MECHANICAL · CHEAT SHEET

Socket & wrench *size chart*.

Cross-reference for SAE (fractional inch) and metric socket sizes — sorted by actual size, with closest cross-match column. The answer to **'I have a 13 mm, what's the closest SAE?'** and vice versa.

The chart

SIZE	SYSTEM	MM	INCH	CLOSEST OTHER SYSTEM
4 mm	Metric	4.00 mm	0.1575"	1/4 (+2.35 mm)
5 mm	Metric	5.00 mm	0.1969"	1/4 (+1.35 mm)
6 mm	Metric	6.00 mm	0.2362"	1/4 (+0.35 mm)
1/4	SAE	6.35 mm	0.2500"	6 mm (-0.35 mm)
7 mm	Metric	7.00 mm	0.2756"	1/4 (-0.65 mm)
5/16	SAE	7.94 mm	0.3125"	8 mm (+0.06 mm)
8 mm	Metric	8.00 mm	0.3150"	5/16 (-0.06 mm)
11/32	SAE	8.73 mm	0.3438"	9 mm (+0.27 mm)
9 mm	Metric	9.00 mm	0.3543"	11/32 (-0.27 mm)
3/8	SAE	9.52 mm	0.3750"	10 mm (+0.48 mm)
10 mm	Metric	10.00 mm	0.3937"	3/8 (-0.48 mm)

SIZE	SYSTEM	MM	INCH	CLOSEST OTHER SYSTEM
11 mm	Metric	11.00 mm	0.4331"	7/16 (+0.11 mm)
7/16	SAE	11.11 mm	0.4375"	11 mm (-0.11 mm)
12 mm	Metric	12.00 mm	0.4724"	1/2 (+0.70 mm)
1/2	SAE	12.70 mm	0.5000"	13 mm (+0.30 mm)
13 mm	Metric	13.00 mm	0.5118"	1/2 (-0.30 mm)
14 mm	Metric	14.00 mm	0.5512"	9/16 (+0.29 mm)
9/16	SAE	14.29 mm	0.5625"	14 mm (-0.29 mm)
15 mm	Metric	15.00 mm	0.5906"	9/16 (-0.71 mm)
5/8	SAE	15.88 mm	0.6250"	16 mm (+0.12 mm)
16 mm	Metric	16.00 mm	0.6299"	5/8 (-0.12 mm)
17 mm	Metric	17.00 mm	0.6693"	11/16 (+0.46 mm)
11/16	SAE	17.46 mm	0.6875"	17 mm (-0.46 mm)
18 mm	Metric	18.00 mm	0.7087"	11/16 (-0.54 mm)
19 mm	Metric	19.00 mm	0.7480"	3/4 (+0.05 mm)
3/4	SAE	19.05 mm	0.7500"	19 mm (-0.05 mm)
20 mm	Metric	20.00 mm	0.7874"	13/16 (+0.64 mm)
13/16	SAE	20.64 mm	0.8125"	21 mm (+0.36 mm)
21 mm	Metric	21.00 mm	0.8268"	13/16 (-0.36 mm)
22 mm	Metric	22.00 mm	0.8661"	7/8 (+0.22 mm)

SIZE	SYSTEM	MM	INCH	CLOSEST OTHER SYSTEM
7/8	SAE	22.22 mm	0.8750"	22 mm (-0.22 mm)
23 mm	Metric	23.00 mm	0.9055"	7/8 (-0.78 mm)
15/16	SAE	23.81 mm	0.9375"	24 mm (+0.19 mm)
24 mm	Metric	24.00 mm	0.9449"	15/16 (-0.19 mm)
25 mm	Metric	25.00 mm	0.9843"	1 (+0.40 mm)
1	SAE	25.40 mm	1.0000"	25 mm (-0.40 mm)
26 mm	Metric	26.00 mm	1.0236"	1 (-0.60 mm)
1-1/16	SAE	26.99 mm	1.0625"	27 mm (+0.01 mm)
27 mm	Metric	27.00 mm	1.0630"	1-1/16 (-0.01 mm)
28 mm	Metric	28.00 mm	1.1024"	1-1/8 (+0.57 mm)
1-1/8	SAE	28.57 mm	1.1250"	29 mm (+0.43 mm)
29 mm	Metric	29.00 mm	1.1417"	1-1/8 (-0.43 mm)
30 mm	Metric	30.00 mm	1.1811"	1-3/16 (+0.16 mm)
1-3/16	SAE	30.16 mm	1.1875"	30 mm (-0.16 mm)
31 mm	Metric	31.00 mm	1.2205"	1-1/4 (+0.75 mm)
1-1/4	SAE	31.75 mm	1.2500"	32 mm (+0.25 mm)
32 mm	Metric	32.00 mm	1.2598"	1-1/4 (-0.25 mm)
33 mm	Metric	33.00 mm	1.2992"	1-5/16 (+0.34 mm)
1-5/16	SAE	33.34 mm	1.3125"	33 mm (-0.34 mm)

SIZE	SYSTEM	MM	INCH	CLOSEST OTHER SYSTEM
34 mm	Metric	34.00 mm	1.3386"	1-5/16 (-0.66 mm)
1-3/8	SAE	34.92 mm	1.3750"	35 mm (+0.08 mm)
35 mm	Metric	35.00 mm	1.3780"	1-3/8 (-0.08 mm)
36 mm	Metric	36.00 mm	1.4173"	1-7/16 (+0.51 mm)
1-7/16	SAE	36.51 mm	1.4375"	37 mm (+0.49 mm)
37 mm	Metric	37.00 mm	1.4567"	1-7/16 (-0.49 mm)
38 mm	Metric	38.00 mm	1.4961"	1-1/2 (+0.10 mm)
1-1/2	SAE	38.10 mm	1.5000"	38 mm (-0.10 mm)
39 mm	Metric	39.00 mm	1.5354"	1-1/2 (-0.90 mm)
40 mm	Metric	40.00 mm	1.5748"	1-1/2 (-1.90 mm)

About socket sizing. Socket sizes refer to the across-flats (AF) dimension — the distance between two parallel hex faces. SAE sockets are sized in fractional inches; metric in millimeters. The two systems don't align cleanly — most SAE/metric pairs differ by 0.1 to 0.5 mm, which is just enough to round off a fastener's corners if you use the wrong one. Always size correctly when torque matters.

Common applications

COMMON FASTENER	TYPICAL SOCKET
1/4-20 hex head bolt	7/16" (across flats)
5/16-18 hex head bolt	1/2"
3/8-16 hex head bolt	9/16"
1/2-13 hex head bolt	3/4"
5/8-11 hex head bolt	15/16"
3/4-10 hex head bolt	1-1/8"
M6 hex head bolt	10 mm
M8 hex head bolt	13 mm
M10 hex head bolt	17 mm (sometimes 16 mm)
M12 hex head bolt	19 mm (sometimes 18 mm)
M14 hex head bolt	21 mm or 22 mm
M16 hex head bolt	24 mm
M20 hex head bolt	30 mm
Automotive lug nut (US car)	3/4" or 13/16" or 7/8"
Automotive lug nut (import)	17 mm, 19 mm, or 21 mm
Bike crank arm bolt	8 mm hex (Allen) inside 14 mm socket

Common pitfalls

- **Close-but-not-equal sizes round off corners.** 13 mm = 0.5118"; 1/2" = 0.5000" — that's 0.3 mm of slop. On a high-torque metric bolt with a 1/2" SAE socket, the corners can shear before the threads engage. Don't substitute under load.
- **Some metric and SAE sizes are functionally identical.** 19 mm ≈ 3/4" (within 0.05 mm) and 10 mm ≈ 3/8" (within 0.1 mm) work for low-torque applications. Above ~50 ft·lbf, always use the matching system.
- **Imperial cars often use metric sockets internally.** A 'made in USA' car may have metric bolts at engine and transmission interfaces (since most engines are metric-design). Always check both sizes.
- **The 6-point vs 12-point distinction matters.** 6-point (single hex) sockets engage the full flat; 12-point engage just the corners. High-torque applications need 6-point. 12-point is faster on visible bolts but rounds them off faster too.
- **Deep sockets and standard sockets have the same hex size.** The depth differs (deep ~3× standard length), but they fit the same fastener. Use deep sockets for studs or recessed bolts.

Common questions

What's the closest SAE socket to 13 mm?

1/2 inch (12.7 mm) — about 0.3 mm undersize. It'll fit and turn a 13 mm fastener but won't grip cleanly and will round corners under high torque. Use only for stuck-fastener removal in emergencies. The proper match is a metric 13 mm socket; SAE-to-metric crossover always has 0.2-0.5 mm slop.

Why are 1/2" and 12 mm so close but not interchangeable?

1/2" = 12.7 mm exactly. A 12 mm socket on a 1/2" bolt has 0.7 mm clearance — too much for high torque, will round the corners. A 1/2" socket on a 12 mm bolt is even worse (0.7 mm undersized). For permanent assembly, always use the correct unit's tooling.

What's a 12-point vs 6-point socket?

6-point sockets contact the flats of the hex (less slip, more grip for high-torque or seized fasteners). 12-point sockets engage every 30° (easier to position in tight spots, but more risk of corner rounding). For impact work, structural bolts, or seized fasteners: 6-point. For delicate work in awkward spaces: 12-point.

Why does my impact gun damage chrome sockets?

Standard chrome-plated sockets are heat-treated to be hard for hand torque but brittle at the high impact forces of pneumatic or electric impact guns. They crack and shatter. Use 'impact sockets' (black oxide finish, softer/tougher chromoly steel) on impact tools. Putting a chrome socket on an impact wrench is dangerous.

What torque can a 1/2" drive socket actually handle?

Quality 1/2" drive impact sockets handle 600-800 lb·ft routinely. Chrome 1/2" hand sockets are typically rated 300-400 lb·ft. The drive size limits torque, not the socket itself: 1/4" drive = up to 60 lb·ft, 3/8" = 250 lb·ft, 1/2" = 600+, 3/4" = 1500+, 1" = 4000+ lb·ft. Match drive size to expected torque.

Sources

- **SAE socket sizes:** ANSI B107.1 — Socket Wrenches, Inch Series.
- **Metric socket sizes:** ISO 2725 / DIN 3120 — Square drive sockets for hand-operated wrenches.
- **Hex bolt head dimensions:** ASME B18.2.1 (inch) and ISO 4014 (metric).

Disclaimer. Closest-match recommendations are for emergency or non-load-bearing use only. For high-torque, automotive, or safety-critical fasteners, always use a properly-sized socket in the correct system.