THE NUTTY COMPANY INC
FASTENER SPECIALISTS SINCE 1977

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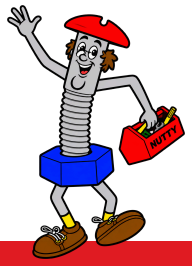
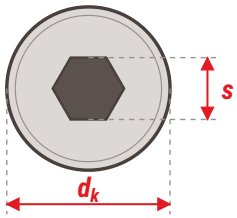
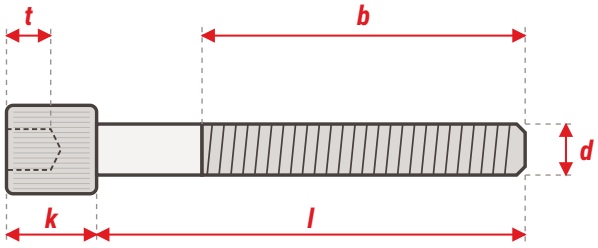


PRODUCT DATA SHEET

Metric Socket Head Cap Screws – Class 12.9







- **Metric socket head cap screws** to **DIN 912 / ISO 4762**, cylindrical head with hex socket.
- **Strength:** property **Class 12.9** alloy steel, quenched & tempered to **ISO 898-1** – the strongest standard metric class.
- **Sizes:** M2 through M30, standard (coarse) pitch. Thread tolerance 5g6g.
- **Finish:** thermal black oxide. See 5.0 for the sizes and lengths we stock.

1.0 Dimensions DIN 912 / ISO 4762, millimeters

Size d	Pitch P	d_k Head Dia.	k Head Height	s Hex Key	t Key Depth	e Socket	b Thread Length	Tap Drill	Clearance Hole
		Max	Max	Nom	Min	Min	Ref		
M2	0.4	3.80	2.00	1.5	1.00	1.733	16	1.6	2.4
M2.5	0.45	4.50	2.50	2	1.10	2.303	17	2.05	2.9
M3	0.5	5.50	3.00	2.5	1.30	2.873	18	2.5	3.4
M4	0.7	7.00	4.00	3	2.00	3.443	20	3.3	4.5
M5	0.8	8.50	5.00	4	2.50	4.583	22	4.2	5.5
M6	1.0	10.00	6.00	5	3.00	5.723	24	5.0	6.6
M8	1.25	13.00	8.00	6	4.00	6.863	28	6.8	9.0
M10	1.5	16.00	10.00	8	5.00	9.149	32	8.5	11.0
M12	1.75	18.00	12.00	10	6.00	11.429	36	10.2	13.5
M14	2.0	21.00	14.00	12	7.00	13.716	40	12.0	15.5
M16	2.0	24.00	16.00	14	8.00	15.996	44	14.0	17.5
M18	2.5	27.00	18.00	14	9.00	15.996	48	15.5	20.0
M20	2.5	30.00	20.00	17	10.00	19.437	52	17.5	22.0
M22	2.5	33.00	22.00	17	11.00	19.437	56	19.5	24.0
M24	3.0	36.00	24.00	19	12.00	21.734	60	21.0	26.0
M27	3.0	40.00	27.00	19	13.50	21.734	66	24.0	30.0
M30	3.5	45.00	30.00	22	15.50	25.154	72	26.5	33.0

d_k = plain (unknurled) head; knurled heads may be slightly larger. b is a reference value for screws with a plain shank. Tap drill for coarse thread; clearance hole = ISO 273 medium fit. l = length under head.

2.0 Chemical Composition ISO 898-1, % by weight (cast analysis)

Class	Material & Treatment	Carbon	Phosphorus max.	Sulfur max.	Boron max.	Min. Tempering Temp.
12.9	Alloy steel, quenched & tempered	0.30 – 0.50	0.025	0.025	0.003	425°C

Alloying elements such as chromium, nickel, molybdenum or vanadium are added for hardenability. Typical steels: SCM435 / 4135 / 4140 Cr-Mo.

3.0 Mechanical Properties ISO 898-1, at room temperature

Property – Class 12.9	Metric	Inch
Min. tensile strength R_m	1,220 MPa	176,900 psi
Min. yield strength $R_{p0.2}$	1,100 MPa	159,500 psi
Proof stress S_p	970 MPa	140,700 psi
Min. elongation after fracture A	8%	–
Min. reduction of area Z	44%	–
Vickers hardness HV	385 – 435	–
Rockwell hardness HRC	39 – 44	–
Brinell hardness HB	366 – 414	–
Matching nut (ISO 898-2)	Class 12	–
Approx. inch equivalent	ASTM A574 alloy socket head	–



HEAD MARKING

Class 12.9 plus the manufacturer's ID (shown as XYZ), on the top or side of the head.

4.0 Proof & Minimum Tensile Loads ISO 898-1, calculated

Size	Stress Area A_s (mm²)	Proof Load		Min. Tensile Load	
		N	lbf	N	lbf
M2 x 0.4	2.07	2,010	452	2,530	569
M2.5 x 0.45	3.39	3,290	740	4,140	931
M3 x 0.5	5.03	4,880	1,100	6,140	1,380
M4 x 0.7	8.78	8,520	1,920	10,700	2,410
M5 x 0.8	14.2	13,800	3,100	17,300	3,890
M6 x 1.0	20.1	19,500	4,380	24,500	5,510
M8 x 1.25	36.6	35,500	7,980	44,700	10,000
M10 x 1.5	58.0	56,300	12,700	70,800	15,900
M12 x 1.75	84.3	81,800	18,400	103,000	23,200
M14 x 2.0	115	112,000	25,200	140,000	31,500
M16 x 2.0	157	152,000	34,200	192,000	43,200
M18 x 2.5	192	186,000	41,800	234,000	52,600
M20 x 2.5	245	238,000	53,500	299,000	67,200
M22 x 2.5	303	294,000	66,100	370,000	83,200
M24 x 3.0	353	342,000	76,900	431,000	96,900
M27 x 3.0	459	445,000	100,000	560,000	126,000
M30 x 3.5	561	544,000	122,000	684,000	154,000

Load = A_s × 970 MPa (proof) or 1,220 MPa (min. tensile), rounded to 3 significant figures; lbf = N × 0.2248. Reference minimums, not working loads.

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4.1 Installation Notes

- **Match the nut:** use a Class 12 nut, or a tapped hole with enough thread engagement (about 1–1.5 × d in steel, more in aluminum or cast iron).
- **Use a hardened washer** under the head in soft materials or oversize holes, so the head does not sink in and lose clamp load.
- **Use a good hex key** of the exact size and seat it fully in the socket before tightening – a worn or short key rounds out the socket.
- **Thread length:** screws longer than about b + head height have a plain shank; shorter screws are threaded close to the head.
- **Black oxide** gives only light rust protection. For wet or outdoor use, choose stainless steel socket screws. Do not electroplate 12.9 screws – plating carries a risk of hydrogen embrittlement.
- **Counterbores:** size the counterbore a little over d_k and at least k deep so the head sits flush or below the surface.

5.0 Stocked Sizes stock # MSHC…

Size	Lengths in stock, mm (Class 12.9 • DIN 912 • black oxide)
M2 x 0.4	3, 4, 5, 6, 8, 10, 12, 16, 20
M2.5 x 0.45	4, 5, 6, 8, 10, 12, 16, 20, 25
M3 x 0.5	4, 6, 8, 10, 12, 16, 20, 25, 30, 35, 40, 45, 50
M4 x 0.7	6, 8, 10, 12, 16, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80
M5 x 0.8	6, 8, 10, 12, 16, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 120
M6 x 1.0	8, 10, 12, 16, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 120, 140
M8 x 1.25	10, 12, 16, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 180, 200
M10 x 1.5	12, 16, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 180, 200, 220, 240
M12 x 1.75	20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 180, 200, 240, 260
M16 x 2.0	25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 120, 130, 140, 150, 160, 180, 200, 220, 240
M18 x 2.5	40, 50, 60, 70, 80, 90, 100, 120
M20 x 2.5	40, 45, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300
M24 x 3.0	50, 60, 70, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300
M30 x 3.5	80, 100, 120, 140, 160

Disclaimer: The above is a compilation of DIN 912, ISO 4762, ISO 273 and ISO 898-1 data. Loads in 4.0 are calculated minimums for reference, not working loads. The Nutty Company, Inc. has made every effort to present the data accurately. However, The Nutty Company, Inc. cannot be held liable for any claim traceable to any errors, typographical or otherwise, contained herein.



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