

MACHINE

SCREWS

Slotted • Phillips
Six-Lobe • Square Recess
Pozi-Alternative
Combination Recess
Military • Commercial
Metric • Inch

**OVER
10,000
ITEMS**



INCH – COMMERCIAL

COMBINATION DRIVE

BINDING UNDERCUT

- Steel Zinc

FLAT

- Steel Zinc

HEX WASHER

- Steel Zinc
- Steel Zinc Green (Header Point)
- Steel Zinc Green (Standard Point)

PAN

- 18-8 Stainless
- Steel Black Oxide
- Steel Zinc

ROUND

- Steel Zinc

TRUSS

- 18-8 Stainless
- Steel Zinc

PHILLIPS

BINDING UNDERCUT

- 18-8 Stainless
- Steel Zinc

FLAT 82°

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- 316 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Yellow Zinc
- Steel Zinc

FLAT UNDERCUT

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- 316 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Yellow Zinc
- Steel Zinc

FLAT 100°

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- Steel Black Oxide
- Steel Black Zinc
- Steel Yellow Zinc
- Steel Zinc

FLAT 100° UNDERCUT

- 18-8 Stainless
- Steel Zinc

FILLISTER

- 18-8 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Zinc

HEX

- Steel Zinc

HEX WASHER SERRATED

- Steel Nickel
- Steel Zinc

HEX WASHER

- 18-8 Stainless
- Steel Black Oxide
- Steel Green Zinc
- Steel Zinc

OVAL

- 18-8 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Zinc

OVAL UNDERCUT

- 18-8 Stainless
- Steel Zinc

PAN

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- 316 Stainless
- 410 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Green Zinc
- Steel Yellow Zinc
- Steel Zinc

ROUND

- 18-8 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Yellow Zinc
- Steel Zinc

ROUND WASHER

- Steel Zinc

TRUSS

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- Steel Black Oxide
- Steel Black Zinc
- Steel Yellow Zinc
- Steel Zinc

SLOTTED

BINDING UNDERCUT

- 18-8 Stainless
- Steel Black Oxide
- Steel Green Zinc
- Steel Zinc

FLAT

- 18-8 Stainless
- Steel Yellow Zinc
- Steel Zinc

FLAT UNDERCUT

- 18-8 Stainless
- Steel Zinc

FILLISTER

- 18-8 Stainless
- Steel Black Oxide
- Steel Yellow Zinc
- Steel Zinc

HEX SLOTTED

- 18-8 Stainless
- Steel Black Oxide
- Steel Green Zinc
- Steel Zinc

HEX WASHER

- 18-8 Stainless
- Steel Black Oxide
- Steel Green Zinc
- Steel Yellow Zinc
- Steel Zinc

HEX WASHER SERRATED

- 18-8 Stainless
- Steel Green Zinc

HEX WASHER W/ DOG POINT

- Steel Zinc

HEX WASHER W/ DRILL HOLE

- Steel Zinc

OVAL

- 18-8 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Zinc
- Steel Zinc w/ Brown Head
- Steel Zinc w/ Ivory Head
- Steel Zinc w/ White Head

OVAL UNDERCUT

- 18-8 Stainless
- Steel Zinc w/ Ivory Head
- Steel Zinc w/ White Head

PAN

- 18-8 Stainless
- Nylon
- Steel Black Oxide
- Steel Black Zinc
- Steel Yellow Zinc
- Steel Zinc

ROUND

- 18-8 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Yellow Zinc
- Steel Zinc

TRUSS

- 18-8 Stainless
- Steel Black Oxide
- Steel Black Zinc
- Steel Zinc

TRUSS SERRATED

- Steel Yellow Zinc
- Steel Zinc

UNSLOTTED

HEX

- 18-8 Stainless
- Steel Black Oxide
- Steel Zinc

HEX WASHER

- 18-8 Stainless
- Steel Black Oxide
- Steel Green Zinc
- Steel Yellow Zinc
- Steel Zinc

HEX WASHER SERRATED

- Steel Zinc

POZIDRIV® ALTERNATIVES

FLAT

- Steel Zinc

PAN

- Steel Zinc

SQUARE RECESS

FLAT

- Steel Zinc

PAN

- Steel Zinc

SIX-LOBE

FLAT UNDERCUT

- 18-8 Stainless
- Steel Black Oxide
- Steel Zinc

FLAT 82°

- 18-8 Stainless
- Steel Black Oxide
- Steel Zinc

FLAT 100°

- 18-8 Stainless
- Steel Zinc

OVAL

- Steel Zinc

PAN

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- Steel Black Oxide
- Steel Black Zinc
- Steel Zinc

TRUSS

- 18-8 Stainless
- Steel Zinc

METRIC

DIN 965 FLAT PHILLIPS (TYPE-H)

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- A4 Stainless
- Steel Black Oxide
- Steel Zinc

DIN 7985 SIX-LOBE PAN

- Steel Zinc

DIN 795A PAN PHILLIPS (TYPE-H)

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- A4 Stainless
- Steel Black Oxide
- Steel Zinc

ISO 7045 PAN SIX-LOBE

- A2 Stainless
- Steel Black Oxide
- Steel Zinc RoHS

ISO 14581 FLAT SIX-LOBE

- 18-8 Stainless
- Steel Zinc (Class 8.8)

ISO 14583 PAN SIX-LOBE

- A2 Stainless
- Steel Zinc (Class 8.8)

JIS-B1111 PAN PHILLIPS

- A2 Stainless

JIS-B1111 SMALL HEAD PAN PHILLIPS

- Steel Zinc

JIS-B1111 TRUSS PHILLIPS

- A2 Stainless

MILITARY-GRADE

MS24693 100° FLAT PHILLIPS

- 18-8 Stainless
- 18-8 Stainless w/ Black Oxide
- Steel Cadmium Yellow

MS35190, 82° FLAT PHILLIPS (COURSE)

- Steel Cadmium

MS35191, 82° FLAT PHILLIPS (FINE)

- Steel Cadmium

MS35206 PAN PHILLIPS (COURSE)

- Steel Cadmium Yellow

MS35207 PAN PHILLIPS (FINE)

- Steel Cadmium Yellow

MS35265 DRILLED FILLISTER SLOTTED (COURSE)

- Steel Cadmium Yellow

MS35266 DRILLED FILLISTER SLOTTED (FINE)

- Steel Cadmium Yellow

MS35275 DRILLED FILLISTER SLOTTED (COURSE)

- 300-Series Stainless

MS35276 DRILLED FILLISTER SLOTTED (FINE)

- 300-Series Stainless

MS51957 PAN PHILLIPS (COURSE)

- 18-8 Stainless
- 18-8 SS w/ Black Oxide Finish

MS51958 PAN PHILLIPS (FINE)

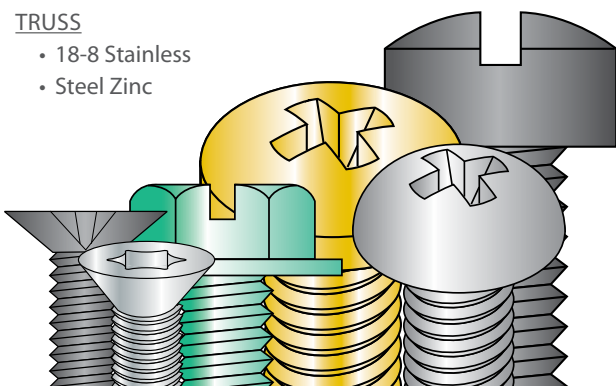
- 18-8 Stainless
- 18-8 SS w/ Black Oxide Finish

MS51959, 82° FLAT PHILLIPS (COURSE)

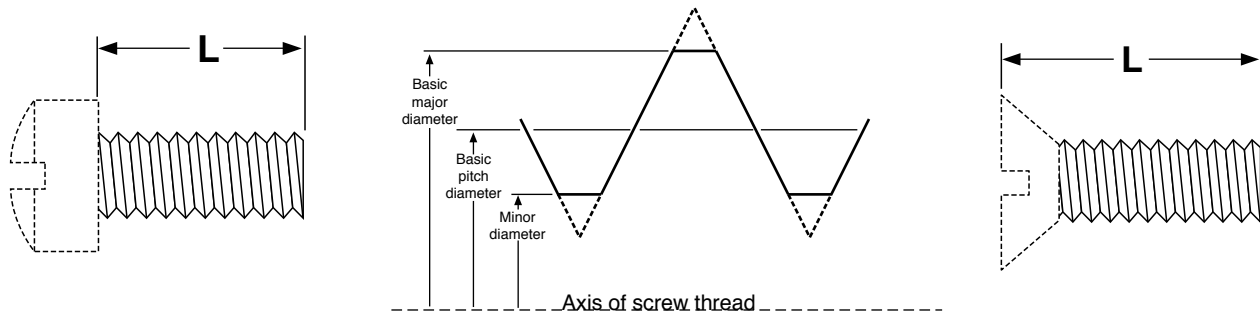
- 18-8 Stainless

MS51960, 82° FLAT PHILLIPS (FINE)

- 18-8 Stainless



DIMENSIONS



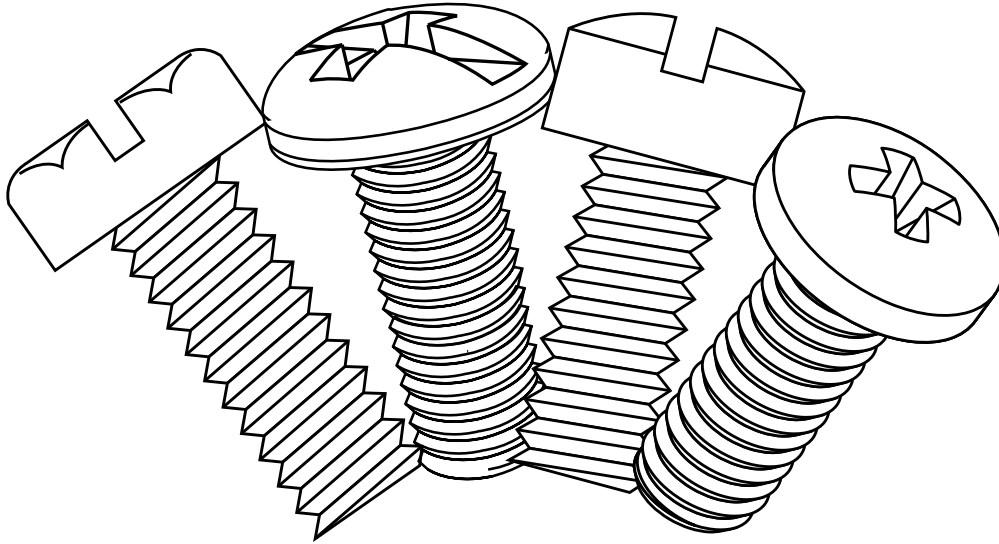
2A EXTERNAL THREADS FOR MACHINE SCREWS AND SEMS

ASME B 1.1 (2008)

Nominal Size & Threads per Inch	Series Designation	Allowance	Major Diameter		Pitch Diameter			Stress Area, in ²	Tensile Strength, ^a lb., min. (STEEL screws only)
			Max	Min	Max	Min	Tolerance		
0-80 0.060	UNF	.0005	.0595	.0563	.0514	.0496	.001762	0.00180	-
1-64 0.073	UNC	.0006	.0724	.0686	.0623	.0603	.001970	0.00263	-
1-72 0.073	UNF	.0006	.0724	.0689	.0634	.0615	.001899	0.00278	-
2-56 0.086	UNC	.0006	.0854	.0813	.0738	.0717	.002127	0.00370	-
2-64 0.086	UNF	.0006	.0854	.0816	.0753	.0733	.002040	0.00394	-
3-48 0.099	UNC	.0007	.0983	.0938	.0848	.0825	.002302	0.00487	-
3-56 0.099	UNF	.0007	.0983	.0942	.0867	.0845	.002191	0.00523	-
4-40 0.112	UNC	.0008	.1112	.1061	.0950	.0925	.002507	0.00604	360
4-48 0.112	UNF	.0007	.1113	.1068	.0978	.0954	.002361	0.00661	396
5-40 0.125	UNC	.0008	.1242	.1191	.1080	.1054	.002562	0.00796	470
5-44 0.125	UNF	.0007	.1243	.1195	.1095	.1070	.002484	0.00830	498
6-32 0.138	UNC	.0008	.1372	.1312	.1169	.1141	.002820	0.00909	550
6-40 0.138	UNF	.0008	.1372	.1321	.1210	.1184	.002614	0.01015	609
8-32 0.164	UNC	.0009	.1631	.1571	.1428	.1399	.002916	0.0140	850
8-36 0.164	UNF	.0008	.1632	.1577	.1452	.1424	.002804	0.01474	884
10-24 0.190	UNC	.0010	.1890	.1818	.1619	.1586	.003319	0.0175	1050
10-32 0.190	UNF	.0009	.1891	.1831	.1688	.1658	.003004	0.0200	1200
12-24 0.216	UNC	.0010	.2150	.2078	.1879	.1845	.003400	0.0242	1450
12-28 0.216	UNF	.0010	.2150	.2085	.1918	.1886	.003224	0.0258	1548
1/4-20 0.250	UNC	.0011	.2489	.2408	.2164	.2127	.003731	0.0318	1900
1/4-28 0.250	UNF	.0010	.2490	.2425	.2258	.2225	.003322	0.0364	2200
5/16-18 0.3125	UNC	.0012	.3113	.3026	.2752	.2712	.004041	0.0524	3150
5/16-24 0.3125	UNF	.0011	.3114	.3042	.2843	.2806	.003660	0.0580	3480
3/8-16 0.375	UNC	.0013	.3737	.3643	.3331	.3287	.004363	0.0775	4650
3/8-24 0.375	UNF	.0011	.3739	.3667	.3468	.3430	.003804	0.0878	5268
1/2-13 0.500	UNC	.0015	.4985	.4876	.4485	.4435	.004965	0.1419	8500
1/2-20 0.500	UNF	.0013	.4987	.4906	.4662	.4619	.004288	0.1599	9594
Tolerance on Length L	Nominal Screw Size	Nominal Screw Length							
		Up to 1/2 in., incl.	Over 1/2 to 1 in., incl.	Over 1 to 2 in., incl.	Over 2 in.				
	0 thru 12	-0.02	-0.03	-0.06	-0.09				
	1/4 thru 3/4	-0.03	-0.03	-0.06	-0.09				

^a Tensile strength values are based on 60,000 psi. and apply to carbon steel screws and SEMS only. Hex and Hex Washer head machine screws of sufficient length may be wedge tensile tested. Other head styles may be axial tensile tested.

MECHANICAL & PERFORMANCE REQUIREMENTS



Description	A straight shank fastener with external threads designed to go through a hole or nut that is pre-tapped to form a mating thread for the screw.				
Applications/ Advantages	Machine screws form a fastening superior in strength to spaced thread screws.				
	Steel	Stainless			Aluminum
	<p>Steel Zinc is the most common and most popular variety of steel machine screws</p> <p>Steel Zinc yellow screws are popular in electronics applications.</p> <p>Steel Zinc Black and Black Oxide screws are used to blend in with black-colored components.</p>	<p>18-8 Stainless steel machine screws are used in applications which require general atmospheric corrosion resistance, in food processing machinery and refrigeration equipment. Stainless is also superior to steel in withstanding some elevation in application operating temperature while maintaining its strength.</p> <p>316 Stainless steel offers superior corrosion resistance to 18-8 and is superior at maintaining its strength at high temperatures.</p> <p>410 Stainless steel is recommended in applications where greater tensile strength is needed such as control mechanisms or valves under high stress. 410 is not as corrosion resistant as are 18-8 or 316 stainless</p>			<p>In some applications, aluminum machine screws can be a less expensive alternative to stainless screws because of their resistance to corrosion and high rate of conductivity. Aluminum machine screws should be fastened with aluminum nuts to minimize the chance of galvanic corrosion.</p>
Material	AISI 1006 - 1022 or equivalent steel.	SAE 18-8 stainless steel	316 stainless steel	410 stainless steel	2024-T4 alloy
Hardness	Rockwell B70 - B100.	Rockwell B85 - B95 (approximate)*	Rockwell B85 - B95 (approximate)*	Rockwell C34 (approximate)	-
Tensile Strength	60,000 psi. minimum.	80,000 psi. minimum (100,000 psi after cold working)*	85,000 - 140,000 psi.	180,000 psi.	62,000 psi. minimum
	<p>Steel machine screws which have a nominal diameter smaller than #4 are not subject to tensile testing. No. 4 and No. 5 machine screws which are shorter than 1/2" are not subject to tensile testing. Steel machine screws of diameters No. 6 to 1/2" inclusive, which are shorter than either 1/2" or 3D (where D is the nominal screw size in inches) are not subject to tensile testing. Such steel machine screws of a size to be tested shall meet the tensile load requirements listed above.</p> <p>Tensile strength values for stainless screws are offered as approximations only; there is no single standard for the performance requirements of stainless machine screws.</p>				
Plating	See Appendix-A for information on the plating of steel machine screws	Stainless machine screws are usually supplied plain or with a black oxide finish.			Aluminum machine screws are usually supplied without any additional finish.
*Hardness and tensile strength standards are offered as guides only for stainless machine screws. There is currently no national standard for these performance requirements for stainless machine screws.					

THREAD GAGING

Thread gaging is one method of testing the acceptability of machine screws, SEMS and nuts. It is possible that parts which are near a limit may be accepted by one type of gaging yet rejected by another. A product screw thread is considered acceptable when it passes any of the permissible gages in ASME B1.3, provided that those gages are within the tolerances specified in this standard.

Many commercial applications will accept a screw that, although may not pass a gage test, will accept a mating nut. It is important to know the customer's requirements concerning thread quality when testing machine screw threads.

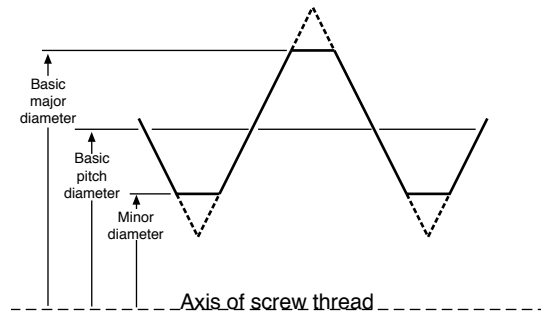
Go gages check either the maximum-material limit or size to assure interchangeable assembly of maximum-material mating parts.

NO GO gages inspect the functional diameter limit of product internal thread. In applying the NO GO gage, the functional diameter is acceptable when gaging elements do not pass the product thread. The NO GO gage can also indicate out-of-roundness of the pitch cylinder.

The gages are normally set to master gages with a range of calibration precision such as Class X (looser tolerance) or Class W (tighter tolerance). They are also set by technicians with slight variations in hand pressure. For these reasons, gage setting variability should be considered during thread inspection. Also, the NO GO gage can be confounded by undersized, error laden threads which in fact are undersized on pitch diameter but with helix, flank or similar out of tolerance conditions large enough to not enter the required number of turns.

FOR THESE REASONS, THREAD INSPECTION SHOULD CONSIDER GAGE AND OPERATOR VARIABILITY WHEN PASSING QUALITY JUDGEMENTS ON MACHINE SCREW THREAD QUALITY.

METRIC THREAD DIMENSIONS



METRIC - EXTERNAL THREADS FOR CAP SCREWS, CLASS 6g

DIN 13;
ISO 898-1 &
965

Nominal Size	Major Diameter		Pitch Diameter		Minor Diameter		Stress Area, mm ²	Tensile Strength N, min.		
	Max	Min	Max	Min	Max	Min		Class 4.8	Class 8.8	Class 10.9
M1.6	1.581	1.496	1.354	1.291	1.151	1.075	-	-	-	-
M2	1.981	1.886	1.721	1.654	1.490	1.407	-	-	-	-
M2.5	2.480	2.380	2.188	2.117	1.928	1.840	-	-	-	-
M3	2.980	2.874	2.655	2.580	2.367	2.273	5.03	2110	4020	5230
M4	3.978	3.838	3.523	3.433	3.119	3.002	8.78	3690	7020	9130
M5	4.976	4.826	4.456	4.361	3.995	3.869	14.2	5960	11,350	14,800
M6	5.974	5.794	5.324	5.212	4.747	4.596	20.1	8440	16,100	20,900
M7	6.974	6.794	6.324	6.212	5.747	5.596	28.9	12,100	23,100	30,100
M8	7.972	7.760	7.160	7.042	6.438	6.272	36.6	15,400	29,200	38,100
M10	9.968	9.732	8.994	8.862	8.128	7.938	58	24,400	46,400	60,300
M12	11.966	11.701	10.829	10.679	9.819	9.602	84.3	35,400	67,400	87,700
M14	13.962	13.682	12.663	12.503	11.508	11.271	115	48,300	92,000	120,000
M16	15.962	15.682	14.663	14.503	13.508	13.271	157	65,900	125,000	163,000
M18	17.958	17.623	16.334	16.164	14.891	14.625	192	80,600	159,000	200,000
M20	19.958	19.623	18.334	18.164	16.891	16.625	245	103,000	203,000	255,000
M24	23.952	23.577	22.003	21.803	20.271	19.955	353	148,000	293,000	367,000
M30	29.947	29.522	27.674	27.462	25.653	25.306	561	236,000	466,000	583,000
M36	35.940	35.465	33.342	33.118	31.033	30.655	817	343,000	678,000	850,000
Tolerance on Length			3mm: ±0.2		4-6mm: ±0.24		8-10mm: ±0.29		12-16mm: ±0.35	
			20-30mm: ±0.42		35-50mm: ±0.5		55-60mm: ±0.95			



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