

GOST : 21931-76
TITLE : Ready-made Tin-Lead Solder
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USSR STATE STANDARD

Ready-made Tin-Lead Solder Specifications

GOST 21931-76

Valid upto 01.01.1983

This supersedes GOST 1499-76 except for ingots

The present standard relates to tin-lead solder in the form of round wire, tape, triangular, round and square rods, round tubes filled with flux, or in powder form, used for tinning and soldering various parts.

This standard takes into account the CMEA recommendations PC 1504-68 on standardisation.

1. ASSORTMENT

1.1. Wire diameters and limit deviations in them must conform to the values shown in Table 1.

1.2. Diameters of round rods, dimensions of sides of triangular and square rods and limit deviations in these must conform to the values shown in Table 2.

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Table 1

mm			
Nominal wire diameter	Limit deviation	Nominal wire diameter	Limit deviations
0,5	±0,05	2,5	±0,12
0,6	±0,06	3,0	±0,15
0,8	±0,08	3,5	±0,17
1,0	±0,10	4,0	±0,17
1,2	±0,09	5,0	±0,17
1,5	±0,10	6,0	±0,18
1,8	±0,10	7,0	±0,20
2,0	±0,10		

Table 2

mm					
Round rods		Triangular rods		Square rods	
Nominal diameter	Limit deviation	Length of side	Limit deviation	Length of side	Limit deviation
8	±0,24	10	±0,30	5	±0,25
10	±0,30	12	±0,36	7	±0,35
12	±0,36	14	±0,42	9	±0,45
				11	±0,55
15	±0,45	16	±0,48	13	±0,55
				15	±0,55

1.3. The rods should be 400 ± 20 mm long.

1.4. Tape dimensions should conform the Table 3 and limit deviations in them to Table 4.

mm

Table 3

Nominal tape thickness	Nominal tape width
0,8 1,0 1,5 2,0 2,5 3,0 4,0 5,0	8-10 5-10; 15

mm

Table 4

Nominal tape thickness	Limit deviation	Nominal tape width	Limit deviation
0,8	$\pm 0,08$	5,0	$\pm 0,5$
1,0	$\pm 0,10$	6,0	$\pm 0,6$
1,5	$\pm 0,10$	7,0	$\pm 0,7$
2,0	$\pm 0,10$	8,0	$\pm 0,8$
2,5	$\pm 0,10$	9,0	$\pm 0,9$
3,0	$\pm 0,12$	10,0	$\pm 1,0$
4,0	$\pm 0,16$	15,0	$\pm 1,0$
5,0	$\pm 0,20$		

1.5. Tube diameters and limit deviations in outside diameter must conform to Table 5.

mm

Table 5

Nominal tube diameter		Limit deviation in outside diameter
Outside	Inside	
1,0	0,5	$\pm 0,05$
1,5	0,7	$\pm 0,07$
2,0	1,0	$\pm 0,07$
2,5	1,2	$\pm 0,07$
3,0	1,5	$\pm 0,09$
4,0	2,0	$\pm 0,12$
5,0	2,5	$\pm 0,16$

Note: Inside diameter of tubes is not inspected.

1.6. Ready-made solder may, by mutual consent between manufacturer and customer, be made in other forms and dimensions.

1.7. The length of a piece of wire, tape and tube must not ^{be less than} exceed 10 m.

1.8. Composition of solder in powder form by grain size must conform to Table 6.

Table 6

Mesh number as per GOST 6613-73	Powder residue on sieve, %, maximum	Passage of powder through sieve, % minimum
008	0.5	--
0071	--	80

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Examples of conventional designation:

[поссы]

Solder in the form of wire of diameter 2 mm, grade POSSU 40-0.5:

Solder : Пp2 ПOCCy 40-0.5 GOST 21931-76

(Pr 2 POSSU 40-0.5 GOST 21931-76)

- Do - in the form of tape of size 1 x 8 mm, grade ПOCC1 (POS 61):

Solder : П1x8 ПOCC1 GOST 21931-76

(L 1x8 POS 61 GOST 21931-76)

- Do - in the form of round rod of diameter ¹⁰~~100~~ mm, grade ПOCCy30-2 (POSSU 30-2):

Solder : Пκ 10 ПOCCy 30-2 GOST 21931-76

(Pκ 10 POSSU 30-2 GOST 21931-76)

- Do - in the form triangular rod of side 14 mm, grade ПOCC 61 (POS 61):

Solder : Пт14 ПOCC 61 GOST 21931-76

(Pt 14 POS 61 GOST 21931-76)

- Do - in the form of a square rod of side 9 mm, grade П000y 61-0.5:
Solder : П KB П000y 61-0.5 GOST 21931-76
(PKV POSSu 61-0.5 GOST 21931-76)
- Do - in the form of tube of outside diameter 4mm, grade П000y 25-2
(POSSu 25-2) with rosin grade A as filler:
Solder T 4A П000y 25-2 GOST 21931-76
(T 4A POSSu 25-2 GOST 21931-76)
- Do - in powder form, grade П000y 30-2 :
Solder Пop П000y 30-2 GOST 21931-76
(Por POSSu 30-2 GOST 21931-76)

2. TECHNICAL REQUIREMENTS

- 2.1. The chemical composition of tin-lead solder must conform to the requirements of GOST 21930-76.
- 2.2. The surface of rods, wires, tapes and tubes must be free from extraneous inclusions and cracks.
- 2.3. The fracture of rods, wires, tapes and tubes must be free from extraneous inclusions and peeling.
- 2.4. Grade A pine rosin and grade B (V) extraction rosin conforming to GOST 19113-73 are used as flux (filler) in tubular solder sticks.

More active fluxes may be used by mutual consent between manufacturer and customer. The flux must constitute $2.5 \pm 0.5\%$ of the tube by weight.

- 2.5. The physical and mechanical properties of various grades of solder have been listed in recommended annexure ¹2 of GOST 21930-76.
- 2.6. Recommended annexure 2 to GOST 21930-76 lists major application areas for tin-lead solder of different grades.

3. ACCEPTANCE RULES

3.1. Solder is accepted in batches.

Each batch must consist of solder of a single grade, a single variety and a single size. The weight of a batch is not limited.

3.2. Visual inspection and dimensional checks are carried out on every bundle, bunch of bundles and coil and on 0.5% of the rods of a batch by weight.

3.3. Sampling scale for check of chemical composition of solder is:

0.5% of the bundles of wire, tape or tubes, by weight, subject to a minimum of two bundles;

0.05% of the rods by weight, subject to a minimum of five rods.

20% of all the tins of solder powder in a batch, subject to a minimum of five tins.

3.4. 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 results of the repeat test are applicable to the whole batch.

4. METHODS OF TESTING

4.1. Visual inspection of the surface of rods, wire, tapes and tubes is carried out without the use of magnifying devices.

4.2. Pieces of length 10 to 15 cm are cut from the end of wires, tubes and tapes in bundles and coils for selecting an average sample. The sample is obtained by turning the entire cross section or by milling the ends. Rods are milled in three places in the centre and at a distance of one quarter of the length from the two ends. The surface of the solder sticks must be cleaned to remove dirt and oxides.

At the manufacturing concern, sample for chemical analysis may be drawn during production from tube-blanks of 8 to 12 mm diameter and the test results applied to the batch of tubes of different diameters manufactured from these blanks. In this case the flux content is determined batch-wise.

The filings obtained as above are passed through a magnetic separator and quartered to yield a laboratory sample weighing 200 g. This sample is divided into two parts, one of which is sent for chemical analysis and the other preserved in case differences of opinion arise in evaluating solder quality.

The laboratory sample prepared from tubular solder must be washed to remove all rosin, using alcohol or other solvents.

4.3. A sample of powder is drawn from each selected tin using a sampler inserted to the full depth of the tin in at least three different places. The sample so collected is mixed up and reduced by quartering.

At the manufacturing concern the sample may be drawn by means of an automatic sampler. page - 6

4.4. Diameter of rods and tubes is measured in not less than two mutually perpendicular directions at a single section using any measuring instrument capable of providing the necessary accuracy of measurement.

4.5. Fracture of the solder stick is obtained by cutting a notch to a depth not exceeding one third of the diameter or thickness and breaking the stick at the notch. Fracture is inspected without the use of magnifying devices. Page 6.

4.6. Chemical composition is analysed as in GOST 1429.0-77 to GOST 1429.10-77.

4.7. Composition of the solder by grain size is determined as in GOST 18318-73.

4.8. Flux content (K) in a tube is determined by selecting a sample weighing $m_0 = 20$ g from the end of a bundle (or coil), placing it in a clean porcelain crucible and heating it till it melts completely. It is then thoroughly stirred and cooled. The solidified solder is cleaned to remove flux and washed in alcohol to remove all residues of flux. It is then dried and weighed, obtaining the weight m_1 . Flux content (K) as a percentage is calculated using the formula.

$$K = \frac{m_0 - m_1}{m_0} \cdot 100.$$

The arithmetic mean of test results on three specimens is taken as the final result.

5. MARKING, PACKING, TRANSPORT AND STORAGE

5.1. Wire, tape and tube containing flux are supplied in bundles. Wire of diameter ^{upto} 1 mm and tube containing flux and having diameter upto 1.5 mm inclusive are supplied wound into coils. The net weight of bundles and coils of wire and tubes containing flux must be 1.5 to 15 kg.

5.2. Each bundle must be tightly secured with twine or adhesive tape in at least three places uniformly distributed along the perimeter of the bundle.

5.3. Bundles of wire, tape and tube containing flux, belonging to the same batch may be joined into a large bundle weighing not more than 15 kg.

5.4. Rods are supplied in packets weighing not more than 15 kg.

5.5. Powder is packed ⁱⁿ metallic tins or plastic containers of volume 1, 3, 5 and 10 litres.

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Tins and plastic containers must be sealed at the joint with the lids and at the lateral joints by soldering or rolling.

5.6. A tag is attached to each bundle, coil or large composite bundle of wire, tape or tube and to each packet of rods. The following particulars are indicated on the tag:

- manufacturer's trade mark;
- conventional designation of solder;
- batch number;
- roll number of quality control inspector and
- date of manufacture.

5.7. The following particulars must be indicated in a packing slip placed in each tin or container of solder;

- a) manufacturer's trade-mark;
- b) conventional designation of solder;
- c) batch number;
- d) tin (container) number;
- e) net weight in kilograms;
- f) date of manufacture and
- g) designation of this standard.

A label containing these particulars is also pasted on each tin (container).

State quality mark is stamped in accordance with GOST 1.9-67 in the case of solder which has been awarded the state quality mark.

5.8. Coils, bundles and large composite bundles of wire, tube of diameter upto 2.5 mm and tape of thickness upto 2.5 mm are packed in boxes after wrapping up in paper conforming to GOST 10396-75 or or GOST 2228-75.

Large composite bundles of wire, tube of diameter over 2.5 mm tape of thickness over 2.5 mm and packets of rods must be wrapped in paper conforming to GOST 10396-75 or GOST 2228-75 and tied up with twine or adhesive tape. The rods in a packet must not differ in length by more than 10 mm to avoid tearing of the packet.

5.9. A label containing the following particulars must be fixed to each large composite bundle or box:

- a) manufacturer's trademark;
- b) conventional designation of solder;
- c) batch number and
- d) designation of the present standard.

5.10. Solder may, by mutual consent, be transported in customer's reusable containers, which may be metal boxes or other containers. In this case adjacent layers are interleaved with paper conforming to GOST 10396-75 or GOST 2228-75.

A document containing the particulars listed in clause 5.11 is placed in each packing case (box or container).

Other methods of packing, guaranteeing preservation of the quality of the solder may be used by mutual consent.

5.11. The following particulars must be indicated in the quality certificate accompanying each batch of tin-lead solder:

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- a) manufacturer's trademark;
- b) conventional designation of solder;
- c) batch number;
- d) results of chemical analysis;
- e) net weight in kilograms;
- f) date of ~~manufacture~~ ^{despatch} and
- e) state quality mark as per GOST 1.9-67 for attested solder.

5.12. Tin-lead solder must be transported and stored in conformity with the requirements of GOST 21930-76.

6. SAFETY REQUIREMENTS

6.1. All tinning and soldering operations using tin-lead solder in baths with exposed molten metal surface must be carried out using protective glasses, in order to avoid injury to the operator's eyes.

6.2. Shops and sections where tinning and soldering operations are carried out, must meet the requirements envisaged in the sanitary rules applicable to the construction, equipment and composition of sections in which light parts are soldered using alloys containing lead.