

COST : 14959-79

Title : CARBON AND ALLOY STEEL
FOR SPRINGS

Translated and edited by

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USSR STATE STANDARD

Carbon and alloy steel for springs	GOST 14959-79 This supersedes GOST 14959-69 and GOST 1050-70 (as far as steel of grades 65, 70, 75, 80, 85, 60Г, 65Г, and 70Г are concerned)
ОКН 09 5000	Valid upto 01.01.1985.

The present standard relates to hot-rolled and forged, structural, carbon and alloy steel of diameter or thickness upto 250 mm, available as bright steel or steel with special surface finish and as round or square rods and shaped sections in strips and bundles and intended for making springs, leaf springs and other parts of machines and mechanisms used in hardened and tempered condition.

The standard is applicable to all other kinds of rolled sections, ingots, forgings and stampings in respect of norms for chemical composition.

1. CLASSIFICATION AND ASSORTMENT

1.1. Steel is subdivided into different varieties by different criteria as below:

With respect to processing:

hot-rolled and forged steel;

bright steel;

round steel with special surface finish;

with respect to chemical composition:
hot-rolled round steel with turned or ground surface;

quality steel;

high quality steel-A.

with respect to standardised characteristics and application:

Categories 1, 1A, 1B (1B), 2, 2A, 2B (2B), 3, 3A, 3B (3B); 3B (3V); 3Г (3G), 4, 4A and 4B (4B).

1.2. Hot-rolled and forged steel of categories 1, 1A, 1B, 4 4A and 4B is divided into three subgroups as below depending upon the purpose to which it is put.

- for hot processing;
- Г (b) - for machining (turning, planing, milling).
- В (c) - for cold drawing.

1.3. Assortment of steel and tolerance in dimensions must conform to the requirements of the following GOST standards.

hot-rolled and forged steel of categories 1, 1A, 1B (1B), 4, 4A and 4B (4B) - GOST 2590-71, GOST 2591-71, GOST 4693-77, GOST 2879-69, GOST 103-76, GOST 1133-71, and GOST 4405-75.

hot-rolled or hot-rolled with turned or ground surface end of categories 2, 2A, 2B (2B), 3 3A, 3B (3B), 3B (3V) and 3Г (3G) GOST 7419.0-78 to GOST 7419.8-78.

bright steel - GOST 7417-75; GOST 8559-75, GOST 8560-67.

steel with special surface finish - GOST 14955-77.

Note: Hot-rolled steel may be manufactured with side of square upto 100 mm complying with GOST 2591-71 and with the corners rounded off to a radius not exceeding 0.15 of the side.

EXAMPLES OF CONVENTIONAL DESIGNATION

1) Hot-rolled, 100 mm diameter, round steel of ordinary accuracy B of rolling as per GOST 2590-71, of grade 65Г (65G), for hot processing - subgroup a, category 4A.

	100 - B - GOST 2590-71
Round	<hr/>
	65Г - a - 4A GOST 14959-79

2) Hot-rolled, square steel, 30 mm side, of ordinary rolling accuracy B, to GOST 7419.1-78, grade 50XΦA, category 3A.

	30 - B - GOST 7419.1-79
Square	<hr/>
	50XΦA - 3A GOST 14959-79

3) Hot-rolled strip steel as per GOST 7419.4-78, 5 mm thick, grade 60C2A, category 3B.

Strip	<u>5x50 - GOST 7419.478</u>
	60C2A - 3B - GOST 14959-79

4) Bright round steel diameter 15 mm, of accuracy class 4 to GOST 7417-75, of grade 50XΦA, heat treated, category 3A, surface quality group B as per GOST 1051-73.

Round	<u>15 - 4 - GOST 7417-75</u>
	50XΦA - 3A - B - GOST 14959-79

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5) Steel with special surface finish, diameter 20 mm, accuracy class 3a to GOST 14959-79, grade 80, heat treated, category 3A, surface finish group B.

Round	<u>20 - 3a - B - GOST 14959-77</u>
	80 - 3A - GOST 14959-77

2. TECHNICAL REQUIREMENTS

2.1. Spring steel, whether as carbon steel or as alloy steel, must be manufactured in accordance with the requirements of the present standard.

2.2. Grade and chemical composition of steel as determined by analysis of molten metal sample from the ladle must conform to norms indicated in Table 1.

2.3. Phosphorus and sulphur content by weight in the ladle sample must not exceed the norms indicated in Table 2.

2.4. Permissible deviations in chemical composition in the finished rolled stock must not exceed the values indicated in Table 3.

2.5. Steel is supplied in 14 different categories as in Table 4 depending upon the characteristic chosen for standardising.

Annexure 1 lists applications by category of steel.

2.5.1. Steel is supplied in the heat treated condition

(annealed or highly tempered).

- categories 1A, 2A, 3A, 3B (3V); or 4A or

without heat treatment

- categories 1, 1B, 2, 2B, 3, 3B (3B), 3Г (3G), 4 and 4B (4B).
(1B)

2.6. Hardness of steel must conform to norms indicated in Table 5.

2.7. Mechanical properties of steel of categories 3, 3A, 3B (3B) or 3Г (3G) determined on heat treated longitudinal specimens, must conform to norms indicated in Table 6.

2.8. Surface quality of steel must meet the requirements of Table 7.

2.9. Rods and strips must be evenly trimmed. Burre in the edges of steel of categories 2, 2A, 2B (2B), 3, 3A, 3B (3B), 3B (3V) and 3Г (3G) must be removed. Bending of edges is not acceptable. When rods and strips are cut in presses, guillotine shears or hammers, a slight tear in their edges can be permitted if the customer agrees. The magnitude of such tears may, if necessary, be specified by mutual agreement.

2.10. Macrostructure of steel in fractures or etched transverse templates (2) must be free from residues of shrinkage cavity, porosity blisters, peeling, cracks, slag inclusion and flakes.

Spot nonuniformity, central porosity and liquation square should not exceed 2 points as per GOST 10243-75 for steel of categories 2, 2A, 2B (2B), 3, 3A, 3B (3B), 3B (3V), 3Г (3G), and one point for steel of other categories.

Proportion of elements, by weight, % Table 1

Steel group	Steel grade	Максимальные доли элементов, %							
		C	Si	Mn	Cr	V	W	Ni	B
Carbon steel	65	0,52-0,70	0,17-0,37	0,50-0,80	Не более 0,25	—	—	—	—
	70	0,67-0,75	0,17-0,37	0,50-0,80	Не более 0,25	—	—	—	
	75	0,72-0,80	0,17-0,37	0,50-0,80	Не более 0,25	—	—	—	
	80	0,77-0,85	0,17-0,37	0,50-0,80	Не более 0,25	—	—	—	
	85	0,82-0,90	0,17-0,37	0,50-0,80	Не более 0,25	—	—	—	
Alloy steel	60Г	0,57-0,65	0,17-0,37	0,70-1,00	Не более 0,25	—	—	—	
	65Г	0,62-0,70	0,17-0,37	0,90-1,20	Не более 0,25	—	—	—	
	70Г	0,67-0,75	0,17-0,37	0,90-1,20	Не более 0,25	—	—	—	
	55С2	0,52-0,60	1,5-2,0	0,60-0,90	Не более 0,30	—	—	—	
	55С2А	0,53-0,58	1,5-2,0	0,60-0,90	Не более 0,30	—	—	—	
	60С2	0,57-0,65	1,5-2,0	0,60-0,90	Не более 0,30	—	—	—	
	60С2А	0,58-0,63	1,5-2,0	0,60-0,90	Не более 0,30	—	—	—	
	70С1А	0,66-0,71	2,4-2,8	0,60-0,90	Не более 0,30	—	—	—	
	60С2Г	0,55-0,65	1,8-2,2	0,70-1,00	Не более 0,30	—	—	—	
	50ХГ	0,46-0,54	0,17-0,37	0,70-1,00	0,90-1,20	—	—	—	
	50ХГА	0,47-0,52	0,17-0,37	0,80-1,00	0,95-1,20	—	—	—	
	55ХГР	0,52-0,60	0,17-0,37	0,90-1,50	0,90-1,20	—	—	0,001-0,003	
	50ХФА	0,46-0,54	0,17-0,37	0,50-0,80	0,80-1,10	0,10-0,20	—	—	
	50Х1ФА	0,48-0,55	0,17-0,37	0,80-1,00	0,95-1,20	0,15-0,25	—	—	
	55С2ГФ	0,52-0,60	1,5-2,0	0,95-1,25	Не более 0,30	0,10-0,15	—	—	

5. Grade 50X ϕ A steel intended for making steel ^{spring}wire to GOST 14953-69 is supplied with 0.47 to 0.55% of carbon, 0.15 to 0.30% of silicon; 0.30 to 0.60% of manganese, 0.75 to 1.10% of chromium and 0.15 to 0.25% of vanadium by weight. In this case it is marked 51X ϕ A.

6. Steel of grades 65, 70, 75, 80 and 85 with 0.30 to 0.60% of manganese and steel of grades 65 Γ and 70 Γ with 0.70 to 1.00% of manganese by weight are used for the manufacture of patented wire. The proportion of chromium, nickel and copper by weight in steel intended for making patented wire must not exceed 0.10%, 0.15% and 0.20% respectively. Sulphur and phosphorus content should conform to the requirements of the standards for the particular wires but should not exceed the norms indicated in Table 2.

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Table 2

Class of steel	Phosphorus	Sulphur
	Content, %, by weight, not more than	
Quality	0.035	0.035
High quality	0.025	0.025

Note: 1. Quality steel of grades 65, 70, 75, 80, 85, 60 Γ , 65 Γ , and 70 Γ may be ordered with sulphur and phosphorus content by weight conforming to the requirements of Table 2 as applicable to high quality steel, in which case, the letter A is added to the steel designation.

2. Sulphur content by weight is permitted upto 0.040% in quality steel or grades 65, 70, 75, 80, 85, 60 Γ , 65 Γ , and 70 Γ ordered in categories 1, 1A, 1B (1B), 4, 4A and 4B (4B).

Table 3

Element	Upper limit of proportion of element by weight, %	Permissible deviation
Carbon	As per Table 1	$\pm 0.01^*$
Silicon	Less than 1.0	± 0.02
	1.0 and over	± 0.05
Manganese	Less than 1.0	± 0.02
	1.0 and over	± 0.05
Chromium (for steel alloyed with chromium)	Less than 1.0	± 0.02
	1.0 and over	± 0.05
Nickel	As per Table 1	- 0.05
Vanadium	As per Table 1	± 0.02
Tungsten	As per Table 1	± 0.05
Phosphorus	As per Table 2	$\pm 0.005^{**}$

Table 1 Contd.

Steel Group	Steel grade	Proportion of elements, by weight, %							
		Carbon	Silicon	Manganese	Chromium	Vanadium	Tungsten	Nickel	Boron
Alloy steel	60C2XA	0.56 to 0.64	1.4 to 1.8	0.40 to 0.70	0.70 to 1.00	-	-	-	-
	60C2XΦA	0.56 to 0.64	1.4 to 1.8	0.40 to 0.70	0.90 to 1.20	0.10 to 0.20	-	-	-
	65C2BA	0.61 to 0.69	1.5 to 2.0	0.70 to 1.00	Not more than 0.30	-	0.8 to 1.2	-	-
	60C2H2A	0.56 to 0.64	1.4 to 1.8	0.40 to 0.70	0.30	-	-	1.4 to 1.7	-
	70C2XA	0.65 to 0.75	1.4 to 1.7	0.40 to 0.60	0.20 to 0.40	-	-	-	-

Note: 1. In the steel grade designation,

the first two numerals denote the average carbon content by weight as a percentage, multiplied by 100;

the letters following the digits stand for the elements: Γ for manganese, C for silicon, X for chromium, Φ for vanadium, B for tungsten and H for nickel.

The numerals following the letter indicate the approximate proportion of the element by weight in whole numbers. The absence of a numeral denotes that the steel grade contains less than 1.5% of the particular alloying element. If the proportion of the element is over 1.5% and up to 2.5% the numeral 2 is placed after the letter signifying the element, if the proportion is over 2.5% the numeral 3 is used. The letter "Γ" is omitted from the steel designation if the proportion of manganese by weight is less than 0.9% (upper limit).

2. Residual copper content by weight in all grades of steel must not exceed 0.20% and residual nickel must not exceed 0.25%.

3. Residual copper and nickel content by weight in steel made by the pig-and-scrap process or the scrap-and-ore process, is permitted up to 0.30% each.

4. Combined sulphur and phosphorus content by weight in grade 60C2Γ steel must not exceed 0.06%.

Table 5

Steel grade	Hardness of steel			
	Not heat treated (categories 1Б (1B), 2Б (2B), 3Б (3B), 4Б (4B), 3Г (3G))		Heat treated (categories 1A, 2A, 3A, 3B (3V) and 4A)	
	HB not more than	Diameter of impression, mm, not less than	HB not more than	Diameter of impression, mm, not less than
65	255	3.6	229	4.0
75, 60Г, 65Г, 70Г, 55С2, 55С2А	285	3.6	241	3.9
80, 85, 60С2, 60С2А, 70С3А, 50ХГ, 50ХГА, 55ХГР, 50ХФА, 55С2ГФ, 60С2Н2А	302	3.5	269	3.7
60С2Г	321	3.4	269	3.7
50ХГФА, 60С2ХА, 60С2ХФА, 65С2БА	321	3.4	285	3.6

Note: 1. Deviation in hardness by +10HB is allowed in the manufacture of steel without heat treatment supplied in coils.

2. Hardness norms for 55С2ГФ grade steel supplied without heat treatment are tentative upto 01.01.1982 after which they are to be clarified.

* No deviation is permitted in steel of grades 5502A, 6002A or 50XFA.

** No deviation is permitted in phosphorus content of high quality steel.

Table 4

Characteristic being standardised	Category										
	1	1A (1B)	2	2A	2B (2B)	3	3A	3B (3B)	4	4A	4B (4B)
Chemical composition	+	+	+	+	+	+	+	+	+	+	+
Hardness in heat treated condition	-	-	-	+	-	-	+	+	-	+	-
Hardness of steel without heat treatment	-	+	-	-	+	-	+	-	-	-	+
Hardenability	-	-	+	+	+	-	-	+	-	-	-
Mechanical properties determined in tension on heat treated specimens (hardening+tempering)	-	-	-	-	-	+	+	+	+	+	+
Permissible depth of decarburised layer	-	-	+	+	+	+	+	+	-	-	-

Note: Plus sign "+" denotes that the particular characteristic is standardised.

Minus sign "-" denotes that the particular characteristic is not standardised.

Note: 1. Relative reduction norms have been given only for round specimens

2. Heat treatment is carried out on specimens intended for mechanical testing.

3. Norms for mechanical properties relate to specimens selected from rods of diameter or thickness upto 80 mm. While testing rods of diameter or thickness over 80 mm and upto 150 mm, a 2% reduction in relative elongation and a 5% shortfall in the relative reduction are acceptable as compared to the norms indicated in Table 6. Similarly, while testing rods of diameter or thickness over 150 mm, a reduction of 3% in relative elongation and a shortfall of 10% in relative reduction are acceptable. Norms of mechanical properties for specimens and rods made out of steel of diameter or thickness over 100 mm by rerolling or reforging into a square of side 90 to 100 mm must conform to the norms indicated in Table 6.

4. Norms of mechanical properties for 55C2ГФ grade steel are tentative upto 01.01.1982 after which date they are to be clarified.

2.11. Turned or ground round rods with special surface finish are supplied without decarburized layer.

Table 7

Type of treatment	Category of steel	Surface quality
Hotrolled and forged	(1E) 1, 1A, 1B 4, 4A, 4B (4E)	<p>The surface of rods, strips and bundles intended for hot processing (subgroup "a") and for cold drawing (cold rolling, subgroup "c") must be free from rolling blisters, rolling scabs, overlaps, rolling or forging contaminations and stress cracks. Local surface defects must be removed by oblique chipping or dressing to a width not less than five times the depth.</p> <p>Depth of dressing of defects must not exceed the following values:</p> <p>6% of the diameter or thickness - for rods of size over 200 mm;</p> <p>5% of the diameter or thickness - for rods of size 140 to 200 mm;</p> <p>Sum of limit deviations for rods of size 80 to 140 mm;</p> <p>half the sum of limit deviations for rods of size less than 80 mm. The depth of dressing of defects is reckoned from the actual size. No more than two dressings to the maximum depth are</p>

Steel grade	Heat treatment schedule (a proximate)			Mechanical properties			
	Harden- ing temperature °C	Harden- ing medium	Temper- ing temperature °C	Yield limit, σ_T MPa (kgf/mm ²)	Ulti- mate strength, σ_B MPa (kgf/mm ²)	Relative elongation, δ_5 %	Relative reduction, ψ %
65	830	oil	470	785(80)	981(100)	10	35
70	830	oil	470	854(85)	1030(105)	9	30
75	820	oil	470	883(90)	1079(110)	9	30
80	820	oil	470	932(95)	1079(110)	8	30
85	820	oil	470	981(110)	1128(115)	8	30
60Г	830	oil	470	785(80)	981(100)	8	30
65Г	830	oil	470	785(80)	981(100)	8	30
70Г	830	oil	470	854(85)	1030(105)	7	25
55С2, 55С2А	870	oil water	470	1177(120)	1275(130)	6	30
60С2	870	oil	470	1177(120)	1275(130)	6	25
70С3А	850	oil	470	1471(150)	1666(170)	6	25
60С2Г	870	oil	470	1324(135)	147(150)	6	25
50ХГ, 50ХГА	850	oil	470	1177(120)	1275(130)	7	33
55ХГР	850	oil	470	1177(120)	1275(130)	7	35
60С2А	870	oil	420	1373(140)	157(160)	6	20
50ХФА	850	oil	470	1079(110)	1275(130)	8	35
50ХГФА	850	oil	470	1324(135)	148(145)	6	35
55С2ГФ	870	oil	470	1373(140)	157(160)	6	25
60С2ХА	870	oil	470	1324(135)	147(150)	6	25
60С2ХФА	870	oil	470	1471(150)	166(170)	6	25
65С2ВА	850	oil	420	1666(170)	186(190)	5	20
60С2Н2А	870	oil	470	1324(135)	147(150)	8	30

Table 7 Contd.

Type of treatment	Category of steel	Surface quality
Hot rolled	2, 2A, 2B (2B) 3, 3A, 3B (3B) 3B (3V), 3Г (3G)	<p>permitted in any one section of a rod of size (diameter or thickness) over 140 mm.</p> <p>The following defects may be left untreated on the surface of rods, strips and bundles: minor grooves, tears and waviness within the limits of half the sum of limit deviations; minor rolling blisters or depth not exceeding 7% the sum of limit deviations on the dimension, subject to a maximum of 0.20 mm.</p> <p>Local defects on the surface of rods and bundles intended for cold machining (subgroup "B" (b)) are not acceptable if their depth exceeds: the sum of limit deviations - for rods of size 100 mm and over; minus tolerance in diameter or thickness for rods of size less than 100 mm.</p> <p>The depth where the defect lies is reckoned from the nominal size.</p> <p>Surface of rods and strips must be free from rolling scabs, waviness and residues from scales. Localised surface defects must be removed by grinding or oblique dressing in the longitudinal direction without resulting in the rod or strip exceeding the limits of minimum dimensions. Surface defects in rods and strips must not be chiseled.</p>
Hot rolled and turned or ground surface	2, 2A, 2B (2B) 3, 3A, 3B (3B) 3B (3V), 3Г (3G)	<p>Surface finish parameter RZ in microns must not exceed the value specified in GOST 2789-73 or that of the agreed master specimen.</p>
Bright steel	1, 1A, 1B (1B) 2, 2A, 2B (2B) 3, 3A, 3B (3B) 3B (3V), 3Г (3G) 4, 4A 4B(4B)	<p>As per GOST 1051-73, surface groups B (B) and B(V).</p>

Table 7 Contd.

Type of treatment	Category of steel	Surface quality
Steel with special surface finish	-Do-	As per GOST 14955-77, surface finish group B (B), B(V), Γ (G), Δ (D).

The depth of decarburized layer on each side of 2, 2A, 2B (2B), 3, 3A, 3B (3B), 3B (3V) and 3Γ (3G) must not exceed the norms indicated in Table 8.

Table 8

Diameter or thickness of rolled stock, mm	Permissible depth of total decarburizing, %	
	for all steels, except those alloyed with silicon	for steels alloyed with silicon
Upto 8	2.0	2.5
Over 8	1.5	2.0

Note: Subject to customer's concurrence, depth of decarburization upto 0.25 mm is permitted in steel of size 10 to 18 mm and not more than 0.15 mm in steel of size 9 mm.

2.12. Steel of grades 50XΓ, 50XΓA, 50XΓΦA, 60C2, 55C2, 60C2A, 55C2A must be checked for austenite grain size which should be no larger than number 6 for grade 50XΓΦA and no larger than number 5 for all other grades as per GOST 5639-65.

2.13. Steel is manufactured to the following special specifications against order:

- a) with carbon content by weight to narrower limits than indicated in Table 1;
- b) with lower sulphur and phosphorus content than the norms in Table 2;
- c) with standardised austenite grain size for steel of grades other than those enumerated in clause 2.12;
- d) with standardised microstructure;
- e) with standardised contamination with nonmetallic inclusions;

f) with fatigue test;

g) with resilience limit determined.

Note: Norms are to be agreed upon with the customer. The method of testing against subitems "d, f and g" also require customer's concurrence.

2.14. Hardenability norms for steel of categories 2, 2A, 2B(2B), 3B(3V) and 3Г(3G) are defined with the customer's concurrence.

Hardenability norms for steel of grades 5502, 5502A, 6002, 6002A and 60XГ4A are given in reference annexure 2.

Reference annexure 3 lists the limits of variation in hardness (maximum and minimum values along the length of end-quenched specimens) and reference annexure 4, the maximum permissible dimensions of different grades of steel intended for making leaf springs and other types of springs.

3. ACCEPTANCE RULES

3.1. Rods, strips and bundles are accepted in batches consisting of steel from a single melt, with a single size and heat treated to a single schedule.

3.2. GOST 7566-69 defines acceptance rules.

3.3. Samples are drawn on the following scale from a batch of rods, strips and bundles for quality check.

1) Samples are drawn as defined in GOST 7565-73 for chemical analysis.

2) Two rods, strips or bundles are selected for checking macrostructure by fracture or by etching, for determining microstructure, and for tensile test.

3) Not more than 2% of the strips (rods or bundles) subject to three strips (rods or bundles) are selected for hardness test.

4) A single specimen from the melt-ladle is drawn for checking hardness penetration (hardenability);

5) Three rods, strips or bundles are selected for determining the depth of decarburized layer;

6) A single sample from the melt-ladle is drawn for determining grain size;

7) Samples are drawn as defined in GOST 1778-70 for determining nonmetallic inclusions;

8) All rods, strips and bundles are checked for surface quality and dimensions.

4. METHODS OF TESTING

4.1. Chemical analysis is carried out in accordance with GOST 22536.0-77 to GOST 25536.13-77, GOST 20560-75; GOST 12344-78, GOST 12345-66, GOST 12346-78, GOST 12347-77, GOST 12348-78, GOST 12352-66, and GOST 12360-66 or by other methods which provide the necessary accuracy.

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4.2. Dimensions of rods, strips and bundles are verified using measuring instruments which provide reliable checking of the specified limit deviations.

4.3. Surface quality of steel is checked visually after dressing the surface, if necessary. Nondestructive testing methods may be used.

4.4. Samples for mechanical tests are selected in accordance with GOST 7564-73 (cutting the testpieces as per variant 2).

Samples from bundles are cut at a distance of not less than 1.5 turns from the end of the unrolled bundle for all types of tests.

4.5. Tensile test is carried out in accordance with GOST 1497-73 on specimens of length five times the diameter.

4.6. Brinell hardness is determined in accordance with GOST 9012-59. Hardness of strips of trapezoidal and T-shaped profile is measured in the thick section of the strip.

4.7. Depth of decarburized layer is determined in accordance with GOST 1763-68.

Trapezoidal and T-shaped profiles are checked at the section with the greatest thickness.

4.8. Grain size is determined in accordance with GOST 5639-65.

Grain size of 55C2, 55C2A, 60C2 and 60C2A grades of steel need not be determined if they meet the other requirements of the present standard.

4.9. Hardenability (depth of hardness penetration) is determined for rods of section upwards of 30 mm by the end quenching method in GOST 1778-78.

4.10. Extent of nonmetallic inclusions is determined in accordance with GOST 1778-78 (method III 1 (Sh1) or III 4 (Sh4)).

4.11. Nondestructive testing and statistical quality control may be employed for checking macrostructure, mechanical properties and grain size.

4.12. The manufacturer may check macrostructure, mechanical properties and hardenability on an intermediate stage blank or rolled stock of larger section and apply the test results to all the profiles of the particular melt.

Grain size may be determined at the melt inspection stage.

5. PACKING AND MARKING

5.1. GOST 7566-69 defines packing, marking and preparation of documents.

GOST 1051-73 defines packing of bright steel.

GOST 14955-77 defines packing of steel with special surface finish.

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5.2. If the state quality mark has been awarded to the product, marking and document preparation are done in conformity with GOST 1.9-67.

ANNEXURE 1

Reference

APPLICATION OF STEEL

Category with respect to characteristics, being standardised	Application of steel
2, 3, 3B (2B) 3, 3A, 3B (3B) 3B (3V), 3Г (3G)	Manufacture of automobile elements - leaf springs, torsion rods, etc. (?)
3A, 3B (3B) 3B (3V), 3Г (3G)	Manufacture of automobile leaf-springs and springs.
1, 1A, 1B (1B), 4, 4A, 4B (4B)	For use as structural steel.

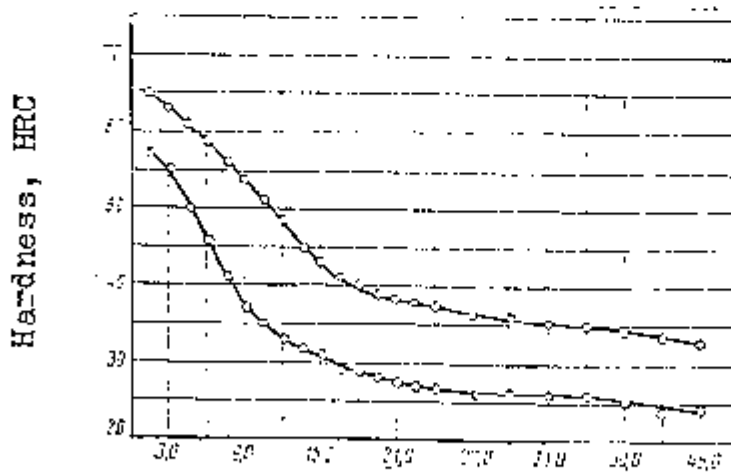
ANNEXURE 2

Reference

HARDENABILITY OF STEEL

Steel of grades 55C2 and 55C2A

Hardening at 850°C

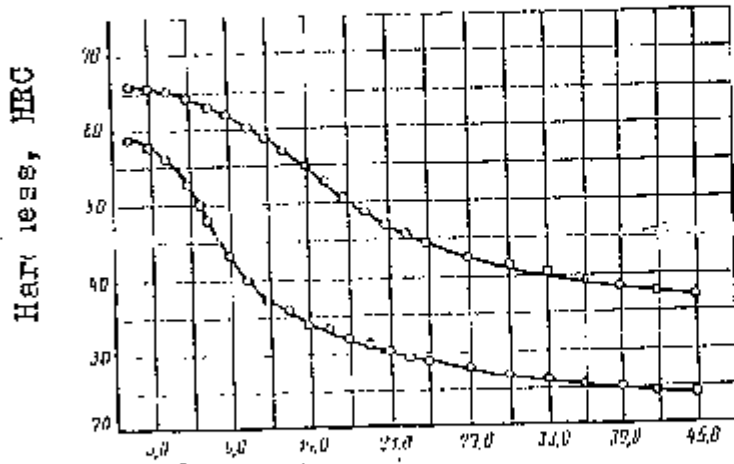


Distance from end being quenched, mm

Drg. 1

Steel of grades 60C2 and 60C2A

Hardening at 850°C

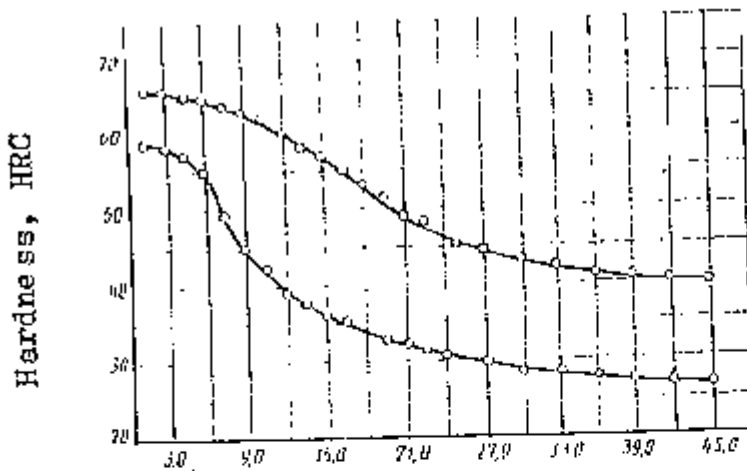


Distance from end being quenched, mm

Dr. 2

Steel of grades 60C2F

Hardening at 850°C

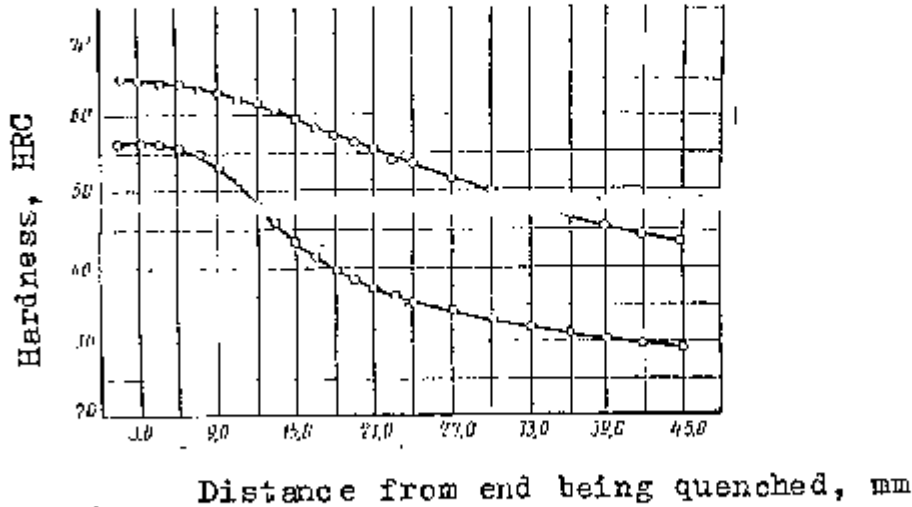


Distance from end being quenched, mm

Dr. 3

Steel of grades 50XΓΦ

Hardening at 850°C



Drg.4

ANNEXURE 3

Reference

LIMITS OF VARIATION IN HARDNESS (MAXIMUM AND MINIMUM)
ALONG THE LENGTH OF END QUENCHED SPECIMENS BASED ON HARDENABILITY
BANDS FOR DIFFERENT GRADES OF STEEL

Distance from quenched end	Hardness HRC for hardenability bands for steel of grades							
	55C2, 55C2A		60C2, 60C2A		60C2Γ		50XΓΦA	
	max	min	max	min	max	min	max	min
1.5	65	57	66	59	66	59	65	56
3.0	63	55	66	58	66	58	65	56
4.5	61	50	65	56	65	57	64	56
6.0	58	46	64	53	65	55	64	56
7.5	56	41	63	47	64	49	63	55
9.0	54	37	62	43	63	45	63	53
10.5	51	35	60	40	62	42	62	51
12.0	48	33	59	37	60	39	62	48

Table Contd.

Distance from quenched end	Hardness HRC for hardenability bands for steel of grades							
	55C2,		55C2A		60C2,		60C2A	
	max	min	max	min	max	min	max	min
13.5	45	32	57	36	58	37	61	46
15.0	43	31	55	34	57	36	59	43
16.5	41	29	53	33	55	35	58	42
18.0	40	29	51	32	53	33	57	40
19.5	39	28	49	31	51	32	56	38
21.0	38	28	47	30	49	32	56	37
22.5	38	27	46	29	48	31	54	36
24.0	37	27	44	29	46	30	54	35
27.0	36	26	42	28	44	29	52	34
30.0	36	26	41	27	43	28	50	33
33.0	35	26	40	26	42	28	48	32
36.0	35	26	39	25	41	27	47	31
39.0	34	25	38	25	40	27	45	30
42.0	33	24	37	24	40	26	44	29
45.0	33	24	37	24	39	26	43	29

ANNEXURE 4
Reference

MAXIMUM PERMISSIBLE DIMENSIONS FOR
MAKING LEAF SPRINGS AND OTHER SPRINGS

Steel grade	Maximum permissible dimensions, mm	
	Strip steel	Diameter or side of square
80	8	12
55C2	8	12
55C2A	8	12
60C2	14	20
60C2A	14	20
60C2Г	16	24
50XГ	14	25
50XГA	14	25
50XГP	24	30
50XГΦA	24	25
55C2ГΦ	25	30

REVISION No. 1 to GOST 14959-79

1) Insert OKP 09 5000 below title

Amend references to GOST standards as below

Reference	For	Read
	GOST 8560-67	GOST 8560-79
3) Clause 2.2 Table 1, Note 5	GOST 14963-69	GOST 14963-78
4) Clause 2.6 Table 5, Note 2 and clause 2.7 Table 6, Note 4	01.01.1982	01.01.1985
5) Clause 3.2 and 5.1	GOST 7566-69	GOST 7566-81
6) Clause 3.3	GOST 7565-73	GOST 7565-81
7) Clause 4.1	GOST 20560-75	GOST 20560-81
	GOST 12345-66	GOST 12345-80
	GOST 12350-66	GOST 12350-78
	GOST 12351-66	GOST 12351-81
	GOST 12352-66	GOST 12352-81
	GOST 12360-66	GOST 12360-82

(ISI No. 2. 1983)