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STEEL COILS

STEEL COILS FOR OIL IN FIVE LINES
1971-1977-78

Official Publication



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STEEL COILS FOR OIL IN FIVE LINES
OF THE COMPANY OF THE USSR
OF THE USSR

USSR

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U.S. 659.14-652.3(653.74)

Group 382

U.S. 659.14-652.3(653.74)

SEAMLESS STEEL TUBES FOR OIL
AND FUEL LINES

6527
13277-73

By the decision of the State Committee for Standards of the
Council of Ministers of the USSR dated December 18,
1973 No.2701 declared effective from January 1, 1975
till January 1, 1980

NON-OBSERVANCE PROSECUTED

The present standard applies to seamless cold-worked tubes
of ordinary-melted steel and of steel produced by vacuum-arc
melting, intended for use in aircraft engineering.

1. Assortment

1.1. The dimensions and mass per 1 meter of tubes shall
be as specified in Table 1.

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Таблица 1

Масса 1 м трубы, кг, при толщине стенки, мм.

	0,5	0,6	0,7	0,8	0,9	1,0	1,2	1,4	1,5	1,6	1,8	2,0	2,2	2,5	2,8	3,0
0,043	0,070	0,057	0,067	—	—	—	—	—	—	—	—	—	—	—	—	—
0,072	0,075	0,074	0,083	—	—	—	—	—	—	—	—	—	—	—	—	—
0,074	0,080	0,091	0,100	0,123	0,142	0,170	0,165	—	—	—	—	—	—	—	—	—
0,080	0,095	0,107	0,122	0,133	0,136	0,172	0,170	0,203	—	—	—	—	—	—	—	—
0,092	0,110	0,126	0,132	0,150	0,173	0,200	0,227	0,240	0,253	0,275	0,290	—	—	—	—	—
0,105	0,125	0,143	0,162	0,160	0,197	0,241	0,262	0,277	0,290	0,319	0,315	—	—	—	—	—
0,117	0,139	0,161	0,182	0,202	0,222	0,261	0,290	0,314	0,332	0,367	0,395	—	—	—	—	—
0,129	0,154	0,178	0,201	0,224	0,247	0,290	0,331	0,351	0,371	0,407	0,411	—	—	—	—	—
0,142	0,167	0,195	0,221	0,246	0,271	0,320	0,362	0,388	0,411	0,452	0,493	—	—	—	—	—
0,154	0,181	0,212	0,241	0,269	0,295	0,349	0,400	0,425	0,451	0,496	0,541	—	—	—	—	—
0,166	0,199	0,230	0,260	0,291	0,321	0,375	0,424	0,452	0,490	0,541	0,592	—	—	—	—	—
0,179	0,214	0,247	0,280	0,313	0,345	0,402	0,452	0,490	0,529	0,585	0,641	—	—	—	—	—
0,191	0,228	0,261	0,300	0,332	0,370	0,428	0,500	0,536	0,568	0,625	0,691	—	—	—	—	—
0,203	0,244	0,281	0,320	0,357	0,390	0,457	0,537	0,573	0,603	0,674	0,740	—	—	—	—	—
0,216	0,258	0,295	0,336	0,390	0,419	0,497	0,572	0,610	0,647	0,711	0,782	—	—	—	—	—
0,228	0,271	0,316	0,372	0,402	0,444	0,522	0,605	0,647	0,687	0,762	0,835	—	—	—	—	—
0,240	0,288	0,333	0,379	0,424	0,469	0,550	0,632	0,683	0,723	0,800	0,875	—	—	—	—	—
0,253	0,301	0,350	0,395	0,446	0,490	0,586	0,675	0,721	0,767	0,851	0,937	—	—	—	—	—
0,265	0,318	0,368	0,419	0,468	0,518	0,616	0,710	0,758	0,803	0,893	0,986	1,07	1,20	1,33	1,41	—
0,290	0,347	0,402	0,455	0,513	0,557	0,651	0,759	0,832	0,885	0,981	1,09	1,18	1,33	1,46	1,55	—
0,302	0,363	0,419	0,478	0,535	0,592	0,693	0,813	0,869	0,925	1,04	1,13	1,24	1,30	1,53	1,63	—

4) Продолжение табл. 1

Внутренний диаметр, мм

Масса 1 м трубы, кг, при толщине стенки, мм.

	0,5	0,6	0,7	0,8	0,9	1,0	1,2	1,4	1,5	1,6	1,8	2,0	2,2	2,5	2,8	3,0
27	0,327	0,391	—	0,517	0,579	0,641	0,781	—	0,913	—	—	—	—	—	—	—
28	0,330	0,405	—	0,537	0,601	0,662	0,792	0,915	0,986	1,042	1,163	1,252	—	—	—	—
30	0,351	0,436	0,506	0,575	0,645	0,715	0,851	0,955	1,05	1,12	1,25	1,33	1,51	1,70	1,85	2,03
32	0,359	0,456	0,540	0,615	0,690	0,753	0,910	1,050	1,13	1,20	1,34	1,43	1,62	1,76	2,02	2,15
34	0,413	0,495	0,573	0,653	0,732	0,814	0,965	1,120	1,20	1,28	1,43	1,58	1,72	1,91	2,15	2,29
36	0,425	0,510	0,592	0,673	0,757	0,838	0,998	1,159	1,21	1,32	1,47	1,63	1,75	2,00	2,22	2,37
38	0,438	0,523	0,609	0,693	0,779	0,863	1,027	1,192	1,23	1,36	1,52	1,68	1,83	2,07	2,29	2,44
40	0,462	0,553	0,641	0,724	0,821	0,912	1,087	1,26	1,35	1,44	1,61	1,78	1,94	2,19	2,43	2,59
42	0,491	0,585	0,678	0,774	0,865	0,962	1,140	1,33	1,42	1,52	1,69	1,87	2,05	2,31	2,56	2,74
44	—	—	—	—	—	1,010	1,205	1,41	1,50	1,60	1,79	1,97	2,15	2,44	2,70	2,89
46	—	—	—	—	—	1,030	1,235	1,51	1,61	1,71	1,91	2,12	2,32	2,62	2,91	3,11
48	—	—	—	—	—	1,100	1,320	1,61	1,72	1,83	2,05	2,27	2,45	2,81	3,11	3,33
50	—	—	—	—	—	1,21	1,44	1,69	1,79	1,91	2,14	2,37	2,59	2,93	3,25	3,48
52	—	—	—	—	—	1,23	1,53	1,78	1,90	2,03	2,27	2,51	2,76	3,11	3,46	3,73
54	—	—	—	—	—	1,35	1,62	1,82	2,02	2,15	2,41	2,63	2,82	3,23	3,66	3,92
56	—	—	—	—	—	1,37	1,71	2,02	2,16	2,31	2,58	2,85	3,13	3,55	3,94	4,23
58	—	—	—	—	—	1,53	1,83	2,13	2,27	2,43	2,71	3,01	3,30	3,72	4,15	4,45
60	—	—	—	—	—	1,55	1,85	2,25	2,35	2,50	2,80	3,11	3,41	3,85	4,29	4,61

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- 1) Table 1
- 2) Outside diameter, mm
- 3) Mass per 1 meter of tubes, kg, versus wall thickness, mm
- 4) Table 1, cont'd.

NOTES: 1. The mass specified in Table 1 is calculated for tubes made from steel grades 20A, 30X1CA and 30X1CA-3A by the formula: $m = 0.02466 \pi (D_o - s) s$ where D_o = outside diameter, mm; s = wall thickness, mm. The density of steel is assumed to be 7.85 g/cm^3 . To calculate the mass of tubes made from steel grades X18H10T, X18H10T-3A, OX18H10T and OX18H10T-3A, the value given in Table 1 shall be multiplied by 1.0064.

2. The tubes with the outside diameter to wall thickness ratio $D_o/s \geq 40$ are included into the group of extra-thin-walled tubes.

3. On Purchaser's request it is permitted to manufacture tubes measuring 23×1.5 , 43×1.5 and 44×1.0 mm, the mass per 1 meter of tubes being, respectively, 0.795, 1.535 and 1.060 kg.

1.2. With respect to the length the tubes shall be furnished as follows:

- (a) of random length within 1.5 and 7 m;
- (b) of specified length within the limits of random length;
- (c) of the length divisible by the random length with an allowance of not over 5 mm for each cut.

1.3. Each lot of random-length tubes may contain not more than 1% of tubes of 1.5 m long but not shorter than

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1.4. On Purchaser's consent each lot of specified length tubes may contain not more than 20% of random length tubes though not shorter than 1 m.

1.5. The tolerance limits on the length of the specified length tubes and of the tubes whose length is divisible by the specified length shall not exceed ± 10 mm.

1.6. The tolerance limits on the outside diameter and wall thickness of tubes shall not exceed those specified in Table 2.

The manufacturing accuracy of tubes shall be stipulated in the order.

Table 2

Grade of steel : Tube dimensions : Tolerance limits for tubes with manufacturing accuracy : standard : increased

Outside diameter:

20A			
30X16A	4 to 18 mm incl.	± 0.15 mm	± 0.10 mm
12X16H10T (116H10T)	over 18 to 30 mm incl.	± 0.20 mm	± 0.15 mm
08X16H10T (08X16H10T)	over 30 to 40 mm incl.	± 0.30 mm	± 0.20 mm
30X16A-BA, 12X16H10T-BA, (116H10T-BA), 08X16H10T-BA, (08X16H10T-BA)	over 40, to 70 mm incl.	± 0.40 mm	± 0.30 mm

Wall thickness:

20 A			
30X16A, 30X16A-BA	up to 0.8 mm incl.	± 0.10 mm	± 0.05 mm
	over 0.8 mm	$\pm 10\%$	$\pm 7.5\%$
12X16H10T (116H10T), 12X16H10T-BA (116H10T-BA), 08X16H10T (08X16H10T), 08X16H10T-BA (08X16H10T-BA)	from 0.5 to 0.6 mm incl.	± 0.10	± 0.05 mm
		$- 0.05$	
		$+ 0.15$	$+ 0.10$
	over 0.6 to 0.9 mm	± 0.05	$- 0.05$
		$- 0.15$	
		$- 0.15$	

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1.7. On Purchaser's request the tubes shall be furnished with combined tolerance limits; for example, increased accuracy of outside diameter and standard accuracy of wall thickness. With one-sided (displaced) tolerance limits on dimensions the one-sided tolerance limit shall not exceed the sum of tolerance limits specified in Table 2.

1.8. The out-of-round and wall variations of the tubes shall not bring their dimensions beyond the tolerance limits on the outside diameter and wall thickness, respectively.

The out-of-round of the tubes with the outside diameter to wall thickness ratio $D_0/s \geq 40$ is not specified.

1.9. The curvature of any portion of the tube on the length of 1 meter shall not exceed:

1 mm for the tubes made from steel 20A, 30XFGA and 30XFGA-BA;

1.5 mm for the tubes made from steel 12X18H10T(X18H10T) 12X18H10T-BA (X18H10T-BA), 08X18H10T (0X18H10T) and 08X18H10T-BA (0X18H10T-BA).

Examples of designations:

A tube of 25 mm outside diameter, a wall thickness of 2.2 mm, standard manufacturing accuracy of diameter and wall thickness, 3000 mm long made of steel 30XFGA.

Tube 25x2.2x3000 - 30XFGA GOST 19277-73

Same, increased manufacturing accuracy of diameter and wall thickness with a length divisible by 2000 mm made from steel 30XFGA:

Tube 25x2.2x2000 sp - 30XFGA GOST 19277-73

Same, standard manufacturing accuracy of diameter and increased manufacturing accuracy of wall thickness, 25 mm

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length, made from steel 30X10A, vacuum arc melting;

Yuga 2512.20 - 30X10A - GOST 19277-73

2. Technical Requirements

2.1. The tubes shall be made from the turned tube billet of steel grades 20A, 30X10A, 12X18H10T (X18H10T), 08X18H10T (X18H10T), 30X10A-B, 12X18H10T-B (X18H10T-B) and 08X18H10T-B (X18H10T-B).

2.2. The chemical composition of steel grades 30X10A, 12X18H10T (X18H10T) and 08X18H10T (X18H10T) shall conform to the stipulations of GOST 4543-71 and GOST 5632-72; the content of sulphur and phosphorus in the steel grade 30X10A shall be not over 0.025% each and the content of residual copper shall not exceed 0.2% (0.25% in case of scrap process melting).

The chemical composition of steel grade 20A and of the steel grades 30X10A-B, 12X18H10T-B (X18H10T-B) and 08X18H10T-B (X18H10T-B) produced by vacuum arc melting shall be as specified in Table 3.

2.3. The tubes made from steel grades 12X18H10T (X18H10T), 12X18H10T-B (X18H10T-B), 08X18H10T (X18H10T) and 08X18H10T-B (X18H10T-B) shall be made with the ground external surface and with pickled or passivated internal surface or else with the pickled external and internal surfaces.

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Table 3

Steel grade	Chemical composition, %					
	Car- bon	Sili- con	Manga- nese	Chro- mium	Nickel plus copper	Sulphur: Phospho- rus not over
20A	0.17-0.17 0.24	0.17-0.17 0.37	0.35- 0.65	not over 0.25	not over 0.25	0.035 0.040
30LFC1-BH	0.28-0.9 0.34	0.9- 1.2	0.9- 1.1	0.2- 1.1	not over 0.25	0.012 0.015
18H10T-BH	0.08	not	not	17-19	9-11 (0.02)5	0.015 0.015
12X18H10T-BH	0.12	over 0.8	over 1.0			
08X18H10T-BH	not over	not over	100- 2.0	17-19	9-11 50-0.6	0.015 0.015
(08X18H10T-BH)	0.08	0.8				

Note: The copper content in the steel, grade 20A, shall not exceed 0.20% (not more than 0.25% in case of scrap-process melting).

2.4. On Purchaser's request the tubes of steel grades 12X18H10T (18H10T), 12X18H10T-BH (18H10T-BH), 08X18H10T (08H10T) and 08X18H10T-BH (08H10T-BH) shall be made with the electropolished external and internal surfaces or with the ground external and electropolished internal surfaces.

NOTE: The internal surface of the tubes with inside diameters up to 6 mm is not subject to electropolishing.

2.5. The tubes of steel grades 20A, 30LFC1 and 30LFC1-BH shall be made with the ground external surface and polished internal surface in the post-heat-treatment state.

2.6. On agreement of the contracting parties the tubes of all steel grades may be made without polishing their external surface.

2.7. The external and internal surfaces of the tubes shall be free from scale, fissures, tears, cracks, longitudinal and transverse scratches, rolled-down blisters, scores, dents, pickling stains, surface and penetrating burns.

The external surface is allowed to have the following defects left without dressing: slight roughness, spottiness, temper colours, signs left by the guide rule of the reeler mill and scratches, provided they do not show in the light.

The internal surface may have the following defects which may be left unattended: small shallow dents, slight roughness, longitudinal scratches provided their depth is not over 0.02 mm for the tubes with a wall thickness up to 1.5 mm and 0.03 mm for those with a wall thickness over 1.5 mm. The permissible defects must not bring the wall thickness beyond the permissible dimensional limits.

The unground external and internal surfaces of the tubes made from steel grades 20A, 30X/CA and 30X/CA-B₁ may have the traces of scale easily removable with fine emery paper.

The electropolished surface and the points of cuts on the tubes with non-electropolished surface may have temper colours.

2.8. The surface of the ground tubes may have a roughness (parameter Ra, GOST 2789-73) not over:

- 1.25 μm for the tubes up to 30 mm in diameter;
- 2.5 μm for the tubes over 30 mm in diameter.

The ground tubes may have transverse notches left by the grinding stone within the permissible roughness limits.

Note. In Purchaser's request the surface roughness of the ground tubes (Ra parameter) shall not exceed 1.25 μm according to GOST 2789-73.

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polished and ground tubes can be judged in accordance with reference specimens agreed upon by the contracting parties.

2.10 The ends of the tubes shall be trimmed at a right angle and deburred.

2.11 The tubes shall be furnished in a heat-treated state.

2.12 The mechanical properties of the tubes after heat treatment shall meet the requirements specified in Table 4.

Table 4

Grade of steel	Tensile strength, σ_{B} , kgf/mm ² , minimum	Elongation per unit length, δ , %, minimum
20A	40	22
30X17A 30X17A-BP	50	18
12X18H10T (12X18H10T) 12X18H10T-BP (12X18H10T-BP)	56	40
08X18H10T (08X18H10T), 08X18H10T-BP (08X18H10T-BP)	56	40

Note. The elongation per unit length of the tubes made from steel grades 12X18H10T (12X18H10T), 12X18H10T-BP (12X18H10T-BP), 08X18H10T (08X18H10T) and 08X18H10T-BP (08X18H10T-BP) with the outside diameter to wall thickness ratio over 40 shall be not less than 35%.

2.13 The tubes with the outside diameter to wall thickness ratio over 40 may be furnished after heat treatment with the diameter increased by up to 0.5 mm.

2.14 The tubes made from steel grades 30X17A and 30X17A-BP, shall be checked for the presence of surface defects.

2.15 The tubes shall be checked for the presence of surface defects.

2.16 The tubes shall be checked for the presence of surface defects.

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2.15. The tubes made of all grades of steel shall stand a hydraulic test pressure (P), Pa, calculated by the formula:

$$P = \frac{200 \cdot a \cdot R}{D}$$

where: a - minimum wall thickness, mm (including minus tolerance)
 R - permissible test stress, kgf/mm², equal to 40% tensile strength for the steel of the given grade;
 D - inside diameter of tube, mm.

The hydraulic test pressure (P) shall be not over 200 kgf/cm² (revised, see "Information Guide to Standards" No.1, 1975).

2.16. The tubes of steel grades 12X18H10T (X18H10T), 12X18H10T-3P (X18H10T-3P), 08X18H10T (03X18H10T) and 08X18H10T-3P (0X18H10T-3P) shall be tested for intercrystalline corrosion.

2.17. The tubes of all steel grades shall be tested for flaring to 10% of the initial diameter.

2.18. The tubes of steel grades 20A, 30XFC1 and 30XFC1-3P of all wall thickness and of steel grades 12X18H10T (X18H10T), 12X18H10T-3P (X18H10T-3P), 08X18H10T (03X18H10T) and 08X18H10T-3P (0X18H10T-3P) with a wall thickness of 0.8 mm and over shall be tested for flattening to a distance of (H), mm between the flattened surfaces, said distance being calculated by the formula:

$$H = \frac{1.08 \cdot s}{0.08 + \frac{s}{D}}$$

where: s - nominal wall thickness, mm;
 D - nominal outside diameter, mm.

2.19. The tubes of steel grades 12X18H10T (X18H10T), 12X18H10T-3P (X18H10T-3P), 08X18H10T (03X18H10T) and 08X18H10T-3P (0X18H10T-3P) shall be tested for intercrystalline corrosion.

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tested for flattening until the internal surfaces of the tubes touch each other.

3.3. Acceptance Rules

3.3.1. A lot shall consist of the tubes of the same nominal diameter and wall thickness, the same melt and grade of steel and the same heat treatment conditions.

The number of tubes in a lot shall not be over 200.

3.3.2. Each tube of the lot shall be subjected to visual examination and measurements.

3.3.3. For checking the quality of metal in the finished tubes, the following amounts of inspections shall be established:

two tubes from a lot for the chemical analysis;

two tubes from a lot for tension, flattening, flaring and bending tests and for intercrystalline corrosion check;

2% of tubes from a lot but not less than two tubes for

decarburizing;

two tubes from a lot for a hydraulic pressure test.

(Revised, see "Information Guide to Standards" No. 1, 1976).

3.3.4. On Purchaser's request the tubes of all steel grades shall be tested for bending.

3.3.5. 3% of tubes shall be selected from a lot for examining the internal surface.

3.3.6. If the tests yield unsatisfactory results in even one of the characteristics, retests shall be made of this characteristic on twice the original number of tubes taken from the same lot. The results of retests shall be considered final and applying to the entire lot.

In case of repeated unsatisfactory results, the lot shall be rejected.

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the type of test which has yielded unsatisfactory results.

4. Methods of Testing

4.1. The external surface of the finished tubes shall be inspected by the naked eye.

The external surface and the inside of the tube walls shall be checked for defects as follows.

tubes of steel grades 12X18H10T (X18H10T), 12X18H10T-BA (X18H10T-BA), 08X18H10T (OY18H10T) and 08X18H10T-BA, (OY18H10T-BA) by ultrasonic or eddy current testers;

tubes of steel grades 20A, 30X1A and 30X1A-BA by the magnetic flaw detection method.

The inspection methods and the limits of permissible defects shall be agreed upon by the manufacturer and the purchaser.

(Revised, see "Information Guide to Standards" No. 1, 1976).

4.2. The internal surface of the tubes shall be checked with a periscope at intermediate dimensions, using the technology of the manufacturing plant.

The internal surface of the finished tubes with a diameter over 20 mm made from all steel grades shall be inspected with the naked eye from the tube ends. The internal surface of the tubes with diameters less than 20 mm shall be examined on 200 mm pieces cut from the tube ends then cut longitudinally.

4.3. (Cancelled, see "Information Guide to Standards" No. 1, 1976).

4.4. The chemical composition of steel shall be established by the manufacturer's quality certificate of the billet, the carbon content in steel grades 30X1A and 30X1A-BA being based on the results of tests made on the steel rods of the same steel.

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If it is considered necessary to check the chemical composition of the finished tubes, the test shall be carried out in accordance with GOST 2331-57, GOST 12344-66, GOST 12352-56. The samples for the chemical test shall be taken as stipulated in GOST 7565-73.

The tubes of steel grades 12X18H10T (12X18H10T), 12X18H10T-BP (12X18H10T-BP), 08X18H10T (08X18H10T), 08X18H10T-BP (08X18H10T-BP) shall be tested to check whether their chemical composition corresponds to the given grade of steel on a steeloscope while the tubes of steel grades 30X17CA, 30X17CA-BP and 20A, shall be spark-tested.

4.5. The tensile test shall be carried out in conformity with GOST 10006-73 on longitudinal short standard specimens, one from a tube.

4.6. The flaring test shall be made in a cold state, according to GOST 2694-75 using a mandrel with a taper of 1/10.

4.7. The flattening test shall be carried out in a cold state according to GOST 8695-75.

4.8. The hydraulic tests of the tubes shall be carried out in accordance with GOST 3845-75, holding the tubes under pressure for not less than 10 s.

4.9. The intercrystalline corrosion test shall be made by the AH method in accordance with GOST 6032-75.

4.10. The bending test shall be conducted in accordance with GOST 3728-56.

5. Marking, Packing, Transportation

5.1. The marking, packing and transportation of tubes

shall conform to the provisions of GOST 10652-73 with the following additional requirements:

5.2. Each accepted tube of 20 mm dia. and over with a wall thickness of 1 mm and over shall be marked on one end with a mark etcher or indelible paint using a rubber stamp at a distance not more than 50 mm from the end. The markings shall state:

- (a) grade of steel;
- (b) melt No.;
- (c) lot No.;
- (d) No. of this standard.

The tubes made of steel produced by vacuum-arc melting shall be additionally marked with letters "BA", for example: 30X1CA-BA.

(Revised, see "Information Guide to Standards" No.1, 1976)

5.3. The tubes made from steel grades 20A, 30X1CA and 30X1CA-B shall be coated with a neutral lubricant.

5.4. The tubes shall be packed in wooden boxes. The tubes of different sizes may be packed in one box.

Revisions:

GOST 3845-75 supersedes GOST 3845-55
 GOST 6032-75 supersedes GOST 6032-55
 GOST 8694-75 supersedes GOST 8694-55
 GOST 8695-75 supersedes GOST 8695-55
 GOST 10005-73 supersedes GOST 10005-52