

1.2. Wire diameter and tolerances on it should correspond to the values given in table 1.

1.3. Ovality of wire should not exceed half the tolerance on diameter.

Method of calling :

Wire of I category, high accuracy, diameter 1.20 mm :

Wire I-P-1.20 GOST 9882-76 ;

Wire of III category, normal accuracy, diameter 2.0 mm :

Wire III-1.0 GOST 9882-76 .

Table - 1.

Nominal diameter of wire	Tolerances on diameter	
	high accuracy	normal accuracy
0.14		
0.15		
0.16		
0.18		
0.20	± 0.01	± 0.02
0.22		± 0.015
0.25		
0.28		
0.30		
0.32		
0.36		
0.40		
0.45	± 0.015	± 0.02
0.50	± 0.01	
0.56		
0.60		

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Nominal diameter of wire.	Tolerances on diameter	
	high accuracy	normal accuracy
0.63		
0.70		
0.80	+0.02	+0.03
0.90	-0.01	+0.02
1.00		
1.10		
1.20		
1.30		
1.40		
1.50		
1.60		
1.70	+0.02	+0.03
1.80		
1.90		
2.00		
2.10		
2.20		
2.50		
2.80		
3.00		
3.20		
3.50		
3.60		
4.00		
4.20	+0.03	
4.50	-0.02	+0.04
5.00		
5.60		
6.00		
6.30		
6.50	+0.03	+0.05
6.70		
7.00		
7.50		
8.00	+0.04	+0.06

NOTES:

1. On customer's request, it is allowed to

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supply wire of intermediate diameters. In this case, tolerances on diameter should correspond to the values given for the nearest larger diameter.

3. Theoretical weight of wire is given in the appendix.

2. TECHNICAL REQUIREMENTS

2.1. Wire should be fabricated from carbon steel (GOST 1050-74, GOST 1436-74) and also from steel of grades EI-2 and EK-7, whose chemical composition is given in table 2, and from other types of steel of special melt, supplied as per the approved technical documents. In this case, wire of category IIA should be fabricated from steel having sulphur content not exceeding 0.030% and phosphorus content not exceeding 0.035%.

By mutual agreement between customer and supplier, wire may be fabricated from any single pre-determined grade of steel.

2.2. There should not be any cracks, seams, laps, hair cracks, cavities and corrosion on the wire surface.

Lines having depth not exceeding half the tolerance on diameter, and also residues of technological plating (copper, phosphate, borax), applied on the wire surface for preparation of the metal for drawing, are allowed.

NOTES:

1. Wire of IIA category for aviation industry should be supplied without copper-plated surface, provided such an indication is present in the order.

2. Wire of I, II, III categories is supplied without copper-plated surface, if agreed upon mutually by customer and manufacturer.

3a. Norms of mechanical properties for wire of I and II categories without copper-plated surface are set by mutual agreement between customer and manufacturer.

Table 2a

Steel grade	Chemical composition, %						
	Carbon	Manganese	Silicon	Sulphur	Phosphorus	Copper	Cadmium
		max	max	max	max	max	max
KT-2	0.25-0.31	0.20-0.40	0.17-0.37	0.020	0.020	0.05	0.05
3K-7	0.62-0.76	0.50-0.80	0.17-0.37	0.030	0.020	0.05	0.05

2.3. Mechanical properties of the wire should correspond to the norms given in table 3.

Mechanical properties of wire of intermediate diameters should correspond to the norms, given for the nearest larger diameter (see table 3).

2.4. On customer's request, the depth of decarburised layer should not exceed 1.0% of the wire diameter.

2.5. On customer's request, the wire should be fabricated such that it does not break or split after winding 5 turns around a mandrel of diameter, indicated in table 4.

Table - 4a.

Wire diameter, mm.	Relation of mandrel diameter, to wire diameter.
From 0.14 to 4.00	1 d
Above 4.00 to 6.00	2 d
" " 6.00	3 d

2.6. Wire should be supplied in bundles or on spools.

Winding of wire should be done without entangling the turns, and should ensure free (smooth) unrolling of the wire from spools and bundles. The wire should not twist into the form of "figure eight" while untying the bundles.

Table - 3a

HAL (NH)

CARBON STEEL SPRING WIRE

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Wire diameter, mm.	Tensile strength, kg/mm ²		No. of bends, minimum.										No. of twists, minimum.			
	Category I	Category II	Category IIA	Category IIB	Category IIC	Category IIA	Category IIB	Category IIC	Category IIA	Category IIB	Category IIC	Category IIA	Category IIB	Category IIC		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)		
0.14	230-315	235-280	225-270	195-235	-	-	-	-	35	35	35	35	35	35		
0.15	230-315	230-280	225-270	195-235	-	-	-	-	34	34	34	34	34	34		
0.16	230-315	235-280	225-270	195-235	-	-	-	-	33	33	33	33	33	33		
0.18	230-315	235-280	225-270	195-235	-	-	-	-	31	31	31	31	31	31		
0.20	275-310	230-275	225-270	190-230	-	-	-	-	30	30	30	30	30	30		
0.22	275-310	230-275	225-270	190-230	-	-	-	-	29	29	29	29	29	29		
0.25	275-310	230-275	225-270	190-230	-	-	-	-	27	27	27	27	27	27		
0.28	275-310	230-275	225-270	190-230	-	-	-	-	26	26	26	26	26	26		
0.30	275-310	230-275	225-270	190-230	-	-	-	-	23	23	23	23	23	23		
0.32	270-305	235-270	220-265	175-225	-	-	-	-	22	22	22	22	22	22		
0.35	270-305	235-270	220-265	175-225	-	-	-	-	22	22	22	22	22	22		
0.40	255-300	220-265	220-265	170-220	-	-	-	-	20	20	20	20	20	20		
0.45	255-300	220-265	220-265	170-220	-	-	-	-	17	17	17	17	17	17		
0.50	255-300	220-265	220-265	170-220	-	-	-	-	16	16	16	16	16	16		

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
0.55	265-300	220-265	220-265	170-220	-	-	-	-	16	12	27	19
0.60	265-300	220-265	220-265	170-220	-	-	-	-	16	12	25	18
0.63	260-295	220-260	215-260	170-220	-	-	-	-	16	12	25	18
0.70	260-295	220-260	215-260	170-220	-	-	-	-	16	12	25	18
0.80	260-295	215-260	215-260	170-215	11	12	12	12	15	17	24	17
0.90	255-285	215-265	210-255	165-215	10	11	11	11	15	17	24	17
1.00	250-280	210-250	205-250	160-210	9	10	10	10	15	17	24	17
1.10	245-275	205-245	195-240	155-235	8	9	8	8	15	17	24	17
1.20	240-270	200-240	195-240	155-230	7	7	7	7	16	17	24	17
1.30	235-265	200-235	190-230	155-200	19	18	18	18	16	17	24	17
1.40	230-260	195-230	190-230	150-195	17	17	17	17	16	17	24	17
1.50	225-255	190-225	185-220	145-190	15	15	15	15	15	17	24	17
1.60	220-250	180-220	185-220	145-190	13	13	13	13	16	17	24	17
1.70	210-240	180-210	180-210	140-180	11	10	10	11	15	17	24	17
1.80	210-240	180-210	180-210	140-180	10	10	10	11	15	17	24	17
1.90	205-235	180-205	180-210	140-180	8	10	9	10	14	17	23	16
2.00	205-230	180-205	180-210	140-180	8	9	9	10	14	16	23	16
2.10	200-225	175-200	170-200	140-175	7	8	8	9	13	16	22	15
2.20	195-220	170-195	170-200	135-170	6	7	7	8	13	16	21	15

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2.50	185-210	165-190	165-195	180-195	6	7	7	3	12	15	21	15
2.80	180-205	165-190	165-195	130-165	7	9	9	10	11	14	19	14
3.00	175-200	165-190	165-195	130-165	4	5	5	7	10	13	18	13
3.20	175-200	155-180	165-195	125-155	4	5	5	7	10	13	18	13
3.30	170-195	155-180	165-190	125-155	3	5	5	5	8	13	18	13
3.60	170-195	155-180	165-190	125-155	2	5	5	5	7	12	18	13
4.00	265-190	150-175	150-175	120-150	4	6	6	6	6	13	18	13
4.20	160-185	145-170	140-165	115-145	4	5	5	5	6	12	16	12
4.40	155-180	140-165	140-165	115-140	4	5	5	5	6	12	16	12
5.00	150-175	140-165	140-165	115-140	3	4	4	4	4	9	13	9
5.20	145-170	135-160	135-160	110-135	5	6	6	6	4	6	8	6
6.00	145-170	135-160	135-160	110-135	3	6	6	6	2	4	6	4
6.20	-	125-145	-	105-125	-	6	-	6	-	-	-	-
6.50	-	125-145	-	105-125	-	6	-	6	-	-	-	-
6.70	-	125-145	-	105-125	-	6	-	6	-	-	-	-
7.00	-	125-145	-	105-125	-	6	-	6	-	-	-	-
7.50	-	125-145	-	105-125	-	6	-	6	-	-	-	-
8.00	-	125-145	-	105-125	-	5	-	5	-	-	-	-

NOTE:

For wire of diameter less than 0.9 mm, the bending test is substituted by rupture test with knot. In this case, the breaking force with the knot should not be less than 50% of

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breaking force of the same wire in case of testing without the knot.

2. If required by the customer, the difference in values of tensile strength in a bundle for wire of I, II and IIA categories of diameter 1.6 mm and below should not exceed 20 kg/mm², and for wire of diameter more than 1.6 mm - 15 kg/mm².

3. If (during determination of tensile strength at the bundle ends) two different values are obtained, the lesser value is taken into consideration. In this case, the greater value should not exceed the upper limit of tensile strength norm for that particular category, to which the bundle belongs, by more than 5 kg/mm².

This note is not taken into consideration if wire of all diameters belong to category IIA and wire of diameter 2.5 mm and above belong to category II.

4. In case of additional checking for twisting, the regime of low-temperature tempering and the norms of twists after tempering are set by mutual agreement between manufacturer and customer.

The bundle should consist of a single piece of wire.

In a spool there should be more than three wire pieces. Packings should be laid at the end of each wire piece. Instead of marking the wire piece ends, it is allowed to lead out and fix the wire piece tips on catch of the spools.

It is not allowed to lead the wire piece tips on the spool.

2.7. Weight of a wire piece in a bundle or spool should correspond to the values, given in table 5.

Table 5.

Wire diameter, mm.	Weight of wire piece, kg, minimum.
Upto 0.25	0.30
Above 0.25 upto 0.50	1.00
" 0.50 " 1.00	5.00
" 1.00 " 1.50	10.00
" 1.50 " 3.00	20.00
" 3.00	30.00

It is allowed to supply wire pieces of 50% lesser weight in comparison with the values given in table 5. The quantity of wire pieces of lesser weight should not be more than 10% of the batch as regards weight.

3. ACCEPTANCE RULES.

3.1. Wire is supplied in batches. A batch should consist of bundles or spools of wire of identical diameter, same category and same group of accuracy.

3.2. Each bundle or spool of a batch should be checked for dimensions and appearance.

3.3. For checking the mechanical properties, 10% bundles or 20% spools (but not less than 5 bundles or spools) should be taken from a batch of wire selected as per point 3.2. For checking decarburization layer, 3% bundles or spools (but not less than 3) are taken.

3.4. If unsatisfactory test results are obtained even for one of the properties, repeated tests are done for this property on double the quantity of bundles (spools), taken from these bundles and rolls, which have not undergone the test. Results of repeated tests are final and pertain to the whole batch.

4. TEST METHODS.

4.1. One specimen each from both ends (for each type of test) or one specimen from each test spool is taken.

4.2. Checking the diameter and ovality of wire is done by measuring in 2 mutually perpendicular directions of a single section of wire at any place in the bundle.

Measurement of diameter is done with a measuring instrument, which ensures the required measuring accuracy.

4.3. Examination of wire surface is done visually, and in doubtful cases - it is done by using a 5-7 magnifying glass.

Depth of wire defect should be determined by eliminating it by cleaning followed by comparative measurement of the time

at cleaned and uncleaned places. If it is not possible to determine the depth of the defect by cleaning, determination of depth and characteristics of the defect is done by micro-analysis.

4.4. Tensile strength test and rupture test with knot are done as per GOST 10646-83.

4.5. Bending test of wire is done as per GOST 1573-83.

4.6. Twisting test of wire is done as per GOST 1546-83.

The following additional tests of the wire are done with customer's approval :

a) for absence of "peeling-off" during the twisting test. Surficial cracks (helical), along the specimen are formed (like lamination) after twisting;

b) for twisting after low temperature tempering.

4.7. Determination of depth of decarbonization is done as per method M of GOST 1763-83.

4.8. Coiling test of wire is done as per GOST 10447-83.

5. PACKING, MARKING, TRANSPORTATION AND STORAGE.

5.1. Each bundle should be tied with wire at not less than three places, uniformly located on the circumference of the bundle.

Wire bundles of diameter 0.60 mm and below may be tied with the wire ends of the bundle or with string.

Bundles of same category, group and diameter may be tied together.

The end of the top wire piece in a spool should be fixed on the catch.

5.2. Wire should be treated with liquid preserving grease of type NG-203A (GOST 12328-66) or K-17 (GOST 10877-76).

Usage of other types of grease, which ensure protection from corrosion, is allowed. Wire on spools may be supplied in non-lubricated state.

5.3. Wire of diameter 0.20 mm and above on spools, in bundles or coils should be wrapped with wax paper (GOST 9569-66) or single - layer bituminous paper (GOST 515-60) or water-proof paper (GOST 8828-75) or any other packing paper, supplied as per approved technical documentation.

Wire, above the paper, is packed in packing cloth or polymer film.

If packing machines (devices) are used, the wire bundles are packed in reinforced paper KVRB-40 (GOST 10396-75), or in polyethylene film (GOST 10354-73) or PVC film V-118, or in any other polymer film.

The packed bundles or spools should be tied with soft wire or fastened by some other method, which prevents unwinding of bundle or spool.

Spools with wire of diameter less than 0.20 mm should be wrapped with wax paper (GOST 9569-66), or water-proof paper.

(GOST 8828-75), or with any other paper and then laid in a rigid box, lined with water-proof paper.

Loading of wire in containers without packing is allowed.

NOTE : By mutual agreement between both parties, it is allowed to supply wire without packing, or without grease, or without both packing and grease.

6.4. A tag, containing the following details, should be securely fastened to each spool, bundle or coil of wire :

- a) name or trade mark of the manufacturing plant;
- b) method of calling the wire;
- c) stamp (seal) of quality control department.

5.5. Each batch of wire should be furnished with a certificate, which contains the following details :

- a) name or trade mark of the manufacturing plant;
- b) method of calling the wire;
- c) batch no.;
- d) quantity of packing items;
- e) net weight of the wire;
- f) grade of steel;
- g) date of acceptance.

5.6. Transportation of the wire may be done by any means, under conditions which protect the wire from the action of moisture, aggressive mediums, impurities or damage to its packing.

5.7. Wire should be stored in dry rooms under conditions, which prevent the action of moisture or aggressive mediums on the wire.

APPENDIX TO 1967 2362-75

(Reference)

THEORETICAL WEIGHT OF 1000 M WIRE.

Wire diameter, ϕ Cross-sectional area, mm^2 Weight of 1000 M of wire, kg.

(1)

(2)

(3)

0.14	0.0184	0.1506
0.16	0.0177	0.1337
0.18	0.0201	0.1573
0.18	0.0254	0.1924
0.20	0.0314	0.2463
0.22	0.0380	0.392
0.25	0.0491	0.385
0.28	0.0616	0.484
0.30	0.0707	0.655
0.32	0.0834	0.631
0.36	0.1018	0.80
0.40	0.1267	0.99
0.45	0.159	1.25
0.50	0.193	1.54
0.56	0.243	1.93
0.60	0.283	2.22
0.63	0.312	2.45
0.70	0.385	3.02
0.75	0.442	3.47
0.80	0.503	3.95
0.85	0.567	4.43
0.90	0.626	4.90
1.00	0.735	6.17
1.10	0.850	7.45

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(1)	(2)	(3)
1.20	1.131	8.88
1.30	1.327	10.42
1.40	1.523	12.03
1.50	1.727	13.87
1.60	2.01	15.78
1.70	2.27	17.82
1.80	2.64	19.91
1.90	2.84	22.23
2.00	3.14	24.65
2.10	3.46	27.19
2.20	3.80	29.83
2.30	4.15	32.58
2.50	4.91	38.54
2.80	6.16	48.86
3.00	7.07	55.20
3.20	8.04	63.11
3.40	9.06	71.83
3.50	9.62	75.52
3.60	10.13	79.9
4.00	12.57	98.7
4.20	13.25	103.7
4.50	15.90	124.8
5.00	19.63	154.2
5.50	24.63	193.3
6.00	28.3	221.9
6.30	31.7	244.1
6.50	33.2	260.5
6.70	35.3	273.8
7.00	38.3	292.1
7.50	44.2	342.8
8.00	50.3	394.8

Other standards referred to in this standard :

GOST 1050-74;
 " 1579-63;
 " 10447-63;
 " 1560-63;
 " 10396-75;
 " 1435-74;
 " 1545-63;
 " 12392-66;
 " 515-56;
 " 10364-73;
 " 10446-63;
 " 1763-63;
 " 10377-76;
 " 8328-75.

ГОСТ 1050-74