

Table 6 contd.

Brass grade	Manufacturing process and material condition	Rod diameter, mm	Ultimate tensile strength σ_B , kgf/mm ²	Relative elongation δ_{10} , %
ЛС 63-3	Drawn hard	3-9.5 10-14 15-20	60 55 50	1 1 1
	Drawn medium hard	10-20	36	12
Л0 62-1	Extruded	10-160	37	20
	Drawn medium hard	3-50	40	15
ЛКС 58-1-1	Extruded	10-160	30	20
	Drawn medium hard	3-50	45	10
ЛМ 58-2	Extruded	10-160	40	25
	Drawn medium hard	3-12 over 12-50	45 42	20 20
ЛЖМ 59-1-1	Extruded	10-160	44	28
	Drawn medium hard	3-12 over 12-50	50 45	15 17
ЛАЗ 60-1-1	Extruded	10-160	45	18

74
GOST 2060-73 Page 9 178

Notes:

1. Mechanical properties of extruded and drawn rods made out of Л 60 grade and drawn rods out of Л 63 and Л С59-1 are optional for one year from the introduction of this standard.

2. Relative elongation may be reduced to 20 abs. % for rods extruded from ЛЖМ 59-1-1 grade alloy, provided the sum of the absolute values of σ_B and δ_{10} is not less than 72 ($\sigma_B + \delta_{10} \geq 72$).

3. Reference annexure 6, lists hardness of rods.

2.13 Reference annexure 8 lists suggested application areas for different grades of brass.

10/32

3. Acceptance Rules

3.1 Rods are presented for acceptance in batches. A batch must consist of rods of a single grade of brass, of a single size, ^{and} of the same accuracy, manufacturing process and material condition.

A batch should not weigh more than 3000 kg.

3.2 Every rod of a batch must be inspected for surface quality. Dimensional checks are carried out on 10 % of the rods.

3.3 Five rods are selected from a batch for checking twist. If the batch consists of less than 5 rods all of them are inspected for twist.

3.4 Every extruded rod of a batch is checked for internal defects at the end leaving the press.

Two drawn rods from a batch are selected for checking for internal defects. This check is carried out at both ends of drawn rods.

3.5 Two rods from a batch are drawn for checking mechanical properties and residual tensile stresses.

One testpiece from each selected rod is taken for each of these tests.

3.6 The customer selects two rods from a batch for checking chemical composition. The manufacturer may check chemical composition of the molten metal.

3.7 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.

The repeat test results are final and applicable to the whole batch.

4. Testing Methods

4.1 Rod surface is inspected without using magnifying devices.

4.2 Rod dimensions are checked by means of measuring instruments providing the necessary accuracy. Fillet radius on longitudinal edges is determined by means of master specimens (radius gauge).

4.3 Twist in rods is measured by the lag in one of the four sides of the rod placed with this side on a surface plate, using a feeler gauge.

4.4 Nondestructive testing methods are used for detecting internal defects as described in annexure 7.

Check for internal defects may also be done by fracture examination. The fractured end of rods need not be trimmed for supply.

The rod may be notched on one side or both for making the fracture which must pass through the central part of the rod.

Fracture width must be:

not less than 60% of the diameter - for rods of diameter upto and including 16 mm and not less than 10 mm for rods of diameter over 16 mm.

The fracture must be inspected with the naked eye unaided by magnifying devices.

4.5 Tensile test on rods is carried out in accordance with GOST 1497-

Test pieces for the tensile test are prepared with diameter 5,8,10 or 15 mm (nearest smaller diameter) depending on the rod diameter.

Annexure 1 indicates the place from where testpieces are to be cut depending on the cross-section of the rod.

4.6 Chemical composition of rods is determined in accordance with

4.7 Stress-relieving is part of production technology.

Annexure 2 describes the procedure for checking residual tensile stresses to be used in the event of arbitration.

5. Packing, Marking, Transport and Storage

5.1 Rods of diameter less than 5 mm are packed in wooden boxes, sack cloth or coarse canvass.

Rods of diameter 5 to 35 mm inclusive are tied up in bundles. Rods of diameter over 35 mm are not tied up in bundles.

Drawn tubes of diameter upto and including 10 mm and made to high or improved accuracy are packed in sack cloth or coarse canvass at customer's request.

The weight of a single package should not exceed 3000 kg.

Notes, Other types of packing may be adopted by mutual consent.

5.2 A metallic or wooden tag containing the following particulars should be fastened to each bundle:

- a) manufacturer's name or trade mark;
- b) conventional designation of rod;
- c) batch number and
- d) ^{Designation} number of the present standard.

5.3 The alloy grade and batch number must be punched on the end face of each rod despatched loose and unpacked.

5.4 Every batch of rods must be accompanied by a certificate attesting conformity of the quality with the requirements of the present standard and containing the following particulars:

- a) manufacturer's name or trademark;
- b) alloy grade;
- c) rod size;
- d) material condition;
- e) manufacturing process;
- f) manufacturing accuracy;
- g) test results (at customer's request);
- h) batch number;
- i) net weight of batch and
- j) number of the present standard.

13/32

5.5 The following conventional designations may be used for marking rods of different alloys.

Alloy grade	Designation
Л 60	Л 60
Л 63	Л 63
Л 63 non-magnetic	Л 63A
Л С59-1	М
Л С59-1 non-magnetic	МА
Л С63-3	Л 63-3
Л С63-3 non-magnetic	Л 63-3A
Л О62-1	Л О
Л Ж С58-1-1	Л Ж С
Л М Ц 58-2	Л М
Л Ж М Ц 59-1-1	Л Ж М
Л А Ж 60-1-1	Л А Ж

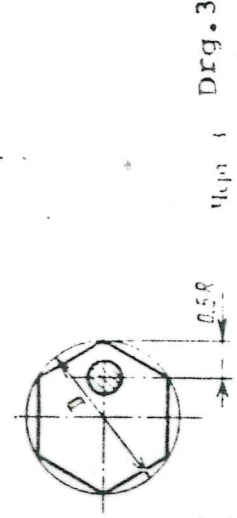
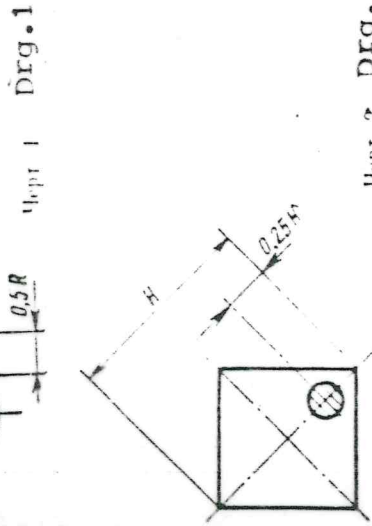
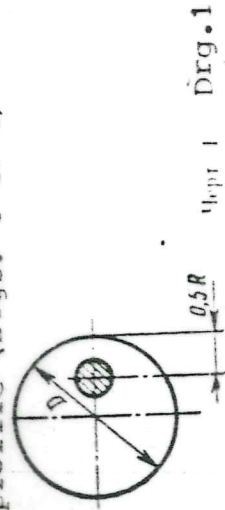
5.6 The letter "O" is added after the size on the tag and in documents in the case of rods intended for machining on automats.

5.7 Rods in transit and storage must be protected against mechanical damage and action of moisture and active chemicals.

Annexure 1

SELECTION OF TESTPIECES FOR TENSILE TEST

Nomenclature of semi-finished article	Direction	Length of article	Place of cutting in relation to	Cross-section of article
Rods (rounds, squares and hexagons)	Along	Any		<p>For sections upto 80 mm^2 the entire section makes up the specimen.</p> <p>For sections over $80 \text{ up to } 700 \text{ mm}^2$ the centreline of the testpiece must approximately coincide with that of the rod.</p> <p>For sections over 700 mm^2 upto 2000 mm^2 the centreline of the testpiece must pass at a distance of approximately $1/2$ the radius from the surface or $1/4$ the diagonal from a corner of the profile (Drags. 1 to 3)</p>

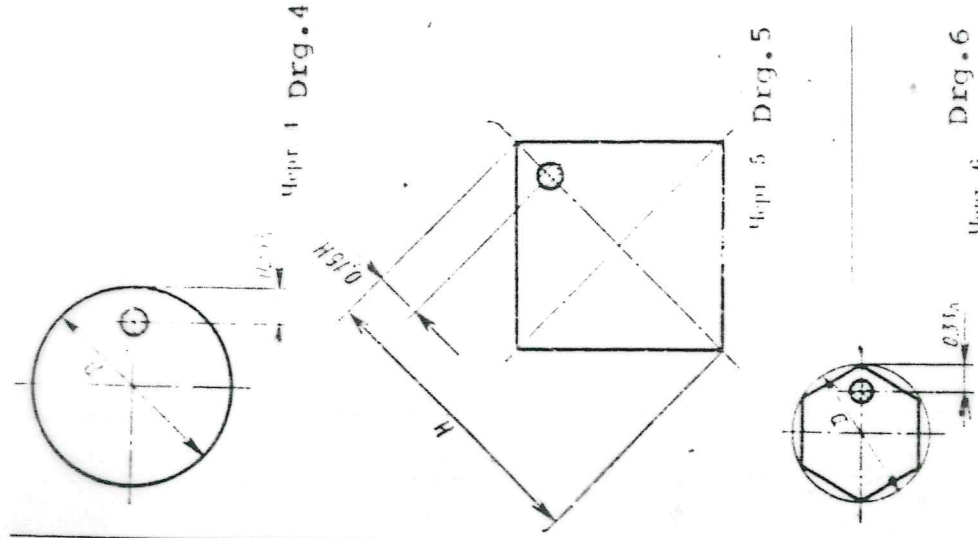


Черт. 2 Дрг. 2

Черт. 3 Дрг. 3

- 15/32

Nomenclature of semi-finished article	Place of cutting in relation to		Cross-section of article
	Direction	Length of article	
			For sections over 2000 mm^2 the centre line of the testpiece must pass at a distance of approximately $1/3$ the radius from the surface or $1/6$ the diagonal from the corner of the profile (drgs. 4 to 6)



Примечание. Допускается готовить цилиндрические образцы по рис. 4 сечением 40-80 мм².

Note: Cylindrical testpieces may be prepared from rods of section $40 \text{ to } 80 \text{ mm}^2$.

TESTING COPPER - ZINC ALLOYS AS SEMIFINISHED ARTICLES FOR
RESIDUAL TENSILE STRESSES

The following is a method for accelerated testing of semifinished products made out of copper-zinc alloys for residual stresses capable of causing corrosion disintegration of the alloy. The test is conducted in mercury nitrate solution.

The method has been developed in conformity with the CMEA recommendations on standardisation.

1. Terms and Definitions

1.1 Corrosion Disintegration - disintegration of material under the combined action of a corrosive medium and stresses (residual or applied).

1.2 Residual stress - stress, remaining in metal as a result of uneven plastic deformation.

2. Solvents Used

2.1 An aqueous solution containing 10 g of HgNO_3 and 10 ml of HNO_3 ($d = 1.40$ to 1.42) in 1 litre of solution.

2.2 The solution is prepared as follows: 11.4 g of $\text{HgNO}_3 \cdot 2\text{H}_2\text{O}$ or 10.7 g of $\text{HgNO}_3 \cdot \text{H}_2\text{O}$ is dissolved in approximately 40 ml of distilled water acidulated with 10 ml of HNO_3 .

After the crystals dissolve completely the solution is diluted with distilled water upto 1000 ml.

76 g of mercury is dissolved in 11.4 ml of dilute 1:1 HNO_3 and water is added gradually upto 1000 ml with constant stirring.

Dissolving in this manner in an excess of acid prevents precipitation of basic mercuric salts.

The solvent obtained in this manner must contain 100 g of HgNO_3 and surplus (30 ml) of HNO_3 in one litre of solvent. ^{17/30}

One hundred ml of this solvent is drawn and 7 ml of 10 % HNO_3 solution is added to it. The volume is brought up to 1000 ml with water and the solvent is ready for use in the test.

Notes:

1. Mercuric nitrate salts are highly poisonous and must therefore be handled carefully. In preparing the solution the weight of crystallised water in the salt must be taken into account. Mercuric nitrate is photo-sensitive and gets transformed into an insoluble form on exposure to light.
2. Loss of HgNO_3 while heating as part of the process of preparing the solvent must be ruled out.

3. Preparation of Testpiece for Testing

- 3.1 The testpieces must be not less than 150 mm long.
- 3.2 Testpieces must not be marked by punching or by any other means likely to set up residual stresses.

Page 16 GOST 2060-73 ⁸⁷ 102

4. Test Procedure

- 4.1 Testpieces are degreased and immersed in a 15 % (by volume) solution of sulphuric acid or a 40 % solution of nitric acid for 30 seconds in order to remove any oxide films.

Immediately after pickling, the testpieces are washed in running water. All traces of water are then removed from their surface and they are immersed in the mercuric nitrate solution (composition given in section 2 above). The test is conducted at room temperature.

The consumption of mercuric nitrate should be not less than 1.5 ml per cm^2 of testpiece surface.

Before immersing the testpieces into mercuric nitrate solution, they are checked for surface defects with a view to excluding defective testpieces from further testing.

If the testpieces are only partially immersed in the solution, the immersed portion must conform to the dimensions specified in section 3 above.

4.2 The testpieces are removed from the solution thirty minutes later and washed in running water. Surplus mercury is removed from their surface. The testpieces are inspected not earlier than 30 minutes after the above test unless a different interval is specified in the technical conditions. If any doubts arise as to cracks, mercury must be removed from the rod surface by heating in a furnace.

Testpieces are examined with a 10 to 18 multiplication lens.

Note: Mercury is highly toxic and appropriate equipment is recommended to be used for removing it. Rubber gloves must be worn while conducting the test.