Leaf – spring rolled stock made of carbon and alloy steel

Technical specifications

GOST 14959-79

For GOST 14959-79. Rolled stock of leaf- spring made carbon and alloy steel. Technical specifications.

In which places	Printed	Should be
Point 1.1 Last paragraph	1А, 1Б, 2, 2А, 2Б, 3, 3А, 3Б, 3В, 3Г, 4, 4А, 4Б	1, 1А, 1Б, 2, 2А, 2Б, 3, 3А, 3Б, 3В, 3Г, 4, 4А, 4Б
Point 1.3 Second paragraph Example of conventional codes	For hot-rolled	For hot-rolled
Eighth paragraph	Round bar h11-15 GOST 7417-75/50ХФА-3А-Б GOST 14959-79	Round bar h11-15 GOST 7417-75/50ХФА-3А-Б GOST 14959-79
Tenth paragraph	Round bar h10-20 GOST 14955-77/80-3А-Д GOST 14959-79	Round bar h10-20 GOST 14955-77/80-3А-Д GOST 14959-79
Point 2.1	Leaf spring should be made of carbon and alloyed steel.	Rolled stock of leaf spring made of carbon and alloyed steel
Point 2.2	According to melting analysis of ladle test/sample.	According to melting analysis.
Table 1 Column << Boron >>. For grade 50ХФА Column << Chromium >>. For grade 60С2Н2А	0.001.0.003 0.30	Not more than 0.30.
Note 7. Explanation	Residual content of chromium, nickel, copper in steel, without increasing the norms of table1.	Residual mass fraction of chromium, Nickel, copper in steel without increasing the norms of table 1.
Point 2.3 Point 2.5 Last paragraph. Point 2.6.Table 5. Remark.	As per- ladle test/sample steel. During manufacturing of roll from.	According to melting analysis of rolled stock. During manufacturing of roll without
Point 2.7. Table 6. Heading	MPa (2 times)	N/ mm^2 (2 times)

(Continuation of correction for GOST 14959-79)

Continuation

In which places	Printed	Should be
Point 2.10. Last paragraph	For steel of other categories Subgroup b	For rolled stock /rolled iron of other categories.
Point 2.13. Enumeration 3		With quality of surface of group 2ГП.
Point 2.14. Last paragraph	(Maximum and minimum along length of end faces of samples), in annexure 4- maximum permissible dimensions of steel.	(Maximum and minimum) along length of end faces of samples), in annexure 4 – maximum permissible dimensions of rolled iron.
Point 3.3. Third paragraph	Two bar or coil and strips.	Two bars or coil, two strips.
Point 4.7. Last paragraph	Trapezium	Trapezium form
Annexure 1.Table. Column << Purpose of rolled iron / rolled stock >> Last paragraph.	Structural design	of design

(ИУС No. 1 2000)

Amendment, is introduced in Inter state standards

B. Metals and metallic units.

Group B32

Amendment No. 6 GOST 14959-79. Leaf – spring rolled stock made of carbon and alloy steel. Technical specifications.
By the decision of Inter State council on standards, metrology and certification (minutes of meeting No 3 from 17.02.93)

Date of introduction 01.02.94

Points 1.2, 1.3 put in new edition: << 1.2. Depending on the quality of surface of hot rolled and forged rolled stock of categories 1, 1А, 1Б, 4, 4А and 4В is manufactured of groups 2 ГП and 3ГП.

1.3. Assortment of rolled stock and maximum deviations with respect to the sizes, should correspond to the requirements:

GOST 2590-88- for hot-rolled round bar, including sharpened/machined;
GOST 2591-88- for hot-rolled square bar;
GOST 1133-71- for forged round bar and square bar;
GOST 2879-88- for hot- rolled hexahedral;
GOST 103-76- for hot- rolled strip;
GOST 4405-75- for forged strip;
GOST 7419-90- for hot-rolled strip, trapezium-stepped. T- shaped, trapezium- form and grooved categories 2, 2А, 2Б, 3, 3А, 3Б, 3В and 3Г;
GOST 7417-75- for calibrated round bar;
GOST 8559-75- for calibrated square bar;
GOST 8560-78- for calibrated hexahedral;
GOST 14955-77- with special surface finishing;
Other standard technical documents >>
Write down the examples of code in new edition:
<< Example of conventional code >>
Hot- rolled rolled-stock, round bar having diameter 100 mm, usual/common accuracy of rolled stock B according to GOST 2590-88, made of steel of grade 65 Г, quality of surface of group 2ГП, category 4А:

Round bar B-100 GOST 2590-88/65Г- 2ГП-4А GOST 14959-79

Hot-rolled rolled stock square bar with the side of square 30 mm, usual/general accuracy of rolled stock B according to GOST 2591-88, made of steel of grade 50 ХФА, category 3А:

Square bar B-30 GOST 2591-88/ 50 ХФА-3А GOST 14959-79

Hot-rolled rolled stock with trapezium form having dimension (В Х Н) 45 Х 6, increased accuracy of rolled stock Б according to GOST 7419-90, made of steel of grade 60С2А and category of group 3Б:

Trapezium forms strip Б-45 Х 6 GOST 7419-90/ 60С2А- 3Б GOST 14959-79.

(Continuation of Amendment N0. 6 GOST 14959-79)

Calibrated rolled stock round bar with maximum deviations with respect to h11 according to GOST 7417-75, having diameter 15 mm, made of steel of grade 50ХФА, category 3А, quality of surface of group Б according to GOST 1051-73:

Round bar h11 –15 GOST 7417-75/50ХФА-3А-Б GOST 14959-79

Rolled stock / rolled iron with special surface finishing, round bar having diameter 20 mm, with maximum deviations with respect to h10, group of surface finishing Д according to GOST 14955-77, made of steel of grade 80 and category 3А:

Round bar h10 – 20 GOST 14955-77/80-3А-Д GOST 14959-79

Hot-rolled rolled stock round bar having diameter 6 mm, general accuracy of rolled stock B according to GOST 2590-88, made of steel of grade 65Г, quality of surface of group 3ГП, category 1А, for the patented wire:

Round bar B – 6 GOST 2590-88/65- 3 ГП-1А GOST 14959-79, for patented wire:

Examples of conventional codes, which are permitted to bring in the design documents:

Hot- rolled rolled-stock round bar having diameter 100 mm, general accuracy of rolled stock B according to GOST 2590-88, made of steel of grade 65Г, quality of surface of group 2ГП and category 4А:

Round $\frac{\text{B} - 100\,\text{GOST}\ 2590 - 88}{65\Gamma - 2\Gamma\Pi - 4\text{A}\,\text{GOST}\ 14959 - 79}$

Point 2.8. Table 7. Column << quality of surface >> Replace the words: << meant for hot machining (sub-point а) and for cold drawing (rough stock, sub group в) >> to << quality of surface group 2ГП >>, << meant for cold machining (subgroup б) >> to << quality of surface group 3ГП >>.

Point 2.9 put in new edition: << 2.9. Hot- rolled and forged bars and strips should be cut off.

Slope cutting of strips for leaf spring should correspond to GOST 7419-90. Slope cutting of forged strips, hot- rolled strips (except spring) and bars having dimension up to 30 mm is not regulated. Above 30 mm should not exceed 0.1 diameter or thickness. Bar and strip having dimension up to 40 mm of unmeasured length is permitted to manufacture with untrimmed ends.

Burrs should be cleaned and bend of ends is not permitted for bars and strips of categories 2, 2А, 2Б, 3, 3А and 3Г.

During cuts by presses / moulds, shears and under hammers according to the agreement with the user, insignificant crumpling of ends of bars and strips is not permitted size of crumpling of ends is set by the agreement between the manufacturer and user if necessary.

Crumpled ends and burrs are permitted on bars and strips of categories 1, 1А, 1Б, 4, 4А, 4Б.

Trimming of ends of calibrated rolled stock according to GSOT 1051-73, with special surface finishing according to GOST 14955-77 >>.

Point 4.1. Replace the references: GOST 20560-81 by GOST 28473-90, GOST 12344-78 by GOST 12344-88, GOST 12345-80 by GOST 12345-88.

(ИУС No. 1 1994)

Group B32

THE STATE STANDARD OF USSR

LEAF-SPRING ROLLED STOCK MADE OF CARBON AND ALLOYED STEEL

Technical specification

GOST 14959-79

ОКП 09 5800, 11 4100, 11 5000

Effective period from 01.01.81

Non observance of standard is dealt according to rules.

This standard pertains to hot- rolled and forged rolled bar stock having diameter or thickness up to 250 mm and also calibrated rolled stock and with special surface finishing, meant for manufacturing of springs, leaf springs and other parts of machines and mechanisms, used in the hardened and tempered condition.

In the part of norms of chemical composition, standard pertains to all other forms of rolled stock ingots, forgings and stampings.

(Amended edition, Amendment No. 5).

1. CLASSIFICATION AND ASSORTMENT

1.1. Rolled stock is divided:
By using the method of processing/treatment:
Hot rolled and forged;
Calibrated;
By special surface finishing;
Hot-rolled round bar with machined or ground surface;
By the chemical composition of steel:
Qualitative;
High- quality- A;
According to standardized characteristics and application on categories 1, 1А, 1Б, 2, 2А, 2Б, 3, 3Б, 3В, 3Г, 4, 4А and 4Б.

1.2. Depending on the purpose of hot-rolled and forged rolled stock of categories 1, 1А, 1Б, 4, 4А and 4Б is divided into the following sub groups:

а- For hot processing;
б- For cold mechanical processing/ machining (turning, planning and milling);
в- for cold drawing (rough stock)

1.3. Assortment of rolled stock and maximum deviations with respect to the sizes should correspond to the requirements:

Hot- rolled and forged rolled stock of categories 1, 1А, 1Б, 4 , 4А and 4Б according to GOST 2590-88, GOST 2591-88, GOST 2879-88, GOST 103-76, GOST 1133-71 and GOST 4405-75 or other standard technical documents;

Hot rolled or hot-rolled with mechanical or ground surface of rolled stock of categories 2, 2А, 2Б, 3, 3А, 3Б, 3В and 3Г according to GOST 7419.0-78-GOST 7419.8-78;

Calibrated - GOST 7417-75, GOST 8559-75, GOST 8560-78;

With special surface finishing - GOST- 14955-77 or other standard technical documents.

1.1-1.3. **(Amended edition, Amendment No. 5)**

Examples of conventional code:

Hot rolled rolled stock round bar having diameter 100 mm, usual/general accuracy of rolled stock B according to GOST 2590-88, made of steel of grade 65Г, for hot processing with subgroup a and category 4А.

Round bar $\frac{100 - \text{BGOST2590} - 88}{65\Г - \text{a} - 4\text{AGOST14959} - 79}$

Hot-rolled rolled stock square bar, form the side of square 30 mm, usual/general accuracy of rolled stock B according to GOST 7419.1-78, made of steel of grade 50ХФА of category 3А.

Square bar $\frac{30 - \text{BGOST7419.1} - 78}{50\text{ХФА} - 3\text{AGOST14959} - 79}$

Hot-rolled rolled stock stripe (according to GOST 7419.4-78) having thickness 5 mm and width 50 mm made of steel of grade 60С2А and category 3Б.

Strip $\frac{5\text{X50GOST7419.4} - 78}{60\text{C2A} - 3\text{БGOST14959} - 79}$

Calibrated rolled stock round bar having diameter 15 mm with maximum deviation on h11 GOST 7417-75 made of steel of grade 50 ХФА, category 3А, quality of surface of group Б according to GOST 1015-73.

Round bar $\frac{15 - h11\ GOST\ 7417 - 75}{50\ ХФА - 3АGOST\ 14959 - 79}$

Rolled stock with special surface finishing having diameter 20 mm with maximum deviation on h10, group of surface finishing Д according to GOST 14955-77, made of steel of grade 80 and category 3А:

Round bar $\frac{20 - h10\ GOST\ 14955 - 77}{80 - 3А - ДGOST\ 14959 - 75}$

Hot- rolled rolled-stock round bar having diameter 5 mm, usual accuracy of rolled stock B according, to GOST 2590-88, made of steel of grade 65Г, for cold drawing according to subgroup в, category 1А, for patented wire:

Round bar $\frac{5 - BGOST\ 2590 - 88}{65Г - В - 1АGOST\ 14959 - 79}$

(Amended edition, Amendment No. 2,5).

2. TECHNICAL REQUIREMENTS

2.1. Leaf spring made of carbon and alloyed steel should be manufactured in accordance with the requirements of this standard on production schedule, affirmed in set order.

2.2. Grades and chemical composition of steel according to melting analysis of ladle sample should correspond to the standards, given in table 1.

2.3. Mass fraction of phosphorus and sulphur on ladle sample in the steel of all grades should not exceed the norms, given in table 2.

2.4. Permissible deviations as per chemical composition in finished rolled stock should not exceed the values, indicted in table 3.

2.5. Depending on the standardized characteristics rolled stock is manufactured as per categories, indicated in table 4.

Note :- These Drawings are only for reference. Actual Drawings may be different and shall be issued at the time of procurement

Table 1

Group of steel	Grade of steel	Mass fraction of elements in %							
		Carbon	Silicon	Manganese	Chromium	Vanadium	Tungsten	Nickel	Boron
Carbonaceous	65	0.62-0.70	0.17-0.37	0.50-0.80	Not more than 0.25	-	-	-	-
	70	0.67-0.75	0.17-0.37	0.50-0.80	Not more than 0.25	-	-	-	-
	75	0.72-0.80	0.17-0.37	0.50-0.80	Not more than 0.25	-	-	-	-
	80	0.77-0.85	0.17-0.37	0.50-0.80	Not more than 0.25	-	-	-	-
Alloyed	85	0.82-0.90	0.17-0.37	0.50-0.80	Not more than 0.25	-	-	-	-
	60Г	0.57-0.65	0.17-0.37	0.70-1.00	Not more than 0.25	-	-	-	-
	65Г	0.62-0.70	0.17-0.37	0.90-1.20	Not more than 0.25	-	-	-	-
	70Г	0.67-0.75	0.17-0.37	0.90-1.20	Not more than 0.25	-	-	-	-
	55С2	0.52-0.60	1.5-2.0	0.60-0.90	Not more than 0.30	-	-	-	-
	55С2А	0.53-0.58	1.5-2.0	0.60-0.90	Not more than 0.30	-	-	-	-
	60С2	0.57-0.65	1.5-2.0	0.60-0.90	Not more than 0.30	-	-	-	-
	60С2А	0.58-0.63	1.6-2.0	0.60-0.90	Not more than 0.30	-	-	-	-
	70С3А	0.66-0.74	2.4-3.0	0.60-0.90	Not more than 0.30	-	-	-	-
	60С2Г	0.55-0.65	1.5-2.0	0.70-1.00	Not more than 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	0.53-0.60	0.17-0.37	0.90-1.20	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	-	-	-
	51ХФА	0.47-0.55	0.15-0.30	0.30-0.60	0.75-1.10	0.15-0.25	-	-	-
	50ХГФА	0.48-0.55	0.17-0.37	0.80-1.00	0.95-1.20	0.15-0.25	-	-	-
	55С2ХФ	0.52-0.60	1.5-2.0	0.95-1.25	Not more than 0.30	0.10-0.15	-	-	-
	60С2ХА	0.56-0.64	1.4-1.8	0.40-0.70	0.70-1.00	-	-	-	-
	60С2ХФА	0.56-0.64	1.4-1.8	0.40-0.70	0.90-1.20	0.10-0.20	-	-	-
	65С2ВА	0.61-0.69	1.5-2.0	0.70-1.00	Not more than 0.30	-	0.8-1.2	-	-
	60С2Н2А	0.56-0.64	1.4-1.8	0.40-0.70	Not more than 0.30	-	-	1.4-1.7	-
	70С2ХА	0.65-0.75	1.4-1.7	0.40-0.60	0.20-0.40	-	-		-

Note:

1.In the designation of steel grade, the first two digits indicate the average/mean mass fraction of carbon in the 100th share of percentage, the letters behind the digits mean: Г-manganese, C-silicon, X-chromium, Ф- vanadium, B-tungsten, H-nickel. Digits, which come after letters, which indicate approximate mass fraction of element in entire/all units. Absence of digits means that in the grade contained up to this 1.5% of alloying element. During mass fraction of element above 1.5% to 2.5% after the letter, equivalent/correspond to the component is placed digit 2, more than 2.5%- digit 3. In the nomenclature of grade of steel, with mass fraction up to 0.9% of manganese (on upper limit), letter "Г" is not placed.

2. In steel of all grades, mass fraction of residual copper should not exceed 0.20%, but residual nickels-0.25%.

3. In accordance with the order/indent in steel, manufactured by scrap-process and scrap-ore process, residual mass copper not more than 0.30% and nickel is not more than 0.40% for the rolled stock of all categories, chromium is not more than 0.30% for the rolled stock of categories 2, 2А, 2Б, 3, 3А, 3Б, 3В and 3Г made of carbonaceous steel and not more than 0.40% for rolled stock of categories 1, 1А, 1Б,4, 4А and 4Б.

4.Total mass fraction of sulphur and phosphorous should not exceed 0.06% in steel of grade 60С2Г.

5. Steel of grade 51 ХФА is meant for manufacturing of spring wire.

6. For manufacturing of patented wire, steel of grades 65, 70, 75, 80 and 85 with mass fraction of manganese 0.30-0.60% and grades 65Г and 70Г with mass fraction 0.70-1.00% is used. In steel, meant for patented wire, mass fraction of chromium should not exceed 0.15%, nickel-0.15%, copper-0.20%. Mass fraction of sulphur and phosphorus according to the requirements of standards for wire, but not more than the norms, indicated in table 2. In accordance with indent/order in steel of grades 65, 70, 75, 80 and 85, meant for manufacturing of patented wire, mass fraction of manganese is 0.40-0.70%.

7. According to the requirement of user, mass fraction of manganese in steel, not alloyed with chromium and nickel, can be reduced against the norms of table 1. to the value of manganese equivalent ($Э_M$), but not more than by 0.30%.

Value of manganese equivalent is determined according to formula:

$$Э_M = 0.3 (Cr \text{ in } \%) + 0.5 (Ni \text{ in } \%) + 0.7(Cu \text{ in } \%),$$

Where, Cr, Ni and Cu- Residual content of chromium, nickel and copper in steel, not exceeding the norms of table 1".

(Amended edition, Amendment No. 2, 4, 5).

Purpose of rolled stock depends on categories is given in annexure 1.

2.5.1. Rolled stock is manufactured in heat treated condition (annealed or high tempered) according to the category 1А, 2А, 3А, 3В, 4А, or without heat treatment according to categories 1Б, 2, 2Б, 3, 3Б, 3Г, 4 and 4Б.

2.6. Hardness of rolled stock should correspond to the norms as indicated in table 5.

2.7. Mechanical properties of rolled stock of categories 3, 3А, 3Б, 3В, 3Г, 4, 4А and 4Б, to be determined on heat- treated longitudinal samples, should correspond to norms indicated in table 6.

2.8.Quality of surface of rolled stock should satisfy the requirements of table 7.

2.9.Hot-rolled and forged bars and strips should be trimmed.

Burrs should be cleaned and bend of end is not permitted for bars and strips of categories 2, 2А, 2Б, 3, 3А, 3Б, 3В, 3Г. Slope cutting of bars and strips of categories 2, 2А, 2Б, 3, 3А, 3Б, 3В and 3Г should correspond to GOST 7419.0-78.

During cutting by the presses, shears and under hammers according to the agreement with the user, insignificant crumpling of ends of bars and strips is permitted. If necessary size of crumpling of ends is set by the agreement between the manufacturer and user.

Crumpled ends and burrs are permitted on bars and strips of categories 1, 1А, 1В, 4, 4А and 4Б. Sloping of bars and strips having dimension up to 40 mm of unmeasured length is permitted to manufacture with untrimmed ends.

Trimming of ends of calibrated rolled stock according to GOST 1051-73, with special surface finishing – GOST 14955-77.

(Amended edition, Amendment No. 5).

Table 2

Class of steel	Mass fraction of elements in %, not more than.	
	Phosphorus	Sulphur
Qualitative	0.035	0.035
High quality	0.025	0.025

Note:

1. Rolled stock made of fine steel of grades 65, 70, 75, 80, 85, 60Г, 65Г and 70Г can be manufactured with mass fraction of sulphur and phosphorous in accordance with the requirements of table 2 for high-grade steel. In this case, letter A is added to nomenclature of grade of steel.

2. Mass fraction of sulphur is permitted up to 0.040% in the rolled stock made of fine steel of grades 65, 70, 75, 80, 85, 60Г, 65Г and 70Г of categories 1, 1А, 1Б, 4, 4А and 4Б.

(Amended edition, Amendment No. 5).

Table 3

Name of elements	Upper limit of mass fraction of elements in %	Permissible deviations in %
Carbon	As per table 1	± 0.01*
Silicon	Minimum 1.0	±0.02
	1.0 and maximum	±0.05
Manganese	Minimum 1.0	±0.0
	1.0 and maximum	±0.05
Chromium(for steel, with alloyed chromium)	minimum 1.0	±0.02
	1.0 and maximum	±0.05
Nickel	As per table 1	–0.05
Vanadium	As per table	±0.02
Tungsten	As per table 1	±0.05
Phosphorous	As per table 2	±0.005**

* Deviation for steel of grades 55 С2А, 60С2А and 50ХГА are not permitted.

** Deviation on phosphorous is not permitted for high-grade steel.

Table 4

Standardized characteristics	Categories													
	1	1А	1Б	2	2А	2Б	3	3А	3Б	3В	3Г	4	4А	4Б
Chemical composition.	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Hardness of rolled stock in heat- treated condition.	-	+	-	-	+	-	-	+	-	+	-	-	+	-
Hardness of rolled stock without heat-treatment.	-	-	+	-	-	+	-	-	+	-	+	-	-	+
Harden ability	-	-	-	+	+	+	-	-	-	+	+	-	-	-
Mechanical properties, to be determined during elongation/stretching on heat-treated samples (hardening + tempering).	-	-	-	-	-	-	+	+	+	+	+	+	+	+
Permissible value of de-carburized layer.	-	-	-	+	+	+	+	+	+	+	+	-	-	-

Note:

1.Sign "+" means that characteristics is normalized. Sign "-" means that characteristics is not normalized.

2. For rolled stock with special surface finishing of de-carbonization is checked for all categories of rolled stock.

(Amended edition, Amendment No. 2, 5).

Table 5

Grades of steel	Hardness of rolled stock			
	Un heat-treated (categories 1Б, 2Б, 3Б, 4Б and 3Г).		Heat- treated (categories 1A, 2A, 3A, 3B and 4A)	
	HB, not more than	Dia of indentation in mm, not less than	HB, not more than	Dia of indentation in mm, not less than
65	255	3.8	229	4.0
70	269	3.7	229	4.0
75, 60Г, 65Г, 70Г, 55С2, 55С2А	285	3.6	241	3.9
80, 85, 60С2, 60С2А, 70С3А, 50ХГ, 50ХГА, 55ХР, 50ХФА, 55С2ГФ, 60С2Н2А	302	3.5	269	3.7
60С2Г	321	3.4	269	3.7
50ХГФА, 60С2ХА, 60С2ХФА, 55С2ВА	321	3.4	285	3.6

Note: During manufacturing of rolled stock without heat- treatment in coils, deviation as per hardness +10HB is permitted.

(Amended edition, Amendment No. 2, 5).

Table 6

Grades of steel	Mode of heat treatment (tentative)			Mechanical properties, not less than.			
	Temperature of hardening in °C.	Hardening medium	Temperature of tempering in °C.	Yield point σ_T in N/mm^2 (Kgf/mm^2).	Tensile strength σ_B in N/mm^2 (Kgf/mm^2).	Specific/Relative elongation δ_5, %.	Relative reduction in area φ, %.
65	830	Oil	470	785(80)	980(100)	10	35
70	830	Oil	470	835(85)	1030(105)	9	30
75	820	Oil	470	885(90)	1080(110)	9	30
80	820	Oil	470	930(95)	1080(110)	8	30
85	820	Oil	470	980(100)	1130(115)	8	30
60Г	830	Oil	470	785(80)	980(100)	8	30
65Г	830	Oil	470	785(80)	980(100)	8	30
70Г	830	Oil	470	835(85)	1030(105)	7	25

Continuation of table 6

Grades of steel	Mode of heat treatment (tentative)			Mechanical properties, not less than.			
	Temperature of hardening in °C.	Hardening medium	Temperature of tempering in °C.	Yield point σ_T in N/mm^2 (Kgf/mm^2).	Tensile strength σ_B in N/mm^2 (Kgf/mm^2).	Specific/Relative elongation δ_5, %.	Relative reduction in area ψ, %.
55C2 55C2A	870	Oil or water	470 1175(120)		1270(130)	6	30
60C2	870	Oil	470 1175(120)		1270(130)	6	25
70C3A	850	Oil	470 1470(150)		1670(170)	6	25
60C2Г	870	Oil	470 1325(135)		1470(150)	6	25
50ХГ 50ХГА	850	Oil	470 1175(120)		1270(130)	7	35
55ХГР	850	Oil	470 1175(120)		1270(130)	7	35
60C2A	870	Oil	420 1375(140)		1570(160)	6	20
50ХФА	850	Oil	470 1080(110)		1270(130)	8	35
50ХГФА	850	Oil	470 1325(135)		1420(145)	6	35
55C2ГФ	870	Oil	470 1375(140)		1570(160)	6	25
60C2XA	870	Oil	470 1325(135)		1470(150)	6	25
60C2ХФА	870	Oil	470 1470(150)		1670(170)	6	25
65C2VA	850	Oil	420 1665(170)		1860(190)	5	20
60C2HA	870	Oil	470 1325(135)		1470(150)	8	30

Note:

1.Norms of relative reduction in area are given only for round bar samples.

2. Carry out heat-treatment on samples, meant for mechanical testing.

3. Norms of mechanical properties are related to the samples, selected from bar having diameter or thickness up to 80 mm. During testing of bars having diameter or thickness above 80 to 150 mm is permitted to decrease the relative elongation to 2%, relative reduction of area to 5% in comparison with the norms indicated in table 6. Decreasing of relative elongation to 3% and relative reduction of area to 10% is permitted for bars having diameter or thickness above 150 mm. Norms of mechanical properties of samples and bars made of steel having diameter or thickness above 100 mm, re-rolled or re-forged on square with dimension 90-100 mm, should correspond to norms, specified in table 6.

(Amended edition, Amendment No. 2).

Table 7

Type of machining/ processing	Categories of rolled stock	Quality of surface
Hot rolled and forged.	1, 1А, 1Б, 4, 4А, 4Б	Rolled out bubbles, rolled flaws, overlaps, rolled out contamination and cracks of stress should not be on the surface of bars, strips and coils, meant for hot processing (sub-group) and for cold drawing (rough stock, sub-group в). Local defects on surfaces should be removed by gently dressing, whose width should not be less than five-fold depth.
Hot rolled and forged.	1, 1А, 1Б, 4, 4А, 4Б	Depth of dressing of defects should not exceed the following values: 6% diameter or thickness – for bars having dimension maximum 200 mm; 5% diameter or thickness-for bars having dimension from 140 to 200 mm; Sum of maximum deviations-for bars having dimension from 80 to 140 mm; Halves of sum of maximum deviations- for bars having dimension less than 80 mm; Depth of dressing of defects is calculated from the actual dimension. In one section of bars having dimension (diameter or thickness) more than 140 mm, it is permitted not more than double dressing of maximum depth. With dressing of separate small notches, dents and rust in the limits of half of sum of maximum deviations and also small rolled out bubbles with depth, which does not exceed ¼ sums of maximum deviations to dimension, but not more than 0.20 mm are permitted on the surface of bars, strips and coils. Local defects are not permitted on the surface of bars and coils, meant for cold machining (sub group б), if their depth exceeds: Sum of maximum deviations-for bars having dimension 100 mm and more. Minus tolerance for diameter or thickness-for bars having dimension minimum 100 mm. Depth of conjugation of defects is calculated from nominal size.
Hot-rolled	2, 2А, 2Б, 3, 3А, 3Б, 3В, 3Г	Rolled out cracks, bubbles and contamination, rolled stock flaws, rusts, rolled scale should not be on the surface of bars and strips. Local defects on the surface

Continuation of table 7

Type of machining processing	Categories of rolled stock	Quality of surface
Hot- rolled with machined or ground surface.	2, 2А, 2Б, 3, 3А, 3Б, 3В, 3Г	Should be removed by grinding or gently dressing in longitudinal direction and should not derive/ conclude strip and bar beyond the limit of minimum permissible dimensions. Cutting of defects on the surface of strips and bars are not permitted. Surface finish should not be more than the parameter Rz 40 micron according to GOST 2789-73 or according to the matched standards.
Calibrated	1, 1А, 2Б, 2, 2А, 2Б, 3, 3А, 3Б, 3, 3А, 3Б, 3В, 3Г, 4, 4А, 4Б	According to GOST 1051-73, group of surfaces Б and В.
Rolled stock with special surface finishing.	1, 1А, 2Б, 2, 2А, 2Б, 3, 3А, 3Б, 3В, 3Г, 4, 4А, 4Б	According to GOST 14955-77, group of surface finishing Б, В, Г and Д.

2.10. Microstructure of rolled stock on breaking / fractures or on pickled transverse templates should not have residues of micro cavity, loosening /friability, bubbles, exfoliations, slag inclusions and flakes.

Non-homogeneous point, shrinkage porosity, liquidation square should not exceed the mark 2 as per GOST 10243-75 for rolled stock categories 2, 2А, 2Б, 3, 3А, 3Б, 3В and 3Г and mark 3- for rolled stock of other categories.

2.11.Manufacture the hot-rolled round bar with machined or ground surface and with special surface finishing without de-carbonized layer.

Depth of de-carbonized layer of rolled stock of categories 2, 2А, 2Б, 3, 3А, 3Б, 3В and 3Г to the side should not exceed the norms, indicated ion table 8.

Table 8

Diameter, or thickness of rolled stock in mm	Permissible depth of total carbonization in%.	
	For all steels except alloyed with silicon.	For steels, alloyed with silicon.
Up to 8	2.0	2.5
Above 8	1.5	2.0

(Amended edition, Amendment No. 2).

2.12. Steel of grade 50ХГ, 50ХГА, 50ХГФА, 60С2, 55С2, 60С2А, 55С2А should be checked for austenite grain size for steel of grade 50ХГФА, austenite grain size should not be larger than 6 numbers and for steel of remaining grades should not be larger than 5th number according to GOST 5639-82.

2.13. Rolled stock is manufactured according to the requirement of user:

a) By maximum reduction of area of mass fraction of carbon in comparison with the norms of table 1:

б) With the mass fraction of sulphur not more than 0.015% and phosphorus not more than 0.020% in the high-grad steel;

в) With standardized austenite grain size should not larger than number 5 for steel of grades, not enumerated in point 2.12;

г) With microstructure to be standardized;

д) With the standardized contamination by non-metallic inclusions;

е) With fatigue test;

ж) With the determination of elastic limit.

з) With the inspection of martensite and troostite -martensite section and depth of sorbite of tempering in the microstructure of rolled stock of subgroup в, meant for manufacturing of wire.

Note. Norms for sub-points а, г, д, е, ж, з are set according to the agreement of user with manufacturer.

(Amended edition, Amendment No. 2 and 5).

2.14. Norms of harden ability of rolled stock of categories 2, 2А, 2Б, 3В and 3Г are set according to the agreement with the user.

Harden ability of strip for steel of grades 55С2, 55С2А, 60С2А and 50ХГФА are given in the reference appendix 2.

Maximum oscillations of hardness (maximum and minimum along length of front samples) are given in reference annexure 3 and maximum permissible sizes of rolled stock of different grades for manufacturing of leaf spring and coil spring are given in reference annexure 4.

3. ACCEPTANCE RULES

3.1. Rolled stock is taken batch wise, which consist of steel of same melting, same size and same mode of heat-treatment and noted in same document about quality in accordance with GOST 7566-81.

(Amended edition, Amendment No. 2 and 5).

3.2. Acceptance rules- according to GOST 7566-81.

3.3. Take bars, strips and coils from batch for checking of quality of rolled stock:

For chemical analysis, take the sample according to GOST 7565-81; Carry out periodical inspection of residual of chromium, copper and nickel not less than once in quarter. During production of steel taking into account manganese equivalent, inspection of residual of copper, nickel and chromium is carried out in each melting;

For inspection of microstructure on breaking pickling, for determination of microstructure, for tensile testing (yield point, ultimate stress, relative elongations, relative reduction of area) - two bars of coil or strip;

For checking of hardness- not more than 2% of strip (bars, coils), but not less than three strips (bars and coils);

For determining the harden ability – one sample from melting- ladle;

For determining the depth of de-carbonized layer - three bars, strips or coils;

For determination of grain size-one sample from melting-ladle;

For determining the nonmetallic inclusions-sample according to GOST 1778-70;

For quality control of surface and dimensional bars, strips and coils.

(Amended edition, Amendment No. 2 and 5).

4. METHODS FOR TESTING

4.1. Carry out chemical composition of steel according to GOST 22536.0-87, GOST 22536.1-88, GOST 22536.2-87, GOST 22536.3-88, GOST 22536.4-88, GOST 22536.5-87, 22536.7-88, GOST 22536.8-87, GOST 22536.9-88, GOST 22536.10-88, GOST 20560-81, GOST 12344-88, GSOT 12345-88, GOST 12346-78, GOST 12347-77, GOST 12348-78, GOST 12349-83, GOST 12350-78, GOST 12351-81, GOST 12352-81, GOST 12360-82 and GOST 12355-78 and GOST 18895-81 or by other methods, which ensure the required accuracy of determination.

4.2. Determine the geometrical dimensions and form by measuring tool according to GOST 26877-86, GOST 162-80, GOST 166-80, GOST 427-75, GOST 3749-77, GOST 5378-88, GOST 6507-78, GOST 7502-89 and template on standard technical documents or tools and templates, certified according to GOST 8.001-80 or GOST 8.326-78.

4.1; 4.2. **(Amended edition, Amendment No. 2 and 5).**

4.3. Visually check the quality of surface of rolled stock by dressing/stripping of surface, if necessary.

It is permitted to use nondestructive methods of inspection.

4.4. Selection of sample for mechanical testing- according to GOST 7564-73 (diagram of section of samples according to version 2).

Carry out selection of sample from coils for all types of testing at distance not less than 1.5 turn from end of unrolled stock.

4.5. Carry out tensile test (yield point, ultimate stress, relative elongation, relative reduction of area) on samples of five- fold length according to GOST 1497-84.

(Amended edition, Amendment No. 5).

4.6. Determine the Brinell hardness according to GOST 9012-59. Carry out measurement of hardness of trapezoidal and T-Shaped profile strip at the thick section of strip.

4.7. Carry out determination of depth of de-carbonized layer according to GOST 1763-68.

Trapezoidal and T-shaped strips are checked at the place of maximum thickness.

4.8.Carry out determination of grain size according to GOST 5639-82.

Inspection of grain size of steel of grades 55C2, 55C2A, 60C2 and 60C2A can not be carried out under the condition for correspondence of steel to the requirement of this standard.

4.9. Determine the harden ability by the method of end-quench testing according to GOST 5657-69.

4.10. Carry out determination of non-metallic inclusions according to GOST 1778-70 (method III1 and III4).

4.11.Application of nondestructive methods of inspection is permitted for inspection of microstructure, mechanical properties and grain size.

4.12. It is permitted to carry out checking of microstructure, mechanical properties and harden-ability on intermediate blank or rolled bar stock of larger section and result of testing pertains to all parcle of this melting by manufacturing plant.

It is permitted to determine the grain size during melting inspection.

4.13. Carry out inspection of microstructure according to GOST 10243-75.

4.14. During the use of static method of inspection of harness and mechanical properties in accordance with the standard technical documents, affirmed in set order by manufacturing plant, it is permitted not to carry out inspection of hardness and mechanical properties, provided by this standard and by manufacturer, during this, manufacturer guarantees for correspondence of products to be released to the requirements of this standard. In the arbitration / doubtful cases and during the periodic testing of quality of products are used by the method of inspection and provided by this standard.

4.13; 4.14. **(Additionally introduced, Amendment No.2 and 3).**

4.15. Methods of inspection of fatigue, elastic limit and microstructure are set according to the agreement of user with the manufacturer.

(Additionally introduced, Amendment No. 5).

5. PACKING, MARKING, TRANSPORTATION AND STORAGE

5.1. Carry out packing, marking, transportation and storage of hot-rolled and forged rolled stock according to GOST 7566-81 with addition.

External diameter of coils should not be more than 1500 mm and internal diameter should not be less than 180 mm.

Carry out packing, marking, transportation and storage of calibrated rolled stock according to GOST 1051-73 and rolled stock with special surface finishing according to GOST 14955-77.

(Amended edition, Amendment No.2 and 5).

5.1.1. Product is transported by all type of transport in accordance with the rules of transportation of loads, which is applied in the field of transportation of this form.

Weight of cargo place should not exceed during mechanized loading in open transportation means- 1000 kg and in covered- 1250 kg.

Means of packing according to GOST 7566-81

During transportation of two and more cargo places, whose dimension/size, make it possible to design of transportation packet with over all dimension according to GOST 24597-81, loading /cargo places should be formed into the transport packets according to standard technical documents.

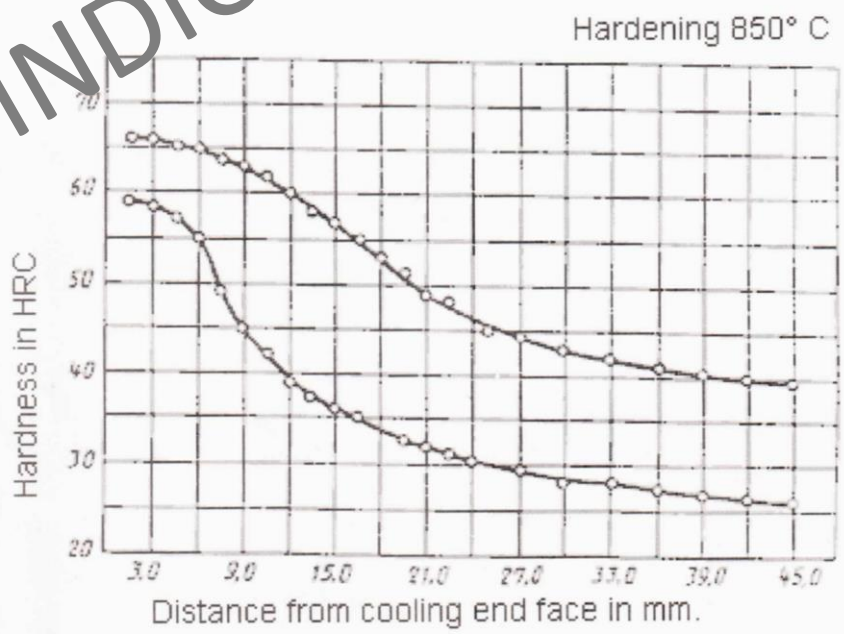
(Additionally introduced, Amendment No. 2).

Purpose of rolled stock

Categories on standardized characteristics	Purpose of rolled stock
2, 2А, 2Б, 3, 3А, 3Б, 3В, 3Г	For manufacturing of elastic elements-leaf spring, spring torsion etc.
3А, 3Б, 3В, 3Г	For manufacturing of leaf spring and spring for automobiles.
1, 1А, 1Б, 4, 4А, 4Б	For using as quality of structure/design

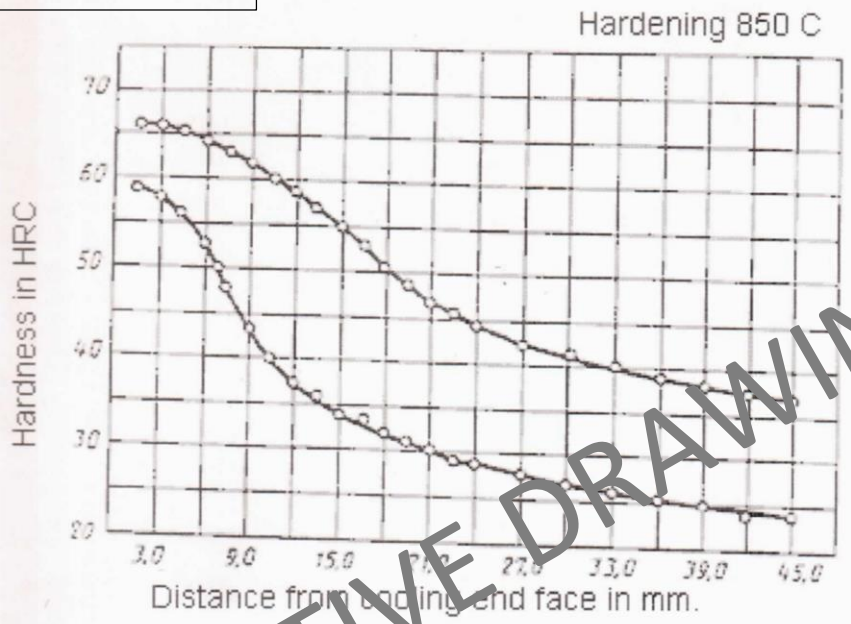
(Amended edition, Amendment No. 5).

Harden ability of steel strip
Steel of grade 55C2, 55C2A

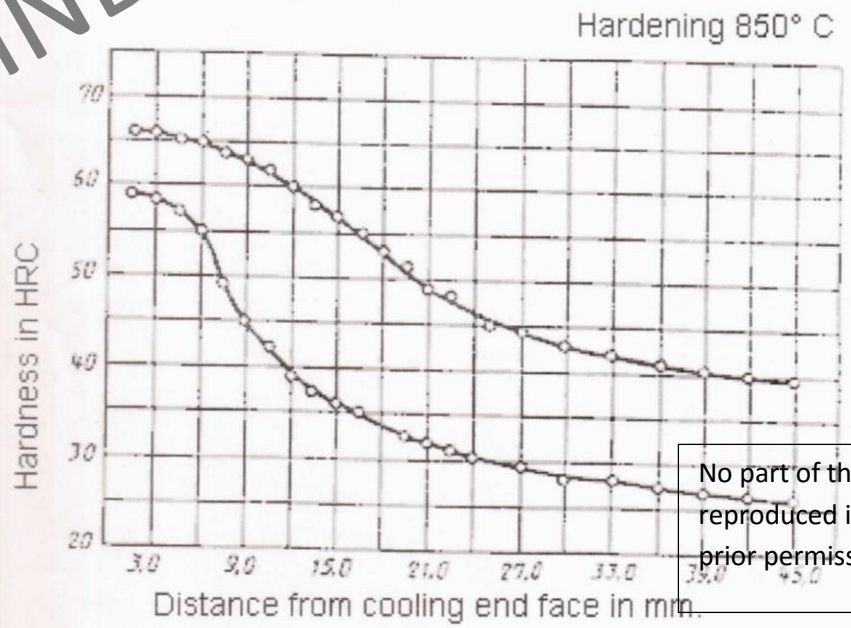


Drawing 1

Steel of grade 60C2, 60C2A

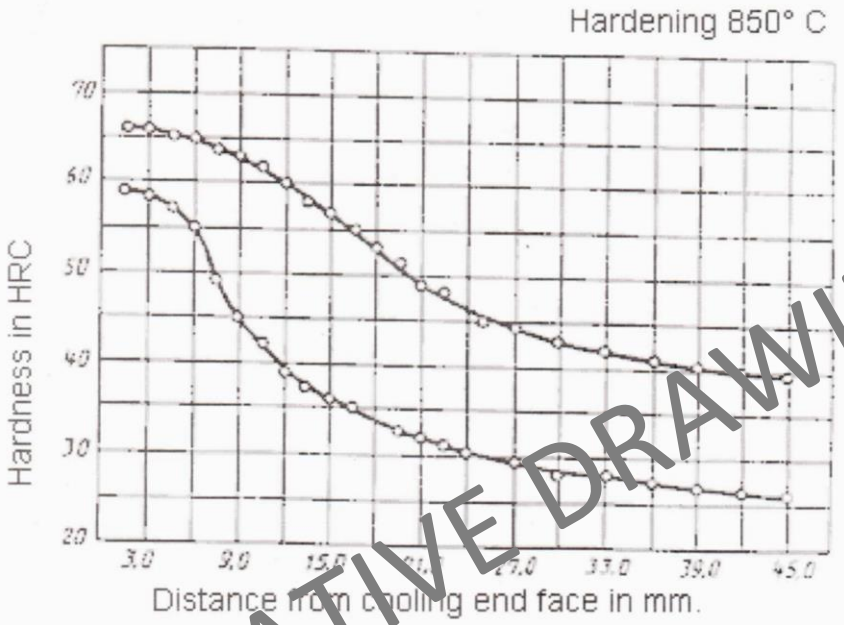


Steel of grade 60C2Г



Drawing 3

Steel of grade 50ХГФА



Drawing 4

Annexure 3
Reference

MAXIMUM OSCILLATIONS OF HARDNESS (MAXIMUM AND MINIMUM) ALONG THE LENGTH OF FRONT /END FACE OF SAMPLES FOR GRADING OF HARDEN ABILITY OF STRIP

Distance from end face in mm	Hardness HRC for strip of harden ability of steel of grades							
	55C2, 55C2A		60C2, 60C2A		60C2Г		50ХГФА	
	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
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

Distance from end face in mm	Hardness HRC for strip of harden ability of steel of grades							
	55C2, 55C2A		60C2, 60C2A		60C2Г		50ХГФА	
	max	min	max	min	max	min	max	min
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	51	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	38	26	44	29
45.0	33	24	37	24	39	26	43	29

Annexure 4
Reference

Maximum permissible dimension for manufacturing of leaf spring and spring

Grade of steels	Maximum permissible dimension in mm.	
	Strip roll	Diameter or side of square
80	8	12
55C2	8	12
55C2A	8	12
60C2	14	20
60C2A	14	20
60C2G	16	24
50ХГ	14	25
50ХГА	14	25
50ХГР	24	30
50ХГФА	24	25
55C2ГФ	25	30

(Amended edition, Amendment No. 5).

SUPERSEDES GOST 14959-69 AND GOST 1050-74 IN THE PART OF STEELS OF GRADE 65, 70, 80, 85, 60Г, 65Г, 70Г

REFERENCE STANDARD- TECHNICAL DOCUMENT

Code of НТД, on which reference is given	Point and Sub-point number
GOST 8.001-80	4.2
GOST 8.326-78	4.2
GOST 103-76	1.3
GOST 162-80	4.2
GOST 166-80	4.2
GOST 427-75	4.2
GOST 1051-73	2.9, 5.
GOST 1133-71	1.3
GOST 1497-84	4.5
GOST 1763-68	4.7
GOST 1778-70	3.3, 4.10
GOST 2216-84	4.2
GOST 2590-88	1.3
GOST 2591-88	1.3
GOST 287[illegible]-88	1.3
GOST [illegible]749-77	4.2
GOST [illegible]405-75	1.3
GOST [illegible]378-88	4.2
GOST 5639-82	2.12,4.8
GOST 5657-69	4.9
GOST 6507-78	4.2
GOST 7417-75	1.3
GOST 7419.0-78	1.3, 2.9

Code of НТД, on which reference is given	Point and Sub-point number
GOST 7419.1-78-GOST 7419.8-78	1.3
GOST 7502-89	4.2
GOST 7564-73	4.3
GOST 7565-81	3.3
GOST 7566-81	3.1, 3.2, 5.1, 5.1.1
GOST 8559-75	1.3
GOST 8560-78	1.3
GOST 9012-59	4.6
GOST 10243-75	2.17, 4.13
GOST 12344-88	4.1
GOST 12345-88	4.1
GOST 12346-78	4.1
GOST 12347-77	4.1
GOST 12348-78	4.1
GOST 12349-83	4.1
GOST 12350-78	4.1
GOST 12351-81	4.1
GOST 12352-81	4.1
GOST 12360-82	4.1
GOST 14955-77	1.3, 2.9, 5.1
GOST 18895-81	4.1
GOST 22550-81	4.1
GOST 22536.0-87	4.1
GOST 22536.1-88	4.1
GOST 22536.2-87	4.1
GOST 22536.3-88	4.1
GOST 22536.4-88	4.1
GOST 22536.5-87	4.1
GOST 22536.7-88	4.1
GOST 22536.8-87	4.1
GOST 22536.9-88	4.1
GOST 22536.14-88	4.1
GOST 26877-86	4.2

Republication with Amendment No.1, 2, 3, 4 and 5, affirmed in November 1982, December 1985, December 1986, June 1987, December 1989 (ИУС 2-83, 3-86, 3-87, 9-87, 3-90).