



USSR STATE STANDARD

**SEAMLESS COLD AND WARM-DEFORMED
TUBES
MADE FROM CORROSION-RESISTANT STEEL**

SPECIFICATIONS

GOST 9941-81

Official Edition

**USSR STATE COMMITTEE FOR PRODUCT
QUALITY MANAGEMENT AND STANDARDS
Moscow**

USSR STATE STANDARD

**SEAMLESS COLD AND WARM-DEFORMED TUBES
MADE FROM CORROSION-RESISTANT STEEL****GOST
9941-81****Specifications**OKP (All-Union Product Classification Code) 136700

**Term from 01.01.83
to 01.01.93**

This Standard applies to seamless cold and warm-deformed tubes made from corrosion-resistant steel of general purpose.

1. ASSORTMENT

1.1. Tubes shall be produced according to the outside diameter and wall thickness dimensions specified in table 1.

1.2. Regarding length, the tubes shall be produced of the following types:

tubes of measured length (sized) within limits of unsized length, but no more than those specified in table 1 with the length maximum deviation of +15 mm; by agreement between the manufacturer and the customer the manufacturing of tubes with measured length more than as specified in table 1 shall be allowed;

multiple sized within limits of measured length, with allowance of 5 mm for each cut and maximum length deviation of +15 mm. The minimum divisible length shall be 300 mm;

tubes of unsized length (out-of-tolerance) with wall thickness up to 0.5 mm, from 0.75 m in length up to the values specified in table 1;

tubes with wall thickness from 0.5 to 1 mm, from 1.0 m in length up to the values specified in table 1;

(Amended Wording, Amendment No. 2).

Official Edition

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Revised Edition with Amendments

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Outside diameter, mm	Length of tubes, m, no more than, for wall thickness, mm																		
	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.4	1.5	1.8	2.0	2.2	2.5	2.8	3.0	3.2	3.5	4.0
60	-	-	-	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7
63	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
65	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
68	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
70	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
73	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
75	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
100	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
102	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
108	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
110	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
120	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7	7	7
130	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7
140	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7
150	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7	7	7
160	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7
170	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7
180	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7
200	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7	7	7
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	7	7	7
273	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1. The requirements for thin-wall tubes with the ratio $D/s \geq 40$ regarding technical characteristics and maximum deviations of dimensions shall be stipulated by specifications and technical documentation.

2. The tubes made from steel of grades 12X17, 08X17T and 15X25T shall be produced with the outside diameter no less than 21 mm and the tubes made from alloy 06XH28MДТ shall be produced with the outside diameter of 14 to 85 mm and wall thickness of 1 to 5 mm.

3. The mass of one meter of length shall be calculated in kilograms using the formula

$$M = \frac{\pi}{1000} \cdot (D - s) \cdot s \cdot \rho$$

where D is nominal outside diameter, mm;
 s is nominal wall thickness, mm;
 ρ is density of metal, g/cm³, depending on grade of steel in compliance with table 3

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tubes with the wall thickness of 1.0 mm and more shall be of length from 1.5 to 12.5 m;
by agreement between the manufacturer and the customer manufacturing tubes of length more than 12.5 m shall be allowed.

By agreement between manufacturer with a customer the tubes up to 25 mm in diameter shall be produced up to 16 m long.

1.3. In a batch of tubes of non-measured length there shall be allowed no more than 6 % of tubes of the following length:

- from 0.5 to 0.75 m for wall thickness up to 0.5 mm;
- from 0.75 to 1 m for wall thickness from 0.5 to 1 mm;
- from 0.75 to 1.5 m for wall thickness of 1 mm and more.

(Amended Wording, Amendment No. 1).

1.4. Maximum deviations of tubes for outside diameter and wall thickness shall not exceed values specified in table 2.

Table 2

Dimensions of tubes, mm	Maximum deviations for manufacture accuracy		
	usual	increased	high
For outside diameter			
For diameter: from 5 to 10	±0.3 mm	±0.2 mm	±0.15 mm
over 10 to 30	±0.4 mm	±0.3 mm	±0.2 mm
over 30 to 95	±1.2 %	±1.0 %	±0.8 %
over 95	±1.0 %	±1.0 %	±0.8 %
For wall thickness			
For a wall 0.2	±0.05 mm	±0.03 mm	—
from 0.3 to 0.4	±0.07 mm	±0.05 mm	—
from 0.5 to 0.6	±0.10 mm	±0.07 mm	—
from 0.7 to 1	±0.15 mm	±0.10 mm	—
over 1 to 3	+12.5 % -10.0 %	±12.5 %	+12.5 % -10.0 %
over 3 to 7	±12.5 %	+12.5 % -10.0 %	±10 %
over 7	+12.5 % -10.0 %	±10 %	—

Table 2 (cont.)

Dimensions of tubes, mm	Maximum deviations for manufacture accuracy	
	usual	high
For tubes with dimensions surrounded by broken line in table 1		
For outside diameter	$\pm 1.2\%$	$\pm 1\%$
For wall thickness		
For a wall: from 1.5 to 2.5	15 %	$\left. \begin{array}{l} +12.5 \\ -10.0 \end{array} \right \%$
over 2.5 to 4	$\left. \begin{array}{l} +12.5 \\ -10.0 \end{array} \right \%$	$\pm 12.5\%$
For tubes made from alloy of grade 06XH28MДТ		
For outside diameter		
For diameter: up to 30	± 0.45 mm	—
over 30	$\pm 1.2\%$	—
For wall thickness		
For a wall: up to 3	$\pm 15.0\%$	—
over 3	$\pm 12.5\%$	—

At the customer's request the tubes shall be produced with combined maximum deviations for diameter and wall thickness.

1.5. At the customer's request the tubes shall be produced in compliance with the inside diameter and wall thickness. The maximum deviations for inside diameter shall be stipulated by agreement between the manufacturer and the customer.

1.6. The ovality of tubes shall not cause tube diameter to deviate above the maximum deviations of the outside diameter.

1.7. The curvature of tubes at any part 1 m long shall not exceed:

1 mm for tubes 5 mm and more in diameter, with the wall thickness of 0.5 mm and more;

2 mm for tubes more than 15 mm in diameter, with wall thickness less than 0.5 mm.

The standards of curvature shall not be regulated for tubes less than 15 mm diameter with wall thickness less than 0.5 mm and these tubes shall not have kinks.

1.8. The ends of tubes shall be cut at right angles and stripped of burrs; chamfer and roughness caused during their removal shall be allowed. At the customer's request there shall be a chamfer for welding at the ends of tubes with the wall thickness more than 5 mm.

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Examples of identification numbers

A tube with the outside diameter of 25 mm, wall thickness of 2 mm, of usual accuracy of manufacture, of non-measured length, made from steel of grade 12X18H10T:

Труба 25×2-12X18H10T ГОСТ 9941-81

The same as above, but of high manufacture accuracy (B) with divisible (кр) length (m) to 1,000 mm:

Труба 25×2×1 000 кр-12X18H10T ГОСТ 9941-81

The same as above, but of usual manufacture accuracy and measured length (m) of 3,000 mm:

Труба 25×2×3 000 м-12X18H10T ГОСТ 9941-81

The same as above, but of usual manufacture accuracy and measured length of 3 000 mm with excess:

Труба 25×2×3 000 м-12X18H10T 9941-81

The same as above, but of extended manufacture accuracy (B) 3 000 mm long and produced in compliance with inside diameter (BH) and wall thickness.

(Amended Wording, Amendment No. 2).

2. TECHNICAL REQUIREMENTS

2.1. The tubes shall be produced in compliance with the requirements of this Standard and production schedules approved in compliance with the established procedure.

2.2. The tubes shall be produced from steel of grades (types) specified in table 3, with chemical composition in compliance with GOST 5632-72.

It shall be allowed to produce tubes with microadding of rare-earth metals.

The contents of sulfur in steel for tubes, liable to be welded, shall not exceed 0.02 %.

(Amended Wording, Amendment No. 3).

2.3. The tubes shall be heat treated. At the customer's request the tubes may be produced without heat treatment and clarification of surface. The standards of mechanical characteristics and curvature of tubes without heat treatment shall be stipulated by agreement between the manufacturer and the customer.

2.4. The mechanical properties of tubes shall comply with those specified in table 3.

The yield stress for tubes made from steel of grade 12X18H10T shall be no less than 216 N/mm² (22 kgf/mm²).

Table 3

Steel grade	Point of maximum load δ_B , N/mm ² (kgf/mm ²)	Elongation δ_5 , %	Density ρ , g/cm ³
	No less than		
08X17T	372 (38)	17	7.70
08X13	372 (38)	22	7.70
12X13	392 (40)	22	7.70
12X17	441 (45)	17	7.70
15X25T	461 (47)	17	7.60
04X18H10	490 (50)	45	7.90
08X20H14C2	510 (52)	35	7.70
10X17H13M2T	529 (54)	35	8.00
08X18H12Б	529 (54)	37	7.90
10X23H18	529 (54)	35	7.95
08X18H10	529 (54)	37	7.90
08X18H10T	549 (56)	37	7.90
08X18H12T	549 (56)	37	7.95
08X17H15M3T	549 (56)	35	8.10
12X18H10T	549 (56)	35	7.95
12X18H12T	549 (56)	35	7.90
12X18H9	549 (56)	37	7.90
17X18H9	568 (58)	35	7.90
08X22H6T	588 (60)	20	7.60
05XH28MДТ	490 (50)	30	7.96

The standards of yield stress for tubes made from steel of grades 12X18H12T, 10X17H13M2T and 08X18H10T shall be stipulated by agreement between the manufacturer and the customer.

(Amended Wording, Amendments Nos. 1, 2, 3 and 4).

2.5. At the customer's request the tubes shall withstand the test for stretching at a temperature of 350 °C.

The standards for point of maximum load and yield stress shall be stipulated by agreement between the manufacturer and the customer.

(Amended Wording, Amendments Nos. 2 and 4).

2.6. The outside and inside surfaces of tubes shall be without scabs, fissures, laps and cracks. The removal of defects by local stripping, complete or local grinding, boring and turning shall be allowed provided that the extent of boring, turning and complete grinding do not change the diameter and wall thickness above the negative maximum deviations, and local stripping and grinding do not change the wall thickness above the negative maximum deviations specified in table 2.

There shall be allowed sparse scabs, marks, rippling, scratches and dents without stripping provided that they do not change the wall thickness above the negative maximum deviations.

At the customer's request sparse scabs shall be stripped.

(Amended Wording, Amendment No. 3).

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2.7. The surface of tubes shall be light. The mat surface with gray tint caused by method of production and grade of steel shall be allowed.

It shall be allowed to produce tubes without the subsequent etching after heat treatment in protective atmosphere or vacuum with temper colors on a surface.

2.8. At the customer's request the tubes made from steel of grades (types) 12X18H10T, 12X18H12T, 12X18H9, 17X18H9, 04X18H10, 08X20H14C2, 10X17H13M2T, 08X18H12Б, 10X23H18, 08X18H10T, 08X18H10, 08X18H12T, 08X17H15M3T, and 06XH28MДТ shall withstand flattening up to receipt of distance (H) in millimeters between the flattening surfaces, calculated using the formula

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

where s is nominal wall thickness, mm;
 D is nominal outside diameter, mm

or expansion up to increase of outside diameter by 10 % with aid of swage with tapering angle of 30 °; it shall be allowed to use swages with tapering angle of 6 and 12 °.

2.9. At the customer's request the tubes shall withstand hydraulic pressure in compliance with the requirements of GOST 3845-75 upon permissible strain equal to 40 % of maximum load point for the given grade of steel. Ability of tubes to withstand hydraulic pressure shall be provided by the production technology.

2.10. The tubes made from steel of grades 10X17H13M2T; 08X17H15M3T, 08X22H6T, 04X18H10, 08X18H10, 08X18H10T, 12X18H10T, 08X18H12T, 12X18H12T, 12X18H9, 08X18H12Б and alloy 06XH28MДТ shall not have propensity to intergranular corrosion.

2.11. At the customer's request the tubes shall pass the ultrasonic test. The dimensions of artificial flaw shall be stipulated by agreement between the manufacturer and the customer.

3. ACCEPTANCE PROCEDURE

3.1. The tubes shall be accepted in batches.

A batch shall consist of tubes of one dimension regarding diameter and wall thickness, one grade of steel and one type of heat treatment, and at the customer's request of one smelt, and accompanied by one quality certificate in compliance with GOST 10692-80 with addition: chemical composition in compliance with quality certificate for tube preform, and also information about the heat treatment.

The quantity of tubes in a batch shall be no more than 300 items.

3.2. Each tube shall be subjected to surface, dimension, hydraulic pressure and ultrasonic tests.

3.3. The following quantity of tubes shall be selected for quality control:

two tubes for extension test;

one tube for flattening or expansion test;

two tubes for intergranular corrosion test.

The testing of tubes made from steel of grades 10X17H13M2T, 08X17H15M3T, 08X22H6T, 04X18H9, 08X18H10T, 12X18H10T, 08X18H10, 08X18H12T, 12X18H12T, 12X18H9, 08X18H12Б and 06X28MДТ for propensity to intergranular corrosion, and also determination of yield stress for tubes made from steel of grades 12X18H10T, 12X18H12T and 08X18H10T shall be carried out at the customer's request.

3.4. If test results are unsatisfactory against at least one of indicators, a re-test shall be carried out on twice the number of tubes, taken from the same batch.

The results of re-testing shall be assigned to the entire batch.

4. TEST METHODS

4.1. One sample from each tube selected for control shall be cut for each type of tests.

4.2. The survey of tube surface shall be carried out visually.

4.3. The tube length shall be tested by with a tape measure in compliance with GOST 7502-89.

4.4. The tube curvature shall be tested with a ruler in compliance with GOST 8026-75 and a probe in compliance with specifications and technical documentation 2-034-225-87.

4.5. The diameter and ovality of tubes shall be tested with a plain micrometer of type MK in compliance with GOST 6507-90 and sheet staples in compliance with GOST 18362-73 to GOST 18366-73.

The wall thickness shall be tested with a tube micrometer of type MT in compliance with GOST 6507-90.

4.6. The stretching test shall be carried out in compliance with GOST 10006-80 and GOST 19040-81 (at temperature of 350 °C). The speed of moving of mobile capture shall be no more than 10 mm/min. An excess of test speed up to 40 mm/min after achievement of yield stress is allowed.

It is allowed to carry out the test for mechanical properties by method of hardness in compliance with specifications and technical documentation.

Where disputes arise over the evaluation of results the test shall be carried out in compliance with GOST 10006-80 and GOST 19040-81.

4.7. The expansion test shall be carried out on tubes up to 150 mm inclusive in diameter with the wall thickness of no more than 10 mm in compliance with GOST 8694-75.

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4.8. The tubes made without heat treatment shall not be tested for flattening and expansion and not be tested for propensity to intergranular corrosion.

4.9. The test for flattening shall be carried out on tubes with the wall thickness of no more than 10 mm in compliance with GOST 8695-75.

At the customer's request, the test for flattening shall be carried out on tubes with the wall thickness of no more than 15 % of the outside diameter.

In case of detection on flattened samples of small defects being a result of outside defects, permissible without stripping, it shall be allowed to carry out the re-testing of sample selected from the same tube, with preliminary stripping of a surface to the depth of half of maximum deviations, but no more than 0.2 mm from the side, on which the defects are detected.

(Amended Wording, Amendment No. 1).

4.10. The hydraulic pressure test shall be carried out in compliance with GOST 3845-75 with the keeping of tubes under pressure for no less than 10 seconds.

4.10.1. In place of hydraulic pressure test it shall be allowed to carry out the testing of each tube by non-destructive methods in compliance with GOST 17410-78 and specifications and technical documentation from 01.01.90.

(Subsequently Inserted, Amendment No. 2).

4.11. The ultrasonic control shall be carried out in compliance with GOST 17410-78 and specifications and technical documentation.

4.12. The test for propensity to intergranular corrosion for steels of grades specified in clause 2.10, except for steel of grade 08X22H6T, shall be carried out in compliance with GOST 6032-89. Where disputes arise over the evaluation of results the test shall be carried out in compliance with GOST 6032-89 by method B for alloy 06XH28MДТ and by method AM for others steels.

The test for propensity to intergranular corrosion for steel of grade 08X22H6T shall be carried out in compliance with specifications and technical documentation.

(Amended Wording, Amendment No. 2).

5. MARKING, PACKING, TRANSPORTATION AND STORAGE

5.1. Marking, packing, transportation and storage shall be carried out in compliance with GOST 10692-80.

DETAILS

**1. DEVELOPED AND SUBMITTED by the USSR Ministry of Ferrous Metallurgy
DEVELOPERS**

V. P. Sokurenko (Project Head), L. G. Kovalyova, V. M. Rovenskiy, G. A. Gorovenko

2. APPROVED AND INTRODUCED by Decree No. 5037, dated 19.11.81, of the USSR State Committee for Standards

3. In place of GOST 9941-72

4. REFERENCE DOCUMENTATION

Number of reference document referred to	Number of clause
3845-75	2.9, 4.10
5632-72	2.2
6032-89	4.12
6507-90	4.5
7502-89	4.3
8026-75	4.4
8694-75	4.7
8695-75	4.9
9941-81	1.8
10006-80	4.6
10692-80	3.1, 4.12
17410-78	4.11, 4.10.1
18362-73	4.5
18366-73	4.5
19040-81	4.6
Specifications and technical documentation 2-034-225-87	4.4

5. Term extended by Gosstandart Decree No. 3020, dated 30.06.87, until 01.01.93

6. REVISED EDITION (October 1990) with Amendments Nos. 1, 2, 3 and 4, approved in August 1984, June 1987, June 1988 and August 1988 (IUS (Standards Information Catalog) 11-83, 11-87, 9-88 and 12-88)

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Amendment No. 5 to GOST 9941-81 Seamless Cold and Warm-Deformed Tubes Made from Corrosion-Resistant Steel

Adopted by Interstate Council on Standardization, Metrology and Certification (Protocol No. 18, dated 18.10.2000)

Registered by Interstate Council Standards Bureau No. 3650

Votes in favor:

State	National standards body
Azerbaijan Republic	Azgosstandart
Republic of Armenia	Armgosstandart
Republic of Belarus	Gosstandart of the Republic of Belarus
Republic of Kazakhstan	Gosstandart of the Republic of Kazakhstan
Republic of Kirghizia	Kirghizstandart
Republic of Moldova	Moldovastandart
Russian Federation	Gosstandart of Russia
Republic of Tajikistan	Tajikgosstandart
Republic of Uzbekistan	Uzgosstandart
Ukraine	Gosstandart of Ukraine

Clause 1.8. Examples of identification numbers shall be reworded as follows:

"A tube with the outside diameter of 25 mm, wall thickness of 2 mm, of usual accuracy of manufacture, of non-measured length, made from steel of grade 12X18H10T:

Труба 25×2-12X18H10T ГОСТ 9941-81

The same as above, but of high manufacture accuracy (B), of the length multiple (кp) to 1000 mm:

Труба 25в×2в×1000кp -12X18H10T ГОСТ 9941-81

The same as above, but of usual manufacture accuracy and of measured length (M) of 3000 mm:

Труба 25×2×3000 M - 12X18H10T ГОСТ 9941-81

The same as above, but of extra manufacture accuracy (п), of measured length (M) of 3000 mm:

Труба 25n×2n×3000 M - 12X18H10T ГОСТ 9941-81

The same as above, but of high manufacture accuracy (B), of measured length (M) of 3000 mm and manufactured by internal diameter (BH) and by the wall thickness:

Труба вH 25в×2в×3000 M - 12X18H10T ГОСТ 9941-81"

Clause 2.2. The last paragraph after the text "liable to be welded" shall be supplemented with the text: "and this shall be specified in the order".

Clauses 2.4, 2.10 and 3.3 shall be reworded as follows (except for table 3):

"2.4. The mechanical properties of tubes shall comply with those specified in table 3.

The yield stress for tubes made from steel of grade 12X18H10T shall be no less than 216 MPa (22 kgf/mm²). The standards of yield stress for tubes made from steel of grades 12X18H12T, 10X17H13M2T and 08X18H10T shall be stipulated by agreement between the manufacturer and the customer.

Determination of yield stress for tubes made from steel of grades 12X18H10T, 12X18H12T, 10X17H13M2T and 08X18H10T shall be carried out at the customer's request.

2.10. At the customer's request specified in the order the tubes made from steel of grades 10X17H13M2T; 08X17H15M3T, 08X22H6T, 04X18H10, 08X18H10, 08X18H10T, 12X18H10T, 08X18H12T, 12X18H12T, 12X18H9, 08X18H12Б and alloy 06XH28MДТ shall be resistant against intergranular corrosion

3.3. The following number of tubes shall be selected from a batch for quality control:

two tubes for tension test;

one tube for flattening or expansion test;

two tubes for intergranular corrosion test.

If unsatisfactory results are obtained for even one of the parameters, in the course of testing, a re-testing shall be performed on double the number of tubes selected from the same batch.

The results of re-testing shall be assigned to the entire batch".

Clause 3.4 shall be removed.

Clause 4.3. Replace GOST 7502-89 with GOST 7502-98.

Clause 4.4. Replace GOST 8026-75 with GOST 8026-92, TU 2-034-225-87 with «normative documentation».

Clause 4.5. Replace «GOST 18362-73 to GOST 18366-73» with «GOST 18360-93 and GOST 18365-93».

Clause 4.12 to be reworded as follows:

"4.12. Test for resistance against intergranular corrosion of all grades of steel, except for 06XH28MДТ, shall be carried out by method AM or AMY, and that of alloy 06XH28MДТ — by method BY in accordance with GOST 6032-89. Where disputes arise over the evaluation of test results, the test of all grades of steel, except for 06XH28MДТ, shall be carried out by method AM.

By agreement between the manufacturer and the customer it is allowed to perform the test for resistance against intergranular corrosion of steel grades 12X18H10T and 08X18H10T by method ПТ in accordance with GOST 9.914-91. Where disputes arise over the evaluation of test results, the test shall be carried out by method AM in accordance with GOST 6032-89".

(IUS {Standards Information Catalog} No. 9-2001)