

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

GOST 1577-93

INDICATIVE DRAWINGS

SUPERSEDES GOST 1577-81

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Group B33

For GOST 1577—93 Rolled sheets and wide strips of structural quality steel. Specifications

At which place	Printed as	Should be
Point 3.1	65, 70, 60Г, 70Г – as per GOST 14959	65, 70, 60Г, 65Г, 70Г – As per GOST 14959
Point 3.4. table 1. under heading «conventional designation of the characteristic»	BT	T
Under heading «point no. of this standard». For rolled stock characteristic «Supply condition without heat treatment»	4.1.7; 4.1.8; 4.1.8; 4.2.11	4.1.7, 4.2.8, 4.2.11
«Standardized macrostructure of rolled stocks with thickness more than 10 MM»	4.3.1	4.3.14
«Specify in the quality certificate: — Rolled stock corresponds to GOST 1577	5.2	5.3
- all types of carried out tests»	5.2	5.3

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GOST 1577-93

Continuation

At which place	Printed as	Should be
Appendix 1. Conventional designation of rolled stock.		
Figure.1. 10 th Paragraph	2.2 and 2.3	4.2 and 4.3
Figure2. Ninth (9 th) paragraph	2.2 and 2.3	4.2 and 4.3
Example of conventional designation. First-fourth, eight and ninth paragraph	BT	T
Tenth and eleventh paragraph	-	Rolled wide strips, non-standard length (HД), good flatness quality (IIY), with rib curvature of class A, with untrimmed edges (HO), of dimension 6x700x6000 MM as per GOST 82, made from steel of grade 35, with hardness as per table 2 (TB1), with mechanical properties as per table 5 (M3) with guarantee of decarbonization not more than 2 % in a side (1C), with ultrasonic inspection of uniformity of class 2 (2Y3K), without heat treatment: Strip $\frac{\text{HД} - \text{ПY} - \text{A} - \text{HO} - 6x700x6000 \text{ GOST } 82 - 70}{35 - \text{TB1} - \text{M3} - 1\text{C} - 2\text{Y}3\text{K} \text{ GOST } 1577 - 93}$

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Continuation

At which place Appendix 2. Third and fourth para	Printed as	Should be
	<p>Rolled wide strip, of non-standard length (HД), good quality of flatness (ПУ), with rib curvature of class A, with untrimmed edges (HO), of dimension 6x700x6000 мм as per GOST 82, made from steel of grade 35, with hardness as per table 2 (TB1), with mechanical properties as per table 5 (M3), with guarantee of decarbonization not more than 2% in side (1C), with ultrasonic inspection of uniformity of class 2 (2У3К), without heat treatment.</p> <p>Strip <u>НД - ПУ - А - HO - 6x700x6000 - GOST 82 - 70</u> 35 - TB1 - M3 - 1C - 2У3К GOST 1577 - 93</p>	-

(ИУС № 4 1999)

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INTERNET STATE STANDARD

Rolled sheets and wide strips of Structural quality steel Specifications

Introduction date 1997—01—01

1 Area of application

The present standard covers for alloy and non-alloy steel Rolled sheets and wide strips of structural quality steel

2 Standard references

In this standard, reference from the following standard and Specifications are taken:

GOST 8.001—80 ГСИ. Organization of measuring tools and government test procedures

GOST 8.326—89 ГСИ. Attestation of measuring tools

✓ GOST 82—70 Universal hot rolled steel wide strips. Grade/dimension ✓

✓ GOST 103—79 Hot rolled steel strip. Grade

✓ GOST 535—88 Rolled section and shaped section made from carbon steel of ordinary quality. General technical specifications

GOST 1497—84 Metals. Tensile strength test methods

✓ GOST 4543—71 Rolled stock of carbon structural steel. Specifications

GOST 7502—89 Metallic measuring tapes. Specifications

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Official edition

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GOST 7564—73 Steel. General rules for selection of samples, billets and specimens for mechanical and technological testing.

GOST 7565—81 Pig iron, steel and alloys. Sample selection method for chemical composition

GOST 7566—81 Rolled stock and articles for further processing. Rules for acceptance, marking, packing, transportation and storage

GOST 9012—59 Metals. Methods for measuring the hardness as per Brinell

GOST 9045—93 Cold rolled thin sheet of non-carbon quality steel for cold stamping. Technical specifications

GOST 9454—78 Metals. Impact bend test methods at lowered, room and increased temperature

GOST 10243—75 Steel. Testing method and estimation of macrostructure

GOST 12344—88 Alloy and high alloy steel. Methods of estimation of carbon

GOST 12345—88 Alloy and high alloy steel. Methods of estimation of sulphur

GOST 12346—78 Alloy and high alloy steel. Methods of estimation of silicon

GOST 12347—77 Alloy and high alloy steel. Methods of estimation of phosphorous

GOST 12348—78 Alloy and high alloy steel. Methods of estimation of tungsten

GOST 12350—78 Alloy and high alloy steel. Methods of estimation of chromium

GOST 12351—81 Alloy and high alloy steel. Methods of estimation of vanadium

GOST 12352—81 Alloy and high alloy steel. Methods of estimation of nickel

GOST 12354—81 Alloy and high alloy steel. Methods of estimation of molybdenum

GOST 12357—84 Alloy and high alloy steel. Methods of estimation of aluminium

GOST 12360—82 Alloy and high alloy steel. Methods of estimation of boron.

GOST 14019—80 Metals. Bend test methods

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GOST 14192—77 Marking of loads

GOST 14637—89 Rolled thick sheets of carbon steel of ordinary quality. Specifications

GOST 14959—79 Rolled stock of spring carbon and alloy steel. Specifications

GOST 15846—79 Products, which are dispatched to extreme north and to regions of difficult accessibility. Packing, marking, transportation and storage

GOST 19903—74 Hot rolled sheets. Grades.

GOST 22235—76 Goods wagon for gauge 1520 mm. General requirements for product safety while loading and unloading and during manoeuvre work

GOST 22536.0—87 Carbon steel and non-alloy pig iron. General requirement for the analysis method.

GOST 22526.1—88 Carbon steel and non-alloy pig iron. Method of estimation of carbon and graphite.

GOST 22536.2—87 Carbon steel and non-alloy pig iron. Method of estimation of sulphur

GOST 22536.3—88 Carbon steel and non-alloy pig iron. Method of estimation of phosphorus

GOST 22536.4—88 Carbon steel and non-alloy pig iron. Method of estimation of silicon

GOST 22536.5—87 Carbon steel and non-alloy pig iron. Method of estimation of manganese

GOST 22536.6—88 Carbon steel and non-alloy pig iron. Method of estimation of arsenic

GOST 22536.7—88 Carbon steel and non-alloy pig iron. Method of estimation of chromium

GOST 22536.8—87 Carbon steel and non-alloy pig iron. Method of estimation of copper

GOST 22536.9—88 Carbon steel and non-alloy pig iron. Method of estimation of nickel

GOST 22536.10—88 Carbon steel and non-alloy pig iron. Method of estimation of aluminium

GOST 22727—88 Rolled sheet. Ultrasonic inspection method

GOST 26877—91 Metal products. Methods for measuring the deviation in shape

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GOST 28473—90 Pig iron, steel, ferro-alloy, chrome, metal manganese. General requirements for analysis method.

3 BASIC PARAMETERS AND DIMENSIONS

3.1 Rolled stock are manufactured from steels of grade 08кп, 08пс, 08, 10кп, 10пс, 10, 15кп, 15пс, 15, 20кп, 20пс, 20, 25, 30, 35, 40, 45, 50, 55, 60 – as per GOST 1050; 08Ю – as per GOST 9045; 15Г, 20Г, 30Г, 40Г, 50Г, 10Г2, 35Г2, 20Х, 30Х, 38ХА, 40Х, 45Х – as per GOST 4543; 65, 70, 60Г, 70Г - as per GOST 14959.

Note — from steel of grade 08Ю, rolled sheet is manufactured

3.2 Rolled stock are manufactured with thickness:

4— 160 mm — sheet;

4— 12 mm — in rolls;

6— 60 mm — in wide strips.

3.3 Requirement for the dimension should correspond to:

GOST 19903— for sheet and rolls;

GOST 82 — for wide strip.

3.4 Conventional designation of the rolled stock characteristics for preparing the order is given in table 1.

Table 1— Conventional designation

Characteristic	Point number of this standard	Conventional designation of characteristics
Rolled stock accuracy for thickness of rolled thick sheet:		
Good	4.21	АТ
Ordinary	4.1.1	БТ
Length of wide strip:		
Non-standard	4.1.2	НД
Standard	4.2.2	МД
Multiples of standard length	4.2.2	КД
Flatness appearance:		
Ordinary	4.1.1	ПН
Good	4.2.1; 4.2.2	ПУ
High	4.2.1	ПВ
Superior	4.2.1	ПО
Rib curvature of wide strip of classes:		
- А	4.2.2	А
- Б	4.1.2	Б

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Continuation of table 1

Characteristic	Point number of this standard	Conventional designation of characteristics
Edge condition:	4.1.1; 4.1.2	HO
- Untrimmed	4.1.1; 4.1.2	HO
- Trimmed	4.2.3; 4.3.3	O
Supply condition:	4.1.7; 4.1.8; 4.2.8;	Not specified
- Without heat treatment	4.2.11	Not specified
- Heat treated	4.2.6; 4.2.7; 4.3.8	TO
Hardness of stock with thickness upto 80MM inclusive, in supply condition:		
— Without heat treatment, after the inspection of stock, in heat treated condition	4.1.7; 4.2.7, table 2	TB1
— Without heat treatment and from the mill of continuous rolling with norms for annealed or high temper rolled stock	4.2.8, table 2	TB2
Hardness check of stock with thickness above 80 MM	4.3.9	TB3
Mechanical properties:		
— Stock with thickness upto 80 MM inclusive, in supply condition or on normalized billet	4.2.9, table 3	M1
— rolled thick sheet with thickness upto 80 MM inclusive., supplied without heat treatment from the mill of continuous rolling, with norms for annealed or high tempered stock	4.2.10, table 3	M2
— in normalized condition for the billet of dimension, determined by the customer	4.3.10, table 5	M3
— after hardening with tempering for billet of dimension, determined by the customer.	4.3.11, table 6	M4
standardized impact strength at temperature minus 20°C for rolled stock of thickness upto 80 MM inclusive	4.2.11	KYB1
Checking of impact strength at temperature minus 20°C, minus 40°C, minus 50°C for rolled stock made from killed steel	4.3.12	KYB2

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Continuation of table 1

Characteristic	Point number of this standard	Conventional designation of characteristics
Test in cold condition	4.2.12	КИ
Standardized point of macrostructure		
rolled stock with thickness more than 10 mm	4.3.1	КМС
carburizing guarantee not more than 2 % to side	4.3.7	IC
Pressing of scales	4.3.15	УО
Deburring of burrs, which occur as a result of parting of rolled thick sheet		
and cutting of wide strips in standard length	4.3.17	УЗ
Ultrasonic inspection of uniformity of metal	4.3.13	УЗК, 2УЗК, 3УЗК
Quality certificate, indicating the following: Rolled stock corresponds to GOST 1577	5.2	ДК1
All type of carried out tests	5.2	ДК2
Welding guarantee	4.3.16	ГС

Example of Conventional designation of rolled stock is given in table 1.

4 TECHNICAL REQUIREMENTS

4.1 Characteristic of the basic design

- 4.1.1. Rolled thick sheet without heat treatment or after the checking of rolling, ordinary quality of thickness, ordinary quality of flatness, with untrimmed edges.
- 4.1.2 Wide strip rolled stock without heat treatment, non-standard length, with rib curvature of class B, ordinary quality of flatness, with untrimmed edges.
- 4.1.3 Chemical composition of ladle sample steel and permissible deviation in the finished good should correspond to GOST 1050, GOST 4543, GOST 9045 and GOST 14959.
- 4.1.4 Surface quality 7 requirements for the edges of the rolled stock should correspond to GOST 14637.
- 4.1.5 Spills is not permitted.

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4.1.6 Macro structure of the rolled stock should be free of spills, collection of rolling cavities, slag inclusions and flakes visible to the naked eye.

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4.1.7 The hardness of the rolled stock with thickness upto 80 MM inclusive without heat treatment or after the rolling check, should correspond to norms, specified in table 2.

Table 2. Hardness of rolled stock

Steel grade	Without heat treatment or after Rolling check		Normalized		Annealed or high tempering	
	Diameter of indentation, мм, not less than	Hardness HB, not more than	Diameter of indentation, мм, not less than	Hardness HB, not more than	Diameter of the impression, мм, not less than	Hardness HB, not more than
08кп, 08пс, 08, 08Ю	+	+	+	+	5.2	131
10кп, 10пс, 10	+	+	+	+	5,1	137
15кп, 15пс, 15	+	+	+	+	5.0	143
20кп, 20пс, 20	+	+	+	+	4.8	156
25	4.6	170	4.6	170	4.6	170
30	4.5	179	4.5	179	4	179
35	4.2	207	4.2	207	4	187
40	4.1	217	4.1	217	4	187
45	4.0	229	4.0	229	4.3	197
50	3.9	241	3.9	241	4.2	207
55	3.8	255	3.8	255	4.1	217
60	3.8	255	3.8	255	4.0	229
65	3.8	255	3.8	255	4.0	229
70	3.7	269	3.7	269	4.0	229
15Г	4.7	163	4.7	163	4.7	163
20Г	4.3	197	4.3	197	4.5	179
30Г	4.1	217	4.1	217	4.4	187
40Г	4.0	229	4.0	229	4.2	207
50Г	3.8	255	3.8	255	4.1	217
60Г	3.7	269	3.7	269	4.0	229
65Г	3.6	285	3.6	285	4.0	229
70Г	3.6	285	3.6	285	4.0	229
01Г	+	+	+	+	4.3	197
35Х2	+	+	+	+	4.2	207
20Х	+	+	+	+	4.5	179
30Х	+	+	+	+	4.4	187
38ХА	+	+	+	+	4.2	207
40Х	+	+	+	+	4.1	217
45Х	+	+	+	+	4.0	229

Note:

1. Hardness standard for normalized rolled stock was not a rejection criteria upto 01.01.98.

2 sign «+» means, that the hardness checking is carried out for set of data and results of the check are noted in the quality certificate.

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4.2 Characteristics set by the customer

4.2.1 Rolled thick sheet of good quality for thickness and flatness, high and superior quality as per GOST 19903. ✓

4.2.2 Rolled wide strip universal, standard and multiples of standard length, good quality of flatness, with rib curvature of class A as per GOST 82. ✓

4.2.3 Rolled thick sheet of thickness upto 80 mm inclusive with trimmed edges.

4.2.4 Rolled stock with mass fraction of sulphur – 0.020 — 0.035 %.

4.2.5 Rolled stock with mass fraction of sulphur and phosphorous, reduced against the norms of GOST 1050, GOST 4543, GOST 9045 and GOST 14959.

4.2.6 Rolled stock with thickness upto 80 mm inclusive in heat treated condition (normalized, annealed, high tempering).

4.2.7 Rolled stock with thickness upto 80 mm inclusive in heat-treated condition with requirements for hardness, as specified in table 2.

4.2.8 Rolled stock with thickness upto 80 mm made from steel of grade 08кп, 08пс, 08, 10кп, 10пс, 10, 15кп, 15пс, 15, 20кп, 20пс and 20, without heat treatment and from the mill of continuous rolling with hardness in compliance with the norms of table 2 for annealed or high tempered rolled stock.

4.2.9 Rolled stock with thickness upto 80 mm inclusive in compliance with requirements of those specified in table 3.

4.2.10 Rolled stock with thickness upto 80 mm made from steel of grade 08кп, 08пс, 08, 10кп, 10пс, 10, 15кп, 15пс, 15, 20кп, 20пс and 20 without heat treatment and from the mill of continuous rolling with mechanical properties in compliance with the norms of table 3 for annealed or high tempered rolled stock. ✓

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Table 3 — mechanical properties of rolled stock

Steel grade	Rolled thick sheet						Wide strip normalized rolled stock or normalized billet			
	Without heat treatment, after the inspection of rolled stock or normalized			Annealed or high tempering			Yield limit, σ_T N/MM ² (kgf/MM ²)	Ultimate strength, σ_B N/MM ² (kgf/MM ²)	Relative elongation δ_5 , %	Relative reduction of cross section area ψ , %
	Yield limit, σ_T N/MM ² (kgf/MM ²)	Ultimate strength, σ_B N/MM ² (kgf/MM ²)	Relative elongation δ_5 , %	Yield limit, σ_T N/MM ² (kgf/MM ²)	Ultimate strength, σ_B N/MM ² (kgf/MM ²)	Relative elongation δ_5 , %				
	Not less than									
08кп, 08Ю	+	310(32)	34	+	270(28)	34	175(18)	290(30)	35	60
08пс	+	310(32)	32	+	270(28)	32	175(18)	290(30)	35	60
08	+	310(32)	32	+	270(28)	32	196(20)	320(33)	33	60
10кп	+	320(33)	32	+	270(28)	32	185(19)	310(32)	33	55
10пс	+	330(34)	32	+	270(28)	32	185(19)	310(32)	33	55
10	+	330(34)	32	+	270(28)	32	205(21)	330(34)	31	55
15кп	+	340(35)	30	+	300(31)	31	205(21)	350(36)	29	55
15пс	+	370(38)	30	+	320(33)	30	205(21)	350(36)	29	55
15	+	370(38)	30	+	320(33)	30	225(23)	370(38)	27	55
20кп	+	380(39)	27	+	340(35)	28	225(23)	380(39)	27	55
20пс	+	410(42)	28	+	370(38)	28	225(23)	380(39)	27	55
✓ 20	+	410(42)	28	+	370(38)	28	245(25)	410(42)	25	55
25	+	400(41)	25	+	400(41)	26	275(28)	450(46)	23	50
30	+	400(41)	24	+	430(44)	24	295(30)	490(50)	21	50
35	+	520(53)	21	+	480(49)	22	315(32)	530(54)	20	45
40	+	560(57)	20	+	520(56)	21	335(34)	570(58)	19	45
✓ 45	+	590(60)	18	+	550(56)	19	✓ 355(36)	600(61)	16	40
50	+	630(64)	16	+	580(59)	17	+	+	+	+
55	+	+	+	+	+	+	+	+	+	+

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Continuation of table 3

Steel grade	Rolled thick sheet						Wide strip normalized rolled stock or normalized billet			
	Without heat treatment, after the inspection of rolled stock or normalized			Annealed or high tempering			Yield limit, σ_T N/MM ² (kgf/MM ²)	Ultimate strength, σ_B N/MM ² (kgf/MM ²)	Relative elongation η δ_5 , %	Relative reduction of cross section area ψ , %
	Yield limit, σ_T N/MM ² (kgf/MM ²)	Ultimate strength, σ_B N/MM ² (kgf/MM ²)	Relative elongation δ_5 , %	Yield limit, σ_T N/MM ² (kgf/MM ²)	Ultimate strength, σ_B N/MM ² (kgf/MM ²)	Relative elongation δ_5 , %				
	Not less than									
60	+	+	+	+	+	+	+	+	+	+
65	+	+	+	+	+	+	+	+	+	+
70	+	+	+	+	+	+	+	+	+	+
15 Γ	+	420(43)	28	+	380(39)	29	+	+	+	+
20 Γ	+	440(45)	27	+	400(41)	28	+	+	+	+
30 Γ	+	+	+	+	+	+	+	+	+	+
40 Γ	+	+	+	+	+	+	+	+	+	+
50 Γ	+	+	+	+	+	+	+	+	+	+
60 Γ	+	+	+	+	+	+	+	+	+	+
65 Γ	+	740(75)	12	+	+	+	+	+	+	+
70 Γ	+	780(80)	10	+	+	+	+	+	+	+
10 Γ 2	+	440(45)	28	+	400(41)	29	+	+	+	+
35 Γ 2	+	+	+	+	+	+	+	+	+	+
20Y	+	+	+	+	+	+	+	+	+	+
30X	+	+	+	+	+	+	+	+	+	+
40X	+	+	+	+	+	+	+	+	+	+
45X	+	+	+	+	+	+	+	+	+	+
38XA	+	+	+	+	+	+	+	+	+	+

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1 For steel of grade 08Ю, the norms covers for only rolled thick sheet.

2 For thickness of the stock above 20 мм, it is permitted to decrease the relative elongation by 0.25 % absolute for every millimeter increase in thickness of the stock, but not more than by 2 % for stock with thickness upto 32 мм inclusive and by 3 % for stock of thickness more than 32 мм.

3 For annealed stock made from grade 35, 40, 45 and 50, it is permitted to reduce the ultimate strength by 39 N/мм²: (4 kgf/мм²).

4 The sign «+» means, the characteristics are controlled for collection of data. Results of the test are noted in the quality certificate.

4.2.11 The rolled stock without heat treatment, after rolling, inspection and normalized thickness upto 80 мм inclusive made from steel of grade 10, 15, 20, 15Г and 20Г with standardized impact strength KCU not less than 19 J/cm² (3 kgf . m /cm²) at temperature minus 20°C.

4.2.12 Rolled stock with thickness upto 60 мм inclusive with bend test in cold condition at 180° with thickness of mandrel as specified in table 4. Breaking, spills and cracks are not permitted at the place of bending, which is visible to naked eyes.

Table 4 — Bend test in cold condition

Steel grade	Mandrel thickness d for stock thickness a	
	Upto 20 мм inclusive	Above 20mm
08кп, 08пс, 08Ю, 08кп, 10кп, 10пс, 10, 15кп, 15пс	$d = 0.5 a$	$d = a$
15, 20кп, 20пс, 20	$d = a$	$d = 2a$
25, 30, 35	$d = 2a$	$d = 3a$

4.3 Characteristics and norms, established in agreement between the customer and the manufacturer

4.3.1 Rolled stock with requirements conforming to dimensions relative to GOST 19903 and GOST 82.

4.3.2 Rolled thick sheet with length from 1.5 to 5 м.

4.3.3 Rolled thick sheet with thickness more than 80 мм with trimmed edges

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4.3.4 Rolled stock with standardized total mass fraction of sulphur and phosphorous

4.3.5 Rolled stock with decreased mass fraction of residual elements in steel with respect to the norms of GOST 1050, GOST 4543, GOST 9045 and GOST 14959.

4.3.6 Rolled stock with increased mass fraction of residual elements (chrome, nickel, copper) in steel, smelted by scrap or iron-ore process, with respect to norms of GOST 1050, GOST 4543, GOST 9045 and GOST 14959.

4.3.7 Rolled stock made from steel with mass fraction of carbon in lower limits 0.3 % minimum with the guarantee of decarbonization depth (ferrite + transition zone) not more than 2 % to the side from the actual thickness of sheet.

4.3.8 Rolled stock with thickness above 80 mm in heat-treated condition

4.3.9 Rolled stock with thickness above 80 mm with hardness control.

4.3.10 Rolled stock with mechanical properties in normalized condition in compliance with the norms as specified in table 5

Table 5 — Mechanical properties of the Rolled stock in normalized condition

Steel grade	Thickness, in mm	Yield limit, $\sigma_{0.2}$ N/mm ² (kgf/mm ²), not less than	Ultimate strength, σ_b N/mm ² (kgf/mm ²)	Relative elongation	
				Along	Across
				The direction of rolling	
				Not less than	
20	Upto 100	230(23.5)	400-550(41-56)	27	25
	From 100 upto 160	210(21.5)	380-520(39-53)	25	23
25	Upto 16	260(26.5)	420-570(43-58)	25	23
	From 16 upto 100	240(24.5)	420-570(43-58)	25	23
	From 100 upto 160	220(22.5)	400-550(41-56)	23	21
30	Upto 16	280(28.5)	450-630(46-64)	23	21
	From 16 upto 100	250(25.5)	450-630(46-64)	23	21
	From 100 upto 160	230(23.5)	430-610(44-62)	21	19
35	Upto 16	300(30.5)	480-670(49-68)	21	19
	From 16 upto 100	270(27.5)	480-670(49-68)	21	19
	From 100 upto 160	245(25)	460-650(47-66)	19	17

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Continuation of table 5

Steel grade	Thickness, in mm	Yield limit, $\sigma_{0.2}$ N/mm ² (kgf/mm ²), not less than	Ultimate strength, σ_B N/mm ² (kgf/mm ²)	Relative elongation	
				Along	Across
				The direction of rolling	
				Minimum	
40	Up to 16	320(32.5)	530-720(54-73)	19	17
	From 16 upto 100	290(29.5)	530-720(54-73)	19	17
	From 100 upto 160	260(26.5)	510-700(52-71)	17	15
45	Up to 16	340(34.5)	580-770(59-79)	17	15
	From 16 upto 100	305(31)	580-770(59-79)	17	15
	From 100 upto 160	275(28)	560-750(57-76)	15	13
50	Up to 16	355(36)	600-810(61-84)	16	14
	From 16 upto 100	320(32.5)	600-820(61-84)	16	14
	From 100 upto 160	290(29.5)	580-800(59-82)	14	12
55	Up to 16	370(37.5)	630-870(64-89)	15	13
	From 16 upto 100	350(35.5)	630-870(64-89)	15	13
	From 100 upto 160	300(30.5)	610-850(62-89)	13	11
60	Up to 16	380(39)	650-920(66-94)	14	12
	From 16 upto 100	340(34.5)	650-920(66-94)	14	12
	From 100 upto 160	310(31.5)	630-880(64-90)	12	10

Note — Norms of mechanical properties was not a rejection criteria till 01.01.98. Results of the test are noted down in the quality certificate.

4.3.11 Rolled stock with mechanical properties after hardening with tempering in compliance with the norms as specified in table 6.

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Table 6 - Mechanical properties of rolled stock after hardening with tempering

Steel grade	For Rolled stock with thickness, in mm						
	upto 16 inclusive				Above 16 upto 40		
	Yield limit, $\sigma_{0.2}$ N/mm ² (kgf/mm ²)	Ultimate strength, σ_n N/mm ² (kgf/mm ²)	Relative elongation, δ_5 , %	Relative reduction, Ψ , %	Impact strength KCU, J (kgf • M) at 20 °C	Yield limit, $\sigma_{0.2}$ N/mm ² (kgf/mm ²)	Ultimate strength, σ_n N/mm ² (kgf/mm ²)
Not less than		Not less than					
20	350 (35.5)	550-700 (56-71)	20	50	50 (5.0)	300 (30.5)	500-650 (51-66)
25	370 (37.5)	550-700 (56-71)	19	45	45 (4.5)	320 (32.5)	500-650 (51-66)
30	400 (41)	600-750 (61-76)	18	40	40 (4.0)	350 (35.5)	550-700 (56-71)
35	430 (44)	630-780 (64-80)	17	40	35 (3.5)	370 (37.5)	600-750 (61-76)
40	460 (47)	650-800 (66-82)	16	35	30 (3.0)	400 (41)	630-780 (64-80)
45	500 (51)	700-850 (71-87)	14	35	25 (2.5)	430 (44)	650-800 (66-82)
50	520 (53)	750-900 (76-92)	13	30	+	460 (47)	700-850 (71-87)
55	550 (56)	800-950 (82-97)	12	30	+	500 (51)	750-900 (76-92)
60	580 (59)	850-1000 (87-102)	11	25	+	520 (53)	800-950 (82-97)
30X	650 (66.5)	850-1000 (87-102)	12	40	35 (3.5)	550 (56)	750-900 (76-92)
38XA	750 (76.5)	950-1150 (97-117)	11	35	30 (3.0)	630 (64)	850-1000 (87-102)
40X	800 (81.5)	1000-1200 (102-122)	10	30	30 (3.0)	660 (67.5)	900-1100 (92-112)

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GOST 1577-93

Steel grade	For rolled stock with thickness, MM							
	Above 16 up to 40			Above 40 up to 100				
	Relative elongation, δ_5 , %	Relative reduction, Ψ , %	Impact strain KCU, at 20 °C J(kgf·M)	Yield limit, $\sigma_{0.2}$ N/mm ² (kgf/mm ²)	Ultimate strength σ_b N/mm ² (kgf/mm ²)	Relative elongation, δ_5 , %	Relative reduction, Ψ , %	Impact strength KCU, at 20 °C J(kgf·M)
	Not less than					Not less than		
20	22	50	50 (5.0)	-	-	-	-	-
25	21	50	45 (4.5)	-	-	-	-	-
30	20	45	40 (4.0)	300 (30.5)	500-650 (51-65)	20	50	40 (4.0)
35	19	45	35 (3.5)	320 (32.5)	550-700 (56-71)	20	50	35 (3.5)
40	18	40	30 (3.0)	350 (35.5)	600-750 (61-76)	19	45	30 (3.0)
45	16	40	25 (2.5)	370 (37.5)	630-780 (64-80)	17	45	25 (2.5)
50	15	35	+	400 (41)	650-800 (66-82)	16	40	+
55	14	35	+	430 (44)	700-850 (71-87)	15	40	+
60	13	30	+	450 (46)	750-900 (76-92)	14	35	+
30X	14	45	40 (4.0)	410 (42)	650-800 (66-82)	15	50	45 (4.5)
38XA	13	40	35 (3.5)	510 (52)	750-900 (76-92)	14	40	35 (3.5)
40X	12	35	35 (3.5)	560 (57)	800-950 (82-97)	14	40	35 (3.5)

Note:

1 Test results of mechanical properties was optional upto 01.01.98.

2 Norms of mechanical properties of Rolled stock made from steel grade 30 is given for thickness upto 63 MM.

3 Sign «+» means, that characteristics are determined for collecting data's. The results are noted down in the quality certificate.

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4.3.12 Rolled stock made from killed steel grade with impact test at 20 °C, minus 40 °C or minus 50 °C.

4.3.13 Rolled stock with ultrasonic inspection for uniformity. Uniformity norm — in compliance with classes 1, 2, 3 as per GOST 22727.

4.3.14 Rolled stock with thickness above 10mm standardized for macrostructure point.

4.3.15 Descaled Rolled stock. Method of scale removal is decided by the manufacturer.

4.3.16 Rolled stock with welding guarantee. Welding is insured by manufacturing technology and chemical composition.

4.3.17 With deburring.

4.3.18 With individual strip test for mechanical properties of Rolled stock made from grade 20.

4.3.19 Rolled stock as per chemical composition.

4.4 Marking of rolled stock — as per GOST 7566.

4.4.1 Transportation marking — as per GOST 14192.

4.5 Packing, formation of packs (stacking) and tying of rolled stock - as per GOST 7566.

4.5.1 Packing of rolled stock for extreme northern region and similar areas — as per GOST 15846.

4.5.2 Rolled stock descaled by pickling method, should be lubricated from both sides with neutral or non-neutral oil with the addition of inhibitor.

5 ACCEPTANCE RULES

5.1 General requirements for acceptance of Rolled stock — as per GOST 7566.

5.2 Rolled stock is supplied in batches.

Batch should consist of sheets, rolls and strips of same grade of steel, same dimension or thickness, similar heat treatment mode. — For heat-treated rolled stock, and for ingot and YHPC — from the same ladle-melt.

In the batches from the rolling mill of continuous pouring, difference in mass fraction of carbon in steel should not exceed 0.04 %, and mass fraction of manganese should be — 0.15 %.

Mass of the batch, poured in the mill of continuous pouring, should be 400 t maximum.

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Formation of rolled stock batch of basic version from steel of different melts is permitted.

5.3 Each batch should be accompanied with quality certificate in compliance with GOST 7566.

In conformation with the order, the quality certificate can be filled in two ways:

- Specifying: «Product corresponds to GOST 1577»;
- Indicating the results of every carried out test.

Note — In the absence of type of document on quality in the supply order, the document is drawn up with the discretion of the manufacturer.

5.4 Rolled stock is subjected to acceptance test.

5.5 For checking the quality, the following are selected from a batch:

- 1) For chemical analysis — sample as per GOST 7566. The manufacturer carries out the chemical composition test from ladle sample, if necessary — in the finished rolled stock
- 2) For checking the quality of the surface — all sheets, rolls and strips.
- 3) For checking the dimension — two sheets, rolls or strips, in case of individual rolled sheet — two sheets, rolls or strips.
- 4) For checking the shape — Two sheet roll or strip
- 5) For checking the hardness and mechanical properties, macrostructure, for carrying out bend test in cold condition — One sheet, roll or one strip.

While supplying the Rolled stock in heat-treated condition, control sheets are selected from the center of melt. During heat treatment of the Rolled stock in conveyer furnace, control sheets are selected randomly.

Stocks which are manufactured in continuous rolls and which does not require the heat treatment, samples are taken from the external coil of the roll.

5.6 The results of testing of sheet, roll and strip made from steel of the same melt for macrostructure and mechanical properties of batches of Rolled stock of higher thickness also applies for batches of lower thickness

5.7 In case of unsatisfactory results of testing for at least one parameter, repeated test is carried out as per GOST 7566.

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6 TEST PROCEDURES

6.1 Chemical analysis of steel is carried out as per GOST 28473, GOST 22536.0 - GOST 22536.10, GOST 12344 - GOST 12352, GOST 12354, GOST 12357, and GOST 12360 or by other methods, which ensures the accuracy of estimation.

For steel from rolling mill of continuous rolling, difference of mass fraction of carbon and manganese in the batch is established as per the ladle analysis.

6.2 Geometric dimensions and non-flatness are determined with the help of measuring tools as per GOST 26877, GOST 162, GOST 166, GOST 427, GOST 7502 or tools, which are attested as per GOST 8.001 or GOST 8.326.

The thickness of the rolled stock is measured at a distance of not less than 100 mm from the face and 40 mm from the edge.

6.3 Sample selection for mechanical testing is as per table 3 and technological testing is carried out as per GOST 7564.

Sample selection for mechanical testing is as per table 5 and 6 is carried out in compliance with appendix 2.

6.4 Surface quality is visually inspected. Absence of spills (folding) is checked by inspection of the face and the edge without the usage of magnifying glass. It is permitted to use devices of type ИЛТ-10HK or other devices of similar class. In case of detection of spills, the rolled stock quality is checked additionally by removal of chips. Doubling of chips is the sign of non-uniformity of the metal.

It is permitted to check the absence of spills after cutting/slitting at the customers end.

6.5 From every selected sheet, roll or strip for testing, the following are selected:

For tensile test and bend test — one specimen each;

For impact bend test — Two specimens from rolled stock of thickness 5 mm and above;

For checking the macrostructure — One cross template of length 250 mm from the middle part of the rolled stock width;

For hardness testing — 2 specimens: one from the corner, from the middle part of the rolled stock width;

For checking the depth of decarbonized layer — From the corner of rolled stock width.

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6.6 Tensile test is carried out as per GOST 1497.

Specimen for testing the mechanical properties of rolled wide strip (see table 3), supplied without heat treatment, is taken from normalized billet of thickness 25 mm. In case of strip thickness less than 25 mm, normalization is carried out on the billet, equal to the thickness of the strip.

6.7 Specimen for tensile test and impact strength (see table 5 and 6) is cut from heat-treated billet of size, as specified by the customer.

6.8 Bend test is carried out as per GOST 14019.

6.9 Recommended regime of heat treatment of billet for carrying out test for mechanical properties (see table 5 and 6) is given in appendix 3.

6.10 Impact bend test is carried out as per GOST 9454 on specimens of type 1, 2, 3 and 11.

Regime for heat treatment of rolled billet made from rolled grade for determining the impact strength at temperature minus 20°C, minus 40°C or minus 50°C is established as per the agreement between the customer and manufacturer.

6.11 Hardness is determined as per GOST 9012.

6.12 Macrostructure inspection is carried out by pickling method as per GOST 10243. The manufacturer can guarantee the macrostructure without carrying out the inspection.

Methods and scales for inspecting the macrostructure of rolled stock with thickness more than 10 mm are established as per the agreement between the customer and supplier.

6.13 Determination of depth of decarbonizing layer is carried as per GOST 1763.

6.14 Ultrasonic inspection is carried out as per GOST 22727.

6.15 For inspecting the macro structure, mechanical properties, hardness and decarbonizing layer, it is permitted to use non-destructive and statistical methods of inspection as per the procedures, approved in established order.

In technically valid cases, as per the requirement of the customer, inspection of mechanical properties as per GOST 1497 and GOST 9454 is carried out.

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TRANSPORTATION and STORAGE

7.1 Transportation and storage — as per GOST 7566.

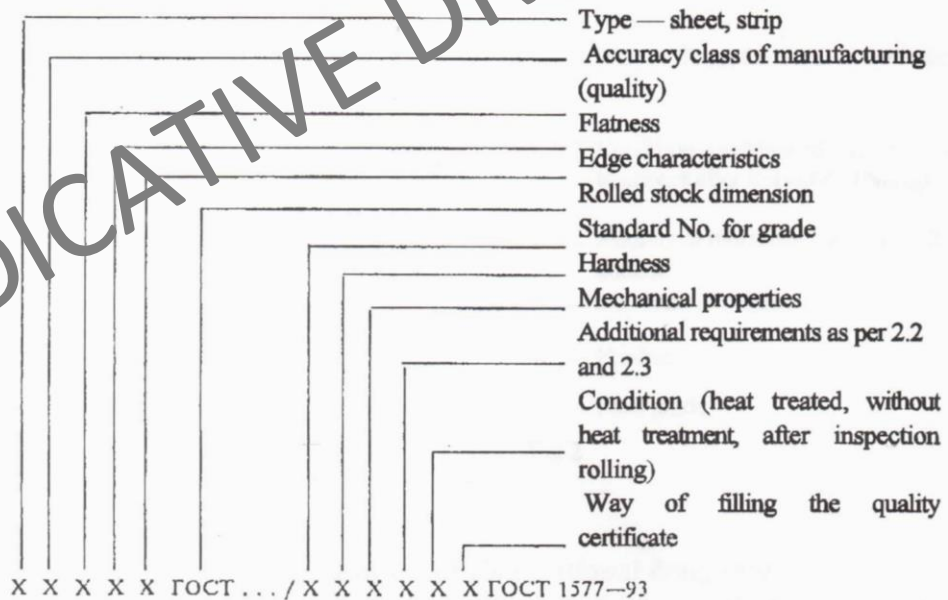
7.2 Rolled stock are transported in all types of transport vehicle in compliance with the rules of transportation of goods, in force for the particular type of vehicle.

7.3 While transporting by railways, shipment type — in individual wagons.

Loading, fastening and arrangement of rolled stock should be in compliance with the technical requirements of loading and fastening of goods, approved by the transport ministry and as per GOST 22235.

**APPENDIX 1
(Compulsory)**

CONVENTIONAL DESIGNATION OF ROLLED STOCK



Drawing 1

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In the design document, it is permitted to give examples of Conventional designation in compliance with the schematic table, given in table 2. Amount of information, which is given in the designer document, can be shortened.

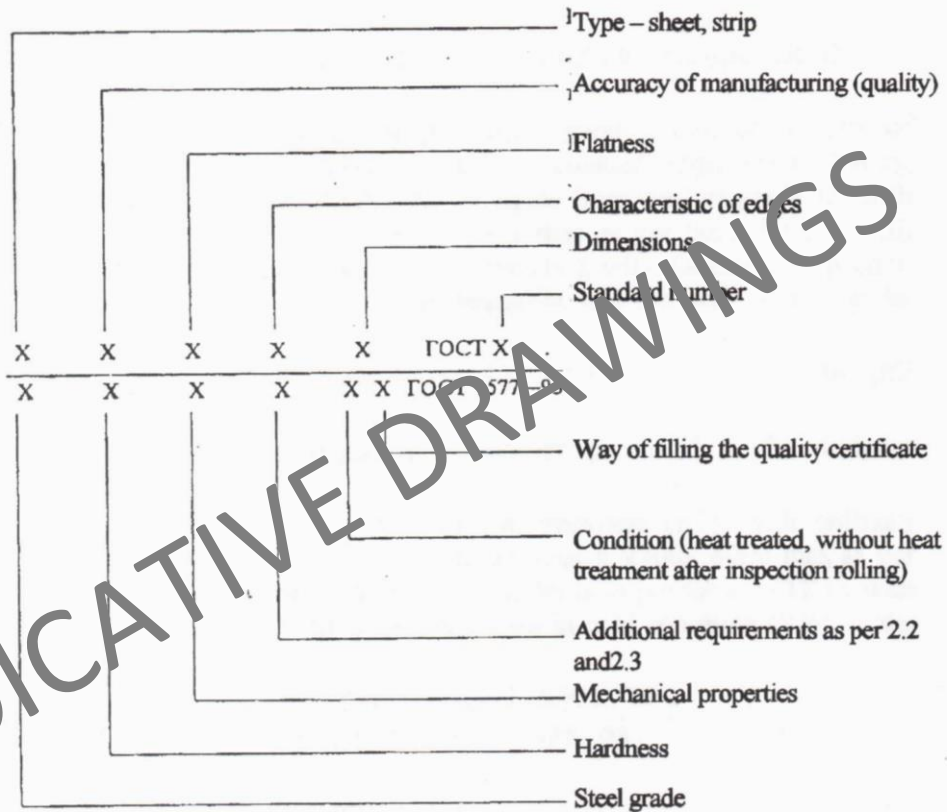


Fig 2

Example of Conventional designation

Rolled thick sheet, ordinary quality for thickness (BT), ordinary quality of flatness (ПН), with trimmed edges (O), of dimensions 6 x 700 x 6000 мм as per GOST 1993—74, made from steel grade 20, with hardness as per (TB1) mechanical properties as per table 3 (M1), with bend test in cold-condition (КИ), in heat treated condition (ТО), with way of filling the quality certificate - ДК1:

Sheet *BT-ПН-О-6 x 700 x 6000 GOST 1993-74 / 20-TB1-M1—КИ-ТО-ДК1 GOST 1577-93*

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

Rolled thick sheet, ordinary quality for thickness (БТ), ordinary quality of flatness (ПН), with trimmed edges (О), of dimensions 6 x 700 x 6000 mm as per GOST 19903-74, made from steel grade 08, with hardness as per table 2 for annealed or high-tempered stock (ТВ2), with mechanical properties as per table 3 for annealed or high-tempered stock (М2), without heat-treatment, with way of filling the quality certificate - ДК1:

Sheet БТ-ПН-О-6 x 700 x 6000 GOST 19903-74 / 08-ТВ2-М2-ДК1 GOST 1577-93

Rolled wide strip, of non-standard length (НД), good (improved) quality of flatness (ПУ), with rib curvature of class A, with untrimmed edges (НО), having dimension 6 x 700 X 6000 mm as per GOST 82-70, made from steel of grade 35, with hardness as per table 2 (ТВ1), with mechanical properties as per table 3 (М3) with guarantee of decarbonization not more than 2 % to side (1С), with ultrasonic inspection of uniformity of class 2 (2УЗК), without heat treatment and the way of filling the quality certificate - ДК2:

Strip НД-ПУ-А-НО-6 x 700 x 6000 GOST 82-70 / 35-ТВ1-М3-1С-2УЗК-ДК2 GOST 1577-93

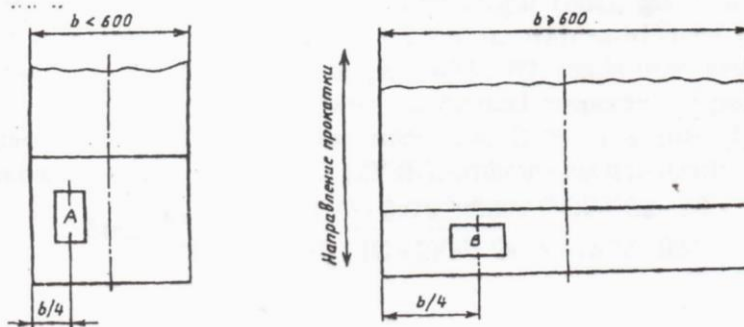
Examples of conventional designation, which are permitted in the designer documents:

Rolled thick sheet with ordinary accuracy on thickness (БТ), with ordinary flatness (ПН), with trimmed edges (О), having dimensions 6 x 700 x 6000 mm as per GOST 19903-74, made from steel of grade 20, with hardness as per table 2 (ТВ1), with mechanical properties as per table 3 (М1) with bend test in cold condition (КН), in the heat-treated condition (ТО):

Strip БТ - ПН - О - 6x700x6000 GOST 19903 - 74
20 - ТВ1 - М1 - КН - ТО GOST 1577 - 93

APPENDIX 2
(Compulsory)

DIAGRAM OF SAMPLE SELECTION FOR THE INSPECTION OF MECHANICAL PROPERTIES, AS GIVEN IN TABLE 5 AND 6 OF THIS DOCUMENT



b - width of the rolled stock; A and B - Place of sample selection

Figure 1.

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Type of testing	Thickne ss, mm	Position of the longitudinal axis of the specimen with respect to the roll direction		Position of the surface with respect to the specimen, mm
		Minimu m 600 mm	More than or equal to 600 mm	
For elongation	Less than or equal to 30	Fraction	Lateral side	
	More than 30			
For impact bend test (vertical cutting to the surface to be rolled)	More than 30	Fraction	Fraction	

INDICATIVE DRAWINGS

*For rolled stock of thickness 5—10 mm, width of the specimen is equal to thickness of the stock, Height — 10 mm.

For rolled stock of thickness more than 30 mm, the specimens cut at a distance of ¼ of the rolled stock thickness as per the agreement between the customer and the manufacturer.

Rolled wide strip, of non-standard length (HД), good (improved) quality of flatness (ПУ), with rib curvature of class A, with untrimmed edges (HO), having dimension 6 x 700 X 6000 mm as per GOST 82, made from steel of grade 35, with hardness as per table 2 (TB1), with mechanical properties as per table 5 (M3) with guarantee of decarbonization not more than 2 % in a side (1C), with ultrasonic inspection of uniformity of class 2 (2У3К), without heat treatment:

Strip HД - ПУ - А - HO - 6x700x6000 GOST 82 - 70
 35 - TB1 - M3 - 1C - 2У3 GOST 1577 - 93

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APPENDIX 3
(Reference)

BILLET HEAT TREATMENT MODE FOR INSPECTION OF MECHANICAL PROPERTIES, SPECIFIED IN TABLES 5 AND 6 OF THIS STANDARD

Table 1

Steel grade	Heat treatment regime, degree centigrade			
	Normalization	Hardening		Tempering, Cooling in air
		In water	In oil	
20	830-910	860-890	—	540-680
25	830-910	860-890	—	
30	870-900	850-880	—	
35	860-890	840-870	850-880	
40	850-880	830-860	840-870	
45	840-870	820-850	830-860	
50	835-865	810-840	820-850	
55	830-860	805-835	815-845	
60	820-850	800-830	810-840	
30X	860-900	840-870	850-880	
38XA	845-885	825-855	835-865	
40X	840-880	820-850	830-860	

INDICATIVE DRAWINGS

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GOST 1577-93

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OKC 77.140.50

B33

OKII 09 8100

Key words: Rolling, Mechanical properties, Quality of surface, Acceptance riles, Test methods.

INDICATIVE DRAWINGS

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