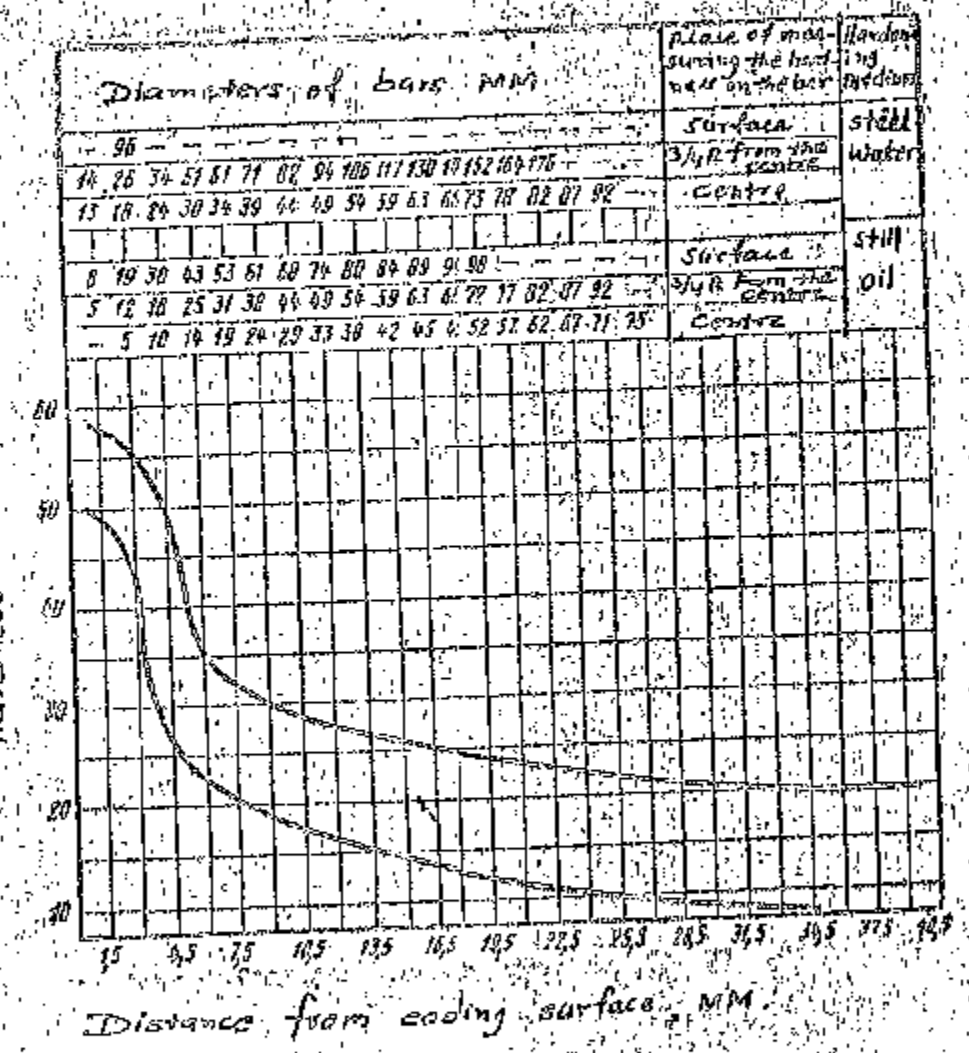
HARDENABILITY BANDS OF STRUCTURAL CARBON STEEL

Steel of grade 35

Diameters of bars, mm	Place of measuring the hardness on the bar	Hardness
95	Surface	still
76 78 80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110 112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150 152 154 156 158 160 162 164 166 168 170 172 174 176 178 180 182 184 186 188 190 192 194 196 198 200 202 204 206 208 210 212 214 216 218 220 222 224 226 228 230 232 234 236 238 240 242 244 246 248 250 252 254 256 258 260 262 264 266 268 270 272 274 276 278 280 282 284 286 288 290 292 294 296 298 300 302 304 306 308 310 312 314 316 318 320 322 324 326 328 330 332 334 336 338 340 342 344 346 348 350 352 354 356 358 360 362 364 366 368 370 372 374 376 378 380 382 384 386 388 390 392 394 396 398 400 402 404 406 408 410 412 414 416 418 420 422 424 426 428 430 432 434 436 438 440 442 444 446 448 450 452 454 456 458 460 462 464 466 468 470 472 474 476 478 480 482 484 486 488 490 492 494 496 498 500 502 504 506 508 510 512 514 516 518 520 522 524 526 528 530 532 534 536 538 540 542 544 546 548 550 552 554 556 558 560 562 564 566 568 570 572 574 576 578 580 582 584 586 588 590 592 594 596 598 600 602 604 606 608 610 612 614 616 618 620 622 624 626 628 630 632 634 636 638 640 642 644 646 648 650 652 654 656 658 660 662 664 666 668 670 672 674 676 678 680 682 684 686 688 690 692 694 696 698 700 702 704 706 708 710 712 714 716 718 720 722 724 726 728 730 732 734 736 738 740 742 744 746 748 750 752 754 756 758 760 762 764 766 768 770 772 774 776 778 780 782 784 786 788 790 792 794 796 798 800 802 804 806 808 810 812 814 816 818 820 822 824 826 828 830 832 834 836 838 840 842 844 846 848 850 852 854 856 858 860 862 864 866 868 870 872 874 876 878 880 882 884 886 888 890 892 894 896 898 900 902 904 906 908 910 912 914 916 918 920 922 924 926 928 930 932 934 936 938 940 942 944 946 948 950 952 954 956 958 960 962 964 966 968 970 972 974 976 978 980 982 984 986 988 990 992 994 996 998 1000	Surface	still
	5/8" from the surface	oil
	Centre	oil

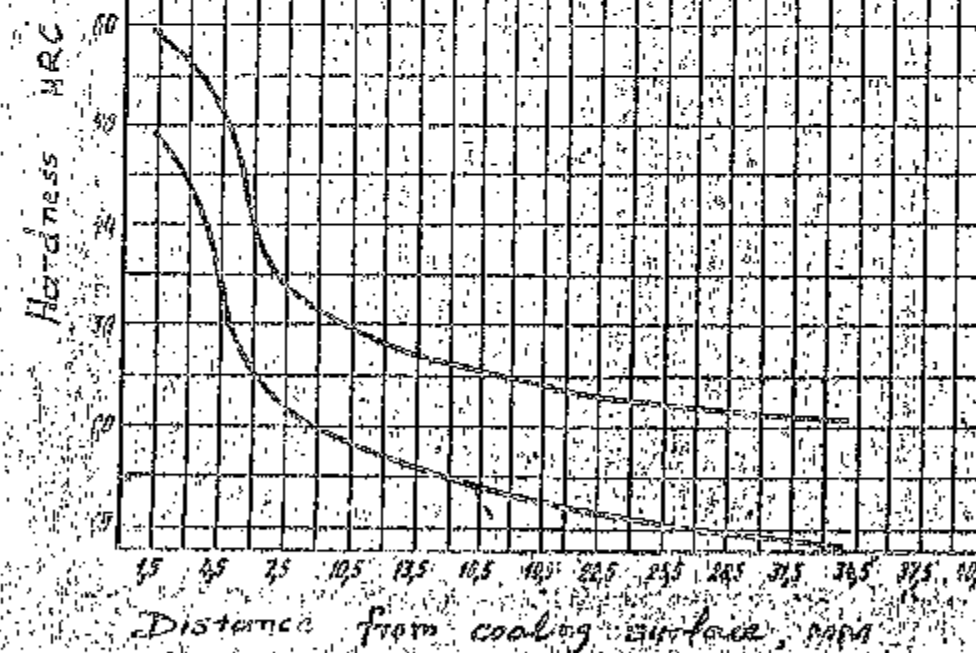


Steel of grade 40



Steel of grade 45.

Diameters of bar, mm	Place of measurement, mm from the bar	Hardness
36	Surface	Still
16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92	3/8" from the surface	Water
16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92	Centre	Oil
36	Surface	Still
16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92	3/8" from the surface	Oil
16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92	Centre	



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 50	HRC 48	HRC 57	HRC 49	HRC 58	HRC 49
3.0	HRC 54	HRC 49	HRC 56	HRC 44	HRC 56	HRC 40
4.5	HRC 48	HRC 28	HRC 51	HRC 38	HRC 53	HRC 27
6.0	HRC 36	HRC 21	HRC 36	HRC 34	HRC 41	HRC 23
7.5	HRC 28	HRC 18	HRC 32	HRC 23	HRC 36	HRC 21
9.0	HRC 28	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 89	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 86
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 of "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	50 (550)	850	-	-
15	900	880	200	60	840	820	600
20	900	880	200	65	850	-	-
25	890	870	200	70	820	-	-
30	890	860	200	75	-	820	480
35	880	850	200	80	-	820	480
40	870	840	200	85	-	820	480
45	860	830	200	90	840	-	-
50	850	820	200	95	820	-	-
55	850	820	200	100	820	-	-

Recommended minimum holding periods:

in case of normalising or hardening - 30 minutes;

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

in case of tempering at 200°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
" 4698-77	" 1133-71
" 2879-69	" 103-76 - 51 ✓
" 9137-59	" 7417-75 ✓ - 57
" 8559-75	" 6530-67
" 12055-69	" 1051-73 ✓
" 7566-69	" 7665-69
" 8931-63 ✓	
GOST 11655-65 to	GOST 11659-65
" 9012-59 ✓	" 9317-73
" 7564-73	" 1497-73
" 9454-60	" 9456-60
" 10248-75	" 1763-68
" 5687-69	" 5539-65
" 1778-70	" 149-67

