COLD-ROLLED TAPE

FROM STEEL OF GRADE 60C2A

TY 14-550-6-94- Ш

The present specification pertains to cold-rolled tape made out of steel of grades 60C2A, 60C2A-Ш, meant for the manufacture of springs and other items.

Designation of tape made out of steel of grade 60C2A of increased accuracy on thickness, normal accuracy on width, dark with trimmed edges, cold-hardened ordinary quality, with dimensions 0.7 x 20mm while ordering and in the documentation of other items:

Tape 60C2A-T-H-0.7x20 TY 14-550-6-94

1. TECHNICAL REQUIREMENTS

1.1. The cold-rolled tape should be manufactured in conformity with the present specifications as per the production schedules, approved in the established order.

1.2. The basic parameters and dimensions

1.2.1. The tape should be manufactured as follows:

with thickness 0.2 - 3.0 mm;

with width 15.0 - 240.0 mm.

Maximum deviations on thickness and on width of tape should conform to GOST 2283-79;

as per the accuracy of manufacturing

on thickness:

normal accuracy

increased accuracy – Т

on width:

normal accuracy

increased accuracy – Ш

as per the appearance of surface

annealed tape:

- bright - С;
- bright with temper colour – Ц;
- dark;

cold-hardened tape:

- bright – С;
- dark;

as per the appearance of edges

- with trimmed edges;
- with untrimmed edges – HO;

as per the type of treatment

- annealed, ordinary quality;
- cold-hardened, ordinary quality – H;

as per microstructure

- with out inspection of microstructure.

1.3. Characteristics

1.3.1. The tape should be manufactured from steel of grades 60C2A with chemical composition as per GOST 14959-79 and 60C2A-Ш with chemical composition, given in Table 1.

Table 1

Steel grade	Mass fraction of elements							
	Carbon	Manganese	Silicon	Phosphorus	Sulfur	Copper	Nickel	Chromium
				Not more than				
60C2A-Ш	0.58–0.63	0.60–0.90	1.6–2.0	0.020	0.015	0.25	0.25	0.30

1.3.2. Ultimate break strength, δ_B should be:

- for annealed tape not more than 880 N/mm^2 /90 kgf/mm^2/,
- for cold-hardened tape – 780-1180 N/mm^2 /80-120 kgf/mm^2/,
- relative elongation, δ_4 for annealed tape should not be less than 8%.

1.3.3. Depth of unilateral decarburization of tape should conform to GOST 2283-79.

1.3.4. There should not be rolling scabs, rolled-in scales, rolled-in metallic particles, surface tears and rusts on the surface of tape. Presence of individual scabs, as well as separate fine scratches, scoring marks, impressions, ripple marks is permitted, provided the value of which does not exceed the following:

- for bright and bright tape with temper colours – half of maximum deviations on thickness;
- for dark tape – maximum deviation on thickness.

1.3.5. Bright tape should have the surface of metallic colour from light-grey to dark-grey colour.

On bright tape with temper colours, oxidized surface with non-uniform temper colours of different shades.

The surface colour of dark tape is not specified. On the surface of dark tape, spots of contamination are permitted.

1.3.6. On the trimmed tape, ragged edge and notches, having depth more than half of maximum deviation along width and burrs – more than the maximum deviation along the thickness of tape of normal accuracy are not permitted.

1.3.7. On the untrimmed tape, ragged edge having depth more than the maximum deviation along the width of tape is not permitted.

1.3.8. Ply separation of tape is not permitted.

1.3.9. Sickle-shape of trimmed tape should conform to GOST 2283-79.

1.3.10. Other technical requirements -as per GOST 2283-79.

1.3.11. For steel of grade 60C2A-Ш, the purity of steel on non-metallic inclusions should conform to the norms, specified in Tab. 2.

Table 2

Type of non-metallic inclusions	Permissible point, max	
	average	maximum
Line-type oxides - OC	1.5	2.0

Dotted-type oxides - OT	1.5	2.0

Continuation of Table 2

Type of non-metallic inclusions	Permissible point, max	
	average	maximum
Fragile silicate - CX	2.0	2.5
Ductile silicate - СП	2.0	2.5
Non-deforming silicate – СН	2.0	2.5
Sulphide - С	2.0	2.5

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TECHNICAL SPECIFICATIONS FOR ARTICLE PARTS

520.TY1

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Present technical specifications pertain to manufacture and acceptance of parts and assembly units of articles, as well as for replacement of materials.

1. GENERAL REQUIREMENTS

1.1 Parts should comply with existing design documentation and present technical specifications (TY).

1.2 Present TY is obligatory for parts and assembly units, in drawings, which have reference to 60.018TY and 432.И6-1.

1.3 While manufacturing parts and Assembly units with thermal cutting, welding, soldering, factory instructions approved by chief designer and representative of customer may be followed.

1.4 Manufacturing and usage of seals, glues, lubrication, zinc white pigment for sealing of joints, as well as chemical materials, specified in design documents, to be carried out as per technical instructions of factory-manufacturer.

1.5 Control of profile and contour of parts may be carried out by any method.

1.6 All parts and assembly units should be thoroughly cleaned from dirt, dust, sand, scales, cuttings and other foreign particles before assembly.

1.7 All threaded joints should be tightened with wrenches, specified in technological process, and locked in compliance with requirements of design documentation.

1.8 Placing of wires during locking of threaded joints should prevent their self-unscrewing.

1.9 Lugs of locking washers should be bent, so that they prevent self-unscrewing of fixing parts.

1.10 It is necessary to lubricate with thin layer of plastic lubricant used on article, thread and clean surface of bolts, nuts, rod, axial, shafts, tie rod, coupling and other, before assembly.

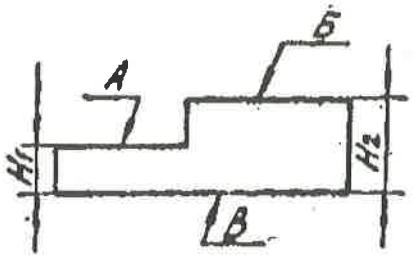
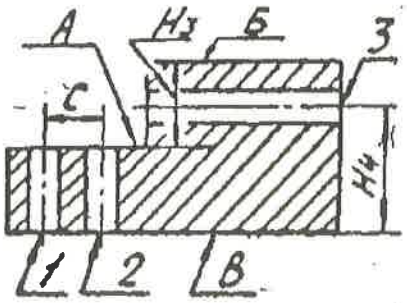
2. REQUIREMENTS FOR MACHINING OF PARTS

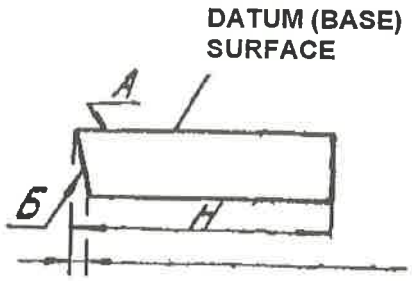
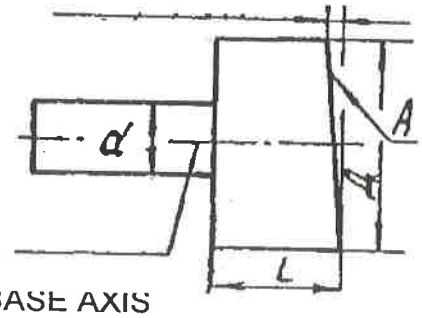
2.1. Surface of parts should not have sharp edges, burrs, and scratches.

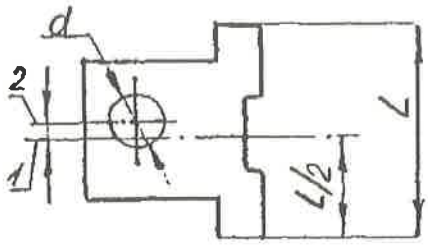
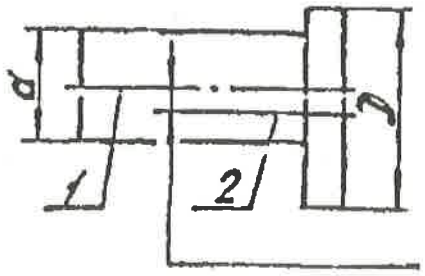
2.2. Limit deviations of surfaces, if they are not specified in drawings or in technical specifications for article, determine as per

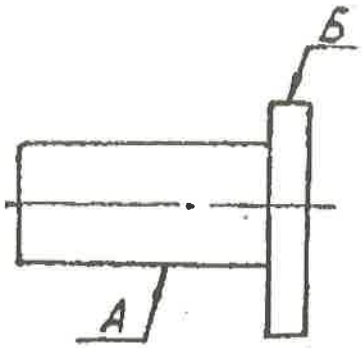
table 1.

Table 1

Term	Drawing	Determination
Deviation from parallelism		Deviation from parallelism of surface A relative to surface B should be with in tolerance range on dimensions H_1. Deviation from parallelism of surface Б relative to surface B should be with in tolerance range on dimensions H_2.
		Deviation from parallelism of surface A relative to surface Б should be with in tolerance range on dimensions H_3. Deviation of parallelism of axis 1 relative to axis 2 should be with in tolerance range on dimension C. Deviation from parallelism of axis 3 relative to surface B should be with in tolerance range on dimension H_4.

Deviation from perpendicularity	 DEVIATION FROM PERPENDICULARITY	Deviation from perpendicularity of surface Б relative to Surface A, should be with in tolerance range on dimension H.
End play	END PLAY  BASE AXIS	End play of surface A relative to base axis should be with in tolerance range on dimension L.

Deviation from symmetry	 DEVIATION FROM SYMMETRICITY	Deviation from symmetry of axis 2 relative to axis 1 should be with in tolerance range on dimensions d and L (MMC tolerance).
Deviation from coaxiality	 DEVIATION FROM ALIGNMENT	Deviation from co-axiality of axis 1 relative to axis 2 should be with in half tolerance range on dimensions d and D (MMC tolerance).

Run out		Radial run out of surface Б relative to surface A should be with in doubled tolerance range on coaxiality.

2.3. Limit deviation of shapes of cylindrical surfaces should be with in tolerance range of diameter.

2.4. Dimension determining positions of surface of parts with technological allowance need not be checked.

2.5. Threaded holes to be reamed at angles from 90^0 to 120^0 upto external diameter of threads.

2.6. While making threads by rolling, it is allowed to decrease diameter of unmachined parts of rod upto mean diameter of threads.

2.7. Unspecified limit deviation of chamfer should be as per table 2.

Table 2

In millimeters

Dimension of chamfer	0.3-0.4	0.5-1.0	1.2-3.0	3.5-5.0
Allowed deviation	±0.2	±0.3	±0.5	±1

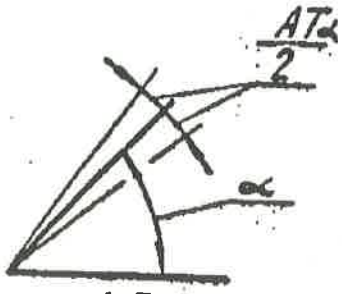
2.8. Permissible limit deviation of radius should be as per table 3.

Table 3

In millimeters

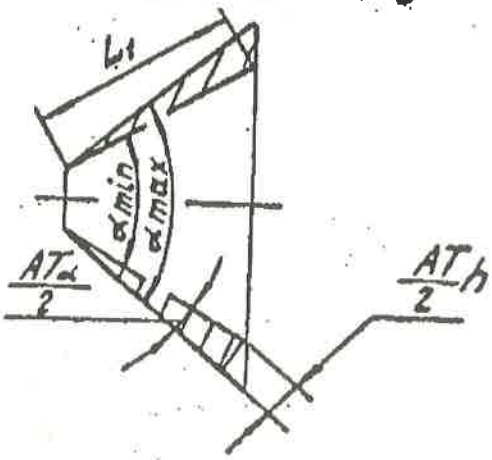
Dimension of radius	0.2	0.3-0.4	0.5 to1.0	Above 1 to 3.0	Above 3 to 6.0	Above 6 to 15	Above 15 to 25	Above 25 to 30	Above 30
permissible deviations	±0.1	±0.2	±0.3	±0.5	±1.0	±2.0	±3.0	±4.0	±5.0

2.9. Unspecified limit deviation of angular dimensions should be as per table 4.



$\alpha \pm \frac{AT_\alpha}{2}$ (SYMMETRICALLY)

WHEN TAPER IS $> 1:3$



WHEN TAPER IS $\leq 1:3$

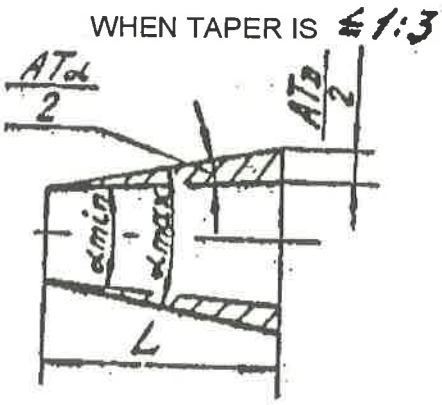


Table 4

Unit of measurement	Range of length L, L_1, mm												
	upto 10	ab.10 to 16	ab. 16 to 25	ab. 25 to	ab. 40	ab. 63 to 100	ab. 100 to 160	ab. 160 to 250	ab. 250 to 400	ab. 400 to 630	ab. 630 to 1000	ab. 1000 to 1600	ab. 1600 to 2500

Limit deviation

AT α°	2°	1°	1°	1°	40'	40'	40'	20'	20'	20'	10'	10'	10'
ATh AT_D mm	Upto 0.5	0.4-0.63	0.5-0.8	0.63-1	0.8-1.25	1-1.6	1.25-2	1.6-2.5	2-3.2	2.5-4	3.2-5	4-6.3	5-8

AT – Tolerance of angle (difference between maximum and minimum limit angles);

$AT\alpha$ – Tolerance angle, expressed in terms of angular units;

ATh – Tolerance angle, expressed with section on perpendicular to side of angle, lying opposite to angle $AT\alpha$ at distance L_1 from vertex of that angle;

AT_D- Tolerance angle of taper, expressed by tolerance for difference of diameters in two normal to axis of cross-section of taper at given distance L between them (is determined as per perpendicular to axis of taper).

Tolerance of taper angles with taper more than 1:3 should be specified depending upon length of generatrix of taper L_1.

Tolerance angle of taper with taper not more than 1:3 should be specified depending upon normal length of taper L.

Note-During taper not more than 1:3 length of taper L approximately taken equal to length of generatrix of L_1 (difference of values not more than 2%).

2.10. Deviation from perpendicularity of axis of threaded holes to supporting surfaces not more than $1^0 30'$ is allowed (MMC tolerance).

2.11. Unspecified limit deviation of linear dimensions in design documentation, except fillet radii and chamfer, should be as per:

Holes as per H14;

Shafts as per h 14;

Others as per $\pm \frac{IT16}{2}$ as per table 5.

Table 5

In millimeters

Nominal dimensions	Limit deviation of dimensions			
	Holes	Shaft	Parts not related to holes or shaft	
	H14	h14	$\pm \frac{IT\ 14}{2}$	$\pm \frac{IT\ 16}{2}$
Less than 1	+0.10 0	0 -0.10	±0.050	±0.07
From 1 to 3	+0.25 0	0 -0.25	±0.125	±0.30
Above 3 to 6	+0.30 0	0 -0.30	±0.150	±0.37
Above 6 to 10	+0.36 0	0 -0.36	±0.180	±0.45
Above10 to18	+0.43 0	0 -0.43	±0.215	±0.55
Above 18 to 30	+0.52 0	0 -0.52	±0.260	±0.65
Above 30 to 50	+0.62 0	0 -0.62	±0.310	±0.80

Above 50 to 80	+0.74 0	0 -0.74	±0.370	±0.95
Above 80 to 120	+0.87 0	0 -0.87	±0.435	±1.10
Above 120 to 180	+1.00 0	0 -1.00	±0.500	±1.25
Above 180 to 250	+1.15 0	0 -1.15	±0.575	±1.45
Above 250 to 315	+1.30 0	0 -1.30	±0.650	±1.60
Above 315 to 400	+1.40 0	0 -1.40	±0.700	±1.80
Above 400 to 500	+1.55 0	0 -1.55	±0.775	±2.00
Above 500 to 630	+1.75 0	0 -1.75	±0.875	±2.20
Above 630 to 800	+2.00 0	0 -2.00	±1.000	±2.50
Above 800 to 1000	+2.30 0	0 -2.30	±1.150	±2.80
Above 1000 to 1250	+2.60 0	0 -2.60	±1.300	±3.30
Above 1250 to 1600	+3.10 0	0 -3.10	±1.550	±3.90
Above 1600 to 2000	+3.70 0	0 -3.70	±1.850	±4.60
Above 2000 to 2500	+4.40 0	0 -4.40	±2.200	±5.50

Above 2500 to 3150	+5.40 0	0 -5.40	±2.700	±6.75

2.12 Changing from one surface to another is carried out as per radius with tool (fig. 1а, б). Dimensions are to be ensured by tool.

2.13. Taper angle in holes with drill bit, reamer or other tools need not be checked (fig. $1_в$). Dimensions are to be ensured by tool.

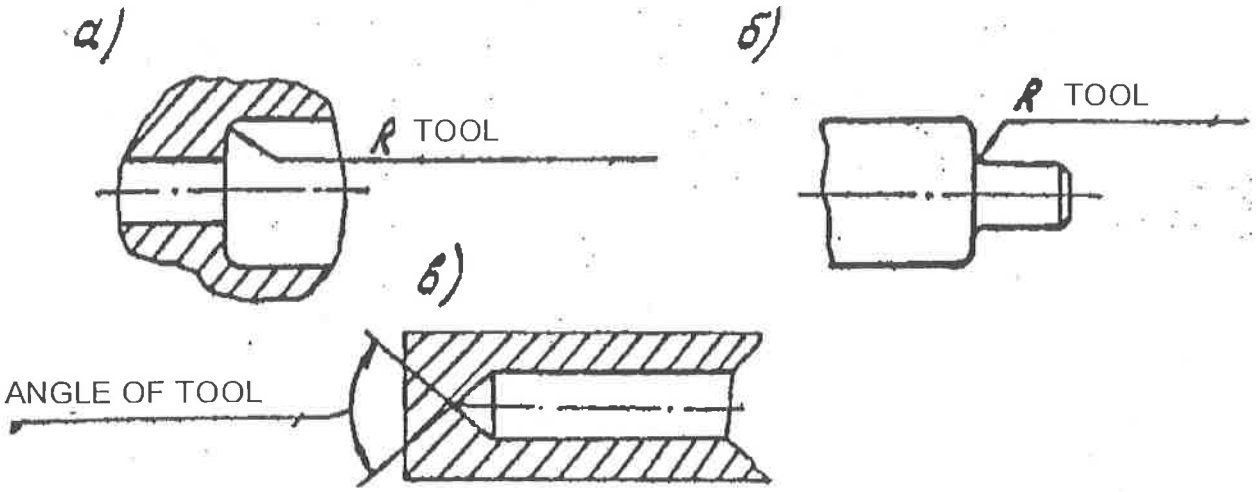


FIGURE 1

2.14. Blunting is carried out on external and internal angles of radii or by chamfering:

for external angles 0.2-0.5 mm;

for internal angles not more than 0.5 mm.

2.15. In holes surface finishing is as per 14 and lower, carried out by drilling, it is allowed to decrease diameters for values, equal to the half of tolerance range of surface finishing 12 for these diameters, except 172.54.003сб-3.

2.16. it is allowed to make standard bolts, screws and studs with tolerance range 6h and 8h, in place of 6g and 8g and in case of necessity, it is allowed to measure zinc plating surface, during assembly.

2.17. While making threads by rolling , transition radius from cylindrical part to thread and chamfer on rod after rolling need not be checked.

2.18. Displacement of marks on parts with left threading, carried out as per GOST 2904-91, need not be checked.

2.19. Non-standard nuts, heads of non-standard bolts and screws should be manufactured at level of accuracy B as per GOST 1759.1-82, if there are no other specifications in drawing.

3. REQUIREMENTS FOR PARTS, MANUFACTURED BY METHODS OF COLD STAMPING

3.1 Defects from raw materials, specified in compliance with standards and technical specifications of these materials are allowed on the surface of parts.

3.2 Traces of process of stamping as figures and bulge holes manufactured by extrusion, flanging, shaping and with bending, as well as local pressing and stamping of working surfaces of dies in depth not more than 12 % of actual thickness of parts is allowed on surfaces of parts.

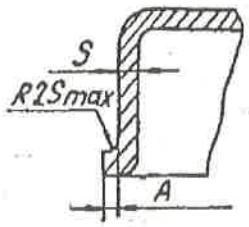
3.3 For parts, subjected to cutting after drawing, on surface of cut along external contour, edges A are allowed to project depending upon the overall dimensions of parts:

upto 150 mm not more than 0.5 mm;

upto 500 mm not more than 0.8 mm;

more than 500 mm not more than 1.2 mm;

At transition radii not more than 1.5 mm.



3.4 Projecting burrs of plane not more than 20 % thickness of parts, but not more than 1 mm, except specified in drawings on stamping parts.

3.5 On surface of cutting of parts from sheet material, draft, shrinkage of edges, double chips are allowed.

3.6 Dimensions, unspecified tolerances, given for design of tool and on parts need not be checked.

3.7 Decreasing of thickness of sheet above minus tolerance by 0.3 mm for thickness of 6mm and by 0.4 mm for thickness 8 mm and more are allowed during stamping thick sheet parts.

3.8 Other requirements as per OST 3-4343-87.

4. REQUIREMENTS FOR PARTS MANUFACTURED BY METHODS OF DIE FORGING

4.1 Permissible deviation for rough dimensions of parts as per GOST 7505-89.

4.2 Drafts not more than 7^0.

4.3 Unspecified fillet radii not more than 3 mm.

4.4 Local defects such as dents from scaling, burrs, taper cutting etc, as well as complete cutting or finishing defects on condition that dimensions of forging remain with in tolerance range, on un-machined surfaces of forging.

4.5 Defects specified in standards or technical specifications on base material are allowed on un-machined surfaces of parts.

4.6 Thinning of cross section, while removing dents not more than 2 % above lower deviation is allowed on machined surfaces of parts.

4.7 On parts, manufactured from rod or sheets by the method of cutting on shear, drafts not more than 7^0 and folds are allowed.

4.8 Other technical requirements as per GOST 8479-70 and GOST 7505-89.

4.9 On parts, manufactured from rod or sheet by the method of bending, following are allowed:

- Thinning or ovality of cross section in place of bending not more than 10%;
- Occasional dents and folds at surfaces of bends.

5. REQUIREMENTS FOR CASTING

5.1 Requirements:

- For structural steel casting as per 172.TY4;
- For castings from special steel casting as per 172.TY5;
- For ferrous casting as per 172.TY6;
- For non-ferrous casting as per 172.TY7;
- For steel castings by investment casting as per 172.TY10.

Above specified technical specifications are obligatory for parts in drawings, which have reference to 432.TY4, 432.TY5, 432.TY6, 432.TY7, and 432.TY10.

5.2 While manufacturing parts from antifriction cast-iron of grade АЧС-1 GOST 1585-85, hardness should be 180-240 HB.

6. REQUIREMENTS FOR MATERIALS AND ALTERNATE-MATERIALS

6.1 It is allowed to replace sheets with thickness 3.9 mm GOST 16523-97 of sheets with thickness 4 mm GOST 1577-93 with same grade of steel.

6.2 For all parts, which are stipulated in working drawings are manufactured from thin-sheet steel grade 08кп and 10кп GOST 16523-97, it is allowed to manufacture from steel 08пс and 10пс GOST 16523-97 and from 08кп and 08пс GOST 9045-93.

6.3 While manufacturing parts from rolled stock as per GOST 16523-97 of thickness from 2 to 3.9 mm, it is allowed to use rolled stock of III rd group of finished surface.

6.4 For manufacturing parts from low alloy steel. Steel 09Г2 GOST 19281-89, thickness higher than 5 mm, it is allowed to use steel from 6 to 12 categories.

It is allowed to use steel 09Г2Д GOST 19281-89 in place of steel 09Г2 of same category.

6.5 For all parts, which are stipulated in working drawings are manufactured from angular rolled stock of grade Ст3сп and Ст3кп GOST 380-94, it is allowed to manufacture from angular rolled stock of grades 09Г2 and 09Г2Д as per GOST 19281-89 of category 2 for rolled stock thickness of 4 mm and category 6 and 12 with thickness of 5 mm and higher and from angular rolled stock of type Ст3сп and 09Г2 as per ТУ 14-1-3023-80; but for parts from angular rolled stock grades 09Г2 and 09Г2Д as per GOST 19281-89, it is allowed to manufacture from angular rolled stock Ст3пс, Ст3сп and Ст3кп as per GOST 380-94 and from angular rolled stock of grades Ст3сп and 09Г2 as per ТУ 14-1-3023-80, except 175.64.093-1.

6.6 For all parts, which are stipulated in working drawings, are manufactured from aluminum alloy sheet grade Амг6БМ GOST 21631-76, it is allowed to manufacture from aluminum alloy sheet Амг6М GOST 21631-76 for all parts.

6.7 Parts, which are manufactured from copper grades М3 GOST 859-78 of all types of rolled stock, it is allowed to manufacture from copper grade М1 and М2 GOST 859-78.

6.8 In assembly units and parts, where hot tinning and soldering with solder ПОССу-30-2 or ПОССу -40-2 is carried out, it is allowed to use solder grade ПОС-30 GOST 21930-76 or GOST 21931-76.

6.9 In place of solder ЛК62-0.5 and ЛО60-1, it is allowed to use soldering grade Л63 GOST 16130-90.

6.10 Bolts, screws and studs, of strength class 4.6 and screws with strength class 8, may be manufactured from steel grade 20пс GOST 10702-78, as well as steel grades 15 and 20 as per TY 3-80-80, during this for bolts, screws and studs strength class 5.8 is permitted, and for steel 40 GOST 1050-88 with specifications in accompanied documentation of strength class as per basic documentation.

6.11 Bolt M6x12.46.016 GOST 7798-70; Bolts M6-6gx12.66.016, M6-6gx14.66.016, M6-6gx16.66.016, M6-6gx10.66.016, 3M6-6gx10.66.016, 3M6-6gx12.66.016, 3M6-6gx16.66.016 GOST 7805-70 is allowed to manufactured from steel 40X GOST 10702-78 with heat treatment, providing strength class 6.6 GOST 1759.4-87 (heat treatment of bolts-strength class 8.8 is allowed).

6.12 Bolts M6-6gx14.66.016, M6-6gx16.66.016, M6-6gx10.66.016, 3M6-6gx10.66.016, 3M6-6gx12.66.016, 3M6-6gx16.66.016 GOST 7805-70 is allowed to manufactured as per GOST 7798-70 from steel 40X GOST 10702-78 with heat treatment, providing strength class 6.6 GOST 1759.4-87 (heat treatment of bolts-strength class 8.8 is allowed).

6.13 All Bolts and screws with designated strength class 8.8, except bolts, entering into groups 40, 43, 46, 64, it is allowed to manufacture from steel 35X and 40X GOST 4543-71 and by cold upsetting from steel 35X and 40X GOST 10702-78.

6.14 Asbestos board grade КАОН-1 GOST 2850-95, used for packing, to be ordered without markings of industrial cloth and straight lines of longitudinal knurling due to turning of drum.

6.15 It is allowed to manufacture screws GOST 17473-80 of strength class 4.6 together with screws GOST 1491-80 of strength class 4.6 except bolts M3-6gx6.46.016, M6-6gx18.46.016.

6.16 Bolts of GOST 7808-70, in designation of which shows strength class 6.6, is allowed to manufacture from steel 40X GOST 10702-78 with strength class 8.8 or 6.6.

6.17 Operating drawings, which are stipulated in working drawing are manufactured from thin sheet rolling grade ПТК of TY 14-11-262-89, is allowed to manufacture from steel grade 10кп of any group GOST 16523-97 for all parts.

6.18 Bolt as per GOST 7798-70 is allowed to manufacture from high forging in head not more than 1 mm, with diameter D≤0.8S.

6.19 Parts with which are stipulated in working drawing are manufactured from ribbon grade Y7A GOST 2283-79, is allowed to manufacture from the same tape of grades Y8A GOST 2283-79.

6.20 For all parts, which are stipulated in working drawing are manufactured from aluminum sheets and table grade АД1, АД0 GOST 4784-74, is allowed to manufacture from aluminum sheets and plate grades A5, A6, A7 as per GOST 11069-74.

6.21 For all parts, which are stipulated in working drawings are manufactured from rolling with quality surface of group Б GOST 1051-73, is allowed to manufacture from same rolling with quality of surface Group B GOST 1051-73.

6.22 it is allowed to use white lead as per instructions АДК 25064.00028 in place of whiting lead hard removing МА-011-1 GOST 482-77 for packing connections.

6.23 In place of steel 20ХГНР GOST 4543-71, allowed to use steel grade 20Х2Н4А.

6.24 It is allowed to manufacture and mount bolts GOST 7795-70 and GOST 7796-70, as replaceable.

6.25 It is allowed to use washer of accuracy class A in place of accuracy class C as per GOST 6958-78, GOST 10450-78, GOST 11371-78.

6.26 It is allowed to use bakelite varnish ЛБС-1 TY6-07.455-93 in place of varnish ЛБС-1 GOST 901-78.

6.27 It is allowed to replace nuts М3-6Н.8.40.016 GOST 5927-70 and М4-6Н.8.40.016 GOST 5927-70 to М3-6Н.8.20.016 GOST 5927-70 and М4-6Н.8.20.016 GOST 5927-70.

7. REQUIREMENTS FOR HEAT TREATMENT OF PARTS

7.1 Hardness of heat treatment of parts, if it is not specified in drawings, they are to be checked on non working surfaces, allowances or standard samples, subjecting to heat treatment jointly with parts. During this slot for checking hardness should be:

- on un-machined surfaces of hot forging and casting not less than depth of decarbonised layer;
- on un-machined surfaces of cold stamping – not more than 1.0 mm;
- on un-machined (non operating) surfaces of parts – not more than 0.5 mm.

7.2 On parts, having hardness more than 302 HB ($d_{отп}$ 3.5) is allowed to check their hardness as per HRC, in separate cases for parts with cross section less than 10 mm with hardness 229-285 HB ($d_{отп}$ 4.0-3.6) is allowed to test hardness as per HRA.

7.3 Scope, methods of checking and place of measuring hardness, if this is not specified in drawings of parts, specified in technical documentation.

7.4 Standard bolts with diameter M6, M8, M10 from steel 38XC to be heat-treated till hardness 255-302 HB.

7.5 Measuring hardness of bolts is allowed to produce on face of heads or at end of rod in flush with not more 0.5 mm.

7.6 Mounting screws as per GOST 1478-93 and GOST 1481-84 of strength class 33H from steel 38XC heat treatment is allowed upto hardness 255-302 HB.

8. REQUIREMENTS FOR PARTS MANUFACTURED FROM PIPES FOR PIPE LINES

8.1 Corrosion, cracks, burrs, cuts and other defects are not allowed on surfaces and ends of pipes.

8.2 Ovality of pipe in places of bend not more than 15% is allowed on external diameter.

8.3 Dents with out undercutting from depth not more than 10 % from external diameter is allowed on surface of pipe.

8.4 Corrugation with height 1.5 mm for pipe with diameter not more than 20 mm and height 2 mm for pipe with diameter more than 20 mm are allowed in places of bending pipes.

8.5 Permissible thinning of wall of bended pipe should not exceed following values of primary thickness:

- for pipe from aluminum alloys – 25 %;
- for pipe from steel – 20 %;
- for pipe from copper and copper alloys – 10 %.

8.6 Edges of broken pipes should not have burrs and sharp edges.

8.7 End of pipe should be cut at angle 90' with surface finishing not less than $R_z 160$.

8.8 Expanding pipe should be projected under nipple not less than at 0.5 mm uniformly throughout the contours.

8.9 Internal surface of tank, radiators and pipelines (Pipes, branching pipe and hose connection) should be clean – presence of mechanical impurities in planes is not allowed. During this after blowing pipe with compressed air mechanical parts, visible to naked eyes on white tissue paper should not be present.

Marks of liquid, used during tests for leak tight ness are allowed.

8.10 During assembly of pipe lines with soldering rings with the method of furnace soldering for providing required gap in mating parts calibration of ends of pipes to suit is allowed.

8.11 During furnace soldering, it is allowed to leak, solder on surfaces of soldered parts.

8.12 While manufacturing steel or copper pipes with the use of gas soldering and induction and casehardening is allowed to use in following soldering rings:

- 520.20.001 replace with 54.05.233;
- 520.20.001-01 replace with 54.02.517;
- 520.20.001-02 replace with 54.03.101;
- 520.20.001-04 replace with 54.42.094

Pressing of rings of pipes during assembly is allowed.

8.13 Pipes of air systems are to be thoroughly purge with compressed gas, passed through moist-oil separator and with felted or felt filter.

8.14 Ends of pipes, branch pipes, hole and branch pipes in tanks, radiators, opened in ends of air systems should be protected from damages and getting dirt of polythene film or technological plugs.

Plugs should be carried out in type of thread caps made from metal or plastic, threaded caps or rubber cap. Plugs should be fitted tightly and should not allow entering dust and dirt.

Removing plugs or film is allowed only before connecting

9. REQUIREMENTS FOR SPRINGS

9.1 Surface of spring should not have cracks, under cuts and folds.

9.2 End (non-working) coils of spring should be pressed compressed to operating coils. After loading springs, as mentioned in drawing, residual deformation of it, is not allowed.

9.3 Permissible deviation of external diameter of spring, if they are not mentioned in drawings, should be in limits as mentioned in table 6.

Table 6

In millimeters

External diameter of spring	Upto10 incl	ab.10 to 30 incl	ab.30 to 40 incl	ab.40 to 80 incl.
Permissible deviation	±0.3	±0.5	±0.7	±1

9.4 Permissible deviation number of complete turns ±0.5 turns.

9.5 Thickness end of supporting turn of compressed spring should have not less than 0.15d, and length of arc of machined surface should be not less than 0.75 length of circle of turn.

9.6. All springs, manufactured from wires as per GOST 9389-75, should be subjected to low temperature tempering.

9.7. Dimensions without allowances need not be checked.

9.8. For spring, in drawings of which are not specified gap between supporting and operating turns – specified gap is determined as per formula 0.15 (t-d),

Where t – pitch spring;

d - diameter of wire.

10 REQUIREMENTS FOR PARTS MANUFACTURED FROM NON-METALLIC MATERIALS

10.1 Acceptance and checking of rubber-industrial parts are produced as per TY 005216-99.

10.2 In drawings of rubber parts, in which connections are stipulated with gluing of cold hardening in inclined cut, it is allowed to carryout connection of edges by mating with the methods of vulcanization.

10.3 Presence of de-colorization of ingredients and products on surfaces of rubber mixture and parts.

10.4 Presence of glue layer and rubbers are allowed on rubber-metallic assembly units.

10.5 It is allowed to grind surfaces of parts to suit of mold connection.

10.6 In all before released drawings РТДИ to their republication of dimensions, indicated in drawing without tolerances, execute by tolerances as per table 7.

Table 7

In millimeters

As per overall dimensions (length, width, diameter)		In height and thickness	
Normal dimensions	Tolerance	Nominal dimensions	Tolerance
Till 5.0	±0.3	Till 2.0	±0.3
Above 5.0 to 10.0	±0.5	Above 2.0 to 5.0	±0.5
Above 10.0 to 25.0	±0.6	Above 5.0 to 10.0	±0.8
Above 25.0 to 50.0	±0.8	Above 10.0 to 20.0	±0.7
Above 50.0 to 100.0	±1.0	Above 20.0 to 50.0	±1.0
Above 100.0 to 150.0	±1.5	Above 50.0 to 100.0	±1.5
Above 150.0 to 250.0	±2.0	Above 100.0 to 150.0	±2.0
Above 250.0	±1.0 %	Above 150.0	±1.5%

10.7 Local scaling of rubber on rubber metallic assembly units is allowed to stick with gluing of cold hardening.

10.8 It is allowed to use industrial plate TY 38 105867-90, rubber mixture as per TY 38 0051166-98, to be replaced with same grades of rubbers and plates as per TY 005216-99.

10.9 It is allowed to use industrial plates HO-68-1M TY 005216-99 in place of plates HO-68-1 TY 005216-99.

11. REQUIREMENTS FOR METALLIC AND NON-METALLIC (IN- ORGANIC) COATING

11.1 Requirements for metallic and non-metallic (In-organic) coating should comply with TY-16.

11.2 Technical specifications TY-16 are obligatory for parts and assembly units, in drawings, which have reference to 432.TY3.

11.3 Zinc coating with thickness of 3 microns (013) for bolts as per GOST 17473-80 and GOST 1491-80 with pitch of threads upto 0.45 is replaced with coating of thickness 6 micron (016).

12. REQUIREMENTS FOR SOLDERING EQUIPMENT WITH PIPE LINES

12.1 Soldering equipment (nipples, unions, protractors and others) with pipelines should be done by soldering, grade of which is specified in compliance with drawings.

12.2 Defects type unspecified figures, dents and other defects in permissible limits with state standards of pipes are allowed on the surface of pipeline, subjected to soldering,.

12.3 Gap between fittings and pipe for copper-zinc soldering should be in limits from 0.05 to 0.45 mm (to side), but for solder $ПС_р$ from 0.05 to 0.3 mm.

12.4 checking quality of soldering fitting with pipelines, as well as other requirements of soldering as per existing instructions of cheif welder, upon agreement with chief designer and representative of customer.

13. REQUIREMENTS FOR PARTS OF INNER AND OUTER SHIELDS

13.1 Unspecified limit deviation of dimensions:

Linear ±2 mm;

Angular ± 30';

13.2 It is allowed to increase drafts in holes and slots for ensuring the removal of parts from molds.

13.3 Double images and traces from marking sign with depth not more than 3 mm is allowed during marking molding.

13.4 In holes with diameter, not more than 15 mm, trim the flash from forging in customer-factory.

13.5 Unspecified radii not more than 5 mm.

13.6 It is allowed to round up angles with radius not more than 3 mm

13.7 Dimension, except thickness, given for projecting tool are not subjected for checking.

14. REQUIREMENTS FOR PREMISES AND WORK PLACES

14.1 Premises and operating places where assembly is carried out for parts and air pipelines and heating system, lubricating and cooling systems, hydro-systems and hydro units should be with out dust particles, falling of dirt, abrasive and foreign inclusions.

15. REQUIREMENTS FOR MOUNTING RUBBER-INDUSTRIAL PARTS (РТД)

15.1 Before mounting RIP should be cleaned from possible dirt, dust etc.

15.2 Mounting of RIP in mounting places is carried out with consideration of excluding bends and mechanical damages.

15.3 On mounting with RIP metallic surfaces sharp edges, dents and other mechanical damages are not allowed.

15.4 If while setting in mounting pin of RIP pass through groove, spline, thread it is recommended to use mandrel if necessary.

15.5 Before mounting, RIP and surface friction should be lubricated by lubricant or operating medium for preserving completeness of RIP.

15.6 Repeating setting of demounting ring and collars are not allowed.

15.7 Before assembling threads with parts, through which mounting of ring are carried out, should be lubricated by thin layer of lubricant or operating medium.

15.8 Pressing collar in bay is carried out with the help of fixture by fixing uniformly in all end surfaces of collar. During this should be carefully observe that bend of collar and damages of external rubber layer of collar.

16. REQUIREMENT FOR NAME PLATES

16.1Name plates should be flat, burrs are not allowed

16.2 Image on table should be short. Font as per GOST 2930-62.

16.3 Image should project or sink relative plane of tables.

16.4 It is allowed to obtain image on tables of photochemical methods.

16.5 Image or background should not be cleaned with water, oil and diesel fuels.

16.6 Table around should be covered with colour less varnish.

16.7 Dimension of words, their location and frame executed by guiding with format.

REFERENCE STANDARD DOCUMENTS

Designation of document	Number of sheets on which having reference
GOST 380-94	16
GOST 482-77	18
GOST 859-78	16
GOST 901-78	18
GOST 1050-88	17
GOST 1051-73	18
GOST 1478-93	19
GOST 1481-84	19
GOST 1491-80	17, 25
GOST 1577-93	16
GOST 1585-85	15
GOST 1759.1-82	11
GOST 1759.4-87	17
GOST 2283-79	18
GOST 2850-95	17
GOST 2904-91	10
GOST 2930-62	30
GOST 4543-71	17, 18
GOST 4784-74	18
GOST 5927-70	18
GOST 6958-78	18
GOST 7505-89	14

GOST 7795-70	18
GOST 7796-70	18
GOST 7798-70	17, 18
GOST 7805-70	17
GOST 7808-70	17
GOST 8479-70	14
GOST 9045-93	16
GOST 9389-75	22
GOST 10450-78	18
GOST 10702-78	17
GOST 11069-74	18
GOST 11371-78	18
GOST 16130-90	17
GOST 16523-97	16, 17
GOST 17473-80	17, 25
GOST 19281-89	16
GOST 21631-76	16
GOST 21930-76	16
GOST 21931-76	16
OST 3-4343-87	13
АДК 25064.00028	18
60.018ТУ	2
432.И6-1	2
ТУ3-80-80	17
ТУ6-07-455-93	18
ТУ 14-1-3023-80	16
ТУ 14-11-262-89	17

TY 005216-99	23, 24
TY 38 0051166-98	24
TY 38 105867-90	24

AMENDMENT SHEET

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	Changed ones	Replaced ones	New	Withdrawal ones					
81						188.49-01			

The State Standard of USSR

Cold –rolled tool and spring steel strip

Technical specifications

GOST 2283-79

Official Publication

State Committee of USSR on
Quality control of products and standards

MOSCOW

УДК 669.14-418.2-122.2:006:354 Group B34

THE STATE STANDARD OF USSR

Cold rolled tool and spring steel strip

Technical specification GOST 2283-79

ОКП 12 3100

Period of effect from 01.01.30

Present standard pertains to steel of cold–rolled strip, meant for manufacturing of springs measuring tape and other articles.

(Amended edition, Amendment No.4).

1.CLASSIFICATION AND ASSORTMENT

1.1.Strip is subdivided:
According to the accuracy of the manufacturing
According to the thickness:
Normal accuracy
Increased accuracy-Т
High accuracy-В
According to width:
Normal accuracy
Increased accuracy- Ш
According to the type of the surface
Bright-С
Bright with temper colours-Ц
Dark
According to the form of edges
With trimmed edges.
With untrimmed edges-НО.

According to the form of treatment
Annealed:
Usual quality
Increased quality-ОП
Cold worked:
Usual quality-Н
Increased quality-НП
According to microstructure
Without the control of microstructure
With the microstructure of granular pearlite - ЗП
1.2. Strip is manufactured with dimensions:

Of thickness:0.10, 0.11, 0.12, 0.13, 0.14, 0.15, 0.16, 0.18, 0.20, 0.22, 0.24, 0.25,0.26, 0.28, 0.30, 0.32, 0.34, 0.35, 0.36, 0.40, 0.42, 0.45, 0.50, 0.55, 0.60, 0.63, 0.65,0.70, 0.75, 0.80, 0.85, 0.90,0.95, 1.00, 1.05, 1.10, 1.15, 1.20, 1.25, 1.30, 1.35, 1.40, 1.45, 1.50, 1.55, 1.60, 1.65, 1.70,1.75,1.80, 1.85, 1.90, 1.95, 2.00, 2.10, 2.20, 2.30, 2.40, 2.50, 2.60,2.80, 2.90, 3.00, 3.10, 3.20, 3.40, 3.50, 3.60, 3.80, 4.00;

Of width: 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 28, 30, 32, 34, 35, 36, 38, 40, 42, 45, 48, 50, 52, 55, 60, 63, 65, 70, 75, 80, 85, 90, 100, 110, 118, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 240, 250, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 440, 450, 465 mm.

Width of the strip depending on the thickness of the strip should correspond, as shown in table 1.

Table 1

MM

Thickness of strip	Width of strip	Thickness of strip	Width of strip
From 0.10 to 0.40 inclusively.	4-250	Above 1.00 to 2.00	10-465
Above 0.40 to 0.45 inclusively.	6-250	inclusively.	15-465
Above 0.45 to 0.50 inclusively.	6-300	Above 2.00 to 3.00	20-465
Above 0.50 to 0.65 inclusively.	8-300	inclusively.	
Above 0.65 to 0.85 inclusively.	8-465	Above 3.00 to 4.00	
Above 0.85 to 1.00 inclusively.	9-465	inclusively.	

Note: Strip with a thickness above 2.00 mm with width up to 30 mm and strip with thickness above 3.00 mm with width up to 40 mm is manufactured, according to the agreement of manufacturer with the consumer.

As per agreement of manufacturer with the consumer strip is manufactured with intermediate dimensions on length and width with the maximum deviations for the nearest larger dimension.

1.1, 1.2. **(Amended edition, Amendment No.4).**

1.3. Maximum deviation on the thickness of strip should correspond as shown in table 2.

Table 2

MM

Thickness of strip	Maximum deviations on the thickness of strip with manufacturing accuracy		
	Normal	Increased	High
From 0.10 to 0.15	-0.02	-0.015	-0.01
Above 0.15 to 0.25	-0.03	-0.02	-0.015
Above 0.25 to 0.40	-0.04	-0.03	-0.02
Above 0.40 to 0.70	-0.05	-0.04	-0.03
Above 0.70 to 0.95	-0.07	-0.05	-0.04
Above 0.95 to 1.30	-0.09	-0.06	-0.05
Above 1.30 to 1.70	-0.11	-0.08	-0.06
Above 1.70 to 2.30	-0.13	-0.10	-0.08
Above 2.30 to 3.00	-0.16	-0.12	-0.10
Above 3.00 to 4.00	-0.20	-0.16	-0.12

Note: According to the agreement of the manufacturer with the costumer, strip is manufactured with bilateral (±) maximum deviations according to thickness by maintaining the tolerance range.

1.4. Maximum deviations on the thickness of the strip should corresponds as shown in table 3.

Table 3

Thickness Strip	Maximum deviation on width of strip										
	For trimmed strips with width						For untrimmed strips				
	Up to 100	Above 100 to 300	Above 300	Up to 100	Above 100 to 300	Above 300	Form trimmed roll with width				From untrimmed roll
	Normal accuracy			Increased accuracy			Up to 100	Above 100 to 200	Above 200 to 300	Above 300	
From 0.10 up to 0.63 inclusively.	-0.3	-0.4	-0.5	-0.2	-0.3	-0.4					+ 4 % Nominal width
Above 0.63 to 1.00 inclusively.	-0.4	-0.5	-0.6	-0.3	-0.4	-0.5	+3	+4	+5	+6	
Above 1.00 to 4.00 inclusively.	-0.6	-0.7	-0.8	-0.4	-0.5	-0.6					

Note. According to the agreement of manufacturer with costumer, strip is manufactured with bilateral (±) maximum deviations on width by maintaining tolerance range.

Example of the conventional code.

Strip made of steel of grade У10А, of increased accuracy on thickness and width, bright, with trimmed edges, cold-worked increased quality, with dimensions 0.5 X 30 mm:

Strip У10А – ТШ – С- НП – 0.5 X 30 GOST 2283-79

Strip made of steel of grade У8А , Increased accuracy on thickness, normal accuracy on width, bright, with trimmed edges, cold-work of ordinary quality, with dimensions 2.0 X 30 mm.

Strip У8А – Т- С- Н- 2.0 X 30 GOST 2283 – 79

Also with untrimmed edges:

Strip У8А – Т- С- НО- Н – 2.0 X 30 GOST 2283- 79.

1.3, 1.4. **(Amended edition, Amendment No.4).**

2. TECHNICAL REQUIREMENTS

2.1a. Cold-rolled strip made of tool and spring steel should be manufactured in accordance with the requirements of present standards according to the technological procedure, certified in established order.

(Introduced additionally, Amendment No.2)

2.1. Cold rolled strip should be manufactured from steel of grade:
50 G according to GOST 4543-71;
У7А, У8А , У8ГА, У10А according to GOST 1435-74 (group 5);
60Г, 65Г, 70Г, 85, 50ХФА, 60С2А, 65С2ВА, 70С2ХА according to GOST 14959-79.
9ХФ, 9ХФМ, 13Х, Х6ВФ, according to GOST 5950-73;
Р9 according to ТУ 14-1-3508-82.

For strips made of steel of grade 60С2А deviation is allowed on the carbon contents up to ± 0.02%. Strip made of steel 60С2А was manufactured till 01.01.94. For strip made of carbon tool steel of grade У7А-У10А according to GOST 1435-74 deviation is allowed on the contents of chromium up to plus 0.02 %.

2.2. Mechanical properties of annealed and cold-worked strip of ordinary quality should correspond, as given in table 4.

2.1,2.2. **(Amended edition, Amendments No 4).**

2.2a. Mechanical properties of annealed strip of increased quality (ОП) should correspond as given in table 4a.

Table 4

Grade of steel	Nominal thickness in mm	Ultimate strength σ_B, N/mm^2 (Kgf/mm^2), not more than	Relative elongation δ_4, %, not less than	Ultimate strength σ_B, N/mm^2 (Kgf/mm^2)
		Annealed strip		Cold rolled strip
50Г, 60Г, 65Г, 70Г, У7А, У8А	Up to 1.50 inclusively.	640 (65)	15	740-1180 (75-120)
	Above 1.50	740 (75)	10	
У8ГА, У10А, 85	From 0.10 to 4.00 inclusively.	740 (75)	10	740-1180 (75-120)
9ХФ, 9ХФМ, 13Х		930 (95)	-	-
Р9, Х6ВФ		880 (90)	-	-
50ХФА, 60С2А, 65С2ВА, 70С2ХА		880 (90)	8	780-1180 (80-120)

Cold –rolled strip of increased quality (НП) should be manufactured with deviation for ultimate strength as given in table 4, in batch, not more than:

Table 4a

Grade of steel	Nominal thickness strip, in mm	Ultimate strength σ_B, N/mm^2 (Kgf/mm^2), not more than	Relative elongation δ_4, %, not less than
50Г	Up to 1.50 inclusively.	610 (62)	15
	Above 1.50		13
60Г	Up to 1.50 inclusively.	620 (63)	15
	Above 1.50		12
65Г	Up to 1.50 inclusively.	630 (64)	15
	Above 1.50		11
70Г, У7А, У8А	Above 1.50	640 (65)	10
85, У8ГА	From 0.10 to 4.00 inclusively.	670 (68)	10
У10А		680 (69)	10
50 ХФА		740 (75)	10

150 N/mm^2 (15 Kgf/mm^2) - for strips with thickness up to 0.36 mm inclusively.;

180 N/mm^2 (18 Kgf/mm^2) - for strips with thickness above 0.36 to 1.00 mm inclusively.;

200 N/mm^2 (20 Kgf/mm^2) - for strips with thickness above 1.00 mm.

According to the agreement of manufacturer with the costumer, it is allowed to establish the specific range of values of ultimate strength, taking into account the permitted values of speed pointed out above.

2.2a, 2.2b. **(Introduced additionally, Amendment No.4).**

2.3; 2.4. **(Deleted, Amendment No.3).**

2.5. Strip with the microstructure of the granular pearlite is manufactured according to the requirements of the costumer. If necessary, scale for evaluation of pearlite and numerical score of dispersion of grains of cementite as well as ratio between grains and lamellar pearlite is can be set on the demand of customer.

(Amended edition, Amendment No.4).

2.6. The overall depth of one-sided de-carbonization of the strips should not exceed:

0.01 mm – For strips with thickness from 0.01 to 0.25 mm,
0.02 mm – For strips with thickness above 0.25 to 0.50 mm,
0.04 mm – For strips with thickness above 0.50 to 1.00 mm,
0.06 mm – For strips with thickness above 1.00 to 2.00 mm,
0.08 mm – For strips with thickness above 2.00 to 4.00 mm.

For the overall depth of the de-carbonized layer, the zone of complete de-carbonization (ferrite) plus the zone of partial de-carbonization is accepted.

Note. According to the agreement with the consumer, strip can be manufactured without the de-carbonized layer or with reduced value of de-carbonization in comparison with the specification, and also without checking the depth of de-carbonization.

2.7. **(Deleted, Amendment No.3).**

2.7a. According to the requirements of the consumer, in the strip made of carbon tool steel, temper carbon (free graphite) should be absent.

(Introduced additionally, Amendment No.1)

2.8. Bright strip should have surface of metallic colour, from light gray to dark gray nuances / shades.

The oxidized surface with heterogeneous temper colours of different hues is allowed on the bright strip with temper colours.

The colour of the surface of the dark strip is not regulated. The spots of contamination are allowed on the surface of dark strip.

2.9. On the surface of the strip, there should not be flows, rolled slag, rolled metallic particles, dents and rusts. The presence of single pin holes, and also, separate small scratches, marks, imprints, ripple marks, is allowed, whose value does not exceed:

For bright and bright with temper colours strip- half the maximum deviations on thickness;

For dark strip- maximum deviation on thickness.

2.8, 2.9. **(Amended edition, Amendment No. 4.).**

2.10. The parameter of roughness of surface of bright strip should not be more than Ra 1.25 MKM according to GOST 2789-73.

2.11. On the trimmed strip cracked edges and notches are not allowed, with depth more than half of maximum deviations on width and burrs – more than the maximum deviations on thickness of strip of normal accuracy.

2.12. On the untrimmed strip, cracked edges, having depth more than the maximum deviations on width of the strip are not permitted.

2.13. The exfoliation of strip is not allowed.

2.14. Trimmed strip is manufactured with the crescent shape, not exceeding in the section by 1 m length:

5 mm – For strips with width from 10 to 18 mm inclusively;

4 mm – For strips with width above 18 to 25 mm inclusively;

3 mm – For strips with width above 25 to 50 mm inclusively;

2 mm – For strips with width above 50 mm.

According to the agreement of manufacturer with the consumer, trimmed strips are manufactured with crescent shape, not exceeding by 1m length:

6 mm – For strips with width from 10 to 40 mm inclusively;

2.5 mm – For strips with width above 40.

Strip with width less than 10 mm with the regulated standard on the crescent shape is manufactured according to the agreement of the manufacturer with the consumer.

(Amended edition, Amendment No. 4.).

2.15.According to the requirements of consumer the trimmed strip is manufactured with non-flatness as per norms, set with the consumer.

2.16. Strip should be manufactured in coils with an internal diameter from 200 to 850 mm. Coils of strips should be tightly and evenly wound.

2.17. Strip with thickness 1 mm and more could be supplied in the form of bars, bound in bundles. The length of separate bars in bundle should be from 2 to 3 m. Manufacture of short bars with length from 1 to 2 m, in quantity, which does not exceed 20% of the batch, is allowed.

2.18.The minimum mass of coil is established:

For strips with width up to 80 mm- from the calculation not less than 0.5 kg on 1 m width;

For strips with width above 80 mm- not less than 40 kg.

Minimum mass of coils is given in the reference appendix.

According to the agreement with the consumer, the maximum mass of coil should not exceed 80 kg.

(Amended edition, Amendment No. 2.).

2.19. Coil should consists of one section. The coils of strip, which consists of two sections in quantity, which should not exceed 10% of the batch. The places of winding should be marked.

In the presence of 3-4 single defects on the edges of the strip, value more than specified in point 2.11, according to the agreement with the consumer, it is allowed, not to carry out cutting from the coils of defective sections, under delivery specification provided to the consumer, of additional quantity of strip (from the calculation for each defect 1 m of length). Places of defects should be indicated with paint/colour, padding or by other methods.

(Amended edition, Amendment No. 4.).

3. ACCEPTANCE RULE

3.1a. Acceptance rule according to GOST 7566-81.

(Introduced additionally, Amendment No.4).

3.1. Strips are received in batches.

Batch should consists of strip of same grade of steel, same melt, same dimension, same group of accurate manufacturing, same form of surface and edges, same form of treatment and accompanied by same document about quality, which contains:

Trademark or name and trade mark of manufacturing plant;
Convention code of strip;
Melt number with the indication of the results of chemical analysis of melt;
The result of tests;
The number of coils, bundles (packets) or cargo areas in batches;
Net mass of the batch

According to the agreement with the consumer, batch can consist of coils of two different melts of same grade of steel.

(Amended edition, Amendment No.2).

3.2. For checking of dimensions quality of surface and edges, 5% of coils and bundles of strip is selected, but not less than two coils or bundles from the batch.

3.3. Strip from the batch, checked as per point 3.2, should be selected:

For checking of ultimate strength, relative elongation, depths of de-carbonized layer, microstructure, exfoliation, crescent shape, parameters of surface finish, non-flatness and chemical compositions (if necessary)- 1 coil from batch with mass up to 25 T or 2 coils from the batch with mass above 25 T.

3.2, 3.3. **(Amended edition, Amendment No.4).**

3.4. Repeated testing is carried out in double quantity of coils on at least one of the Indices, while obtaining non- satisfactory results of testing. The results of repeated testing pertains to entire batch.

4. TESTING METHODS.

4.1. The quality of surface and edges of strip should be checked visually without using of magnifying instruments. Carry out the quality control of the surface and edges on 2-5 turns of coils.

If necessary the value of surface defects of coil is determined with the help of profilograph – profilometer according to GOST 19300-86 and other means of measurements, which corresponds to the accuracy according to the normative-technical documentation.

For checking of ultimate strength, relative elongation, depth of the de-carbonized layer, microstructure, exfoliation, crescent shape, parameters of surface finish, non-flatness and chemical composition (if necessary), one sample is cut for each type of tests from each selected coils or bundles according to point 3.3.

(Amended edition, Amendment No.4).

4.2. The parameters of the roughness of surface of coil should be determined with the help of profilograph-profilometer according to GOST 19300-86 and other means of measurements which corresponds to the accuracy.

4.3. Dimensions of strips and the size of defects on the edges of strip should be checked by micrometers GOST 6507-90, GOST 4381-87, Vernier caliper GOST 166-89 and other means of measurements, which corresponds to the accuracy according to normative-technical documentation.

Thickness of strip with trimmed edge and with width 20 mm and less should be measured in the middle of its width, with width more than 20 mm – at a distance not less than 10 mm from the edge.

Thickness of strip with untrimmed edges should be measured at a distance not less than 20 mm from the edge.

4.2, 4.3. **(Amended edition, Amendment No.4).**

4.4. Testing on the tension of strip with thickness less than 3.00 mm should be carried out on the samples of type I or II according to GOST 11701-84.

Testing on strip with thickness 1.7 mm and may be carried out on samples with an initial calculated length l_0 = 80 mm and width b_0 =20 mm.

Strip with thickness 3.0 mm and more, is tested on samples with initial calculated length l_0 = 80 mm and width b_0 =20 mm.

Preparation of samples for tests should be carried out in accordance with GOST 11701-84.

Testing of strip with width less than 20 mm may be carried out on samples with width, which is equal to width of manufactured strip, with initial calculated length l_0 = 4b, where b- width of the manufactured strip.

Samples for testing are cut along the direction of rolling.
(Amended edition, Amendment No. 2,4).

4.5. Control of microstructure of strip, annealed to the granular pearlite, - according to the scale 2, GOST 8233-56.

4.5a. Check on the absence of temper carbon (free graphite) in carbon tool steel should be carried out on longitudinal micro sections at increased magnification 350-400^{X}.

(Introduced additionally, Amendment No. 2).

4.6. The depth of de-carbonized layer of strip should be determined according to GOST 1763- 68.

Selection of magnification during metallo-graphic inspection method should ensure appropriate accuracy for determination of depth of de-carbonized layer.

(Amended edition, Amendment No. 4).

4.7. The exfoliation of strip is revealed by visual inspection of the edges of the strip or with the use of 7^{X} magnification glass and also during its testing for tension. If necessary, for the detection of exfoliation, hot etching of micro sections in 50% aqueous solution of hydrochloric acid at temperature 60-80^{0} C for 10 minutes is applied.

4.8. Crescent shape should be checked with the combination of edges of sample of strip with a length of 1 m in straight line. Measurement is conducted at the place of largest curvature of scale according to GOST 427-75, by feeler gauge ТУ 2- 034-225-87 and by other means of measurements, which corresponds to the accuracy according to the normative technical documentation.

(Amended edition, Amendment No. 4).

4.9. Measurements of non-flatness of strip is made by the method, as per agreement with the consumer.

4.10. The chemical composition of strips of metal is certified in the document on quality by manufacturing plant of metal. If necessary, the chemical composition of metal strip is determined according to GOST 22536.0-87-GOST 22536.12-88, GOST 27809-88, GOST 12344-88, GOST 12345-88, GOST 12346-78, GOST 12347-77, GOST 12348-78, GOST 12349-83, GOST 12350-88, GOST 12351-81, GOST 12352-81, GOST 12353-78, GOST 12354-81, GOST 12355-78 and GOST 20560-81*.

4.11. It is allowed to use the non-destructive methods for inspection of mechanical properties and other physical characteristics according to agreed procedures.

4.12. The weigh of loading cargo areas in batches, and if necessary weighing of coils (bundles) of strip should be carried out on the weighing machines according to GOST 23676-79 or other weighing machines, which ensure error of weighing up to 1%.

(Introduced additionally, Amendment No. 2).

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*From 01. 07.91 taken into action GOST 28473-90.

5. PACKING, MARKING, TRANSPORTATION AND STORAGE

5.1. Each coil or bundle (packet) of strip should be tied up not less than in three places by soft metallic strip or wire according to GOST 3560 —73, GOST 3282 —74 or other technical-normative documentation.

Other methods of fastening of coils, are allowed which ensures the density of winding and reliable anchorage of the coil edges and preservation of shape of coils during the transportation. With anchorage of the coils by spot welding, the weld penetration should not exceed double thickness of strip.

The ends of the coils of the strip with a width of 30 mm and more, spot welding are not allowed according to the requirements of consumer.

(Amended edition, Amendment No.1, 2, 4).

5.2. Strip should be covered with the thin layer of the inhibited lubricant, which prevents strips from corrosion.

Types of the lubricants: mixture ЖКВ and oil И-12А or И –20А according to GOST 20799—88 * (in ratio 1:1), the mixture НГ –203А according to OST 38.01436 —87, and oil И–18А or И-20А (in ratio 1:1), К -17 according to GOST 10877—76 and other forms of lubricants in ratios of the components of lubricants, which ensure protection of corrosion.

(Amended edition, Amendment No. 4).

5.3. The coils of the strip with a thickness of 0.25 mm and less, should be wrapped up by the layer of paper and packed into the wooden boxes of type II according to GOST 18617—83 or other technical-normative documentation, metallic jars, containers according to the technical-normative documentation.

The strip with a thickness of more than 0.25 mm is packed:

During transportation on the pan, prepared according to the technical-normative documentation, the coils are placed by one of the methods:

On the wooden or metallic pans in the stack (packet) with mass to 1.25 T. the coils or the stack of coils should be wrapped up by paper and fastened to the pan “under the lock” not less than with three metallic strips according to GOST 3560 —73 or other technical-normative documentation. Fastening of coils or stack of coils to the pan by the soft metallic wire according to GOST 3282 —74 or other technical-normative documentation is permitted;

On wooden or metallic pans in stack (packets) form having mass up to 6 t, during this the lower coil of stack is packed in paper or film. Stack is fastened to pan “under lock” with minimum three metallic strips according to GOST 3560 —73 or other normative - technical documents. Additionally excluding pan, stack is wound by fourth strip with metallic label.

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*From 01.01.92 effective GOST 20799-75.

Then the stack of rolls are wrapped by paper and substandard metallic sheet or sheet, obtained by welding of substandard of sheets or strips and bound by one metallic strip << under lock>>. Rolls are covered by metallic cover on the top of stack, which is manufactured from substandard sheet or strip and having round form with bent back lobes with height not less than 50 mm, and bound << under the lock >> on lobes by one metallic strips. The packed stack is bound << under the lock>> by two-mutually perpendicular metallic strips to one on which fasten the metallic tag.

Change of packing, which ensures the quality of packing and safety of strips, is permitted.

According to the agreement of manufacturer with the user the mass of stack should not exceed 5 T;

During transportation without the pans of coils, the bundles (packets) of strip should be wrapped up by the layer of paper, then by the layer of polymer film or cloth are fastened by soft metallic strip or by the wire according to GOST 3560—73, GOST 3282 —74 or other technical-normative documentation not less than in three places or in another method, which ensures the safety of packing.

With the mechanized method of packing the strips are packed by one of the following methods:

The coils of strip should be wrapped up by the layer of the paper according to GOST 10396—84 or by another crepe paper according to the technical-normative documentation, equivalent to the protective properties;

Coils must be covered with the demountable inhibited polymeric coating on the technical-normative documentation;

The coils of strip must be wrapped up by the withdrawals of metallic strip. Packing is fixed by welding on entire perimeter of coils;

Coils of the strips should be wrapped by the layer of paper and cloth.

Manufacturer selects the method of packing. The strip with a thickness of more than 0.25 mm is not allowed to pack according to the agreement of manufacturer with the consumer.

The strips with a thickness of 0.25 mm and less can be transported on the pans/pallets.

(Amended edition, Amendment No. 1, 2, 4).

5.3.1. Used as the packing materials:
Wax paper according to GOST 9569 —79;
Two-layered paper packing according to GOST 8828 —89;
Oiled paper according to GOST 8273 —75 and other on the standard technical documents;
Polymeric film according to GOST 10354 —82, GOST 16272 —79 and other on the standard technical documents;
Linen cloth bag / container— according to technical-normative documentation;

Other forms of packing materials on the technical-normative documentation, with exception of cotton and flaxen fabrics, and also stitched rag from the wastages of textile industry.

(Amended edition, Amendment No. 2).

5.4. Strip is transported by the transport of all forms in covered transportation means in accordance with the rules of the transportation of loads, which act in the field of transportation of this form, and with the transportation by rail transport — in accordance with the technical specifications for loading and fastening loads, approved by the Ministry of Railways of USSR.

Consolidation of cargo places into the transport packets must be carried out according to GOST 21650 —76, GOST 24597 —81.

The transportation of the packets of the strip with a mass up to 6 t in the metallic packing is conducted in open transportation means.

The transportation of strip in the universal containers is allowed according to GOST 15102 —75, GOST 20435 —75, GOST 22225 —76.

(Amended edition, Amendment No. 4).

5.5. To each coil, bundle (packet) or cargo should be fastened by label, which indicate:

Trademark or name and the trade mark of manufacturing plant

Conventional code of strip;

The number of batch.

(Amended edition, Amendment No. 2).

5.5a. Transport marking — according to GOST 14192 —77.

(Introduced additionally, Amendment No. 2).

5.6. **(Delete, Amendment No. 2).**

5.7. Storage of strip should correspond to conditions 2 GOST 15150 —69.

(Amended edition, Amendment No. 4).

5.8. The strip, sent for the regions of the extreme north and similar to that regions, should be packed in correspondence with the requirements GOST 15846 —79 and present standard.

(Introduced additionally, Amendment No. 4).

Annexure

Reference

Width of strips, in mm	Minimum mass of coil, in Kg	Width of strip, in mm	Minimum mass of coil, in Kg
4	2.0	28	14.0
5	2.5	30	15.0
6	3.0	32	16.0
7	3.5	34	17.0
8	4.0	35	17.5
9	4.5	36	18.0
10	5.0	38	19.0
12	6.0	40	20.0
14	7.0	42	21.0
15	7.5	45	22.5
16	8.0	48	24.0
17	8.5	50	25.0
18	9.0	52	26.0
20	10.0	55	27.5
21	10.5	60	30.0
22	11.0	63	31.5
23	11.5	65	32.5
24	12.0	70	35.0
25	12.5	75	37.5
26	13.0	80 and more than	40.0

(Introduced additionally, Amendment No. 2).

SUPERSEDE GOST 2283-69, EXCEPT STRIPS FOR MANUAL HACK SAW CUTTING

REFERENCE TO NORMATIVE TECHNICAL DOCUMENTS

Code NTD on which references are given	Point numbers
GOST 166-89	4.3
GOST 427-75	4.8
GOST 1435-74	2.1
GOST 1763-68	4.6
GOST 2789-73	2.10
GOST 3282-74	5.1, 5.3
GOST 3560-73	5.1, 5.3
GOST 4381-87	4.3
GOST 4543-71	2.1
GOST 5950-73	2.1
GOST 6507-90	4.3
GOST 7566-81	3.1a
GOST 8233-56	4.5
GOST 8273-75	5.3.1
GOST 8828-89	5.3.1
GOST 9569-79	5.3.1
GOST 10354-82	5.3.1
GOST 10396-84	5.3
GOST 10877-76	5.2
GOST 11701-84	4.4
GOST 12344-88	4.10
GOST 12345-88	4.10
GOST 12346-78	4.10
GOST 12347-77	4.10
GOST 12348-78	4.10
GOST 12349-83	4.10
GOST 12350-78	4.10
GOST 12351-81	4.10
GOST 12352-81	4.10

Code NTD on which references are given	Point numbers
GOST 12353-78	4.10
GOST 12354-81	4.10
GOST 12355-78	4.10
GOST 14192-77	5.5a
GOST 14959-79	2.1
GOST 15102-75	5.4
GOST 15150-69	5.7
GOST 15846-79	5.8
GOST 16272-79	5.3.1
GOST 18617-83	5.3
GOST 19300-86	4.1, 4.2
GOST 20435-75	5.4
GOST 20560-81	4.10
GOST 20799-88	5.2
GOST 21650-76	5.4
GOST 22225-76	5.4
GOST 22536.0-87	4.10
GOST 22536.1-88	4.10
GOST 22536.2-87	4.10
GOST 22536.3-88	4.10
GOST 22536.4-88	4.10
GOST 22536.5-87	4.10
GOST 22536.6-88	4.10
GOST 22536.7-88	4.10
GOST 22536.8-87	4.10
GOST 22536.9-88	4.10
GOST 22536.10-88	4.10
GOST 22536.11-87	4.10
GOST 22536.12-88	4.10
GOST 23676-79	4.12
GOST 24597-81	5.4
GOST 27809-88	4.10
TU 2- 034- 225-87	4.8
OST 38.01436-87	5.2
TU 14-1-3508-82	2.1

Republished in (September 1990) with Amendment No. 1, 2, 3, 4, certified in November 1981, February 1986, August 1986, June 1990, [IUS 1-82, 5-86, 11-86, 11-90]

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TECHNICAL SPECIFICATIONS FOR ARTICLE PARTS

520.TY1

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Present technical specifications pertain to manufacture and acceptance of parts and assembly units of articles, as well as for replacement of materials.

1. GENERAL REQUIREMENTS

1.1 Parts should comply with existing design documentation and present technical specifications (TY).

1.2 Present TY is obligatory for parts and assembly units, in drawings, which have reference to 60.018TY and 432.И6-1.

1.3 While manufacturing parts and Assembly units with thermal cutting, welding, soldering, factory instructions approved by chief designer and representative of customer may be followed.

1.4 Manufacturing and usage of seals, glues, lubrication, zinc white pigment for sealing of joints, as well as chemical materials, specified in design documents, to be carried out as per technical instructions of factory-manufacturer.

1.5 Control of profile and contour of parts may be carried out by any method.

1.6 All parts and assembly units should be thoroughly cleaned from dirt, dust, sand, scales, cuttings and other foreign particles before assembly.

1.7 All threaded joints should be tightened with wrenches, specified in technological process, and locked in compliance with requirements of design documentation.

1.8 Placing of wires during locking of threaded joints should prevent their self-unscrewing.

1.9 Lugs of locking washers should be bent, so that they prevent self-unscrewing of fixing parts.

1.10 It is necessary to lubricate with thin layer of plastic lubricant used on article, thread and clean surface of bolts, nuts, rod, axial, shafts, tie rod, coupling and other, before assembly.

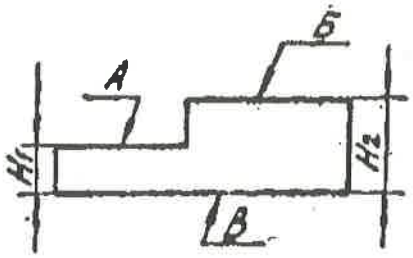
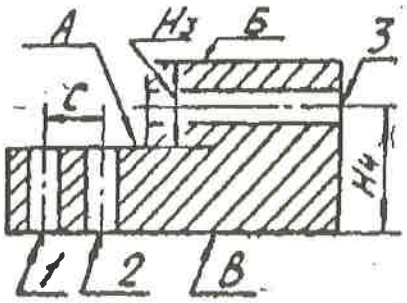
2. REQUIREMENTS FOR MACHINING OF PARTS

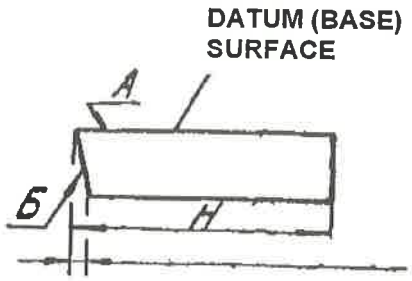
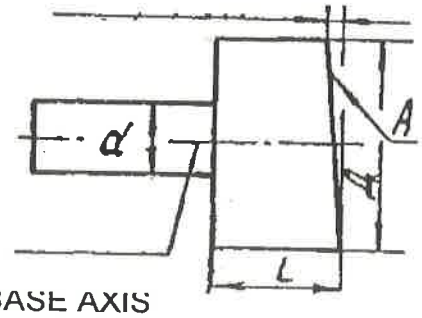
2.1. Surface of parts should not have sharp edges, burrs, and scratches.

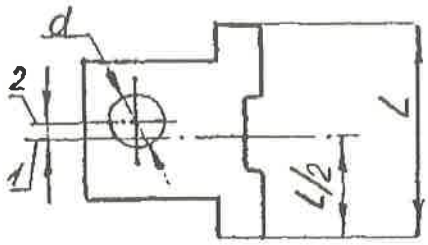
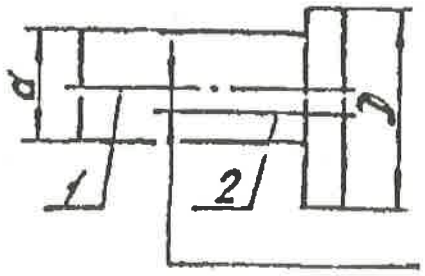
2.2. Limit deviations of surfaces, if they are not specified in drawings or in technical specifications for article, determine as per

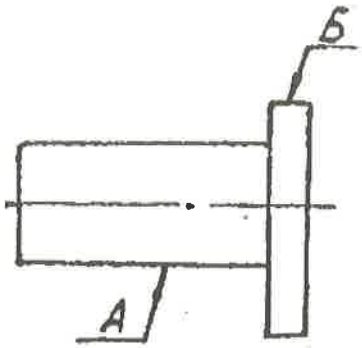
table 1.

Table 1

Term	Drawing	Determination
Deviation from parallelism		Deviation from parallelism of surface A relative to surface B should be with in tolerance range on dimensions H_1. Deviation from parallelism of surface Б relative to surface B should be with in tolerance range on dimensions H_2.
		Deviation from parallelism of surface A relative to surface Б should be with in tolerance range on dimensions H_3. Deviation of parallelism of axis 1 relative to axis 2 should be with in tolerance range on dimension C. Deviation from parallelism of axis 3 relative to surface B should be with in tolerance range on dimension H_4.

Deviation from perpendicularity	 DEVIATION FROM PERPENDICULARITY	Deviation from perpendicularity of surface Б relative to Surface A, should be with in tolerance range on dimension H.
End play	END PLAY  BASE AXIS	End play of surface A relative to base axis should be with in tolerance range on dimension L.

Deviation from symmetry	 DEVIATION FROM SYMMETRICITY	Deviation from symmetry of axis 2 relative to axis 1 should be with in tolerance range on dimensions d and L (MMC tolerance).
Deviation from coaxiality	 DEVIATION FROM ALIGNMENT	Deviation from co-axiality of axis 1 relative to axis 2 should be with in half tolerance range on dimensions d and D (MMC tolerance).

Run out		Radial run out of surface Б relative to surface A should be with in doubled tolerance range on coaxiality.

2.3. Limit deviation of shapes of cylindrical surfaces should be with in tolerance range of diameter.

2.4. Dimension determining positions of surface of parts with technological allowance need not be checked.

2.5. Threaded holes to be reamed at angles from 90^0 to 120^0 upto external diameter of threads.

2.6. While making threads by rolling, it is allowed to decrease diameter of unmachined parts of rod upto mean diameter of threads.

2.7. Unspecified limit deviation of chamfer should be as per table 2.

Table 2

In millimeters

Dimension of chamfer	0.3-0.4	0.5-1.0	1.2-3.0	3.5-5.0
Allowed deviation	±0.2	±0.3	±0.5	±1

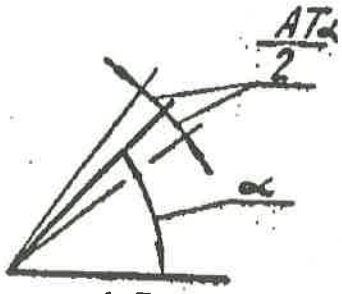
2.8. Permissible limit deviation of radius should be as per table 3.

Table 3

In millimeters

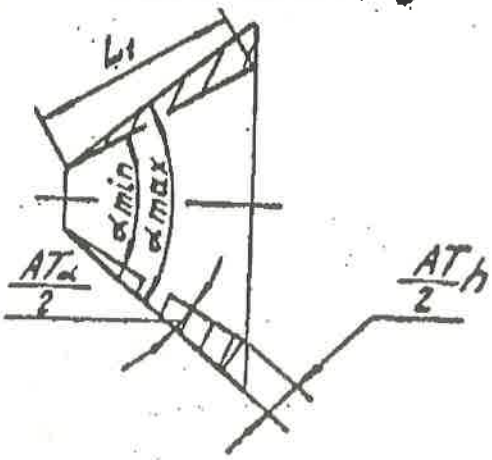
Dimension of radius	0.2	0.3-0.4	0.5 to1.0	Above 1 to 3.0	Above 3 to 6.0	Above 6 to 15	Above 15 to 25	Above 25 to 30	Above 30
permissible deviations	±0.1	±0.2	±0.3	±0.5	±1.0	±2.0	±3.0	±4.0	±5.0

2.9. Unspecified limit deviation of angular dimensions should be as per table 4.



$\alpha \pm \frac{AT_\alpha}{2}$ (SYMMETRICALLY)

WHEN TAPER IS $> 1:3$



WHEN TAPER IS $\leq 1:3$

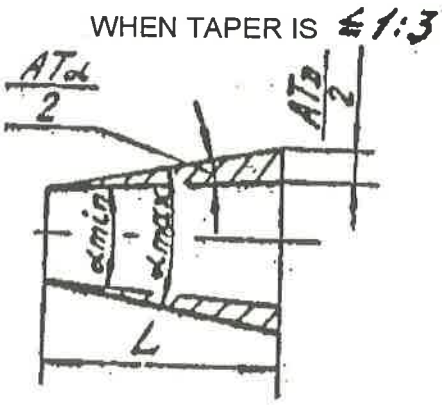


Table 4

Unit of measurement	Range of length L, L_1, mm												
	upto 10	ab.10 to 16	ab. 16 to 25	ab. 25 to	ab. 40	ab. 63 to 100	ab. 100 to 160	ab. 160 to 250	ab. 250 to 400	ab. 400 to 630	ab. 630 to 1000	ab. 1000 to 1600	ab. 1600 to 2500

Limit deviation

AT α°	2°	1°	1°	1°	40'	40'	40'	20'	20'	20'	10'	10'	10'
ATh AT_D mm	Upto 0.5	0.4-0.63	0.5-0.8	0.63-1	0.8-1.25	1-1.6	1.25-2	1.6-2.5	2-3.2	2.5-4	3.2-5	4-6.3	5-8

AT – Tolerance of angle (difference between maximum and minimum limit angles);

$AT\alpha$ – Tolerance angle, expressed in terms of angular units;

ATh – Tolerance angle, expressed with section on perpendicular to side of angle, lying opposite to angle $AT\alpha$ at distance L_1 from vertex of that angle;

AT_D- Tolerance angle of taper, expressed by tolerance for difference of diameters in two normal to axis of cross-section of taper at given distance L between them (is determined as per perpendicular to axis of taper).

Tolerance of taper angles with taper more than 1:3 should be specified depending upon length of generatrix of taper L_1.

Tolerance angle of taper with taper not more than 1:3 should be specified depending upon normal length of taper L.

Note-During taper not more than 1:3 length of taper L approximately taken equal to length of generatrix of L_1 (difference of values not more than 2%).

2.10. Deviation from perpendicularity of axis of threaded holes to supporting surfaces not more than $1^0 30'$ is allowed (MMC tolerance).

2.11. Unspecified limit deviation of linear dimensions in design documentation, except fillet radii and chamfer, should be as per:

Holes as per H14;

Shafts as per h 14;

Others as per $\pm \frac{IT16}{2}$ as per table 5.

Table 5

In millimeters

Nominal dimensions	Limit deviation of dimensions			
	Holes	Shaft	Parts not related to holes or shaft	
	H14	h14	$\pm \frac{IT\ 14}{2}$	$\pm \frac{IT\ 16}{2}$
Less than 1	+0.10 0	0 -0.10	±0.050	±0.07
From 1 to 3	+0.25 0	0 -0.25	±0.125	±0.30
Above 3 to 6	+0.30 0	0 -0.30	±0.150	±0.37
Above 6 to 10	+0.36 0	0 -0.36	±0.180	±0.45
Above10 to18	+0.43 0	0 -0.43	±0.215	±0.55
Above 18 to 30	+0.52 0	0 -0.52	±0.260	±0.65
Above 30 to 50	+0.62 0	0 -0.62	±0.310	±0.80

Above 50 to 80	+0.74 0	0 -0.74	±0.370	±0.95
Above 80 to 120	+0.87 0	0 -0.87	±0.435	±1.10
Above 120 to 180	+1.00 0	0 -1.00	±0.500	±1.25
Above 180 to 250	+1.15 0	0 -1.15	±0.575	±1.45
Above 250 to 315	+1.30 0	0 -1.30	±0.650	±1.60
Above 315 to 400	+1.40 0	0 -1.40	±0.700	±1.80
Above 400 to 500	+1.55 0	0 -1.55	±0.775	±2.00
Above 500 to 630	+1.75 0	0 -1.75	±0.875	±2.20
Above 630 to 800	+2.00 0	0 -2.00	±1.000	±2.50
Above 800 to 1000	+2.30 0	0 -2.30	±1.150	±2.80
Above 1000 to 1250	+2.60 0	0 -2.60	±1.300	±3.30
Above 1250 to 1600	+3.10 0	0 -3.10	±1.550	±3.90
Above 1600 to 2000	+3.70 0	0 -3.70	±1.850	±4.60
Above 2000 to 2500	+4.40 0	0 -4.40	±2.200	±5.50

Above 2500 to 3150	+5.40 0	0 -5.40	±2.700	±6.75

2.12 Changing from one surface to another is carried out as per radius with tool (fig. 1а, б). Dimensions are to be ensured by tool.

2.13. Taper angle in holes with drill bit, reamer or other tools need not be checked (fig. $1_в$). Dimensions are to be ensured by tool.

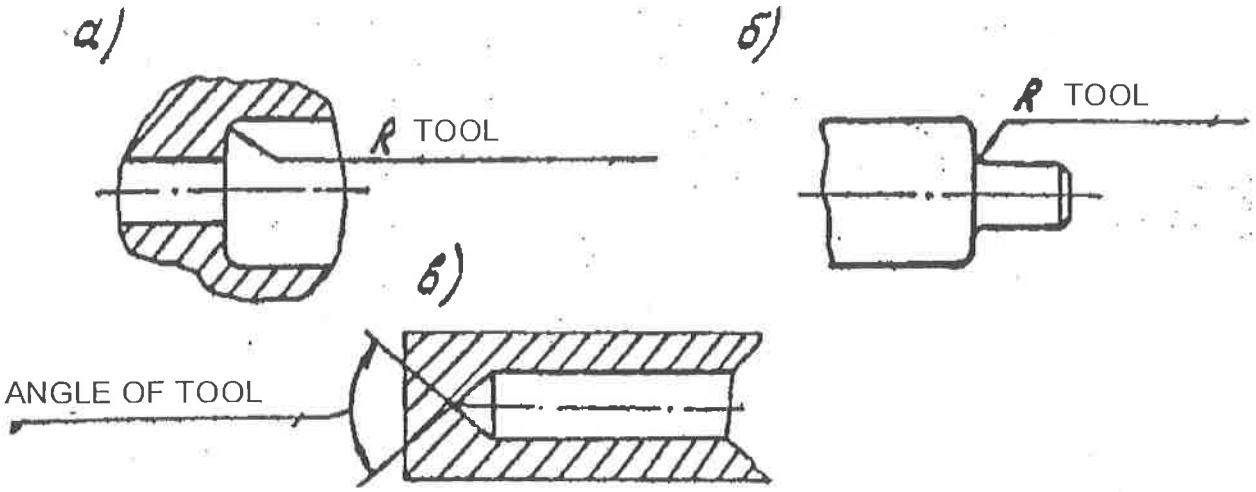


FIGURE 1

2.14. Blunting is carried out on external and internal angles of radii or by chamfering:

for external angles 0.2-0.5 mm;

for internal angles not more than 0.5 mm.

2.15. In holes surface finishing is as per 14 and lower, carried out by drilling, it is allowed to decrease diameters for values, equal to the half of tolerance range of surface finishing 12 for these diameters, except 172.54.003сб-3.

2.16. it is allowed to make standard bolts, screws and studs with tolerance range 6h and 8h, in place of 6g and 8g and in case of necessity, it is allowed to measure zinc plating surface, during assembly.

2.17. While making threads by rolling , transition radius from cylindrical part to thread and chamfer on rod after rolling need not be checked.

2.18. Displacement of marks on parts with left threading, carried out as per GOST 2904-91, need not be checked.

2.19. Non-standard nuts, heads of non-standard bolts and screws should be manufactured at level of accuracy B as per GOST 1759.1-82, if there are no other specifications in drawing.

3. REQUIREMENTS FOR PARTS, MANUFACTURED BY METHODS OF COLD STAMPING

3.1 Defects from raw materials, specified in compliance with standards and technical specifications of these materials are allowed on the surface of parts.

3.2 Traces of process of stamping as figures and bulge holes manufactured by extrusion, flanging, shaping and with bending, as well as local pressing and stamping of working surfaces of dies in depth not more than 12 % of actual thickness of parts is allowed on surfaces of parts.

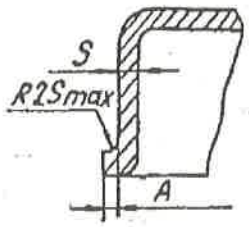
3.3 For parts, subjected to cutting after drawing, on surface of cut along external contour, edges A are allowed to project depending upon the overall dimensions of parts:

upto 150 mm not more than 0.5 mm;

upto 500 mm not more than 0.8 mm;

more than 500 mm not more than 1.2 mm;

At transition radii not more than 1.5 mm.



3.4 Projecting burrs of plane not more than 20 % thickness of parts, but not more than 1 mm, except specified in drawings on stamping parts.

3.5 On surface of cutting of parts from sheet material, draft, shrinkage of edges, double chips are allowed.

3.6 Dimensions, unspecified tolerances, given for design of tool and on parts need not be checked.

3.7 Decreasing of thickness of sheet above minus tolerance by 0.3 mm for thickness of 6mm and by 0.4 mm for thickness 8 mm and more are allowed during stamping thick sheet parts.

3.8 Other requirements as per OST 3-4343-87.

4. REQUIREMENTS FOR PARTS MANUFACTURED BY METHODS OF DIE FORGING

4.1 Permissible deviation for rough dimensions of parts as per GOST 7505-89.

4.2 Drafts not more than 7^0.

4.3 Unspecified fillet radii not more than 3 mm.

4.4 Local defects such as dents from scaling, burrs, taper cutting etc, as well as complete cutting or finishing defects on condition that dimensions of forging remain with in tolerance range, on un-machined surfaces of forging.

4.5 Defects specified in standards or technical specifications on base material are allowed on un-machined surfaces of parts.

4.6 Thinning of cross section, while removing dents not more than 2 % above lower deviation is allowed on machined surfaces of parts.

4.7 On parts, manufactured from rod or sheets by the method of cutting on shear, drafts not more than 7^0 and folds are allowed.

4.8 Other technical requirements as per GOST 8479-70 and GOST 7505-89.

4.9 On parts, manufactured from rod or sheet by the method of bending, following are allowed:

- Thinning or ovality of cross section in place of bending not more than 10%;
- Occasional dents and folds at surfaces of bends.

5. REQUIREMENTS FOR CASTING

5.1 Requirements:

- For structural steel casting as per 172.TY4;
- For castings from special steel casting as per 172.TY5;
- For ferrous casting as per 172.TY6;
- For non-ferrous casting as per 172.TY7;
- For steel castings by investment casting as per 172.TY10.

Above specified technical specifications are obligatory for parts in drawings, which have reference to 432.TY4, 432.TY5, 432.TY6, 432.TY7, and 432.TY10.

5.2 While manufacturing parts from antifriction cast-iron of grade АЧС-1 GOST 1585-85, hardness should be 180-240 HB.

6. REQUIREMENTS FOR MATERIALS AND ALTERNATE-MATERIALS

6.1 It is allowed to replace sheets with thickness 3.9 mm GOST 16523-97 of sheets with thickness 4 mm GOST 1577-93 with same grade of steel.

6.2 For all parts, which are stipulated in working drawings are manufactured from thin-sheet steel grade 08кп and 10кп GOST 16523-97, it is allowed to manufacture from steel 08пс and 10пс GOST 16523-97 and from 08кп and 08пс GOST 9045-93.

6.3 While manufacturing parts from rolled stock as per GOST 16523-97 of thickness from 2 to 3.9 mm, it is allowed to use rolled stock of III rd group of finished surface.

6.4 For manufacturing parts from low alloy steel. Steel 09Г2 GOST 19281-89, thickness higher than 5 mm, it is allowed to use steel from 6 to 12 categories.

It is allowed to use steel 09Г2Д GOST 19281-89 in place of steel 09Г2 of same category.

6.5 For all parts, which are stipulated in working drawings are manufactured from angular rolled stock of grade Ст3сп and Ст3кп GOST 380-94, it is allowed to manufacture from angular rolled stock of grades 09Г2 and 09Г2Д as per GOST 19281-89 of category 2 for rolled stock thickness of 4 mm and category 6 and 12 with thickness of 5 mm and higher and from angular rolled stock of type Ст3сп and 09Г2 as per ТУ 14-1-3023-80; but for parts from angular rolled stock grades 09Г2 and 09Г2Д as per GOST 19281-89, it is allowed to manufacture from angular rolled stock Ст3пс, Ст3сп and Ст3кп as per GOST 380-94 and from angular rolled stock of grades Ст3сп and 09Г2 as per ТУ 14-1-3023-80, except 175.64.093-1.

6.6 For all parts, which are stipulated in working drawings, are manufactured from aluminum alloy sheet grade Амг6БМ GOST 21631-76, it is allowed to manufacture from aluminum alloy sheet Амг6М GOST 21631-76 for all parts.

6.7 Parts, which are manufactured from copper grades М3 GOST 859-78 of all types of rolled stock, it is allowed to manufacture from copper grade М1 and М2 GOST 859-78.

6.8 In assembly units and parts, where hot tinning and soldering with solder ПОССу-30-2 or ПОССу -40-2 is carried out, it is allowed to use solder grade ПОС-30 GOST 21930-76 or GOST 21931-76.

6.9 In place of solder ЛК62-0.5 and ЛО60-1, it is allowed to use soldering grade Л63 GOST 16130-90.

6.10 Bolts, screws and studs, of strength class 4.6 and screws with strength class 8, may be manufactured from steel grade 20пс GOST 10702-78, as well as steel grades 15 and 20 as per TY 3-80-80, during this for bolts, screws and studs strength class 5.8 is permitted, and for steel 40 GOST 1050-88 with specifications in accompanied documentation of strength class as per basic documentation.

6.11 Bolt M6x12.46.016 GOST 7798-70; Bolts M6-6gx12.66.016, M6-6gx14.66.016, M6-6gx16.66.016, M6-6gx10.66.016, 3M6-6gx10.66.016, 3M6-6gx12.66.016, 3M6-6gx16.66.016 GOST 7805-70 is allowed to manufactured from steel 40X GOST 10702-78 with heat treatment, providing strength class 6.6 GOST 1759.4-87 (heat treatment of bolts-strength class 8.8 is allowed).

6.12 Bolts M6-6gx14.66.016, M6-6gx16.66.016, M6-6gx10.66.016, 3M6-6gx10.66.016, 3M6-6gx12.66.016, 3M6-6gx16.66.016 GOST 7805-70 is allowed to manufactured as per GOST 7798-70 from steel 40X GOST 10702-78 with heat treatment, providing strength class 6.6 GOST 1759.4-87 (heat treatment of bolts-strength class 8.8 is allowed).

6.13 All Bolts and screws with designated strength class 8.8, except bolts, entering into groups 40, 43, 46, 64, it is allowed to manufacture from steel 35X and 40X GOST 4543-71 and by cold upsetting from steel 35X and 40X GOST 10702-78.

6.14 Asbestos board grade КАОН-1 GOST 2850-95, used for packing, to be ordered without markings of industrial cloth and straight lines of longitudinal knurling due to turning of drum.

6.15 It is allowed to manufacture screws GOST 17473-80 of strength class 4.6 together with screws GOST 1491-80 of strength class 4.6 except bolts M3-6gx6.46.016, M6-6gx18.46.016.

6.16 Bolts of GOST 7808-70, in designation of which shows strength class 6.6, is allowed to manufacture from steel 40X GOST 10702-78 with strength class 8.8 or 6.6.

6.17 Operating drawings, which are stipulated in working drawing are manufactured from thin sheet rolling grade ПТК of TY 14-11-262-89, is allowed to manufacture from steel grade 10кп of any group GOST 16523-97 for all parts.

6.18 Bolt as per GOST 7798-70 is allowed to manufacture from high forging in head not more than 1 mm, with diameter D≤0.8S.

6.19 Parts with which are stipulated in working drawing are manufactured from ribbon grade Y7A GOST 2283-79, is allowed to manufacture from the same tape of grades Y8A GOST 2283-79.

6.20 For all parts, which are stipulated in working drawing are manufactured from aluminum sheets and table grade АД1, АД0 GOST 4784-74, is allowed to manufacture from aluminum sheets and plate grades A5, A6, A7 as per GOST 11069-74.

6.21 For all parts, which are stipulated in working drawings are manufactured from rolling with quality surface of group Б GOST 1051-73, is allowed to manufacture from same rolling with quality of surface Group B GOST 1051-73.

6.22 it is allowed to use white lead as per instructions АДК 25064.00028 in place of whiting lead hard removing МА-011-1 GOST 482-77 for packing connections.

6.23 In place of steel 20ХГНР GOST 4543-71, allowed to use steel grade 20Х2Н4А.

6.24 It is allowed to manufacture and mount bolts GOST 7795-70 and GOST 7796-70, as replaceable.

6.25 It is allowed to use washer of accuracy class A in place of accuracy class C as per GOST 6958-78, GOST 10450-78, GOST 11371-78.

6.26 It is allowed to use bakelite varnish ЛБС-1 TY6-07.455-93 in place of varnish ЛБС-1 GOST 901-78.

6.27 It is allowed to replace nuts М3-6Н.8.40.016 GOST 5927-70 and М4-6Н.8.40.016 GOST 5927-70 to М3-6Н.8.20.016 GOST 5927-70 and М4-6Н.8.20.016 GOST 5927-70.

7. REQUIREMENTS FOR HEAT TREATMENT OF PARTS

7.1 Hardness of heat treatment of parts, if it is not specified in drawings, they are to be checked on non working surfaces, allowances or standard samples, subjecting to heat treatment jointly with parts. During this slot for checking hardness should be:

- on un-machined surfaces of hot forging and casting not less than depth of decarbonised layer;
- on un-machined surfaces of cold stamping – not more than 1.0 mm;
- on un-machined (non operating) surfaces of parts – not more than 0.5 mm.

7.2 On parts, having hardness more than 302 HB ($d_{отп}$ 3.5) is allowed to check their hardness as per HRC, in separate cases for parts with cross section less than 10 mm with hardness 229-285 HB ($d_{отп}$ 4.0-3.6) is allowed to test hardness as per HRA.

7.3 Scope, methods of checking and place of measuring hardness, if this is not specified in drawings of parts, specified in technical documentation.

7.4 Standard bolts with diameter M6, M8, M10 from steel 38XC to be heat-treated till hardness 255-302 HB.

7.5 Measuring hardness of bolts is allowed to produce on face of heads or at end of rod in flush with not more 0.5 mm.

7.6 Mounting screws as per GOST 1478-93 and GOST 1481-84 of strength class 33H from steel 38XC heat treatment is allowed upto hardness 255-302 HB.

8. REQUIREMENTS FOR PARTS MANUFACTURED FROM PIPES FOR PIPE LINES

8.1 Corrosion, cracks, burrs, cuts and other defects are not allowed on surfaces and ends of pipes.

8.2 Ovality of pipe in places of bend not more than 15% is allowed on external diameter.

8.3 Dents with out undercutting from depth not more than 10 % from external diameter is allowed on surface of pipe.

8.4 Corrugation with height 1.5 mm for pipe with diameter not more than 20 mm and height 2 mm for pipe with diameter more than 20 mm are allowed in places of bending pipes.

8.5 Permissible thinning of wall of bended pipe should not exceed following values of primary thickness:

- for pipe from aluminum alloys – 25 %;
- for pipe from steel – 20 %;
- for pipe from copper and copper alloys – 10 %.

8.6 Edges of broken pipes should not have burrs and sharp edges.

8.7 End of pipe should be cut at angle 90' with surface finishing not less than $R_z 160$.

8.8 Expanding pipe should be projected under nipple not less than at 0.5 mm uniformly throughout the contours.

8.9 Internal surface of tank, radiators and pipelines (Pipes, branching pipe and hose connection) should be clean – presence of mechanical impurities in planes is not allowed. During this after blowing pipe with compressed air mechanical parts, visible to naked eyes on white tissue paper should not be present.

Marks of liquid, used during tests for leak tight ness are allowed.

8.10 During assembly of pipe lines with soldering rings with the method of furnace soldering for providing required gap in mating parts calibration of ends of pipes to suit is allowed.

8.11 During furnace soldering, it is allowed to leak, solder on surfaces of soldered parts.

8.12 While manufacturing steel or copper pipes with the use of gas soldering and induction and casehardening is allowed to use in following soldering rings:

- 520.20.001 replace with 54.05.233;
- 520.20.001-01 replace with 54.02.517;
- 520.20.001-02 replace with 54.03.101;
- 520.20.001-04 replace with 54.42.094

Pressing of rings of pipes during assembly is allowed.

8.13 Pipes of air systems are to be thoroughly purge with compressed gas, passed through moist-oil separator and with felted or felt filter.

8.14 Ends of pipes, branch pipes, hole and branch pipes in tanks, radiators, opened in ends of air systems should be protected from damages and getting dirt of polythene film or technological plugs.

Plugs should be carried out in type of thread caps made from metal or plastic, threaded caps or rubber cap. Plugs should be fitted tightly and should not allow entering dust and dirt.

Removing plugs or film is allowed only before connecting

9. REQUIREMENTS FOR SPRINGS

9.1 Surface of spring should not have cracks, under cuts and folds.

9.2 End (non-working) coils of spring should be pressed compressed to operating coils. After loading springs, as mentioned in drawing, residual deformation of it, is not allowed.

9.3 Permissible deviation of external diameter of spring, if they are not mentioned in drawings, should be in limits as mentioned in table 6.

Table 6

In millimeters

External diameter of spring	Upto10 incl	ab.10 to 30 incl	ab.30 to 40 incl	ab.40 to 80 incl.
Permissible deviation	±0.3	±0.5	±0.7	±1

9.4 Permissible deviation number of complete turns ±0.5 turns.

9.5 Thickness end of supporting turn of compressed spring should have not less than 0.15d, and length of arc of machined surface should be not less than 0.75 length of circle of turn.

9.6. All springs, manufactured from wires as per GOST 9389-75, should be subjected to low temperature tempering.

9.7. Dimensions without allowances need not be checked.

9.8. For spring, in drawings of which are not specified gap between supporting and operating turns – specified gap is determined as per formula 0.15 (t-d),

Where t – pitch spring;

d - diameter of wire.

10 REQUIREMENTS FOR PARTS MANUFACTURED FROM NON-METALLIC MATERIALS

10.1 Acceptance and checking of rubber-industrial parts are produced as per TY 005216-99.

10.2 In drawings of rubber parts, in which connections are stipulated with gluing of cold hardening in inclined cut, it is allowed to carryout connection of edges by mating with the methods of vulcanization.

10.3 Presence of de-colorization of ingredients and products on surfaces of rubber mixture and parts.

10.4 Presence of glue layer and rubbers are allowed on rubber-metallic assembly units.

10.5 It is allowed to grind surfaces of parts to suit of mold connection.

10.6 In all before released drawings РТДИ to their republication of dimensions, indicated in drawing without tolerances, execute by tolerances as per table 7.

Table 7

In millimeters

As per overall dimensions (length, width, diameter)		In height and thickness	
Normal dimensions	Tolerance	Nominal dimensions	Tolerance
Till 5.0	±0.3	Till 2.0	±0.3
Above 5.0 to 10.0	±0.5	Above 2.0 to 5.0	±0.5
Above 10.0 to 25.0	±0.6	Above 5.0 to 10.0	±0.8
Above 25.0 to 50.0	±0.8	Above 10.0 to 20.0	±0.7
Above 50.0 to 100.0	±1.0	Above 20.0 to 50.0	±1.0
Above 100.0 to 150.0	±1.5	Above 50.0 to 100.0	±1.5
Above 150.0 to 250.0	±2.0	Above 100.0 to 150.0	±2.0
Above 250.0	±1.0 %	Above 150.0	±1.5%

10.7 Local scaling of rubber on rubber metallic assembly units is allowed to stick with gluing of cold hardening.

10.8 It is allowed to use industrial plate TY 38 105867-90, rubber mixture as per TY 38 0051166-98, to be replaced with same grades of rubbers and plates as per TY 005216-99.

10.9 It is allowed to use industrial plates HO-68-1M TY 005216-99 in place of plates HO-68-1 TY 005216-99.

11. REQUIREMENTS FOR METALLIC AND NON-METALLIC (IN- ORGANIC) COATING

11.1 Requirements for metallic and non-metallic (In-organic) coating should comply with TY-16.

11.2 Technical specifications TY-16 are obligatory for parts and assembly units, in drawings, which have reference to 432.TY3.

11.3 Zinc coating with thickness of 3 microns (013) for bolts as per GOST 17473-80 and GOST 1491-80 with pitch of threads upto 0.45 is replaced with coating of thickness 6 micron (016).

12. REQUIREMENTS FOR SOLDERING EQUIPMENT WITH PIPE LINES

12.1 Soldering equipment (nipples, unions, protractors and others) with pipelines should be done by soldering, grade of which is specified in compliance with drawings.

12.2 Defects type unspecified figures, dents and other defects in permissible limits with state standards of pipes are allowed on the surface of pipeline, subjected to soldering,.

12.3 Gap between fittings and pipe for copper-zinc soldering should be in limits from 0.05 to 0.45 mm (to side), but for solder $ПС_р$ from 0.05 to 0.3 mm.

12.4 checking quality of soldering fitting with pipelines, as well as other requirements of soldering as per existing instructions of cheif welder, upon agreement with chief designer and representative of customer.

13. REQUIREMENTS FOR PARTS OF INNER AND OUTER SHIELDS

13.1 Unspecified limit deviation of dimensions:

Linear ±2 mm;

Angular ± 30';

13.2 It is allowed to increase drafts in holes and slots for ensuring the removal of parts from molds.

13.3 Double images and traces from marking sign with depth not more than 3 mm is allowed during marking molding.

13.4 In holes with diameter, not more than 15 mm, trim the flash from forging in customer-factory.

13.5 Unspecified radii not more than 5 mm.

13.6 It is allowed to round up angles with radius not more than 3 mm

13.7 Dimension, except thickness, given for projecting tool are not subjected for checking.

14. REQUIREMENTS FOR PREMISES AND WORK PLACES

14.1 Premises and operating places where assembly is carried out for parts and air pipelines and heating system, lubricating and cooling systems, hydro-systems and hydro units should be with out dust particles, falling of dirt, abrasive and foreign inclusions.

15. REQUIREMENTS FOR MOUNTING RUBBER-INDUSTRIAL PARTS (РТД)

15.1 Before mounting RIP should be cleaned from possible dirt, dust etc.

15.2 Mounting of RIP in mounting places is carried out with consideration of excluding bends and mechanical damages.

15.3 On mounting with RIP metallic surfaces sharp edges, dents and other mechanical damages are not allowed.

15.4 If while setting in mounting pin of RIP pass through groove, spline, thread it is recommended to use mandrel if necessary.

15.5 Before mounting, RIP and surface friction should be lubricated by lubricant or operating medium for preserving completeness of RIP.

15.6 Repeating setting of demounting ring and collars are not allowed.

15.7 Before assembling threads with parts, through which mounting of ring are carried out, should be lubricated by thin layer of lubricant or operating medium.

15.8 Pressing collar in bay is carried out with the help of fixture by fixing uniformly in all end surfaces of collar. During this should be carefully observe that bend of collar and damages of external rubber layer of collar.

16. REQUIREMENT FOR NAME PLATES

16.1Name plates should be flat, burrs are not allowed

16.2 Image on table should be short. Font as per GOST 2930-62.

16.3 Image should project or sink relative plane of tables.

16.4 It is allowed to obtain image on tables of photochemical methods.

16.5 Image or background should not be cleaned with water, oil and diesel fuels.

16.6 Table around should be covered with colour less varnish.

16.7 Dimension of words, their location and frame executed by guiding with format.

REFERENCE STANDARD DOCUMENTS

Designation of document	Number of sheets on which having reference
GOST 380-94	16
GOST 482-77	18
GOST 859-78	16
GOST 901-78	18
GOST 1050-88	17
GOST 1051-73	18
GOST 1478-93	19
GOST 1481-84	19
GOST 1491-80	17, 25
GOST 1577-93	16
GOST 1585-85	15
GOST 1759.1-82	11
GOST 1759.4-87	17
GOST 2283-79	18
GOST 2850-95	17
GOST 2904-91	10
GOST 2930-62	30
GOST 4543-71	17, 18
GOST 4784-74	18
GOST 5927-70	18
GOST 6958-78	18
GOST 7505-89	14

GOST 7795-70	18
GOST 7796-70	18
GOST 7798-70	17, 18
GOST 7805-70	17
GOST 7808-70	17
GOST 8479-70	14
GOST 9045-93	16
GOST 9389-75	22
GOST 10450-78	18
GOST 10702-78	17
GOST 11069-74	18
GOST 11371-78	18
GOST 16130-90	17
GOST 16523-97	16, 17
GOST 17473-80	17, 25
GOST 19281-89	16
GOST 21631-76	16
GOST 21930-76	16
GOST 21931-76	16
OST 3-4343-87	13
АДК 25064.00028	18
60.018ТУ	2
432.И6-1	2
ТУ3-80-80	17
ТУ6-07-455-93	18
ТУ 14-1-3023-80	16
ТУ 14-11-262-89	17

TY 005216-99	23, 24
TY 38 0051166-98	24
TY 38 105867-90	24

AMENDMENT SHEET

Change	Number of list (pages)				Total lists (page) in document	No. Of document	Input Number accompanying Document and Date	Signature	Date
	Changed ones	Replaced ones	New	Withdrawal ones					
81						188.49-01			