

GOST 6402-70

Title : SPRING WASHERS

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Date: June 1984
July

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USSR STATE STANDARD

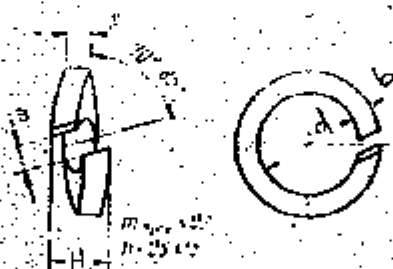
Spring Washers

GOST
6402-70
This supercedes
GOST 6402-61

Valid from 01.01.1972

1. Construction and Dimensions

1.1. Construction and dimensions of spring washers must conform to those shown in drg. 1 and Table 1.



Чер. 1
Drg. 1.

Издание официальное

Перепечатка запрещена

* Переиздание (август 1992 г.) с изменением № 2, опубликованным 1 марта 1973 г.

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Table 1
Таблица 1

1 Номинальный диаметр резьбы болта, винта, стержня	4		4		4		5		6		7	
	2	3	2	3	2	3	2	3	2	3	7	
											2	3
2	2,1	+0,25	—	—	—	—	0,5	±0,07	0,6	+0,07	—	—
2,5	2,6	—	—	—	—	—	0,6	—	0,8	±0,08	—	—
3	3,1	—	±0,07	—	—	—	0,8	—	1,0	—	—	—
4	4,1	+0,30	—	—	—	—	1,2	—	1,4	—	—	—
5	5,1	—	—	—	—	—	1,4	—	1,6	—	—	—
6	6,1	—	—	—	—	—	1,6	—	2,0	±0,125	—	—
8	8,1	+0,58	—	—	—	—	2,0	±0,125	2,5	—	—	—
10	10,1	—	—	—	—	—	2,5	—	3,0	—	—	—
12	12,1	—	—	—	—	—	3,0	—	3,5	—	—	—
14	14,2	+0,70	—	—	—	—	3,5	—	4,0	—	—	—
16	16,3	—	—	—	—	—	4,0	—	4,5	—	—	—
18	18,3	—	—	—	—	—	4,5	±0,15	5,0	—	—	—
20	20,5	—	—	—	—	—	5,0	—	5,5	—	—	—
22	22,5	+0,84	—	—	—	—	5,5	±0,15	6,0	±0,15	—	—
24	24,5	—	—	—	—	—	6,0	—	6,0	—	—	—
27	27,5	—	—	—	—	—	7,0	—	7,0	—	—	—
30	30,5	—	—	—	—	—	8,0	±0,18	8,0	—	—	—
36	36,5	+1,00	—	—	—	—	9,0	—	9,0	±0,18	—	—
42	42,5	—	—	—	—	—	10	—	10	—	—	—
48	48,5	—	—	—	—	—	12	—	12	±0,215	—	—

Nominal dia. of thread.

- 1) Nominal thread diameter of bolt, screw or stud
 2) Nominal; 3) Tolerance; 4) Light washers; 5) Medium washers;
 3) Heavy washers; 7) Extra heavy washers.

Примечание. Для сечения шайб из проволоки 2,5 мм и более допускается увеличение размера S в пределах 10% от номинального размера.

(Измененная редакция — Индекс. указатель стандартов № 3 1973 г.).

Note. Dimension S may be increased by upto 10% over nominal value for the section of washers made out of wire of diameter 2,5 mm and over.

Example of conventional designation of spring washer for bolt, screw or stud of thread diameter 12 mm ;

light washer out of bronze grade E_p KM3-1 without plating:

Washer 12 E_p KM3-1 GOST 6402-70

medium washer out of steel grade 65Г cadmium-plated to 9 microns thickness:

Washer 12 65Г 02 9 GOST 6402-70

heavy washer out of steel grade 3 x 13 passivated

Washer 12T 3 x 13 11 GOST 6402-70

extra heavy washer out of steel grade 65Г, nickel-plated to 3 microns over a copper layer of 1: ^{mm} thickness

Washer 12 OT 65Г 03 M12 H3 GOST 6402-70

2. Technical Requirements

2.1. Spring Washers must be made out of steel grade 65Г to GOST 14959-79. Heat-resistant spring washers ^{must be made} out of steel grade 30 x 13 to GOST 5949-75 or other grades of steel with physical and mechanical properties not inferior to those of the grades specified above.

Where technically justified, spring washers may be made out of bronze grade E_p KM3-1 to GOST 18175-76 or other nonferrous alloys.

2.2. Weight of steel washers and the design resilient force for steel grade 65Г are listed in the reference annexure.

2.3. Steel spring washers must have a hardness of HRC 40 to 50 and bronze ones not less than HRC 30.

2.4. Spring washer surface must be free from knurling marks left by the feeding mechanism, burrs, cracks, holes, peeling,

rolling laps or scales.

The following defects are acceptable:

dents on the outside and inside diameter of the washers at the parting;

local increase in section on the bearing surface;

scratches not resulting in sectional dimensions exceeding 1.5 times the tolerance specified in Table 1;

burrs at the parting on the outside lateral surface not exceeding the tolerance in width b and

burrs on the inside lateral surface of the washers.

Washers may, by mutual consent, be manufactured with knurling marks no deeper than 0.1 mm.

2.5. The end of washers must have a neat plane cut; chipping of metal not resulting in dimension w exceeding the tolerance does not constitute grounds for rejection.

The edge formed by the plane of the cut with the bearing surface of the washer must be sharp.

2.6. Trapezoidal section of washers within the height s is not considered to be a defect.

The maximum dimension of the height s is taken as the effective thickness.

2.7. Fillets at the inside and outside edges of the section must not exceed the values given in Table 2.

Table 2

m:

Width of bearing side b	Fillet	Width of bearing side b	Fillet
0.5 to 0.6	0.15	4.5 to 5.0	1.0
0.8 to 1.4	0.25	5.5 to 6.0	1.2
1.6 to 2.0	0.50	7.0 to 10.0	1.5
2.5 to 4.0	0.60	12.0	2.0

2.3. Washers must be plated. The types and conventional designation of plating must conform to those indicated in Table 3.

Table 3

Conventional designation of plating	Type of plating
00	No plating
01	Zinc plating and chromium-plating
02	Cadmium and chromium-plating
03	Nickel plating
	Multi-layer - copper - nickel
04	Multi-layer - nickel - chromium
	Multi-layer - copper - nickel - chromium
05	Oxidizing
06	Phosphating and greasing
09	Zinc plating
10	Oxide anodizing and chromium plating
11	Passivation

Note. 1. Type of plating and thickness are settled by mutual consent.
 2. 00 as a type of plating is not indicated in the designation.

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3. Hydrogen brittleness induced in washers in the plating process must be removed.
 4. Height of separation H in washers after compressing them three times to a flat condition and holding them in that condition for 24 hours.

hours must be not less than ^{1.65} 3.65 times the actual thickness of the washer.

3.11. Washers must not break or develop cracks when the ends are bent over an angle of 45°.

3.12. Finished spring washers must be put through acceptance tests by the quality control department of the manufacturing organisation. The manufacturer must guarantee conformity of all this products with the requirements of the present standard.

3. Test Procedure.

3.1. Sampling procedure specified in GOST 17769-72 and testing methods listed below must be followed by the customer for carrying out control check of quality of spring washers and their conformity with the requirements of the present standard.

3.2. Samples of washers are drawn from each batch presented for acceptance in order to check

- a) external appearance;
- b) dimensions;
- c) hardness;
- d) strength;
- e) resilient properties and
- f) plating thickness.

3.3. External appearance of washers is checked with the naked eye or using a 2.5 to 3^x magnification lens.

3.4. Universal measuring instruments or limit gauges must be used for dimensional checks.

Note. Fillets in inside and outside edges are not checked (Table 2.)

3.5. Hardness measurement:

for steel washers as per GOST 9013-59;

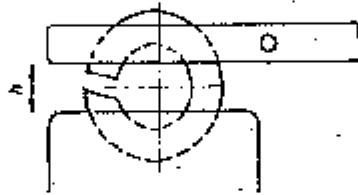
for bronze washers as per GOST 9012-59.

Hardness of washers with dimension less than 6 mm is not checked. 6

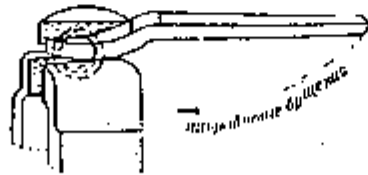
3.6. Strength test on washers is carried out by clamping one end in a vice and bending the other end with an adjustable spanner or a lever with a groove, such that the dimension H increases. The dimension h between the jaws of the vice and the spanner must be maintained at half the inside diameter of the washer (see drgs. 2, 3 and 4.).

3.7. Resilient properties of washers are tested as follows:

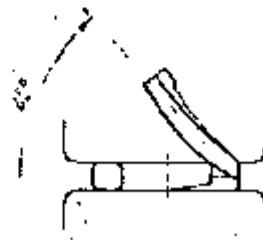
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Черт. 2
Дрг. 2.



Черт. 3
Дрг. 3.



Черт. 4
Дрг. 4.

Direction of rotation

- a) the washers are compressed to a flat condition three times;
- b) spring washers are separated from one another with flat washers and mounted on the body of a bolt of corresponding size and tightened with a nut till the separated ends are fully compressed.

They are held in this condition for 24 hours.

3.8. GOST 9.302-79 specifies the method for checking quality and thickness of plating. The manufacturer has the choice of the testing method.

4. Acceptance, Packing and Marking

4.1. GOST 17769-72 and GOST 18164-72 contain the rules for acceptance and packing of washers and for case marking.

Annexure to GOST 6402-70
Reference

Weight of steel washers and their resilient properties.

Nominal diameter of screw or washer, mm	Theoretical weight of 1000 nos. steel washers, kg, approx.				Design resilient force of washers made out of 65 grade steel, kgf, approx.			
	Light (L)	Normal (H)	Heavy (T)	Extra heavy (OT)	Light (L)	Normal (H)	Heavy (T)	Extra heavy (OT)
2	—	0,016	0,024	—	—	1,6	3,5	—
2,5	—	0,028	0,054	—	—	2,1	7,2	—
3	0,061	0,062	0,101	—	0,9	4,7	12,3	—
4	0,190	0,189	0,267	—	5,1	13,9	26,9	—
5	0,318	0,315	0,421	—	6,9	16,1	28,7	—
6	0,560	0,487	0,801	—	8,3	18,8	49,2	—
8	1,046	0,998	1,638	—	7,1	25,2	66,4	—
10	1,940	1,945	2,914	4,122	11,5	39,3	87,0	168
12	3,369	3,357	4,723	6,369	20,9	56,6	111	197
14	5,351	5,295	7,196	9,791	32,2	77,4	128	299
16	7,392	8,022	10,41	13,16	31,0	101	168	265
18	10,06	11,40	14,39	17,80	34,3	128	202	305
20	14,12	15,75	19,43	23,58	49,3	157	238	348
22	18,99	20,92	25,35	35,73	62,2	190	279	542
24	27,21	27,12	38,14	51,43	83,5	227	444	787
27	38,55	41,76	56,15	73,10	93,0	336	601	996
30	52,64	60,87	79,07	100,1	102	470	783	1229
36	—	91,03	114,9	172,7	—	510	808	1770
42	—	129,7	193,9	—	—	560	1243	—
48	—	215,2	—	—	—	906	—	—

Для определения массы шайб из бронзы номинальной массы, указанные в таблице, следует умножить на коэффициент 1,08.
(Имененная редакция — «Информ. указатель стандартов» № 3 1973 г.).

Weights indicated in the Table are to be multiplied by 1.08 to arrive at the weight of bronze washers.