The technical specifications for rebar

The technical specifications apply to the steel reinforcing die-rolled section bars intended for the production of anchors supporting the workings during the erection of independent anchorage or to reinforce the existing anchored support of the development/permanent workings and stopes.

The main parameters and dimensions of the die-rolled section bars

Reinforcing bars are accepted in batches. The batch shall consist of rebar of the same grade and diameter produced from one melting/ladle.

Geometry of the rebar is controlled for 1% of the bars in the quantity of at least two per batch.

The rolled product is an oval bar with transverse periodic protrusions located along a one-way right-hand helical line with a thread pitch and dimensions specified in Fig. 1 and in Table 1

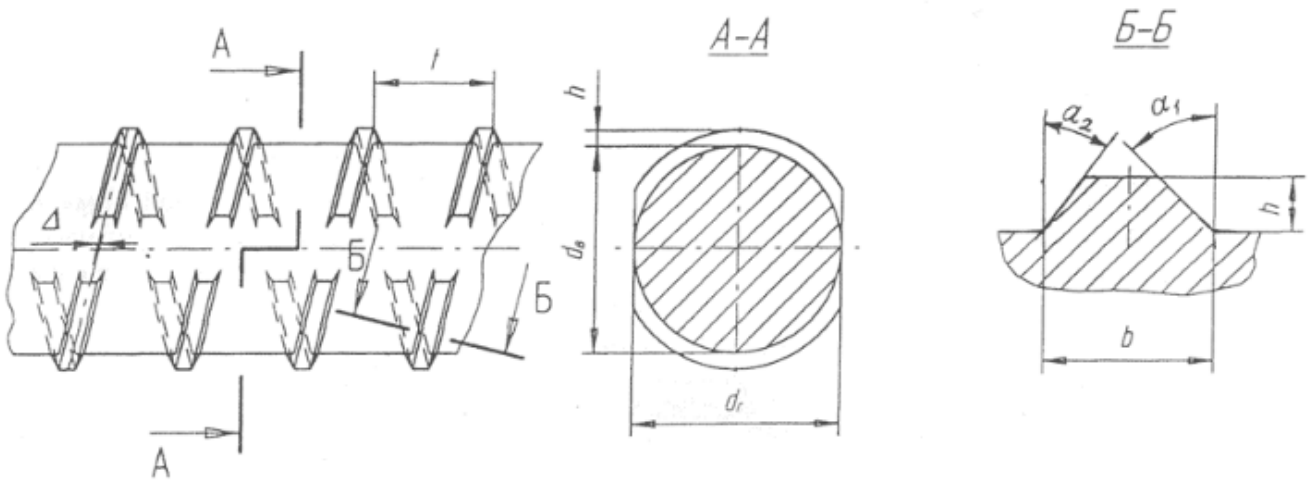

Fig. 1

Table 1

Rolled product (rebar) dimensions according to Fig. 1, mm

	d_o	d_i		d_r		h		t		b	Δ	α_1, deg.	α_2, deg.
		nominal	limit deviation	nominal	limit deviation	nominal	limit deviation	nominal	limit deviation				
Rebar with a thread pitch of 13.2	22	21.3	± 0.3	21.0	± 0.6	1.7	± 0.2	13.2	± 0.2	5.1	± 0.2	40	30
Rebar with a thread pitch of 8	22	21.3	± 0.3	21.0	± 0.6	1.7	± 0.2	8	± 0.2	5.1	± 0.2	40	30

Nominal diameter of the rolled product is 22.0 mm. Cross-section area is 380 mm^2, mass of one meter of rolled product length and allowable deviations in mass are 2.98 kg ± 4.5.

Geometry of the rebar is measured to an accuracy of 0.1 mm. Out-of-roundness of the rolled product (the difference between the largest and smallest diameters in mutually perpendicular directions of one cross-section) is defined as the arithmetic mean value of measurements in two places of selected samples and should not exceed $0.1d_o$. Rolled product dimensions are determined at a distance of at least 0.15 m from the end of the bar or at least 3 m from the end of the bundle. The mass of one meter of bar length is determined as the arithmetic mean value of the mass of two samples weighed to an accuracy of 0.001 kg. The sample length is measured to an accuracy of 0.001 m.

The rolled product surface should be free from cracks, slivers, folds and cavities. It is permissible to have defects that do not prevent the use of rolled product and do not reduce its mechanical and service properties. The surface quality is inspected without using magnifying devices.

The accuracy of the pitch and alignment of the screw protrusions is controlled by screwing the test nut (produced in accordance with Fig. 2 and Table 2) along the entire length of the sample.

The curvature of the bars should not exceed 6 mm per 1 m of measured length.

Reinforcing bar is produced in bars of measured lengths 12 m.

Limit deviations in the length of specific cut-length bars can vary from 0 mm to 100 mm.

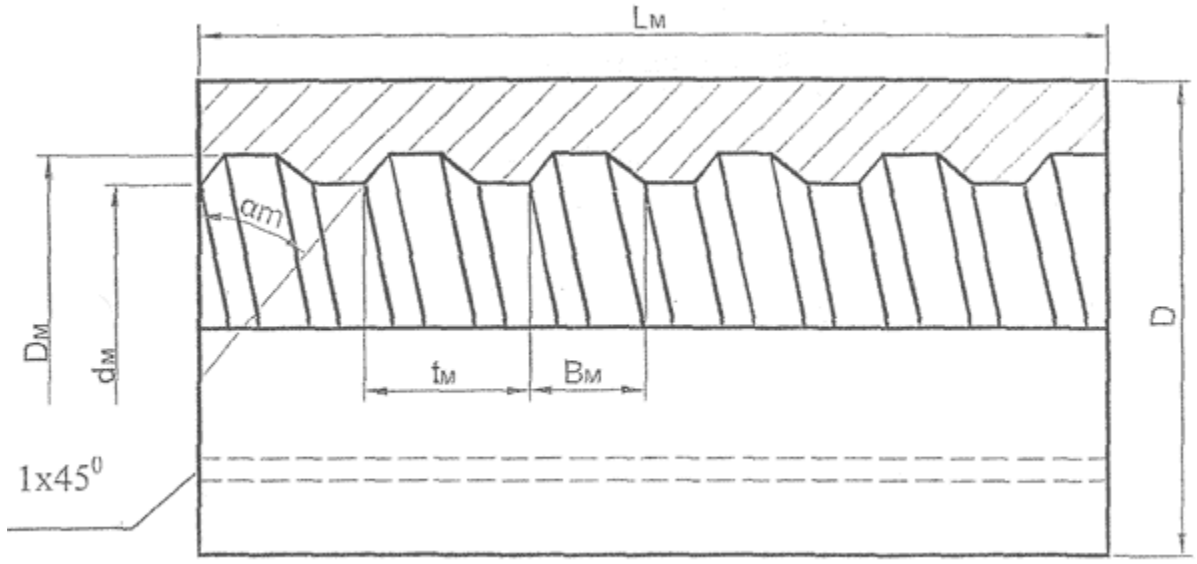

Fig. 2

Table 2

Dimensions of the test nut according to Fig. 2, mm

nominal diameter	d_m	D_m	B_m	t_m	α_m, deg.	L_m

22	22.1	26.4	7.1	13.2	40	120
22	22.1	26.4	7.1	8	40	120

Main parameters and characteristics

Mechanical properties of the die-rolled section bars are as follows:

- usual loadbearing capacity – 250 kN min.;

- tensile strength ($\sigma_в$) – 620 N/mm² min.;

- physical (offset) yield strength ($\sigma_т$) – 500 N/mm² min.;

- elongation after rupture – 20% min.;

- neck contraction ψ – 12% min.;

- out-of-straightness of the bar with respect to the axis – no more than 2 mm per 1 m of its length

Yield strength $\sigma_т$ and tensile strength σ_B are determined using the nominal rolled product area.

Reinforcing bars should withstand a mandrel bend test (mandrel diameter is $3 \cdot d_o$ per 180° angle)

To control the mechanical properties of rebar, two samples are taken from the batch for tensile and bend tests. In the event of unsatisfactory result in at least one parameter, the batch is rejected. Retests are not conducted.

Chemical composition of steel

Reinforcing die-rolled section bars are produced of low-alloy steel, the chemical composition of which should meet the requirements set out in Tables 3 and 4. Two samples from different bars are taken from each batch to determine the chemical composition of finished rolled product.

Table 3

Chemical composition (main elements) of reinforcing steel, %					
	C	Mn	Si	S	P
Ladle sample	0.25 ÷ 0.33	0.90 ÷ 1.30	0.55 ÷ 0.90	0.045 max.	0.040 max.
In the finished rolled product		0.90 ÷ 1.40	0.55 ÷ 0.95	0.050 max.	

Table 4

Chemical composition (other elements) of reinforcing steel (ladle sample and in the finished rolled product), %				
Cr	Ni	Cu	N	As
0.30 max.	0.30 max.	0.30 max.	0.012 max.	0.08 max.

It is allowed to use other steel grades that meet the specified requirements in terms of mechanical properties.

Safety and environmental protection requirements

The level of total activity of natural radionuclides should not exceed 370 Bq/kg.

Marking

Reinforcing bars should have rolling marking with a pitch of no more than 1.5 m in the form of spots, protrusions, other signs or relevant changes in the die-rolled section, indicating:

- procuder;
- reinforcing bar class.

Other marking of reinforcing bars is allowed. The producer should agree on the type of marking with the consumer.

Requirements for the product acceptance and certification

Reinforcing bars are accepted in batches.

The batch shall consist of rebar of the same grade and diameter produced from one melting/ladle.

The producer should confirm in the test report that all samples in the test batch are taken from the same melting/ladle.