

GOST 8733-74

TITLE : COLD DEFORMED AND HOT DEFORMED
SEALLESS STEEL TUBES

TRANSLATED

AID

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USSR STATE STANDARD

Cold deformed and hot deformed

GOST 8733-74

Seamless steel Tubes

This supersedes

Technical Requirements

GOST 8733-66

Valid upto 01.01.81

(01.01.86 vide ISI 1/80)

The present standard relates to general purpose, cold deformed and hot deformed seamless tubes made out of carbon and alloy steel.

The standard conforms to the CMEA recommendations PC 319-65 on standardisation.

1. TECHNICAL REQUIREMENTS

1.1. Tube dimensions and limit deviations in them must conform to those specified in GOST 8734-76 and GOST 9567-75.

1.2. Depending on quality parameters, tubes must be manufactured to the following groups:

B (B) - with standardised chemical composition, out of killed steel of various grades conforming to GOST 1050-74, GOST 4543-71 and GOST 19282-73;

B (V) - with standardised mechanical properties as indicated in Table 1 and with standardised chemical composition, made out of various grades of steel conforming to GOST 1050-74, GOST 4543-71 and GOST 19282-73;

Г (G) - with standardised mechanical properties, checked on heat treated specimens and with standardised chemical composition, made out of various grades of steel conforming to GOST 1050-74, GOST 4543-76 and GOST 19282-73. The norms for mechanical properties must conform to the requirements of the appropriate standards relating to the steel.

A (D) without standardised mechanical properties or chemical composition but with standardised hydraulic test pressure;

E - after special heat treatment. Steel grades, heat treatment schedules and norms for mechanical properties are defined in documentation approved in the established manner.

Table 1

Steel Grades	Ultimate tensile strength σ_b kgf/mm ²	Yield limit σ_r kgf/mm ²	Relative elongation δ_5 $\frac{\delta}{5}$	Brinell hardness for wall thickness over 10 mm	
	Not less than			Diameter of impression mm, not less than	Hardness number H_B , not more than
10	35	21	24	5,1	137
20	42	25	21	4,8	156
35	52	30	17	4,4	187
45	60	33	14	4,2	207
10 F 2	43	25	22	4,3	197
15X	42	--	19	4,5	179
20X	44	--	17	4,5	179
40X	63	--	14	4,1	217
30X F OA	50	--	18	4,0	229
15XM	44	23	21	---	---

Note : Mechanical properties of tubes made out of steel of grades not shown in Table 1 and the norms for impact strength and relative reduction for steel of all grades are defined by mutual consent between manufacturer and supplier.

1.3. Tubes are subjected to heat treatment as part of their manufacturing process. Tubes with ratio of outside diameter D to wall thickness s equal to 50 or more are supplied without heat treatment. Heat treatment is skipped in other cases at customer's request. When tubes are supplied without heat treatment, the norms for mechanical properties are defined by mutual consent.

Note : Tubes with D/s ratio equal to or more than 50 may be supplied after heat treatment by mutual consent.

1.4. Cracks, scabs, tears, cavities and overlaps are not permitted on the surface of tubes.

Minor individual dents and scales (and marks left by scales peeling off) which do not interfere with inspection, dents and traces left after straightening and grooves and traces left after dressing to remove defects are permitted if they do not result in limit deviations being exceeded.

Note : Additional requirements are defined by mutual consent for tubes intended for the manufacture of parts by machining.

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1.5. Scales must be removed from the surface of tubes at customer's request.

1.6. Tube ends must be cut at right angles and cleaned to remove burrs; formation of clamfers as part of deburring is permissible.

1.7. If the customer so stipulates, tubes of wall thickness 5 mm or more intended to be welded must be chamfered at both ends leaving an end ^{ring} 1 to 3 mm long.

1.8. Tubes of all kinds operating under pressure (The order should specify the operating conditions for the tubes) must withstand a hydraulic test pressure (P_1) in kgf/cm^2 as calculated using the formula given in GOST 3845-75, where R is the permissible pressure equal to 40% of the ultimate tensile strength for the particular grade of steel in kgf/cm^2 .

The hydraulic test pressure for tubes as supplied must be guaranteed by the manufacturing concern upto 1.1.1980.

(REVISED EDITION - I.S.I. 10. 4, 1976)

1.9. Heat treated tubes made of steel grades 10, 20 and 15XM (15KhM) must, if so stipulated in the customer's order, (15CrMo) withstand one or more of the technological tests enumerated in clauses 1.10 to 1.13, depending on the purpose and operating conditions for the tubes.

1.10. Tubes must withstand a bend test.

1.11. Tubes of diameter not exceeding 160 mm and wall thickness not exceeding 8 mm must withstand an expansion test on a 1:10 taper mandrel till the outside diameter increases upto the value shown in Table 2

Table 2

Steel Grade	Increases in outside diameter of tube, % for wall thickness, mm.	
	upto 4	over 4
10	1	6
20, 15XK	3	5

1.12. Tubes of diameter 22 mm and over and wall thickness not exceeding 10 mm must withstand a flattening test until the distance (H) between the surfaces being flattened, in millimetres attains the value calculated using the formula $H = \frac{1.08 S}{0.08 + \frac{S}{D}}$

where S is the nominal wall thickness,

D is the nominal outside diameter, of the tube, mm.

1.13. Tubes with outside diameter not less than 160 mm must withstand a flange bending test if their wall thickness is not more than 10% of the outside diameter for tubes of outside diameter over 60 upto 108 mm, not more than 6% of the outside diameter for tubes of outside diameter over 108 upto 140 mm and

not more than 5% of the outside diameter for tubes of outside diameter over 140 upto 140 mm.

The width of the flange being bent, measured from the inside surface of the tube must be not less than 12% of the inside diameter of the tube and not less than 1.5 times the wall thickness.

Flange bending angle must be:

90° - for tubes made out of grade 10 steel;

60° - for tubes made out of grade 20 and 15XM steel.

1.14. Documents are drawn up as in GOST 10692-73 (in force till 01.01.1979).

2. ACCEPTANCE RULES

2.1. Tubes are presented for acceptance in batches.

A batch must consist of tubes of a single size, made out of a single grade of steel, subjected to the same kind of heat treatment and accompanied by a single quality certificate.

The number of tubes in a batch must not exceed;

400 nos - for tubes of diameter not more than 76 mm and with wall thickness not more than 2.5 mm;

200 nos - for tubes of other dimensions.

The above batch size limits may be increased to 600 and 300 nos respectively.

2.2. If the customer so stipulates, a batch must consist of tubes manufactured from a single melt.

2.3. Each tube must be inspected and subjected to dimensional checks.

2.4. Chemical composition of tubes is accepted on the basis of the blank manufacturer's quality certificate, chemical analysis is conducted in the event of difference of opinion.

2.5. Two tubes are selected from a batch for checking conformity of tubes in respect of all parameters except hydraulic tests (clause 1.18) and hardness test.

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2.6. Two percent of the tubes in a batch (subject to a minimum of two tubes) are tested to check hardness.

2.7. The ^{manufacturer} customer carries out periodic determination of yield limit and Brinell hardness in terms of the customer's order.

2.8. Each tube must, if so stipulated by the customer, be tested at a pressure of P_1 in kgf/cm^2 as calculated using the formula given in GOST 3845-75 but not exceeding 200 kg f/cm^2 .

Tubes may be tested at pressures exceeding 200 kg f/cm^2 by mutual consent.

As an alternative to hydraulic testing, the manufacturer may inspect each tube by a non-destructive testing method which ensures conformity of the tubes with the norms for hydraulic test pressure (P_1) in kg f/cm^2 calculated using the formula given in GOST 3845-75.

2.9. If unsatisfactory test results are obtained in respect of even a single parameter, the particular test is repeated on twice the number of samples drawn from the same batch.

Results of the repeat test are final and applicable to the whole batch.

3. METHODS OF TESTING

3.1. A single specimen is cut out from each tube selected from a batch.

3.2. Tubes are inspected without using special instruments. Depth of defects is checked by filling or ^{any} other method.

Special instruments may be used for inspecting geometric dimensions and surface quality of tubes.

3.3. Chemical analysis of steel used in tube making is conducted in accordance with ^{GOST 22536.0-77 to} GOST 22536.6-77, GOST 12344-66 to GOST 12346-66, GOST 12347-77, GOST 12348-66 to GOST 12365-66 and GOST 20560-75.

Samples for determining chemical composition of steel used in tubes are selected in accordance with GOST 7565-73.

3.4. Tensile test is carried out in accordance with GOST 10006-73 on longitudinal (in the form of a strip or cut piece of tube) proportional short testpiece.

The test speed for test pieces in the form of strips should not exceed 10 mm/min upto yield limit and 40 mm/min beyond yield limit.

3.5. Hardness test is conducted in accordance with GOST 9012-59 at both ends of a tube.

Hardness test is conducted at one end of tubes heat treated in continuous furnaces.

Hardness may be tested on specimens intended for tensile testing.

Nondestructive testing methods may be used for checking hardness.

3.6. Hydraulic test of tubes is conducted in accordance with GOST 3845-75 with a holding time of 10 seconds under pressure.

3.7. Bend test on tubes is carried out in accordance with GOST 3728-78.

3.8. Expansion test on tubes is carried out in accordance with GOST 8694-75.

3.9. Flattening test on tubes is carried out in accordance with GOST 8096-75.

If very fine tears or other minor defects are noticed on flattened test pieces, the flattening test may be carried out on another test piece drawn from the same tube after removing a surface layer (internal and external) from the test piece to a depth not exceeding 0.2 mm.

3.10. Flange bending test on tubes is conducted in accordance with GOST 8693-53.

4. MARKING, PACKING, TRANSPORT AND STORAGE

4.1. Marking, packing, transport and storage are done in conformity with GOST 10692-73 (in force till 01.01.1979)
