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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

An American National Standard

SAE J58

REAF. MAY1998

Issued 1972-09
Reaffirmed 1998-05

Superseding J58 AUG93

FLANGED 12-POINT SCREWS

1. ***Scope—***Included in this SAE Standard are the detailed general and dimensional specifications applicable to flanged 12-point screws recognized as SAE Standard and intended for general use in automotive and other ground-based vehicles and industrial equipment. Also included is Appendix A, covering runout sleeve gages and gaging.

The inclusion of dimensional data in this standard is not intended to imply that all of the products described are stock production sizes. Consumers should consult manufacturers concerning availability of product.

2. ***References***

2.1 **Applicable Publications—**The following publication forms a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J429—Mechanical and Material Requirements for Externally Threaded Fasteners

3. ***General Specifications—***(See Figure 1.)

3.1 **Dimensions—**All dimensions in this document are in inches unless otherwise stated.

3.2 **Options—**Options, where specified, shall be at the discretion of the manufacturer unless otherwise agreed by manufacturer and purchaser.

3.3 **Heads**

3.3.1 HEAD HEIGHT—The head height shall be measured, parallel to the axis of screw, from the top of the head to the bearing surface of the flange.

3.3.2 TOP OF HEAD—The top of head may be full form or indented at the option of the manufacturer. If full form, the top of head shall be chamfered or rounded with the diameter of chamfer circle or start of rounding being equal to the specified maximum width across flats within a tolerance of –15%. If the top of head is indented, the periphery may be rounded.

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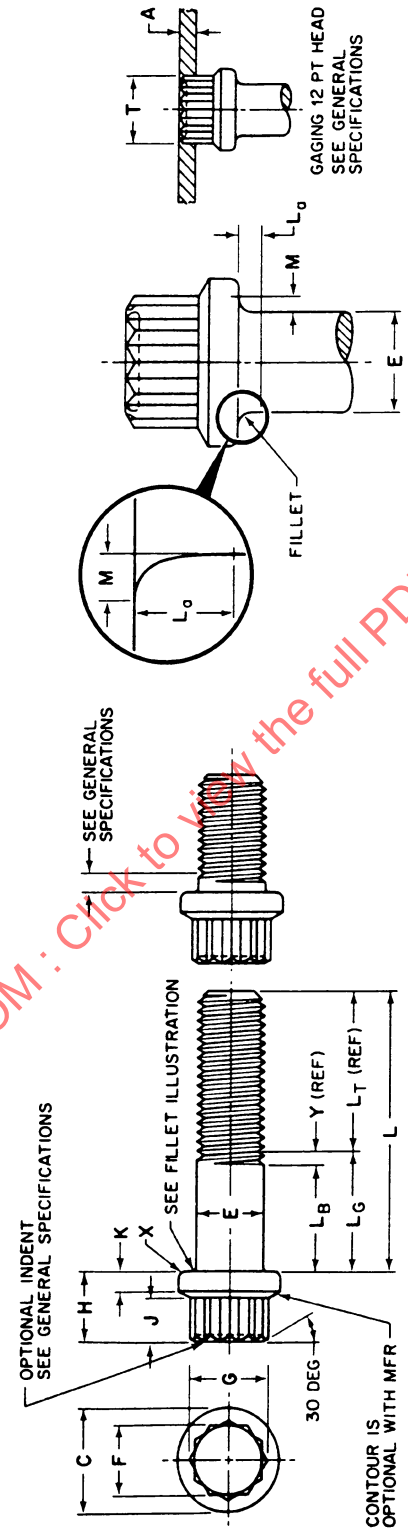

FIGURE 1—DIMENSIONS OF FLANGED 12-POINT SCREWS AND HEAD GAGING RINGS

3.3.3 CORNER FILL—The rounding due to lack of fill at all 12 corners of the head shall be reasonably uniform and the width across corners of the head shall be such that when a sharp ring, having an inside diameter equal to the T dimension and a thickness within the limits for A specified in Table 1, is placed on the top of the head, normal to the screw axis, the head may enter but shall not protrude through the gage.

3.3.4 WRENCHING HEIGHT—The wrenching height shall be measured, parallel to the axis of screw, from the intersection of the top contour of flange with any corner of head to the top of the head.

3.3.5 BEARING SURFACE—The outer periphery may be rounded or chamfered to the extent permitted by X, as measured on the bearing face. The plane of the bearing face shall be perpendicular to the axis of screw within the runout limit specified in Table 1. Measurement of runout shall be made as close to the periphery of bearing face as possible while the screw is held in a collet or other gripping device at a distance equal to one screw diameter from the underside of the head.

3.4 Underhead Fillets—For all lengths of screws, the form of the fillet shall be optional provided: it is tangent to the shank of the screw at a distance no greater than L_a from the underside of the head; it is tangent to the bearing surface within the limits of the basic screw diameter plus M max, and E min plus M min; and it is a smooth continuous curve having a bearing surface juncture radius no less than that specified in Table 1.

For reduced diameter body screws threaded full length, the minimum fillet extension, M min, may be reduced by an amount equivalent to one-half the difference between the basic screw diameter and the specified minimum pitch diameter of the thread.

3.5 Length

3.5.1 MEASUREMENT—The length of screw shall be measured, parallel to the axis of screw, from the bearing surface of the head to the extreme end of the shank.

3.5.2 TOLERANCE ON LENGTH—The tolerance on length shall be as tabulated in Table 2.

3.6 Body Diameter—On screws threaded full length, the diameter of the screw under the head shall not be less than the specified minimum pitch diameter of the thread.

3.7 Threads—Threads, when produced by roll threading, shall be Unified coarse or fine thread series UNRC or UNRF, Class 2A or Class 3A as specified by purchaser. Threads produced by other methods shall preferably be UNRC or UNRF series, but at the option of the manufacturer may be UNC or UNF series, Class 2A or Class 3A as specified by purchaser.

For threads with additive finish, the maximum diameters of Class 2A may be exceeded by the amount of the allowance, that is, the Class 2A maximum diameters apply to an unplated or uncoated part or to a part before plating or coating, whereas the basic diameters (Class 2A maximum diameters plus the allowance) apply to a part after plating or coating. The maximum diameters of Class 3A threads apply to screws with or without additive finish.

TABLE 1—DIMENSIONS OF FLANGED 12-POINT SCREWS AND HEAD GAGING RINGS

Nominal Size[1] or Basic Screw Dia	Nominal Size[1] or Basic Screw Dia	E Body Dia Min (Max Equal to Basic Screw Dia)	C Flange Dia Max	C Flange Dia Min	F Width Across Flats Max	F Width Across Flags Min	G Width Across Corners Min	H Head Height Max	J Wrenching Height Min	K Flange Thickness Min	Runout of Bearing Surface FIM Max
1/4	0.2500	0.2435	0.375	0.365	0.252	0.244	0.278	0.260	0.15	0.058	0.007
5/16	0.3125	0.3053	0.469	0.457	0.315	0.306	0.348	0.312	0.18	0.074	0.008
3/8	0.3750	0.3678	0.562	0.550	0.377	0.368	0.420	0.375	0.21	0.095	0.010
7/16	0.4375	0.4294	0.656	0.642	0.438	0.429	0.489	0.438	0.26	0.109	0.011
1/2	0.5000	0.4919	0.750	0.735	0.502	0.493	0.562	0.500	0.29	0.129	0.013
9/16	0.5625	0.5538	0.844	0.828	0.564	0.555	0.633	0.563	0.33	0.145	0.015
5/8	0.6250	0.6163	0.938	0.921	0.627	0.618	0.705	0.625	0.36	0.166	0.016
3/4	0.7500	0.7406	1.125	1.107	0.752	0.743	0.847	0.750	0.44	0.200	0.020
7/8	0.8750	0.8647	1.312	1.293	0.877	0.866	0.987	0.875	0.51	0.234	0.023
1	1.0000	0.9886	1.500	1.479	1.003	0.991	1.130	1.000	0.60	0.268	0.026
1-1/8	1.1250	1.1086	1.688	1.665	1.128	1.115	1.271	1.125	0.66	0.310	0.029
1-1/4	1.2500	1.2336	1.875	1.852	1.253	1.240	1.414	1.250	0.73	0.350	0.033
1-3/8	1.3750	1.3568	2.062	2.038	1.378	1.365	1.556	1.375	0.80	0.392	0.036
1-1/2	1.5000	1.4818	2.250	2.224	1.503	1.489	1.697	1.500	0.87	0.433	0.039

Nominal Size[1] or Basic Screw Dia	Nominal Size[1] or Basic Screw Dia	M Fillet Extension Max	M Fillet Extension Min	L Fillet Length Max	Bearing Surface Juncture Radius Min	X Chamfer or Radius Max	A Gaging Ring Thickness Max	A Gaging Ring Thickness Min	T Gaging Ring Dia Max	T Gaging Ring Dia Min	L_T Thread Length Basic	Y Transition Thread Length Max
1/4	0.2500	0.014	0.009	0.087	0.007	0.020	0.0525	0.0522	0.2783	0.2780	1.000	0.25
5/16	0.3125	0.017	0.012	0.087	0.009	0.020	0.0600	0.0597	0.3483	0.3480	1.125	0.28
3/8	0.3750	0.020	0.015	0.087	0.012	0.020	0.0711	0.0708	0.4203	0.4200	1.250	0.31
7/16	0.4375	0.023	0.018	0.087	0.014	0.030	0.0840	0.0837	0.4893	0.4890	1.375	0.36
1/2	0.5000	0.026	0.020	0.087	0.016	0.030	0.0948	0.0945	0.5623	0.5620	1.500	0.38
9/16	0.5625	0.029	0.022	0.157	0.018	0.030	0.1071	0.1068	0.6333	0.6330	1.625	0.42
5/8	0.6250	0.032	0.024	0.157	0.021	0.040	0.1179	0.1176	0.7053	0.7050	1.750	0.46
3/4	0.7500	0.039	0.030	0.157	0.025	0.040	0.1416	0.1413	0.8473	0.8470	2.000	0.50
7/8	0.8750	0.044	0.034	0.227	0.031	0.040	0.1656	0.1653	0.9873	0.9870	2.250	0.56
1	1.0000	0.050	0.040	0.332	0.034	0.040	0.1893	0.1890	1.1303	1.1300	2.500	0.62
1-1/8	1.1250	0.055	0.045	0.332	0.039	0.050	0.2109	0.2106	1.2713	1.2710	2.750	0.71
1-1/4	1.2500	0.060	0.050	0.332	0.044	0.050	0.2331	0.2328	1.4143	1.4140	3.000	0.71
1-3/8	1.3750	0.065	0.055	0.332	0.048	0.050	0.2544	0.2541	1.5563	1.5560	3.250	0.83
1-1/2	1.5000	0.070	0.060	0.332	0.052	0.050	0.2763	0.2760	1.6973	1.6970	3.500	0.83

1. Where specifying nominal size in decimals, zeros preceding decimal and in fourth decimal place shall be omitted. Additional requirements given in Section 3 shall apply.

TABLE 2—LENGTH TOLERANCE

Nominal Screw Length, in	Nominal Screw Size 0 thru 3/8	Nominal Screw Size 7/16 thru 3/4	Nominal Screw Size 7/8 thru 1-1/2
Up to 1, incl	–0.03	–0.03	–0.05
Over 1 to 2-1/2, incl	–0.04	–0.06	–0.10
Over 2-1/2 to 6, incl	–0.06	–0.08	–0.14
Over 6	–0.12	–0.12	–0.20

3.8 Length of Thread—The length of thread on screws shall be controlled by the grip gaging length L_G max and the body length L_B min as set forth in the following:

3.8.1 GRIP GAGING LENGTH—L_G max is the distance, measured parallel to the axis of screw, from the underside of head to the face of a noncounterbored or nonchamfered standard GO thread ring gage assembled by hand as far as the thread will permit. It represents the minimum design grip length and shall be used as the criterion for inspection and for determining thread availability when selecting screw lengths even though usable threads may extend beyond this point. Values for L_G max applicable to common nominal screw lengths are shown in Table 3.

For screws having nominal lengths which fall between those tabulated in Table 3, the L_G max value shown for the next shorter tabulated nominal length and respective screw size shall apply.

For screws having nominal lengths longer than those specified in Table 3 for the respective screw size, the L_G max value shall be determined by subtracting the L_T value in Table 1 from the nominal screw length.

For screws having shorter nominal lengths than those specified in Table 3 for the respective screw size, the complete (full form) thread, as measured with a thread ring gage, shall extend to within two threads (pitches) of the bearing face for sizes up to and including 5/8 in, and as close to the head as practicable for larger sizes.

3.8.2 BODY LENGTH—L_B min is the distance, measured parallel to the axis of screw, from the underside of the head to the last scratch of thread or the top of extrusion angle. The minimum body length for any screw length shall be equal to the maximum grip length minus the transition thread length (L_B min = L_G max – Y max). It shall be used as a criterion for inspection.

3.8.3 BASIC THREAD LENGTH—L_T is a reference dimension, intended for calculation purposes only, which represents the distance from the extreme end of the screw to the last complete (full form) thread.

3.8.4 TRANSITION THREAD LENGTH—Y max is a reference dimension, intended for calculation purposes only, which represents the length of incomplete threads and the tolerance on grip length.

3.9 Point—The point shall be flat and chamfered from a diameter approximately 0.016 in below the minor diameter of the thread to produce a length of point equivalent to 1/2 to 1-1/2 threads (pitches).

3.10 Incomplete Thread Diameter—The major diameter of incomplete thread shall not exceed the actual major diameter of the full form thread.

3.11 Thread Runout—The total runout between thread, body, and head of screws shall be such that screw may be assembled for a minimum of two full turns into the threaded hole of a concentricity sleeve gage as shown in Appendix A.

TABLE 3—MAXIMUM GRIP GAGING LENGTHS (LA MAX) FOR FLANGED 12-POINT SCRWS—NOMINAL SIZ

Nominal Length[1]	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2
1-1/2	0.500	—	—	—	—	—	—	—	—	—	—	—	—	—
1-3/4	0.500	0.625	0.500	—	—	—	—	—	—	—	—	—	—	—
2	1.000	0.625	0.500	0.625	—	—	—	—	—	—	—	—	—	—
2-1/4	1.000	1.125	1.000	0.625	0.750	0.750	—	—	—	—	—	—	—	—
2-1/2	1.500	1.125	1.000	1.125	0.750	0.750	0.750	—	—	—	—	—	—	—
2-3/4	1.500	1.625	1.500	1.125	0.750	0.750	0.750	—	—	—	—	—	—	—
3	2.000	1.625	1.500	1.625	1.500	1.500	0.750	1.000	—	—	—	—	—	—
3-1/4	2.000	2.125	2.000	1.625	1.500	1.500	1.500	1.000	1.000	—	—	—	—	—
3-1/2	2.500	2.125	2.000	2.125	1.500	1.500	1.500	1.000	1.000	1.000	—	—	—	—
3-3/4	2.500	2.625	2.500	2.125	2.250	2.250	1.500	1.000	1.000	1.000	1.000	—	—	—
4	3.000	2.625	2.500	2.625	2.250	2.250	2.250	2.000	1.000	1.000	1.000	1.000	—	—
4-1/4	3.000	3.125	3.000	2.625	2.250	2.250	2.250	2.000	2.000	1.000	1.000	1.000	1.000	—
4-1/2	3.500	3.125	3.000	3.125	3.000	3.000	2.250	2.000	2.000	2.000	1.000	1.000	1.000	1.000
4-3/4	3.500	3.625	3.500	3.125	3.000	3.000	3.000	2.000	2.000	2.000	2.000	1.000	1.000	1.000
5	4.000	3.625	3.500	3.625	3.000	3.000	3.000	3.000	2.000	2.000	2.000	2.000	1.000	1.000
5-1/4	—	4.125	4.000	3.625	3.750	3.750	3.000	3.000	3.000	2.000	2.000	2.000	2.000	1.000
5-1/2	—	4.125	4.000	4.125	3.750	3.750	3.750	3.000	3.000	3.000	2.000	2.000	2.000	2.000
5-3/4	—	4.625	4.500	4.125	3.750	3.750	3.750	3.000	3.000	3.000	3.000	2.000	2.000	2.000
6	—	4.625	4.500	4.625	4.500	4.500	3.750	4.000	3.000	3.000	3.000	3.000	2.000	2.000
6-1/4	—	5.125	5.000	4.625	4.500	4.500	4.500	4.000	4.000	3.000	3.000	3.000	3.000	2.000
6-1/2	—	5.125	5.000	5.125	4.500	4.500	4.500	4.000	4.000	4.000	3.000	3.000	3.000	3.000
6-3/4	—	—	5.500	5.125	5.250	5.250	4.500	4.000	4.000	4.000	4.000	3.000	3.000	3.000
7	—	—	5.500	5.625	5.250	5.250	5.250	5.000	4.000	4.000	4.000	4.000	3.000	3.000
7-1/4	—	—	6.000	5.625	5.250	5.250	5.250	5.000	5.000	4.000	4.000	4.000	4.000	3.000
7-1/2	—	—	—	6.125	6.000	6.000	5.250	5.000	5.000	5.000	4.000	4.000	4.000	4.000
7-3/4	—	—	—	6.125	6.000	6.000	6.000	5.000	5.000	5.000	5.000	4.000	4.000	4.000
8	—	—	—	6.625	6.000	6.750	6.000	6.000	5.000	5.000	5.000	5.000	4.000	4.000
8-1/2	—	—	—	7.125	7.000	6.750	6.750	6.000	6.000	6.000	5.000	5.000	5.000	4.000
9	—	—	—	7.625	7.000	7.750	6.750	7.000	6.000	6.000	6.000	5.000	5.000	5.000
9-1/2	—	—	—	—	8.000	7.750	7.750	7.000	7.000	7.000	6.000	6.000	5.000	5.000
10	—	—	—	—	8.000	9.25	7.750	8.000	7.000	7.000	7.000	6.000	6.000	5.000
11	—	—	—	—	—	10.25	9.25	9.000	8.000	8.000	7.000	7.000	6.000	6.000
12	—	—	—	—	—	—	10.25	10.000	9.000	9.000	8.000	7.000	7.000	6.000
13	—	—	—	—	—	—	—	11.000	10.000	10.000	9.000	8.000	7.000	7.000
14	—	—	—	—	—	—	—	12.000	11.000	11.000	10.000	9.000	8.000	7.000
15	—	—	—	—	—	—	—	13.000	12.000	12.000	11.000	10.000	9.000	8.000
16	—	—	—	—	—	—	—	—	13.000	13.000	12.000	11.000	10.000	9.000
17	—	—	—	—	—	—	—	—	14.000	14.000	13.000	12.000	11.000	10.000
18	—	—	—	—	—	—	—	—	15.000	15.000	14.000	13.000	12.000	11.000
19	—	—	—	—	—	—	—	—	—	16.000	15.000	14.000	13.000	12.000
20	—	—	—	—	—	—	—	—	—	17.000	16.000	15.000	14.000	13.000

1. For nominal screw lengths falling between tabulated lengths, and nominal lengths shorter than tabulated lengths, see 3.8.

3.12 Materials

3.12.1 STEEL—Suitable properties for steel screws are covered in SAE J429, Grades 2, 5, and 8, as specified by purchaser.

3.12.2 OTHER MATERIALS—Where specified, screws may be made from brass, corrosion resisting steel, or other materials as agreed upon by the manufacturer and purchaser.

3.13 Finish—Unless otherwise specified, screws shall be supplied plain (unplated or uncoated), as processed.

3.14 Workmanship—Screws shall be free from burrs, seams, laps, loose scale, and any defects that affect serviceability.

PREPARED BY THE SAE FASTENERS COMMITTEE