WORKSHOP REFERENCE · 06

Fasteners, Spanners & Torque

Spanner and hex key sizes, clearance holes and tightening torques for metric and inch fasteners.

Metric spanner, hex key & hole sizes

ISO coarse thread

Size	Pitch	Hex AF ISO	Hex AF DIN	Socket head key	Button head key	Csk head key	Grub screw key	Clear. fine	Clear. medium	Clear. coarse	C'bore Ø
M3	0.5	**5.5**	5.5	2.5	2	2	1.5	3.2	3.4	3.6	6.5
M4	0.7	**7**	7	3	2.5	2.5	2	4.3	4.5	4.8	8
M5	0.8	**8**	8	4	3	3	2.5	5.3	5.5	5.8	10
M6	1	**10**	10	5	4	4	3	6.4	6.6	7	11
M8	1.25	**13**	13	6	5	5	4	8.4	9	10	15
M10	1.5	**16**	17	8	6	6	5	10.5	11	12	18
M12	1.75	**18**	19	10	8	8	6	13	13.5	14.5	20
M14	2	**21**	22	12	—	10	—	15	15.5	16.5	24
M16	2	**24**	24	14	10	10	8	17	17.5	18.5	26
M20	2.5	**30**	30	17	—	12	10	21	22	24	33
M24	3	**36**	36	19	—	14	12	25	26	28	40
M30	3.5	**46**	46	22	—	—	—	31	33	35	48
M36	4	**55**	55	27	—	—	—	37	39	42	57

Hex AF: ISO 4014/4017/4032 and the older DIN 931/933/934 differ at M10, M12, M14 and M22 (M22: ISO 34, DIN 32). Hex keys: socket head ISO 4762, button head ISO 7380, countersunk ISO 10642, grub screw ISO 4026–4029. Clearance holes ISO 273. Counterbore diameter for socket head cap screws (DIN 974-1).

Tightening torque & preload

VDI 2230 · μ = 0.12 · 90% yield

Size	Tightening torque (N·m)			Preload (kN)		
	8.8	10.9	12.9	8.8	10.9	12.9
M4	**3**	**4.6**	**5.1**	4.4	6.5	7.6
M5	**5.9**	**8.6**	**10**	7.2	10.6	12.4
M6	**10.1**	**14.9**	**17.4**	10.2	14.9	17.5
M8	**24.6**	**36.1**	**42.2**	18.6	27.3	32
M10	**48**	**71**	**83**	29.6	43.4	50.8
M12	**84**	**123**	**144**	43	63.2	74
M14	**133**	**195**	**229**	59.1	86.7	101.5
M16	**206**	**302**	**354**	80.9	118.8	139
M20	**415**	**592**	**692**	130	186	217
M24	**714**	**1017**	**1190**	188	267	313
M30	**1428**	**2033**	**2380**	300	427	499
M36	**2482**	**3535**	**4136**	438	623	729

Metric coarse thread, hex head (ISO 4014–4018) or socket head (ISO 4762) screws, lightly oiled, $\mu_G = \mu_K = 0.12$. Values per VDI 2230 as published in the Würth technical handbook. Dry or plated threads, lubricants and washers all change friction, so adjust accordingly.

SAE inch bolt grades

SAE J429

Grade	Head marks	Tensile MPa
Grade 2	None	**510 (74 ksi)**
Grade 5	3 radial lines	**827 (120 ksi)**
Grade 8	6 radial lines	**1034 (150 ksi)**

Grade 5 tensile shown for ¼–1 in. Larger sizes are rated lower.

Inch (UNC) spanner & hex key sizes

ASME B18

Size	TPI	Hex AF	Socket head key	Button head key
No. 4	40	—	3/32	1/16
No. 6	32	—	7/64	5/64
No. 8	32	—	9/64	3/32
No. 10	24	—	5/32	1/8
1/4	20	**7/16**	3/16	5/32
5/16	18	**1/2**	1/4	3/16
3/8	16	**9/16**	5/16	7/32
7/16	14	**5/8**	3/8	—
1/2	13	**3/4**	3/8	5/16
5/8	11	**15/16**	1/2	3/8
3/4	10	**1 1/8**	5/8	—
7/8	9	**1 5/16**	3/4	—
1	8	**1 1/2**	3/4	—

Hex AF for finished hex bolts and cap screws. Socket head ASME B18.3, button head ASME B18.3.

Metric property classes

8.8 800 MPa tensile · 640 MPa yield
10.9 1000 MPa tensile · 900 MPa yield
12.9 1200 MPa tensile · 1080 MPa yield

First number × 100 = tensile strength in MPa. Second number × 10 = yield as a percentage of tensile. Nominal values shown; ISO 898-1 minimums are slightly higher above M16 for 8.8.

Torque values are a starting point for steel-on-steel joints. Critical joints should be calculated for the actual parts.

A guide only. Always check against the tool maker's data and your machine and set-up, and talk to your Teravin sales engineer before relying on it. Terms: teravin.tools/terms