

# INDEX

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## TYPES OF PLATING

Grade identification	Specification	Available plating	Other available plating
	SAE J429 GRADE 2	<ul style="list-style-type: none"> <li>• Black</li> <li>• Zinc</li> <li>• Hot galvanization</li> </ul>	<ul style="list-style-type: none"> <li>• Bronze</li> <li>• Brass</li> <li>• Chromium</li> <li>• Yellow brass</li> <li>• Different color</li> </ul>
	SAE J429 GRADE 5	<ul style="list-style-type: none"> <li>• Black</li> <li>• Zinc</li> <li>• Zinc yellow</li> <li>• Hot galvanization</li> </ul>	<ul style="list-style-type: none"> <li>• Bronze</li> <li>• Brass</li> <li>• Chromium</li> <li>• Yellow brass</li> <li>• Different corlor</li> </ul>
	SAE J429 GRADE 8	<ul style="list-style-type: none"> <li>• Black</li> <li>• Zinc</li> <li>• Hot galvanization</li> </ul>	<ul style="list-style-type: none"> <li>• Bronze</li> <li>• Brass</li> <li>• Chromium</li> <li>• Yellow brass</li> <li>• Different corlor</li> </ul>
	L9	<ul style="list-style-type: none"> <li>• Black</li> <li>• Zinc yellow</li> </ul>	X
	ASTM A325 TYPE I	<ul style="list-style-type: none"> <li>• Black</li> <li>• Hot galvanization</li> </ul>	X
	ASTM A193 GRADE B7	<ul style="list-style-type: none"> <li>• Black</li> <li>• Hot galvanization</li> </ul>	X
	304 Stainless steel	<ul style="list-style-type: none"> <li>• Stainless steel 304</li> </ul>	X
	316 Stainless steel	<ul style="list-style-type: none"> <li>• Stainless steel 316</li> </ul>	X

### THE QUESTIONS TO ASK

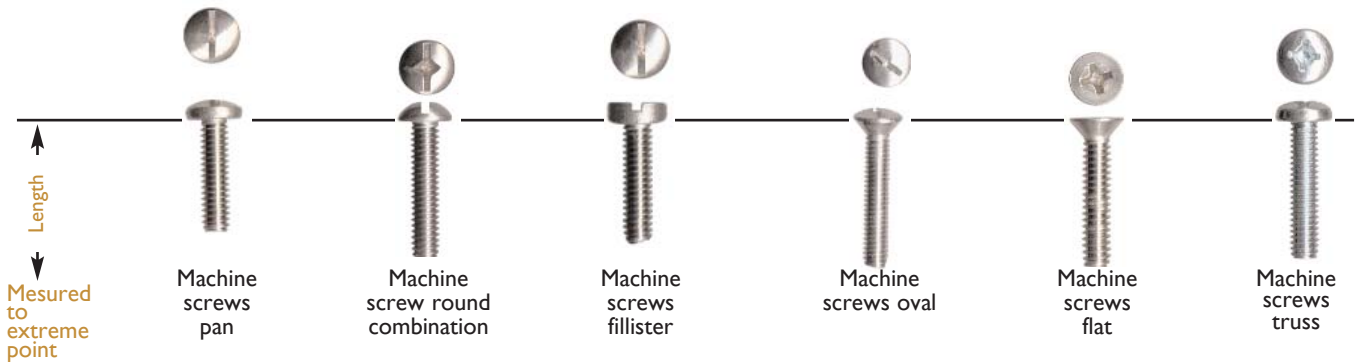
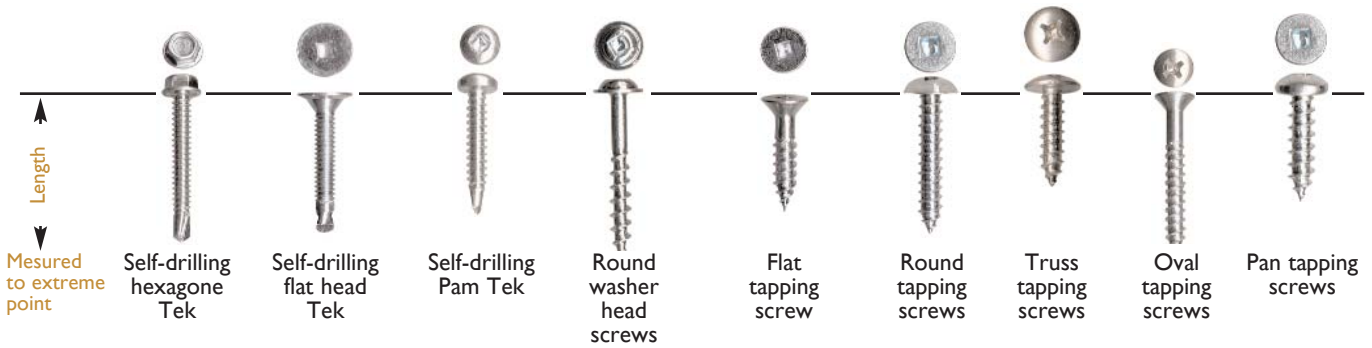
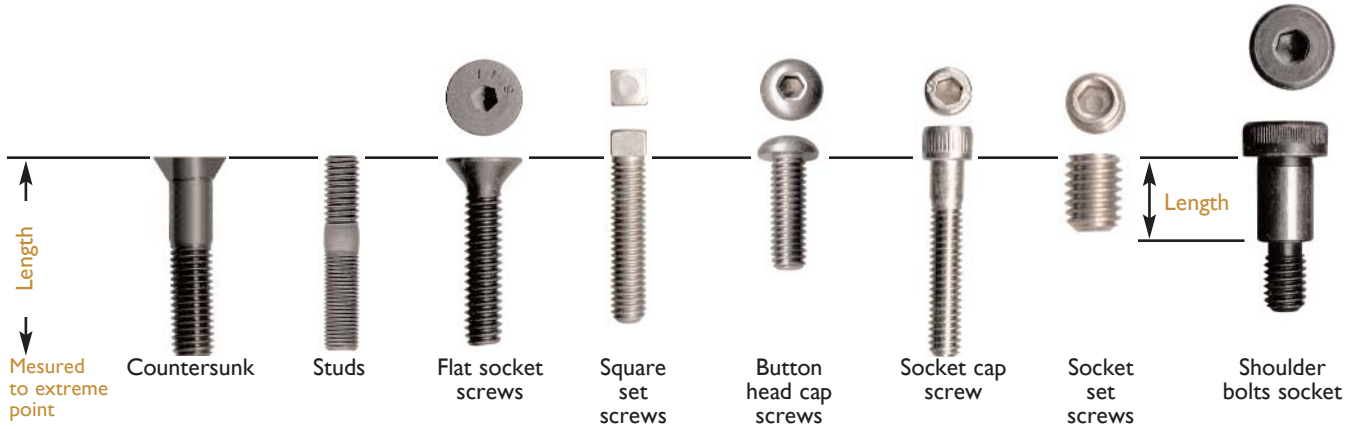
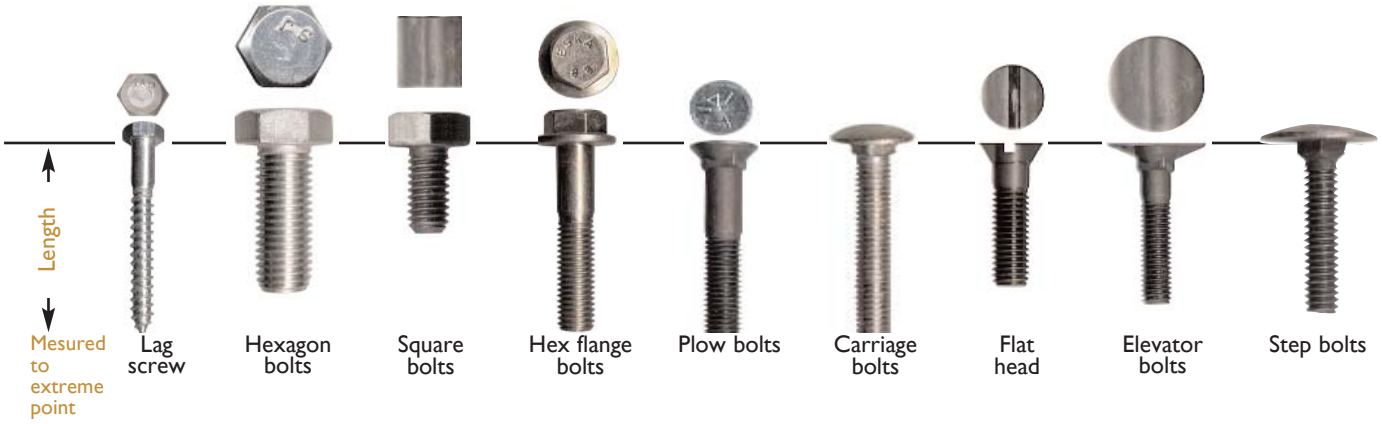
1. Bolts size
2. Type of thread
3. Type of bolts
4. Grade of bolts
5. Bolts' finish (Plating)
6. Requested quantity

- Ex.: 1/2 x 1-1/2  
 Ex.: fine thread or large thread (UNF, UNC)  
 Ex.: Hexagon, Lag screw, Boulon Carrosserie etc.  
 Ex.: Grade 2, Grade 5, Grade 8, Stainless steel etc.  
 Ex.: Black, Zinc plated, Hot galvanized, Stainless steel etc.  
 Ex.: 100, 1000, Vrac, etc.

# IDENTIFICATION OF BOLTS

Grade identification	Specification	Fastening description	Material	Normal size	Mecanic property		
					charge proof	Output strength	Maximal torsion
	SAE J429 GRADE 2	• Bolts • Screw • Pin	Steel is carbon base or average	1/4" à 3/4" de 3/4" à 1-1/2" au-dessus	55 000 33 000	57 000 36 000	74 000 60 000
	SAE J429 GRADE 5	• Bolts • Screw • Pin	Steel average out of tight and moderate carbon	1/4" à 1" de 1" à 1-1/2" au-dessus	85 000 74 000	92 000 81 000	120 000 105 000
	SAE J429 GRADE 8	• Bolts • Screw • Pin	Tempered steel average out of tight and moderated carbon	1/4" à 1-1/2"	120 000	130 000	150 000
	L9	• Structure of bolts	Steel average out of tight and moderate carbon	1/4" à 1-1/2"	145 000	155 000	180 000
	ASTM A325 TYPE I	• Structure of bolts	Tempered steel, hot treaty	1/2" à 1" 1/1/8" à 1-1/2"	85 000 74 000	92 000 81 000	120 000 105 000
	ASTM A193 GRADE B7	• Structure of bolts	AISI 4140, 4142 or 4145	1/4" à 2-1/2" 3/4" à 1-1/2" et au-dessus 4" à 7"	- - -	105 000 95 000 -	125 000 115 000 -
	SAE J429 GRADE 5	Hexagon nut	Steel average out of carbon	X	X	X	X
	SAE J429 GRADE 8	Hexagon nut	Tempered steel average out of tight and moderated carbon	X	X	X	X
	L9	Hexagon nut	Tempered steel, hot treaty	X	X	X	X

**SCREWS & BOLTS**



**TYPES  
OF NUTS**



FINISHED HEXAGON NUTS



FINISHED HEAVY HEXAGON NUTS



FINISHED HIGH HEXAGON NUTS



FINISHED HEXAGON JAM NUTS



STEEL, BRASS MACHINE SCREW NUTS



HOT PRESS NUTS



LOCK NUTS NYLON INSERT STOP NUTS



LOCK NUTS DOUBLE NYLON  
INSERT STOP NUTS



FLANGE NUTS



FINISHED THICK SLOTTED  
HEXAGON NUTS



KEPS LOCKNUTS



STOVER LOCKNUTS



COUPLING NUTS



UNIT-NUT ALL NYLON  
LOCKNUTS



STOVER LOCKNUTS



WING FORGED NUTS



WING STAMPED NUTS



ACORN NUTS

## TYPES OF WASHER



TOOTH LOCK WASHER  
INTERNAL



TOOTH LOCK WASHER EXTERNAL



TOOTH LOCK WASHER  
COUNTERSUNK



COUNTERSUNK FINISHING  
WASHERS STANDART



COUNTERSUNK FINISHING  
WASHERS FLUSH



BEVEL WASHERS MALLEABLE



SPRING LOCK WASHERS



FENDER WASHERS



U.S.S. PLATE WASHERS



S.A.E. WASHERS

## ANCHOR



WEDGE ANCHOR



MASONRY ANCHOR



HOLLOW WALL ANCHORS  
DRIVE TYPE



WALL DRILLER



LAG SCREWS SHIELDS



DOUBLE EXPANSION SHIELDS



WOOD SCREWS LEAD SHIELDS



TOGGLE BOLTS



HOLLOW WALL ANCHORS

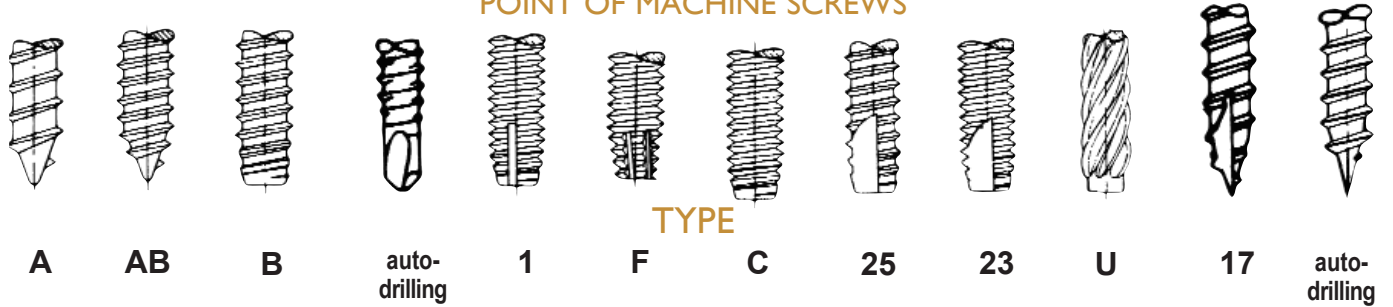
## TYPES OF POINT

### POINT OF SOCKET SCREW SET



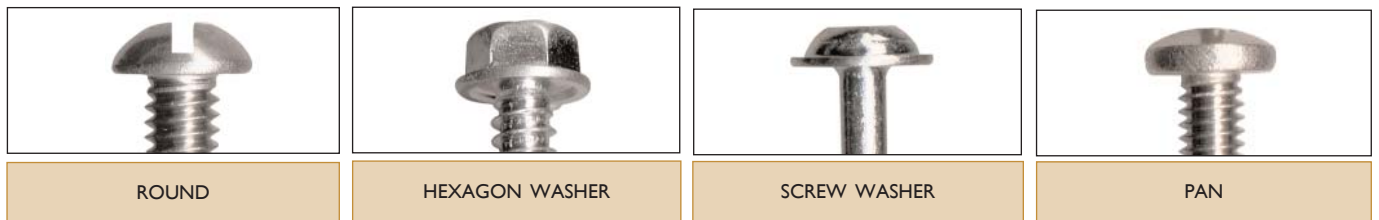
## POINT

### POINT OF MACHINE SCREWS



### TYPE

## SCREW'S HEAD



## GRIP

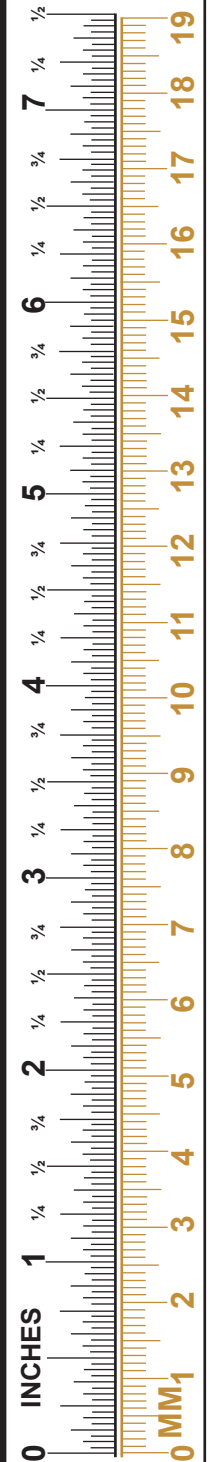


**TYPES OF MEASUREMENT**

STANDARD THREAD UNC	FINE THREAD UNF	STANDARD THREAD UNC	FINE THREAD UNF
1/4" - 20	1/4" - 28	3/4" - 10	3/4" - 16
5/16" - 18	5/16" - 24	7/8" - 9	7/8" - 14
3/8" - 16	3/8" - 24	1" - 8	1" - 14
7/16" - 14	7/16" - 20	1-1/8" - 7	1-1/8" - 12
1/2" - 13	1/2" - 20	1-1/4" - 7	1-1/4" - 12
9/16" - 12	9/16" - 18	1-3/8" - 6	1-3/8" - 12
5/8" - 11	5/8" - 18	1-1/2" - 6	1-1/2" - 12
		1-3/4" - 5	

**MESUREMENT OF FINES & STANDARD THREAD ET LES GROSSEURS**

MESUREMENT IN INCHES AND MILIMETRE



**Fractions Decimale Milimeter**

Frac.	Dec.	Mm.	Frac.	Dec.	Mm.
1/64"	.0156	0.396	33/64"	.5156	13.096
1/32"	.0312	0.793	17/32"	.5312	13.493
3/64"	.0468	1.190	35/64"	.5468	13.890
1/16"	.0625	1.587	9/16"	.5625	14.287
5/64"	.0781	1.984	37/64"	.5781	14.684
3/32"	.0937	2.381	19/32"	.5937	15.081
7/64"	.1093	2.778	39/64"	.6093	15.478
1/8"	.125	3.175	5/8"	.625	15.875
9/64"	.1406	3.571	41/64"	.6406	16.271
5/32"	.1562	3.968	21/32"	.6562	16.668
11/64"	.1718	4.365	43/64"	.6718	17.065
3/16"	.1875	4.762	11/16"	.6875	17.462
13/64"	.2031	5.159	45/64"	.7031	17.859
7/32"	.2187	5.556	23/32"	.7187	18.256
15/64"	.2343	5.953	47/64"	.7343	18.653
1/4"	.250	6.350	3/4"	.750	19.050
17/64"	.2656	6.746	49/64"	.7656	19.446
9/32"	.2812	7.143	25/32"	.7812	19.843
19/64"	.2968	7.540	51/64"	.7968	20.240
5/16"	.3125	7.937	13/16"	.8125	20.637
21/64"	.3281	8.334	53/64"	.8281	21.034
11/32"	.3437	8.731	27/32"	.8437	21.431
23/64"	.3593	9.128	55/64"	.8593	21.828
3/8"	.375	9.525	7/8"	.875	22.225
25/64"	.3906	9.921	57/64"	.8906	22.621
13/32"	.4062	10.318	29/32"	.9062	23.018
27/64"	.4218	10.715	59/64"	.9218	23.415
7/16"	.4375	11.112	15/16"	.9375	23.812
29/64"	.4531	11.509	61/64"	.9531	24.209
15/32"	.4687	11.906	31/32"	.9687	24.606
31/64"	.4843	12.303	63/64"	.9843	25.003
1/2"	.500	12.700	1"	1.000	25.400

STANDARD THREAD	FINE THREAD
03 - 0.50	-
04 - 0.70	04 - 0.75
05 - 0.80	05 - 0.90
06 - 1.00	06 - 0.75
07 - 1.00	-
08 - 1.25	08 - 1.00
10 - 1.50	10 - 1.00
-	10 - 1.25
12 - 1.75	12 - 1.00
-	12 - 1.25
-	12 - 1.50
14 - 2.00	14 - 1.50
16 - 2.00	16 - 1.00
-	16 - 1.50
18 - 2.50	18 - 1.50
20 - 2.50	20 - 1.50
22 - 2.50	22 - 1.50
-	22 - 2.00
24 - 3.00	24 - 1.50
-	24 - 2.00
27 - 3.00	27 - 2.00
30 - 3.50	30 - 2.00
33 - 3.50	33 - 2.00
36 - 4.00	36 - 3.00
39 - 4.00	39 - 3.00
42 - 4.50	42 - 3.00
45 - 4.50	45 - 3.00
48 - 5.00	48 - 3.00
52 - 5.50	52 - 3.00
56 - 5.50	56 - 4.00
60 - 5.50	60 - 4.00
64 - 6.00	64 - 4.00
68 - 6.00	68 - 4.00

## SPÉCIFICATIONS / SPECIFICATIONS

LES DIMENSIONS DES TÊTES HEXAGONES *GRADE 2, GRADE 5 ET DU GRADE 8* /  
**GRADE 2, GRADE 5, AND GRADE 8 HEX HEAD CAP SCREWS-HEAD DIMENSIONS**

Diamètre / Diameter	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
Largeur de la Tête / Width Across Flats	7/16	1/2	9/16	5/8	3/4	13/16	15/16	1-1/8	1-5/16	1-1/2	1-11/16	1-7/8	2-1/16	2-1/4
Hauteur de la Tête / Height of Head	5/32	13/24	15/64	9/32	5/16	23/64	25/64	15/32	35/64	39/64	11/16	15/32	27/32	15/16

## SPÉCIFICATIONS / SPECIFICATIONS

LES DIMENSIONS DES NOIX HEXAGONES *GRADE 2, GRADE 5 ET DU GRADE 8* /  
**GRADE 2, GRADE 5, AND GRADE 8 HEXAGON NUTS DIMENSIONS**

Diamètre Diameter	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
Largeur Noix Across Flats	7/16	1/2	9/16	11/16	3/4	7/8	15/16	1-1/8	1-5/16	1-1/2	1-11/16	1-7/8	2-1/16	2-1/4
Épaisseur Thickness	7/32	17/64	21/64	3/8	7/16	31/64	35/64	41/64	3/4	55/64	31/32	1-1/16	1-11/64	1-9/32

### INFORMATION TECHNIQUE DES *RONDELLES PLATES S.A.E.* TECHNICAL INFORMATION *S.A.E. WASHER*

Grandeur des Vis et Boulons / Screw or Bolt Sizes	Diamètre du Trou / Hole Diameter	Diamètre Extérieur / Outside Diameter	Épaisseur / Thickness		N° Approx. par 100 lbs. / *Approx. N° in 100 lbs.	Poids Approx. de 1000 Pièces lbs. / Approx. Weight 1000 Pcs. in lbs.
			Écartement / Gauge	Pouces / Inches		
No. 2	3/32"	1/4"	22	1/32	250,000	0.4
No. 4	1/8"	5/16"	22	1/32	165,000	0.6
No. 6 (1/8)	5/32"	3/8"	18	3/64	80,000	1.3
No. 8	3/16"	7/16"	18	3/64	55,000	1.8
No. 10 (3/16)	7/32"	1/2"	16	1/16	37,000	2.7
1/4"	9/32"	5/8"	16	1/16	24,400	4.1
5/16"	11/32"	11/16"	16	1/16	21,200	4.7
3/8"	13/32"	13/16"	16	1/16	15,140	6.6
7/16"	15/32"	59/64"	16	1/16	11,360	8.8
1/2"	17/32"	1-1/16"	13	3/32	5,900	16.9
9/16"	19/32"	1-3/16"	13	3/32	4,740	21.1
5/8"	21/32"	1-5/16"	13	3/32	3,880	25.8
3/4"	13/16"	1-1/2"	11	1/8	2,360	42.3
7/8"	15/16"	1-3/4"	11	1/8	1,720	58.1
	1-1/16"	2"	11	1/8	1,310	76.4

\* Note: Nombre des pièces par lb. peut varier de ± 15% dépendant du I.F.I permettant une meilleure tolérance épaisseur  
 L : Large

\* Note: Number or pieces per pound may vary ± 15% based on I.F.I allowable thickness tolerances.  
 L : Large

# DIMENSIONS — RÉGULIER DES RONDELLES ÉLASTIQUES SANS BECS / DIMENSIONS — REGULAR LOCK WASHER

Grandeur de Vis et Boulons / Screw or Bolt Size	Section Rondelle / Washers Section		Grandeur de Vis et Boulons / Screw or Bolt Size	Section Rondelle / Washers Section		Grandeur de Vis et Boulons / Screw or Bolt Size	Section Rondelle / Washers Section		Grandeur de Vis et Boulons / Screw or Bolt Size	Section Rondelle / Washers Section	
	Largeur / Width	Épaisseur / Thick		Largeur / Width	Épaisseur / Thick		Largeur / Width	Épaisseur / Thick		Largeur / Width	Épaisseur / Thick
No. 2	.035	.031	No. 10	.062	.047	1/2"	.171	.125	1-1/8"	.328	.281
No. 3	.040	.040	No. 12	.070	.056	9/16"	.188	.141	1-1/4"	.359	.312
No. 4	.040	.020	1/4"	.109	.062	5/8"	.203	.156	1-3/8"	.391	.344
No. 5	.047	.025	5/16"	.125	.078	3/4"	.234	.188	1-1/2"	.422	.375
No. 6	.047	.031	3/8"	.141	.094	7/8"	.266	.219			
No. 8	.055	.031	7/16"	.156	.109	1"	.297	.297			

## INFORMATION TECHNIQUE DES *RONDELLES PLATES U.S.S.* TECHNICAL INFORMATION *PLATE WASHER U.S.S.*

Grandeur des Vis et Boulons / Screw or Bolt Sizes	Diamètre du Trou / Hole Diameter	Diamètre Extérieur / Outside Diameter	Épaisseur / Thickness		N° Approx. par 100 lbs. / *Approx. N° in 100 lbs.	Poids Approx. de 1000 Pièces lbs. / Approx. Weight 1000 Pcs. in lbs.
			Écartement / Gauge	Pouces / Inches		
1/8"	3/16"	7/16"	18	3/64"	55,400	1.8
3/16"	1/4"	9/16"	18	3/64"	29,400	3.4
1/4"	5/16"	3/4"	16	1/16"	16,200	6.2
5/16"	3/8"	7/8"	14	5/64"	9,600	10.4
3/8"	7/16"	1"	14	5/64"	7,460	13.4
7/16"	1/2"	1-1/4"	13	3/32"	3,800	26.2
1/2"	9/16"	1-3/8"	12	7/64"	2,740	36.6
9/16"	5/8"	1-1/2"	12	7/64"	2,300	43.3
5/8"	11/16"	1-3/4"	10	9/64"	1,290	77.5
5/8"L	3/4"	1-3/4"	10	9/64"	1,340	74.8
3/4"	13/16"	2"	10	9/64"	1,000	100.0
3/4"L	7/8"	2"	9	5/32"	930	107.6
7/8"	15/16"	2-1/4"	9	5/32"	720	139.2
7/8"L	1"	2-1/4"	9	5/32"	740	135.2
1"	1-1/16"	2-1/2"	9	5/32"	580	170.4
1"L	1-1/8"	2-1/2"	9	5/32"	600	165.9
1-1/8"	1-3/16"	2-3/4"	9	5/32"	490	204.7
1-1/8"L	1-1/4"	2-3/4"	9	5/32"	500	199.7
1-1/4"	1-5/16"	2-3/4"	9	5/32"	520	194.3
1-1/4"L	1-3/8"	3"	9	5/32"	420	236.6
1-3/8"	1-1/2"	3-1/4"	9	5/32"	360	276.6
1-1/2"	1-9/16"	3-1/4"	8	11/64"	340	297.2
1-1/2"L	1-5/8"	3-1/2"	8	11/64"	280	351.6
1-5/8"	1-3/4"	3-3/4"	8	11/64"	250	402.5
1-3/4"	1-13/16"	3-3/4"	7	3/16"	230	430.1
1-3/4"L	1-7/8"	4"	7	3/16"	200	498.3
2"	2-1/16"	4-1/4"	7	3/16"	180	551.1
2"L	2-1/8"	4-1/2"	7	3/16"	160	628.0

\* Note: Nombre des pièces par lb. peut varier de ± 15% dépendant du I.F.I permettant une meilleur tolérance épaisseur  
L : Large

\* Note: Number of pieces per pound may vary ± 15% based on I.F.I allowable thickness tolerances.  
L : Large

# MESUREMENT OF TORQUE

SAE GRADE 2						
Dia. & Thds.	Stress area in.	Tensile strength	Proff load (lbs)	Clamp load (lbs)	Torque	
					Dry ft. lb.	Lub. ft. lb.
1/4-20	0.0318	74	1750	1310	5.5	4.2
28	0.0364	74	2000	1500	6.3	4.7
5/16-18	0.0524	74	2900	2160	11	8
24	0.0580	74	3200	2400	12	9
3/8-16	0.0775	74	4250	3200	20	15
24	0.0878	74	4800	3620	23	17
7/16-14	0.1063	74	5850	4380	32	24
20	0.1187	74	6550	4900	36	27
1/2-13	0.1419	74	7800	5850	50	35
20	0.1599	74	8800	6600	55	40
9/16-12	0.1820	74	10000	7500	70	55
18	0.2030	74	11200	8400	80	60
5/8-11	0.226	74	12400	9320	100	75
18	0.256	74	14100	10560	110	85
3/4-10	0.334	74	18400	13800	175	130
16	0.373	74	20500	15390	200	140
7/8-9	0.462	74	15200	11430	170	125
14	0.509	74	16800	12600	180	140
1-8	0.606	74	20000	15000	250	190
14	0.679	74	22400	16800	280	210
1-1/8-7	0.763	74	25200	18900	350	270
12	0.856	74	28200	21200	400	300
1-1/4-7	0.969	74	32000	24000	500	380
12	1.073	74	35400	26550	550	420
1-1/2-6	1.405	74	46400	34800	870	650
12	1.581	74	52200	39150	980	730

**Torque Wrenches AVAILABLE SPECIAL TO ORDER**

**LEGEND**  
 Torques for Grades 2,5, and 8 were calculated based on the following relationship:  
 $T=RDP$   
 where :  
 T= Torque (in.-lbs.)  
 D=Nominal Diameter (in.)  
 P=Clamp Load (lbs.)  
 R=Tightening Coefficient

The value of R is assumed to be equal to .20 for dry unplated conditions, and equal to .15 for lubricated, including plated, conditions. Actual values of R can vary between .05 and .35 for commonly encountered conditions.

SAE GRADE 5						
Dia. & Thds.	Stress area in.	Tensile strength	Proff load (lbs)	Clamp load (lbs)	Torque	
					Dry ft. lb.	Lub. ft. lb.
1/4-20	0.0318	120	2700	2020	8	6.3
28	0.0364	120	3100	2320	10	7.2
5/16-18	0.0524	120	4450	3340	17	13
24	0.0580	120	4900	3700	19	14
3/8-16	0.0775	120	6600	4950	30	23
24	0.0878	120	7450	5600	35	25
7/16-14	0.1063	120	9050	6780	50	35
20	0.1187	120	10100	7570	55	40
1/2-13	0.1419	120	12100	9050	75	55
20	0.1599	120	13600	10200	85	65
9/16-12	0.1820	120	15500	11600	110	80
18	0.2030	120	17300	12950	120	90
5/8-11	0.226	120	19200	14400	150	110
18	0.256	120	21800	16350	170	130
3/4-10	0.334	120	28400	21300	260	200
16	0.373	120	31700	23780	300	220
7/8-9	0.462	120	39300	29450	430	320
14	0.509	120	43300	32450	470	350
1-8	0.606	120	51500	38600	640	480
14	0.679	120	57700	43300	720	540
1-1/8-7	0.763	120	56500	42300	790	590
12	0.856	120	63300	47500	890	670
1-1/4-7	0.969	120	71700	53800	1120	840
12	1.073	120	79400	59600	1240	930
1-1/2-6	1.405	120	10400	78000	1950	1460
12	1.581	120	11700	87700	2200	1640

L9® Fastening System torque values are for a nut, bolt, and two-washer assembly, not for screws used in tapped holes; and were developed through laboratory testing of representative samples. As such, they are average values, which, when used under actual assembly conditions, can be expected to produce clamp loads within ± 15% of the recommended values. When L9® hex screws with L9® tension control washers are used in tapped holes, assembly torque values should be determined experimentally under actual conditions.

The above recommended assembly torques are offered as a guide only. Torque specifications, especially for critical joints, should be determined under actual assembly conditions due to the many variables involved which are difficult to predict and do affect the torque-tension relationship.

The above recommended clamp loads are based on 75% of the minimum specified proof loads for each grade and size.

Strength Grade	Applicable sizes	Proof Load Stress (psi)	Yield min. Stress (psi)	Tensile Stress (psi)
SAE Gr. 2	1/4 thru 3/4 dia	55,000	57,000	74,000
	over 3/4" thru 1-1/2" dia.	33,000	36,000	60,000
	over 6" long	33,000	36,000	60,000
SAE Gr. 5	1/4" thru 1" dia.	85,000	92,000	120,000
	over 1" thru 1-1/2" dia.	74,000	81,000	105,000

# MESUREMENT OF TORQUE

SAE GRADE 8						
Dia. & Thds.	Stress area in.	Tensile strength	Proff load (lbs)	Clamp load (lbs)	Torque	
					Dry ft. lb.	Lub. ft. lb.
1/4-20	0.0318	150	3800	2850	12	9
28	0.0364	150	4350	3250	14	10
5/16-18	0.0524	150	6300	4700	24	18
24	0.0580	150	6950	5200	27	20
3/8-16	0.0775	150	9300	6980	45	35
24	0.0878	150	10500	7900	50	35
7/16-14	0.1063	150	12800	9550	70	50
20	0.1187	150	14200	10650	80	60
1/2-13	0.1419	150	17000	12750	110	80
20	0.1599	150	19200	14400	120	90
9/16-12	0.1820	150	21800	16350	150	110
18	0.2030	150	24400	18230	170	130
5/8-11	0.226	150	27100	20350	210	160
18	0.256	150	30700	23000	240	180
3/4-10	0.334	150	40100	30100	380	280
16	0.373	150	44800	33500	420	310
7/8-9	0.462	150	55400	41600	600	450
14	0.509	150	61100	45800	670	500
1-8	0.606	150	72700	54500	910	680
14	0.679	150	81500	61100	1020	760
1-1/8-7	0.763	150	91600	68700	1290	970
12	0.856	150	102700	77000	1440	1080
1-1/4-7	0.969	150	116300	87200	1820	1360
12	1.073	150	128800	96600	2010	1510
1-1/2-6	1.405	150	168600	126500	3160	2370
12	1.581	150	189700	142200	3560	2670

**Torque Wrenches AVAILABLE SPECIAL TO ORDER**

**LEGEND**  
 Torques for Grades 2,5, and 8 were calculated based on the following relationship:  
 $T=RDP$   
 where :  
 T= Torque (in.-lbs.)  
 D=Nominal Diameter (in.)  
 P=Clamp Load (lbs.)  
 R=Tightening Coefficient

The value of R is assumed to be equal to .20 for dry unplated conditions, and equal to .15 for lubricated, including plated, conditions. Actual values of R can vary between .05 and .35 for commonly encountered conditions.

L9 FASTENING SYSTEM						
Dia. & Thds.	Stress area in.	Tensile strength	Proff load (lbs)	Clamp load (lbs)	Torque	
					Dry ft. lb.	Lub. ft. lb.
1/4-20	0.0318	180	4610	3450	11	10
28	0.0364	180	5270	3950	13	12
5/16-18	0.0524	180	7590	5700	21	19
24	0.0580	180	8410	6300	23	20
3/8-16	0.0775	180	11230	8450	33	30
24	0.0878	180	12730	9550	38	35
7/16-14	0.1063	180	15410	11550	60	55
20	0.1187	180	17210	12900	65	60
1/2-13	0.1419	180	20570	15450	95	85
20	0.1599	180	23180	17400	105	95
9/16-12	0.1820	180	26393	19800	140	120
18	0.2030	180	29430	22100	150	135
5/8-11	0.226	180	32770	24550	185	170
18	0.256	180	37120	27800	205	190
3/4-10	0.334	180	48430	36350	290	265
16	0.373	180	54080	40600	355	330
7/8-9	0.462	180	66990	50300	505	475
14	0.509	180	73800	55400	585	520
1-8	0.606	180	87870	66900	775	550
14	0.679	180	98450	73800	900	700
1-1/8-7	0.763	180	110630	83000	1150	1025
12	0.856	180	124120	93100	1325	1150
1-1/4-7	0.969	180	140500	105400	1600	1400
12	1.073	180	155580	116700	1750	1600
1-1/2-6	1.405	180	203720	152800	3250	2900
12	1.581	180	229240	171900	3650	3300

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The above recommended assembly torques are offered as a guide only. Torque specifications, especially for critical joints, should be determined under actual assembly conditions due to the many variables involved which are difficult to predict and do affect the torque-tension relationship.

Strength Grade	Applicable sizes	Proof Load Stress (psi)	Yield min. Stress (psi)	Tensile Stress (psi)
SAE Gr. 8	1/4 thru 1-1/2 dia	55,000	57,000	74,000.
L'9®	1/4 thru 1-1/2 dia	85,000	92,000	120,000

The above recommended clamp loads are based on 75% of the minimum specified proof loads for each grade and