

Fastener Sizes: Bolts, Nuts and Washers — Dimensions and Mass

The tables list hexagon head bolts with a reduced head, hexagon nuts and plain washers: thread, width across flats, height, washer diameters and mass of 1000 pieces. With these data the mass of the fasteners of a structure is easy to work out.

How to use the tables

Dimensions are in millimetres, the mass of 1000 pieces in kilograms. To get the mass of one part in grams you need no conversion: 1 kg per 1000 pieces equals 1 g per piece. So an M12 nut of 15.67 kg per thousand weighs 15.67 g.

A metric thread is written with the letter M and the diameter in millimetres, for example M16. If the pitch is not given, the coarse pitch is meant. Sizes in brackets are not recommended in the standards. For the mass of bolts by length see the text of the standard; the head dimensions are given here.

Hexagon head bolts

Bolts to DSTU GOST 7796:2008 have a reduced hexagon head and accuracy class B. Width across flats S and head height k depend on the diameter. The S of these bolts equals that of nuts to GOST 5915-70, so one spanner fits both the bolt and the nut.

Hexagon head bolts, reduced head, accuracy class B: dimensions · ДСТУ ГОСТ 7796:2008

Thread d, mm	Coarse pitch, mm	Width across flats S, mm	Head height k, mm	Across corners e, mm
M6	1	10	4	10.9
M8	1.25	13	5.3	14.2
M10	1.5	16	6.4	17.6
M12	1.75	18	7.5	19.9
M14	2	21	8.8	22.8
M16	2	24	10	26.2
M18	2.5	27	12	29.6
M20	2.5	30	12.5	33
M22	2.5	34	14	37.3
M24	3	36	15	39.6
M27	3	41	17	45.2
M30	3.5	46	18.7	50.9
M36	4	55	22.5	60.8
M42	4.5	65	26	71.3
M48	5	75	30	82.6

S is the width across flats, k the head height, e the across-corners diameter, mm. Bolt lengths and thread lengths are in the tables of the standard.

Hexagon nuts

A nut is chosen for a bolt by its thread. Every diameter has a coarse pitch and, for most sizes, a fine one. The mass is given for nuts with the coarse pitch.

Hexagon nuts, accuracy class B: dimensions and mass · ГОСТ 5915-70

Thread d, mm	Coarse pitch, mm	Fine pitch, mm	Width across flats S, mm	Across corners e, mm	Height m, mm	Mass of 1000 pcs, kg	Mass of 1 pc, g
M1.6	0.35	—	3.2	3.3	1.3	0.074	0.074
M2	0.4	—	4	4.2	1.6	0.141	0.141
M2.5	0.45	—	5	5.3	2	0.272	0.272

Thread d, mm	Coarse pitch, mm	Fine pitch, mm	Width across flats S, mm	Across corners e, mm	Height m, mm	Mass of 1000 pcs, kg	Mass of 1 pc, g
M3	0.5	—	5.5	5.9	2.4	0.377	0.377
(M3.5)	0.6	—	6	6.4	2.8	0.497	0.497
M4	0.7	—	7	7.5	3.2	0.8	0.8
M5	0.8	—	8	8.6	4.7	1.44	1.44
M6	1	—	10	10.9	5.2	2.573	2.573
M8	1.25	1	13	14.2	6.8	5.548	5.548
M10	1.5	1.25	16	17.6	8.4	10.22	10.22
M12	1.75	1.25	18	19.9	10.8	15.67	15.67
(M14)	2	1.5	21	22.8	12.8	25.33	25.33
M16	2	1.5	24	26.2	14.8	37.61	37.61
(M18)	2.5	1.5	27	29.6	16.4	53.27	53.27
M20	2.5	1.5	30	33	18	71.44	71.44
(M22)	2.5	1.5	34	37.3	19.8	103.15	103.2
M24	3	2	36	39.6	21.5	122.87	122.9
(M27)	3	2	41	45.2	23.6	175.28	175.3
M30	3.5	2	46	50.9	25.6	242.54	242.5
M36	4	3	55	60.8	31	416.78	416.8
M42	4.5	3	65	71.3	34	623.88	623.9
M48	5	3	75	82.6	38	956.2	956.2

S is the width across flats, e the across-corners diameter, m the nut height, mm. Sizes in brackets are not recommended.

Plain washers

A plain washer increases the contact area of a bolt head or nut with the part. The standard has two types of washer with different hole diameters and two accuracy classes, C and A, so the table has two hole columns and three mass columns.

Plain washers: dimensions and mass · ГОСТ 11371-78

Thread d, mm	Hole d1, mm (type 1)	Hole d1, mm (type 2)	Outside diameter D, mm	Thickness s, mm	Mass of 1000 pcs, kg: type 1, class C	Mass of 1000 pcs, kg: type 1, class A	Mass of 1000 pcs, kg: type 2, class A
1	1.2	1.1	3.5	0.3	0.02	0.02	—
1.2	1.4	1.3	4	0.3	0.026	0.026	—
1.4	1.6	1.5	4	0.3	0.025	0.025	—
1.6	1.8	1.7	4	0.3	0.024	0.024	—
2	2.4	2.2	5	0.3	0.036	0.037	—
2.5	2.9	2.7	6.5	0.5	—	—	—
3	3.4	3.2	7	0.5	0.115	0.119	—
3.5	—	3.7	8	0.5	—	0.155	—
4	4.5	4.3	9	0.8	0.299	0.308	—
5	5.5	5.3	10	1	0.43	0.443	0.413
6	6.6	6.4	12	1.6	0.99	1.016	0.925
8	9	8.4	16	1.6	1.725	1.828	1.706
10	11	10.5	20	2	3.438	3.571	3.333
12	13.5	13	24	2.5	6.066	6.27	5.824
14	15.5	15	28	2.5	8.377	8.612	8.089
16	17.5	17	30	3	10.976	11.295	10.491
18	20	19	34	3	13.976	14.697	13.782
20	22	21	37	3	16.361	17.156	16.157
22	24	23	39	3	17.47	18.339	17.285

Thread d, mm	Hole d1, mm (type 1)	Hole d1, mm (type 2)	Outside diameter D, mm	Thickness s, mm	Mass of 1000 pcs, kg: type 1, class C	Mass of 1000 pcs, kg: type 1, class A	Mass of 1000 pcs, kg: type 2, class A
24	26	25	44	4	31.058	32.315	30.211
27	30	28	50	4	39.438	42.298	39.898
30	33	31	56	4	50.456	53.612	50.917
33	—	34	60	5	—	75.303	70.809
36	39	37	66	5	87.35	92.033	87.078
39	—	40	72	6	—	132.513	124.748
42	45	43	78	7	175.088	182.68	171.256
48	52	50	92	8	283.956	294.013	276.397

d1 is the hole diameter, D the outside diameter, s the thickness, mm. A dash marks a value that could not be confirmed in the text of the standard.

How to work out the fasteners of a structure

The mass of fasteners is found by addition: the number of bolts, nuts and washers is multiplied by the mass of one part. For a set of an M16 nut and two washers for that diameter: $37.61 + 2 \times 10.98 \approx 59.6$ g without the bolt.

In KMD drawings fasteners are usually listed in the specification separately from rolled metal. The mass of the rolled metal itself comes quickly from the metal weight calculator.

Calculator and ordering

Anchor bolts for the foundations of poles and masts are described in the article “Anchor bolts for poles and masts”. Other sections are collected in the rolled metal handbook. If you need a structure with fasteners to your drawings, send them with the request.

Frequently asked questions

How much does an M12 nut weigh?

An M12 nut to GOST 5915-70 weighs 15.67 g. A thousand such nuts weigh 15.67 kg.

What does width across flats mean?

The distance between opposite faces of a bolt head or nut. It is the spanner size: 18 mm for M12.

Which thread pitch is meant if the designation does not give one?

The coarse one. For example, M12 means a thread with a 1.75 mm pitch. A fine pitch is written separately, for example M12×1.25.

Why does the washer table have several mass columns?

The standard has two types of washer and two accuracy classes with different hole diameters, so their mass differs.

Reference information. Check the values against the current standard before using them in a project.