



**Guides & références**  
Reference guides



## ÉQUIVALENT DE BOULONS ET ÉCROUS - STANDARDS ET MÉTRIQUES

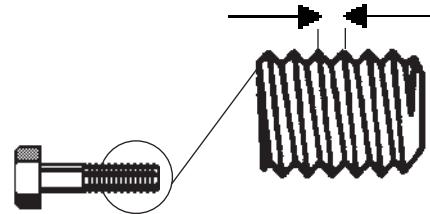
DIA.	UNC	UNF	HEX	ÉQUIVALENT MÉTRIQUE
1	64	72	-	M2 x 0.40
3	48	56	-	M2.5 x 0.45
4	40	48	-	M3 x 0.5
6	32	40	-	M3.5 x 0.6
8	32	36	-	M4 x 0.7
10	24	32	-	M5 x 0.8
1/4	20	28	7/16	M6 x 1.00
5/16	18	24	1/2	M8 x 1.25
3/8	16	24	9/16	M10 x 1.50
7/16	14	20	11/16	M12 x 1.75
1/2	13	20	3/4	M14 x 2.00
9/16	12	18	7/8	-
5/8	11	18	15/16	M16 x 2.00
3/4	10	16	1-1/8	M20 x 2.50
7/8	9	14	1-5/16	-
1	8	14	1-1/2	M24 x 3.00
1-1/8	7	12	1-11/16	M30 x 3.50
1-1/4	7	12	1-7/8	M36 x 4.00
1-1/2	6	12	2-1/4	-

### SYMBOLES ET ABRÉVIATIONS

ANSI = American National Standards Institute  
 ASTM = American Society for Testing and Materials  
 BSW = British Standard Whitworth  
 DIN = Deutsches Institut für Normung  
 ISO = International Organization for Standardization  
 JIS = Japanese Industrial Standards  
 SAE = Filet fin  
 UNC = United National Course thread  
 UNF = United National Fine thread  
 USS = Filet gros

### PAS (PITCH) BOULONS MÉTRIQUES

PAS / PITCH = Distance entre les filets



## GUIDE POUR PAS (PITCH) DE FILETS ET TÊTE HEXAGONE DE BOULONS MÉTRIQUES

DIAMÈTRE BOULON	PAS (PITCH) FILET RÉGULIER	PAS (PITCH) FILET FIN	PAS (PITCH) FILET EXTRA FIN	PAS (PITCH) FILET EXTRA FIN	INTERNATIONALE NORME TÊTE HEXAGONE / HEX. HEAD NORM		
					DIN	I.S.O.	HEX. J.I.S.
3mm	.50				6 mm	-	-
4mm	.70				7mm	-	-
5mm	.80				8mm	-	-
6mm	1.00	.75			10mm	10mm	10mm
7mm	1.00				11mm	-	-
8mm	1.25	1.00	.75		13mm	13mm	12mm
10mm	1.50	1.25	1.00		17mm	16mm	14mm
12mm	1.75	1.50	1.25		19mm	18mm	17mm
14mm	2.00	1.50	1.25		22mm	21mm	-
16mm	2.00	1.50	1.00		24mm	24mm	-
18mm	2.50	2.00	1.50		27mm	27mm	-
20mm	2.50	2.00	1.50	1.00	30mm	30mm	-
22mm	2.50	2.00	1.50		32mm	34mm	-
24mm	3.00	2.00	1.50	1.00	36mm	36mm	-

1-800-463-5259



TABLEAU DE CONVERSION POUCE ET MÉTRIQUE

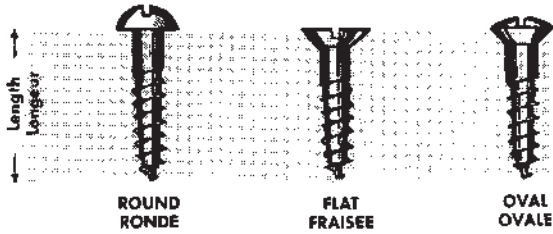
Fractions, Decimals and Millimetres

Inches			Inches			Inches			Inches		
Fractions	Decimals	MM	Fractions	Decimals	MM	Fractions	Decimals	MM	Fractions	Decimals	MM
	.0004	.01	25/32	.781	19.844		2.165	55.	3-11/16	3.6875	93.663
	.004	.10		.7874	20.	2-3/16	2.1875	55.563		3.7008	94.
	.01	.25	51/64	.797	20.241		2.2047	56.	3-23/32	3.719	94.456
1/64	.0156	.397	13/16	.8125	20.638	2-7/32	2.219	56.356		3.7401	95.
	.0197	.50		.8268	21.		2.244	57.	3-3/4	3.750	95.250
	.0295	.75	53/64	.828	21.034	2-1/4	2.250	57.150		3.7795	96.
1/32	.03125	.794	27/32	.844	21.431	2-9/32	2.281	57.944	3-25/32	3.781	96.044
	.0394	1.00	55/64	.859	21.828		2.2835	58.	3-13/16	3.8125	96.838
3/64	.0469	1.191		.8661	22.	2-5/16	2.312	58.738		3.8189	97.
	.059	1.5	7/8	.875	22.225		2.3228	59.	3-27/32	3.844	97.631
1/16	.0625	1.588	57/64	.8906	22.622	2-11/32	2.344	59.531		3.8583	98.
5/64	.0781	1.984		.9055	23.		2.3622	60.	3-7/8	3.875	98.425
	.0787	2.	29/32	.9062	23.019	2-3/8	2.375	60.325		3.8976	99.
3/32	.094	2.381	59/64	.922	23.416		2.4016	61.	3-29/32	3.9062	99.219
	.0984	2.5	15/16	.9375	23.813	2-13/32	2.406	61.119		3.9370	100.
7/64	.109	2.778		.9449	24.	2-7/16	2.438	61.913	3-15/16	3.9375	100.013
	.1181	3.	61/64	.953	24.209		2.4409	62.	3-31/32	3.969	100.806
1/8	.125	3.175	31/32	.969	24.606	2-15/32	2.469	62.706		3.9764	101.
	.1378	3.5		.9843	25.		2.4803	63.	4	4.000	101.600
9/64	.141	3.572	63/64	.9844	25.003	2-1/2	2.500	63.500	4-1/16	4.062	103.188
5/32	.156	3.969	1	1.000	25.400		2.5197	64.	4-1/8	4.125	104.775
	.1575	4.		1.0236	26.	2-17/32	2.531	64.294		4.1338	105.
11/64	.172	4.366	1-1/32	1.0312	26.194		2.559	65.	4-3/16	4.1875	106.363
	.177	4.5	1-1/16	1.062	26.988	2-9/16	2.562	65.088	4-1/4	4.250	107.950
3/16	.1875	4.763		1.063	27.	2-19/32	2.594	65.881	4-5/16	4.312	109.538
	.1969	5.	1-3/32	1.094	27.781		2.5984	66.		4.3307	110.
13/64	.203	5.159		1.1024	28.	2-5/8	2.625	66.675	4-3/8	4.375	111.125
	.2165	5.5	1-1/8	1.125	28.575		2.638	67.	4-7/16	4.438	112.713
7/32	.219	5.556		1.1417	29.	2-21/32	2.656	67.469	4-1/2	4.500	114.300
15/64	.234	5.953	1-5/32	1.156	29.369		2.6772	68.		4.5275	115.
	.2362	6.		1.1811	30.	2-11/16	2.6875	68.263	4-9/16	4.562	115.888
1/4	.250	6.350	1-3/16	1.1875	30.163		2.7165	69.	4-5/8	4.625	117.475
	.2559	6.5	1-7/32	1.219	30.956	2-23/32	2.719	69.056	4-11/16	4.6875	119.063
17/64	.2656	6.747		1.2205	31.	2-3/4	2.750	69.850		4.7244	120.
	.2756	7.	1-1/4	1.250	31.750		2.7559	70.	4-3/4	4.750	120.650
9/32	.281	7.144		1.2598	32.	2-25/32	2.781	70.6439	4-13/16	4.8125	122.238
	.2953	7.5	1-9/32	1.281	32.544		2.7953	71.	4-7/8	4.875	123.825
19/64	.297	7.541		1.2992	33.	2-13/16	2.8125	71.4376		4.9212	125.
5/16	.3125	7.938	1-5/16	1.312	33.338	2-27/32	2.8346	72.	4-15/16	4.9375	125.413
	.315	8.		1.3386	34.		2.844	72.2314	5	5.000	127.000
21/64	.328	8.334	1-11/32	1.344	34.131		2.8740	73.		5.1181	130.
	.335	8.5	1-3/8	1.375	34.925	2-7/8	2.875	73.025	5-1/4	5.250	133.350
11/32	.344	8.731		1.3779	35.	2-29/32	2.9062	73.819	5-1/2	5.500	139.700
	.3543	9.	1-13/32	1.406	35.719		2.9134	74.		5.5118	140.
23/64	.359	9.128		1.4173	36.	2-15/16	2.9375	74.613	5-3/4	5.750	146.050
	.374	9.5	1-7/16	1.438	36.513		2.9527	75.		5.9055	150.
3/8	.375	9.525		1.4567	37.	2-31/32	2.969	75.406	6	6.000	152.400
25/64	.391	9.922	1-15/32	1.469	37.306		2.9921	76.	6-1/4	6.250	158.750
	.3937	10.		1.4961	38.	3	3.000	76.200		6.2992	160.
13/32	.406	10.319	1-1/2	1.500	38.100	3-1/32	3.0312	76.994	6-1/2	6.500	165.100
	.413	10.5	1-17/32	1.531	38.894		3.0315	77.		6.6929	170.
27/64	.422	10.716		1.5354	39.	3-1/16	3.062	77.788	6-3/4	6.750	171.450
	.4331	11.	1-9/16	1.562	39.688		3.0709	78.	7	7.000	177.800
7/16	.438	11.113		1.5748	40.	3-3/32	3.094	78.581		7.0866	180.
29/64	.453	11.509	1-19/32	1.594	40.481		3.1102	79.		7.4803	190.
15/32	.469	11.906		1.6142	41.	3-1/8	3.125	79.375	7-1/2	7.500	190.500
	.4724	12.	1-5/8	1.625	41.275		3.1496	80.		7.8740	200.
31/64	.484	12.303		1.6535	42.	3-5/32	3.156	80.169	8	8.000	203.200
	.492	12.5	1-21/32	1.6562	42.069	3-3/16	3.1875	80.963		8.2677	210.
1/2	.500	12.700	1-11/16	1.6875	42.863		3.1890	81.	8-1/2	8.500	215.900
	.5118	13.		1.6929	43.	3-7/32	3.219	81.756		8.6614	220.
33/64	.5156	13.097	1-23/32	1.719	43.656		3.2283	82.	9	9.000	228.600
17/32	.531	13.494		1.7323	44.	3-1/4	3.250	82.550		9.0551	230.
35/64	.547	13.891	1-3/4	1.750	44.450		3.2677	83.		9.4488	240.
	.5512	14.		1.7717	45.	3-9/32	3.281	83.344	9-1/2	9.500	241.300
9/16	.563	14.288	1-25/32	1.781	45.244		3.3071	84.		9.8425	250.
	.571	14.5		1.8110	46.	3-5/16	3.312	84.1377	10	10.000	254.001
37/64	.578	14.684	1-13/16	1.8125	46.038	3-11/32	3.344	84.9314		10.2362	260.
	.5906	15.	1-27/32	1.844	46.831		3.3464	85.		10.6299	270.
19/32	.594	15.081		1.8504	47.	3-3/8	3.375	85.725	11	11.000	279.401
39/64	.609	15.478	1-7/8	1.875	47.625		3.3858	86.		11.0236	280.
5/8	.625	15.875		1.8898	48.	3-13/32	3.406	86.519		11.4173	290.
	.6299	16.	1-29/32	1.9062	48.419		3.4252	87.		11.8110	300.
41/64	.6406	16.272		1.9291	49.	3-7/16	3.438	87.313	12	12.000	304.801
	.6496	16.5	1-15/16	1.9375	49.213		3.4646	88.	13	13.000	330.201
21/32	.656	16.669		1.9685	50.	3-15/32	3.469	88.106		13.7795	350.
	.6693	17.	1-31/32	1.969	50.006	3-1/2	3.500	88.900	14	14.000	355.601
43/64	.672	17.066	2	2.000	50.800		3.5039	89.	15	15.000	381.001
11/16	.6875	17.463		2.0079	51.	3-17/32	3.531	89.694		15.7480	400.
45/64	.703	17.859	2-1/32	2.03125	51.594		3.5433	90.	16	16.000	406.401
	.7087	18.		2.0472	52.	3-9/16	3.562	90.4877	17	17.000	431.801
23/32	.719	18.256	2-1/16	2.062	52.388		3.5827	91.		17.7165	450.
	.7283	18.5		2.0866	53.	3-19/32	3.594	91.281	18	18.000	457.201
47/64	.734	18.653	2-3/32	2.094	53.181		3.622	92.	19	19.000	482.601
	.7480	19.	2-1/8	2.125	53.975	3-5/8	3.625	92.075		19.6850	500.
3/4	.750	19.050		2.126	54.	3-21/32	3.656	92.869	20	20.000	508.001
49/64	.7656	19.447	2-5/32	2.156	54.769		3.6614	93.			

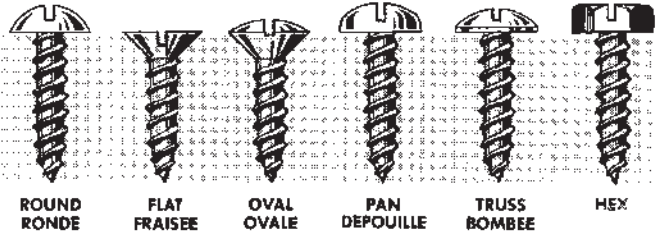


## GUIDE DE MESURE

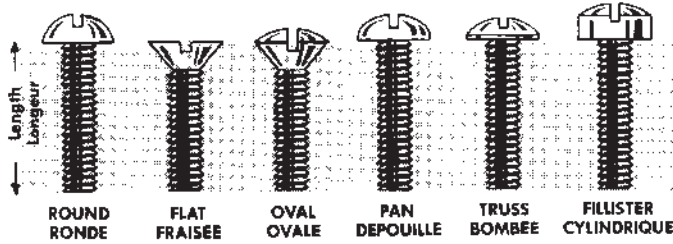
### WOOD SCREWS VIS A BOIS



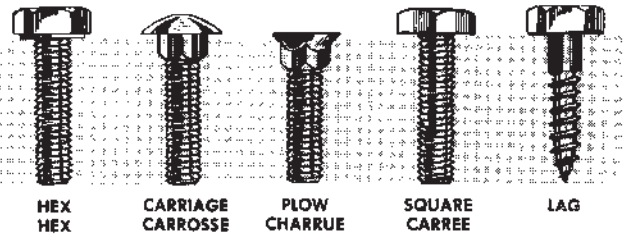
### TAPPING SCREWS VIS TARAUDEUSES



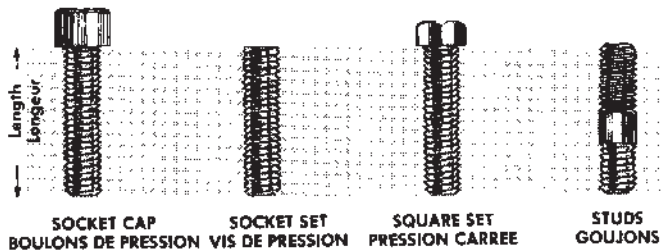
### MACHINE SCREWS VIS DE MECANIQUE



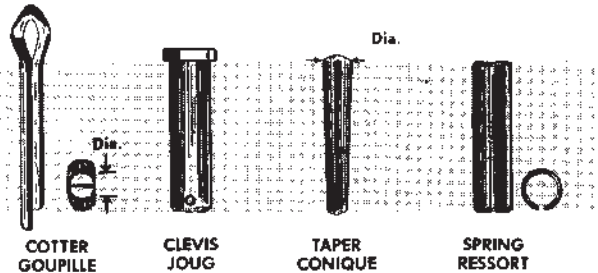
### CAP SCREWS and BOLTS BOULONS et BOULONS DE PRECISION



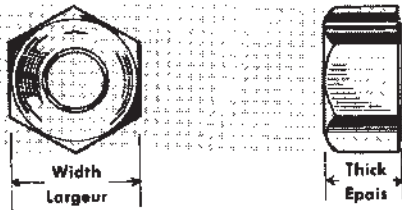
### SET SCREWS and STUDS VIS DE PRESSION et GOUJONS



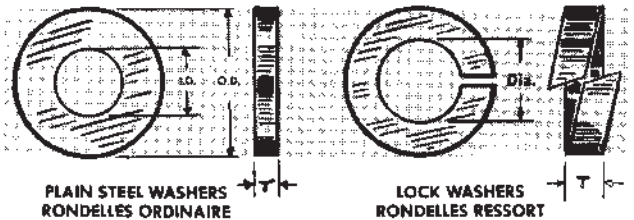
### STANDARD PINS GOUPILES REGULIER



### HEXAGON NUTS ECROUS HEXAGON



### WASHERS RONDELLES



POUCE  
INCH

1/2 1 1 1/2 2 2 1/2 3 3 1/2 4 4 1/2 5 5 1/2 6



GRADE 2



GRADE 5



GRADE 8



FASBELLOY

TABLEAU DE FORCES DES BOULONS / BOLT CLAMP LOADS - SUGGESTED ASSEMBLY TORQUE VALUES

DIAM. # THDS. PER IN.	SAE GRADE 2 THRU A" LONG						SAE GRADE 5						SAE GRADE 8						FASTENING SYSTEM					
	TENSILE STRESS AREA SQ. IN.	TENSILE STRENGTH MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	DRY FT. LB.	LUB. FT. LB.	TENSILE STRENGTH MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	DRY FT. LB.	LUB. FT. LB.	TENSILE STRENGTH MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	DRY FT. LB.	LUB. FT. LB.	TENSILE STRENGTH MIN. KSI.	PROOF LOAD LBS.	CLAMP LOAD LBS.	DRY FT. LB.	LUB. FT. LB.	CLAMP LOAD LBS.	HEAD FT. LB.	NUT FT. LB.
1/4-20	0.318	74	1750	1310	5.5	4.2	120	2700	2020	8	6.3	150	3800	2850	12	9	180	4610	3450	10	11	3450	10	11
28	0.364	74	2000	1500	6.3	4.7	120	3100	2320	10	7.2	150	4350	3250	14	10	180	5270	3950	12	13	3950	12	13
5/16-18	0.524	74	2900	2160	11	8	120	4450	3340	17	13	150	6300	4700	24	18	180	7590	5700	19	21	5700	19	21
24	0.560	74	3200	2400	12	9	120	4900	3700	19	14	150	6950	5200	27	20	180	8410	6300	20	23	6300	20	23
3/8-16	0.775	74	4250	3200	20	15	120	6600	4950	30	23	150	9300	6980	45	35	180	11230	8450	30	33	8450	30	33
24	0.878	74	4800	3620	23	17	120	7450	5600	35	25	150	10500	7900	50	35	180	12730	9550	35	38	9550	35	38
1/2-14	1.062	74	5950	4380	32	24	120	9050	6760	50	35	150	12800	9550	70	50	180	15410	11550	55	60	11550	55	60
20	1.187	74	6550	4900	36	27	120	10100	7570	55	40	150	14200	10650	80	60	180	17210	12900	60	65	12900	60	65
1/2-13	1.419	74	7800	5650	50	35	120	12100	9050	75	55	150	17000	12750	110	80	180	20570	15450	85	95	15450	85	95
20	1.599	74	8800	6600	55	40	120	13600	10200	85	65	150	19200	14400	120	90	180	23180	17400	95	105	17400	95	105
3/8-12	1.820	74	10000	7500	70	55	120	15500	11600	110	80	150	21800	16350	150	110	180	26390	19800	120	140	19800	120	140
18	2.030	74	11200	8400	80	60	120	17300	12950	120	90	150	24400	18250	170	130	180	29430	22100	135	150	22100	135	150
5/8-11	2.26	74	12400	9320	100	75	120	19200	14400	150	110	150	27100	20350	210	160	180	32770	24550	170	185	24550	170	185
18	2.56	74	14100	10560	110	85	120	21800	16350	170	130	150	30700	23000	240	180	180	37120	27800	190	205	27800	190	205
3/4-10	3.34	74	18400	13800	175	130	120	28400	21300	260	200	150	40100	30100	360	280	180	48430	36350	285	290	36350	285	290
16	3.73	74	20500	15350	200	140	120	31700	23780	300	220	150	44800	33500	420	310	180	54060	40600	330	355	40600	330	355
7/8-9	4.62	60	15200	11430	170	125	120	39300	29450	430	320	150	54400	41600	600	450	180	66990	50300	475	505	50300	475	505
14	5.09	60	16800	12600	180	140	120	43300	32450	470	350	150	61100	45800	670	500	180	73800	55400	520	565	55400	520	565
1-8	6.06	60	20000	15000	250	190	120	51500	38600	640	480	150	72700	54500	910	680	180	87670	65900	680	775	65900	680	775
1-6	6.79	60	22400	16800	280	210	120	57700	43300	720	540	150	81500	61100	1020	760	180	98450	73800	700	900	73800	700	900
1 1/8-7	7.63	60	25200	18900	350	270	105	65500	49300	790	590	150	91600	68700	1290	970	180	110630	83000	1025	1150	83000	1025	1150
12	8.56	60	28200	21200	400	300	105	73400	54750	890	670	150	102700	77000	1440	1080	180	124120	93100	1150	1325	93100	1150	1325
1 1/4-7	9.69	60	32000	24000	500	380	105	71700	53900	1120	840	150	116300	87200	1820	1360	180	140500	105400	1400	1600	105400	1400	1600
12	1.073	60	35400	26550	550	420	105	79400	59600	1240	930	150	126800	95600	2010	1510	180	155580	116700	1600	1750	116700	1600	1750
1 1/2-6	1.405	60	46400	34800	870	650	105	104000	78000	1950	1460	150	168600	126500	3160	2370	180	203720	152900	2900	3250	152900	2900	3250
12	1.581	60	52200	39150	980	730	105	117000	87700	2200	1640	150	189700	142200	3560	2670	180	229240	171900	3300	3650	171900	3300	3650

NOTES:

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.

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.

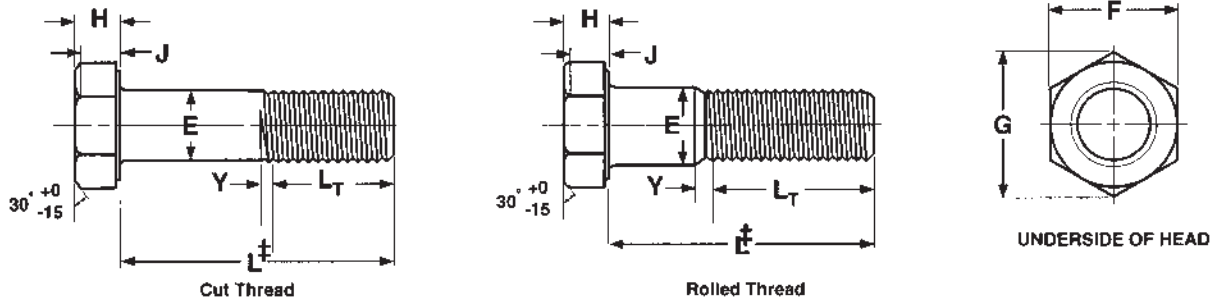
**Fasbelloy** System torque values are for a nut, bolt, and two washer assembly, not for screws used in lapped holes; and were developed through laboratory testing of representative samples. As such, they are average values which when used under actual assembly conditions can be expected to produce clamploads within ±15% of the recommended values.

Strength Grade	Applicable Sizes	Proof Load Stress (psi)	Yield Strength Min. Stress (psi)	Tensile Strength Min. Stress (psi)
SAE Gr 2	1/4" thru 3/4" dia. over 3/4" thru 1-1/2" dia. over 6" long	55,000	57,000	74,000
SAE Gr 5	1/4" thru 1" dia. over 1" thru 1-1/2" dia.	85,000	92,000	120,000
SAE Gr 8	1/4" thru 1-1/2" dia.	120,000	130,000	150,000
Fasbelloy	1/4" thru 1-1/2" dia.	145,000	155,000	180,000





## DIMENSION DE LA TÊTE ET LONGUEUR DES BOULONS - GRADE 2 - 5 - 8



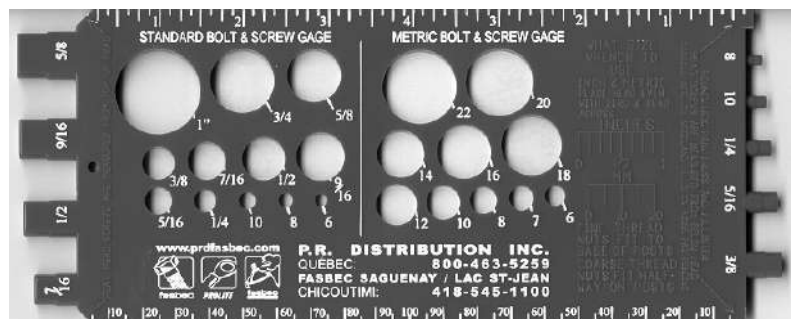
‡Length of a cap screw is measured from the underhead bearing surface to the extreme end of the screw.

HEX CAP SCREWS															ASME B18.2.1-1996
Nominal or Basic Product Diameter	E		F			G		H			J	L <sub>T</sub>		Y	
	Body Diameter		Width Across Flats			Width Across Corners		Head Height			Wrenching Height	Thread Length		Transition Thread Length	
	Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min		Min	For Screw Lengths ≤ 6 in.		For Screw Lengths > 6 in.
1/4	0.2500	0.2500	0.2450	7/16	0.438	0.428	0.505	0.488	5/32	0.163	0.150	0.106	0.750	1.000	0.250
5/16	0.3125	0.3125	0.3065	1/2	0.500	0.489	0.577	0.557	13/64	0.211	0.195	0.140	0.875	1.125	0.278
3/8	0.3750	0.3750	0.3690	9/16	0.562	0.551	0.650	0.628	15/64	0.243	0.226	0.160	1.000	1.250	0.312
7/16	0.4375	0.4375	0.4305	5/8	0.625	0.612	0.722	0.698	9/32	0.291	0.272	0.195	1.125	1.375	0.357
1/2	0.5000	0.5000	0.4930	3/4	0.750	0.736	0.866	0.840	5/16	0.323	0.302	0.215	1.250	1.500	0.385
9/16	0.5625	0.5625	0.5545	13/16	0.812	0.798	0.938	0.910	23/64	0.371	0.348	0.250	1.375	1.625	0.417
5/8	0.6250	0.6250	0.6170	15/16	0.938	0.922	1.083	1.051	25/64	0.403	0.378	0.269	1.500	1.750	0.455
3/4	0.7500	0.7500	0.7410	1-1/8	1.125	1.100	1.299	1.254	15/32	0.483	0.455	0.324	1.750	2.000	0.500
7/8	0.8750	0.8750	0.8660	1-5/16	1.312	1.285	1.516	1.465	35/64	0.563	0.531	0.378	2.000	2.250	0.556
1	1.0000	1.0000	0.9900	1-1/2	1.500	1.469	1.732	1.675	39/64	0.627	0.591	0.416	2.250	2.500	0.625
1-1/8	1.1250	1.1250	1.1140	1-11/16	1.688	1.631	1.949	1.859	11/16	0.718	0.658	0.461	2.500	2.750	0.714
1-1/4	1.2500	1.2500	1.2390	1-7/8	1.875	1.812	2.165	2.066	25/32	0.813	0.749	0.530	2.750	3.000	0.714
1-1/2	1.5000	1.5000	1.4880	2-1/4	2.250	2.175	2.598	2.480	1-5/16	0.974	0.902	0.640	3.250	3.500	0.833

### GABARIT POUR BOULONS

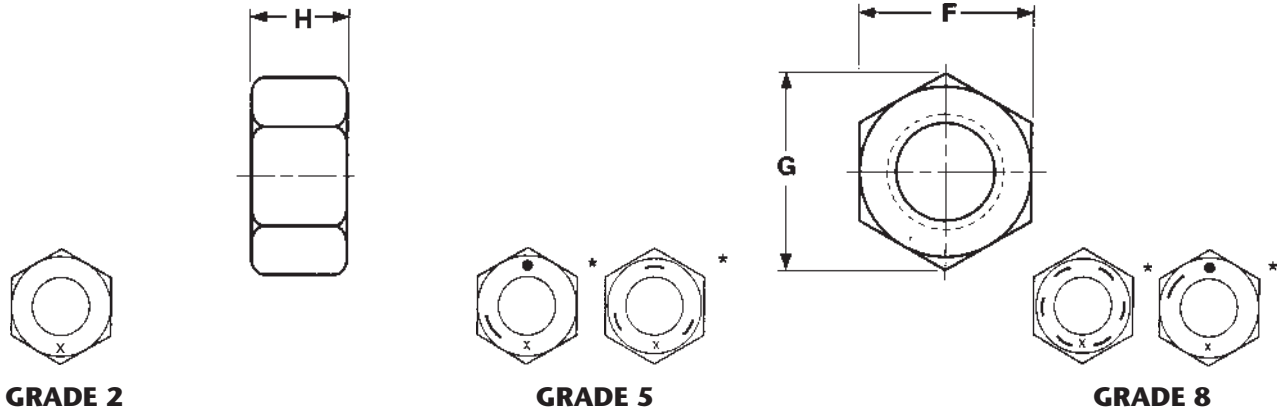
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Indispensable pour mesurer vos boulons en standard et métrique





**DIMENSION ET ÉPAISSEUR DES ÉCROUS - GRADE 2 - 5 - 8**



**GRADE 2**

**GRADE 5**

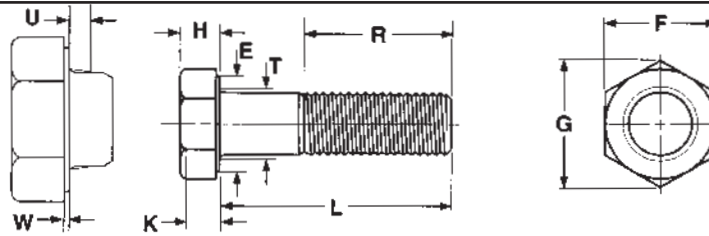
**GRADE 8**

<b>FINISHED HEX NUTS</b>									
ANSI/ASME B18.2.2									
Nominal or Basic Major Diameter of Thread		F			G		H		
		Width Across Flats			Width Across Corners		Thickness of Hex Nuts		
		Basic	Max	Min	Max	Min	Basic	Max	Min
1/4	0.2500	7/16	0.438	0.428	0.505	0.488	7/32	0.226	0.212
5/16	0.3125	1/2	0.500	0.489	0.577	0.557	17/64	0.273	0.258
3/8	0.3750	9/16	0.562	0.551	0.650	0.628	21/64	0.337	0.320
7/16	0.4375	11/16	0.688	0.675	0.794	0.768	3/8	0.385	0.365
1/2	0.5000	3/4	0.750	0.736	0.866	0.840	7/16	0.448	0.427
9/16	0.5625	7/8	0.875	0.861	1.010	0.982	31/64	0.496	0.473
5/8	0.6250	15/16	0.938	0.922	1.083	1.051	35/64	0.559	0.535
3/4	0.7500	1-1/8	1.125	1.088	1.299	1.240	41/64	0.665	0.617
7/8	0.8750	1-5/16	1.312	1.269	1.516	1.447	3/4	0.776	0.724
1	1.0000	1-1/2	1.500	1.450	1.732	1.653	55/64	0.887	0.831
1-1/8	1.1250	1-11/16	1.688	1.631	1.949	1.859	31/32	0.999	0.939
1-1/4	1.2500	1-7/8	1.875	1.812	2.165	2.066	1-1/16	1.094	1.030
1-3/8	1.3750	2-1/16	2.062	1.994	2.382	2.273	1-11/64	1.206	1.138
1-1/2	1.5000	2-1/4	2.250	2.175	2.598	2.480	1-9/32	1.317	1.245
1-5/8	1.6250	2-7/16	2.438	2.356	2.815	2.686	1-25/64	1.429	1.353
1-3/4	1.7500	2-5/8	2.625	2.538	3.031	2.893	1-1/2	1.540	1.460
2	2.0000	3	3.000	2.900	3.464	3.306	1-23/32	1.763	1.675
2-1/4	2.2500	3-3/8	3.375	3.263	3.897	3.719	1-15/16	1.986	1.890
2-1/2	2.5000	3-3/4	3.750	3.625	4.330	4.133	2-5/32	2.209	2.105
2-3/4	2.7500	4-1/8	4.125	3.988	4.763	4.546	2-3/8	2.431	2.319
3	3.0000	4-1/2	4.500	4.350	5.196	4.959	2-19/32	2.654	2.534

\* Le nom ou la marque du fabricant est identifié à la position du x



## DIMENSION DE LA TÊTE ET LONGUEUR DES BOULONS - MÉTRIQUE



### METRIC - HEX HEAD BOLTS, PRODUCT GRADE A

ISO 4014

Nominal Size	Thread Pitch	R		W		T	U	E	H		F		G	K
		Threaded Length		Washer Face Thickness		Fillet Transition Diameter	Under-head Fillet	Washer Face Diameter	Head Height		Width Across Flats		Width Across Corners	Wrenching Height
		L ≤ 125 mm	L > 125 mm ≤ 200 mm	Max	Min	Max	Max	Min	Max	Min	Max	Min	Min	Min
M1.6	0.35	9	-	0.25	0.1	2	0.6	2.27	1.225	0.975	3.2	3.02	3.41	0.68
M2	0.4	10	-	0.25	0.1	2.6	0.8	3.07	1.525	1.275	4	3.82	4.32	0.89
M2.5	0.45	11	-	0.25	0.1	3.1	1	4.07	1.825	1.575	5	4.82	5.45	1.1
M3	0.5	12	-	0.4	0.15	3.6	1	4.57	2.125	1.875	5.5	5.32	6.01	1.31
M4	0.7	14	-	0.4	0.15	4.7	1.2	5.88	2.925	2.675	7	6.78	7.66	1.87
M5	0.8	16	-	0.5	0.15	5.7	1.2	6.88	3.65	3.35	8	7.78	8.79	2.35
M6	1	18	-	0.5	0.15	6.8	1.4	8.88	4.15	3.85	10	9.78	11.05	2.7
M8	1.25	22	-	0.6	0.15	9.2	2	11.63	5.45	5.15	13	12.73	14.38	3.61
M10	1.5	26	-	0.6	0.15	11.2	2	14.63	6.58	6.22	16**	15.73	17.77	4.35
M12	1.75	30	-	0.6	0.15	13.7	3	16.63	7.68	7.32	18**	17.73	20.03	5.12
M14	2	34	40	0.6	0.15	15.7	3	19.37	8.98	8.62	21**	20.67	23.36	6.03
M16	2	38	44	0.8	0.2	17.7	3	22.49	10.18	9.82	24	23.67	26.75	6.87
M20	2.5	46	52	0.8	0.2	22.4	4	28.19	12.715	12.285	30	29.67	33.53	8.6
M24	3	54	60 73*	0.8	0.2	26.4	4	33.61	15.215	14.785	36	35.38	39.98	10.35
Tolerance on Length		12-16mm: ±0.35		20-30mm: ±0.42		35-50mm: ±0.5		55-80mm: ±0.6		90-120: ±0.7		130-150mm: ±0.8		

\*For nominal lengths over 200mm.

\*\*DIN 931 spec for maximum width across flats on these three diameters are 17, 19 & 22 mm, respectively.

### METRIC - HEX HEAD BOLTS, PRODUCT GRADE B

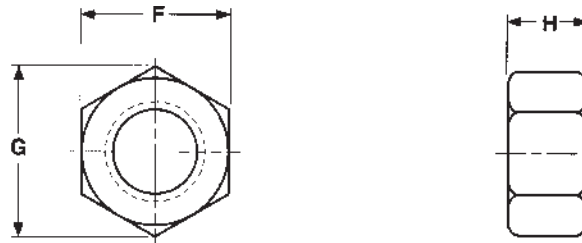
ISO 4014

Nominal Size	Thread Pitch	R		W		T	U	E	H		F		G	K
		Threaded Length		Washer Face Thickness		Fillet Transition Diameter	Under-head Fillet	Washer Face Diameter	Head Height		Width Across Flats		Width Across Corners	Wrenching Height
		L > 125 mm ≤ 200 mm	L > 200 mm	Max	Min	Max	Max	Min	Max	Min	Max	Min	Min	Min
M16	2	44	-	0.8	0.2	17.7	3	22	10.29	9.71	24	23.16	26.17	6.8
M20	2.5	52	-	0.8	0.2	22.4	4	27.7	12.85	12.15	30	29.16	32.95	8.51
M24	3	60	73	0.8	0.2	26.4	4	33.25	15.35	14.65	36	35	39.55	10.26
M30	3.5	72	85	0.8	0.2	33.4	6	42.75	19.12	18.28	46	45	50.85	12.8
M36	4	84	97	0.8	0.2	39.4	6	51.11	22.92	22.08	55	53.8	60.79	15.46
M42	4.5	96	109	1	0.3	45.6	8	59.95	26.42	25.58	65	63.1	71.3	17.91
M48	5	108	121	1	0.3	52.6	10	69.45	30.42	29.58	75	73.1	82.6	20.71
M56	5.5	-	137	1	0.3	63	12	78.66	35.5	34.5	85	82.8	93.56	24.15
M64	6	-	153	1	0.3	71	13	88.16	40.5	39.5	95	92.8	104.66	27.65
Tolerance on Length		110-120mm: ±1.75		130-180mm: ±2.0		200-240mm: ±2.3		260-300mm: ±2.6		320-400mm: ±2.85		420-500mm: ±3.15		





**DIMENSION ET ÉPAISSEUR DES ÉCROUS - MÉTRIQUE**

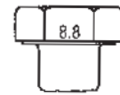


<b>METRIC - HEX NUTS, STYLE 1</b>							ISO 4032
Nominal Size	Thread Pitch	F		G	H		
		Width Across Flats		Width Across Corners	Thickness		
		Max	Min	Min	Max	Min	
M1.6	0.35	3.2	3.02	3.41	1.3	1.05	
M2	0.4	4	3.82	4.32	1.6	1.35	
M2.5	0.45	5	4.82	5.45	2	1.75	
M3	0.5	5.5	5.32	6.01	2.4	2.15	
M4	0.7	7	6.78	7.66	3.2	2.9	
M5	0.8	8	7.78	8.79	4.7	4.4	
M6	1	10	9.78	11.05	5.2	4.9	
M8	1.25	13	12.73	14.38	6.8	6.44	
M10	1.5	16	15.73	17.77	8.4	8.04	
M12	1.75	18	17.73	20.03	10.8	10.37	
M14	2	21	20.67	23.35	12.8	12.1	
M16	2	24	23.67	26.75	14.8	14.1	
M20	2.5	30	29.16	32.95	18	16.9	
M24	3	36	35	39.55	21.5	20.2	
M30	3.5	46	45	50.85	25.6	24.3	
M36	4	55	53.8	60.79	31	29.4	
M42	4.5	65	63.1	71.3	34	32.4	
M48	5	75	73.1	82.6	38	36.4	
M56	5.5	85	82.8	93.56	45	43.4	
M64	6	95	92.8	104.86	51	49.1	

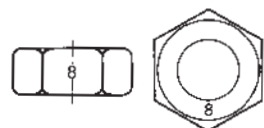
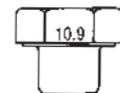
**CLASSE POUR BOULONS ET ÉCROUS - MÉTRIQUE**



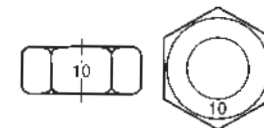
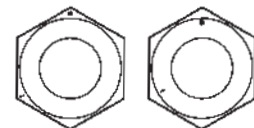
**CLASS 8.8 BOLTS**



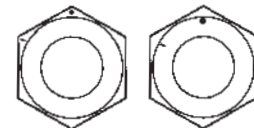
**CLASS 10.9 BOLTS**



**CLASS 8 HEX NUTS**



**CLASS 10 HEX NUTS**





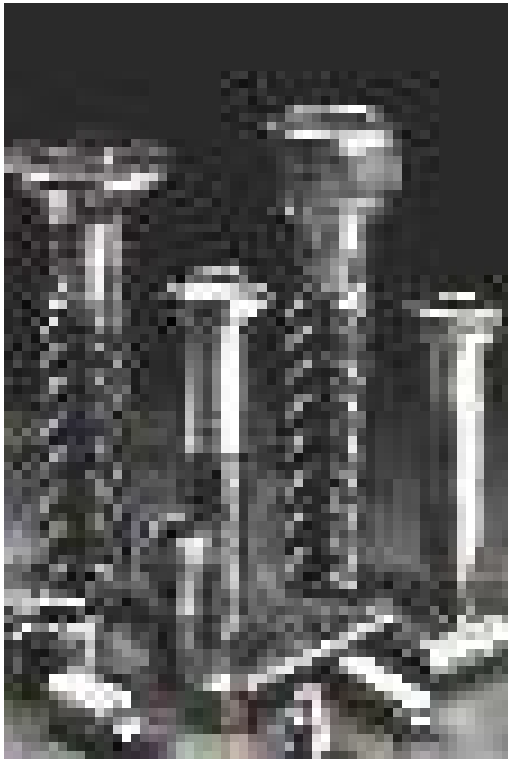
**GUIDE D'ANCRAGES**

**ANCRAGES / CONCRETE ANCHORS**

	<b>Nom Name</b>	<b>Finition Type</b>	<b>Dimension Size range</b>	<b>Utilisation Use in</b>	<b>Information générale General information</b>
	Parawedge	Grade 2 &, 304 & 316 Stainless & Galvanized	1/4" x 1 3/4" to 1-1/4" x 12"	Concrete & Stone	Heavy Duty One-Piece Fully-Threaded Stud-Bolt
	Three Dimple	Grade 2	1/4" x 2-1/4" to 3/4" x 8-1/2"	Concrete & Stone	Heavy Duty One Piece Fully Threaded Stud- Bolt
	Parasleeve	Steel & Stainless Steel	1/4" x 5/8" to 3/4" x 6 1/4"	Concrete, Block Brick & Stone	Pre-Assembled, All Purpose Medium - Duty Anchor, Nine Head Styles Available
	Drop-In Anchors	Steel & 304 Stainless	1/4" to 3/4" Internal Thread	Concrete & Stone	Internally Threaded Anchor With Pre- Assembled Expander Plug
	Double Expansion Shields	Zinc Alloy	1/4" to 3/4" Internal Thread	Concrete, Brick & Stone	Double Cone Expansion Bolt Anchor For Heavy Duty Applications
	Single Expansion Shields	Zinc Alloy	1/4" to 3/4" Internal Thread	Concrete, Block Brick & Stone	Single Cone Expansion Bolt Anchor For Medium Duty Applications
	Machine Screw Anchors	Lead & Zinc Alloy	#6 to 1/2" Internal Thread	Concrete, Brick & Stone	Light To Medium Duty Machine Screw Caulking Anchor
	Lag Screw Shields	Zinc Alloy	1/4" to 1/2" Short & Long	Concrete, Stone Mortar Joint	Internally Threaded Light to Medium Duty Lag Screw Anchor
	Lead Screw Anchors	Lead	#6-3 x 3/4" to 16-18 x 1 1/2"	Concrete, Block & Brick	Light Duty, Corrosion Resistant Screw Anchor
	Plastic Screw Anchors	Polyethylene	#4-6 x 7/8" to #14-16 x 1 1/2"	Concrete, Brick Block & Stone	Economical Light Duty Multi-Size Screw Anchor, Corrosion Resistant
	Drive Nail Anchors	Zinc Alloy, Steel & Stainless Steel	3/16" x 7/8" to 1/4" x 2"	Concrete, Block & Brick	Nail Drive Anchor Available With Stainless Steel Nail
	Nylon Nail Anchors	Nylon & Steel Nail	3/16" x 1" to 1/4" x 4"	Concrete & Stone	Nylon Drive Anchor Available in Three Head Styles
	Nylon Nail Anchor	Nylon	3/16" x 1" to 1/4" x 4"	Concrete & Stone	Nylon Drive Anchor All Nylon White
	Concrete Screws	Steel With Corrosion Resistant Coating	3/16" x 1 1/4" to 1/4" x 5"	Concrete, Block Brick	Tapping Concrete Screw Anchor, Light-Duty. Available in Two Head Styles
	Drill Bits for Concrete Screws	Steel / Carbide Tip	5/32" x 3 1/2" to 3/16" x 7 1/2"	Concrete, Block Brick	One Drill Bit Also Is Included In Each Box of 100 Concrete Screws
	Nylon Rivet	White Nylon	5/16" x 1" to 5/16" x 3-1/8"	Concrete, Brick, Wood & Stone	White Nylon Rivet, One Piece

**ANCRAGES / HOLLOW WALL ANCHORS**

	<b>Nom Name</b>	<b>Finition Type</b>	<b>Dimension Size range</b>	<b>Utilisation Use in</b>	<b>Information générale General information</b>
	WallDriller*	Nylon or Zinc Alloy	#6 & #8 Short & Long	Drywall	Economical, Easy To Use Screw Anchor. For Use in Drywall
	DrillerToggle*	Zinc Alloy	#8 x 2"	Drywall	Easy To Use Hollow Wall Toggle Anchor No Pre-Drilling Required
	WallDriller* Picture Hooks	Zinc Alloy	#6 #8	Drywall	No Screw Or Drill Required Available in 4 Colors
	Longhorn Nylon Toggles	Nylon	1/4" x S. M. & L. 3/8" x S. M. & L.	Drywall & Masonry	Economical & Versatile Toggle, Screw Anchor, Corrosion Resistant
	Spring Toggle Wings & Bolts	Steel	1/8" x 2" to 3/8" x 6"	Hollow Block Drywall, Plaster	Spring Toggle For Use in Hollow Wall Applications
	Picture Hooks	Steel	1/8" & 3/16" Screw Diameter	Drywall	Light to Medium-Duty Picture Hook
	Hollow Wall Anchors	Steel	1/8" Extra Short to 1/4" X-Long	Drywall, Hollow Block & Plaster	Assembled Unit For Hollow Wall Applications



## INVENTAIRE COMPLET DE VIS À SIX PANS CREUX

- Vis calibrées à tête cylindrique
- Vis calibrées à tête cylindrique à épaulement
- Vis calibrées à tête bombée
- Vis calibrées à tête plate
- Vis d'arrêt sans tête
- Vis d'arrêt à tête carrée
- Bouchons à tuyau
- Clés hexagonales

### Disponible en différents alliages Standard et Métrique

- Acier régulier Alloy
- Acier inoxydable

## TABLEAU D'APPLICATION DES CLÉS / KEY APPLICATION TABLE

POUCE / INCH							MÉTRIQUE / METRIC					
Nominal Key Size	Socket Head Cap Screws	Flat Head Cap Screws	Button Head Cap Screws	Set Screws	Shoulder Screws	Pressure Plugs	Nominal Head Cap Size	Socket Head Cap Screws	Flat Head Cap Screws	Button Head Cap Screws	Set Screws	Shoulder Screws
.028	----	----	----	0	----	----						
.035	----	0	0	1,2	----	----					M1.4	
.050	0	1,2	1,2	3,4	----	----	0.7	----	----	----	M1.6	----
1/16	1	3,4	3,4	5,6	----	----	----	----	----	----	M1.7	0.9
5/64	2,3	5,6	5,6	8	----	----	----	----	M2	----	----	----
3/32	4,5	8	8	10	----	----	1.3	M1.4	----	----	M2.3	----
7/64	6	----	----	----	----	----	----	----	----	----	M2.5	----
1/8	----	10	10	1/4	1/4	----	1.5	M1.6	----	M2.6	M3	----
9/64	8	----	----	----	----	----	----	M1.7	----	----	----	----
5/32	10	134	1/4	5/16	5/16	1/16	2	M2	M3	M3	M4	----
3/16	1/4	5/16	5/16	3/8	3/8	1/8	----	M2.3	----	----	----	----
7/32	----	3/8	3/8	7/16	----	----	M2.6	M2.5	----	----	----	----
1/4	5/16	7/16	----	1/2	1/2	1/4	2.5	M3	M4	M4	M5	----
5/16	3/8	1/2	1/2	5/8	5/8	3/8	3	M4	M5	M5	M6	----
3/8	7/16, 1/2	5/8	5/8	3/4	3/4	1/2	4	M5	M6	M6	M8	M4
7/16	----	----	----	----	----	----	5	M6	M8	M8	M10	M5
1/2	5/8	3/4	----	7/8	1	----	6	M8	M10	M10	M12	M6
9/16	----	7/8	----	1, 1-1/8	----	3/4	8	----	----	----	M14	----
5/8	3/4	1	----	1-1/4, 1-3/8	1-1/4	1	10	M10	M12	M12	M16	M8
3/4	7/8, 1	1-1/8	----	1-1/2	----	1-1/4	12	M12	M14	----	M20	M10
7/8	1-1/8, 1-1/4	1-1/4, 1-3/8	----	----	1-1/2	----	14	----	M16	----	----	----
1	1-3/8, 1-1/2	1-1/2	----	1-3/4, 2	1-3/4	1-1/2, 2	17	M14	M20	----	----	M14
1-1/4	1-3/4	----	----	----	2	----		----	----	----	----	----
1-1/2	2	----	----	----	----	----		----	----	----	----	----
1-3/4	2-1/4, 2-1/2	----	----	----	----	----		----	----	----	----	----
2	2-3/4	----	----	----	----	----		----	----	----	----	----



LISTE DES COMPOSANTES DES DIFFÉRENTS ACIERS INOXYDABLES

	Chromium	Nickel	Max. Carbon	Max. Mangan.	Max. Phosph.	Max. Sulfur	Molybd.	Max. Silicium	Copper	Other Elements	Tensile	Yield	Approx. Hardness	Special Characteristics
<p><b>300 SERIES AUSTENITIC STAINLESS:</b> Accounts for 85%-90% of stainless fasteners; best corrosion resistance of stainless alloys; non-magnetic before cold working; low heat conductivity; good strength at higher temperatures; not hardenable by heat treatment.</p>														
18-8 Also referred to as 300 Series.	17-20% Usually 17-18%	8-13% Usually 8-10.5%	.08% Usually .03-.05% or less	2%	.02% Usually .045%	.03-.15% Usually .03%		1%	0-4% Usually 2%-3%		80,000-150,000 usual range. After cold work: 100,000-120,000 typical for 1/4"-5/8" dia. 45,000-70,000 typical for 3/4" & over dia.	40,000 min. After cold work: 80,000-90,000 typical for 1/4"-5/8" dia. 45,000-70,000 typical for 3/4" & over dia.	B85-95	Most common designation for non-magnetic stainless fasteners; encompasses 30 to 40 various mixtures of 301, 302-303, 304, 305 and XM7
302	17-19%	8-10%	.15%	2%	.045%	.03%		1%			90,000-125,000 Typical: 100,000	40,000 min Typical: 50,000-70,000	B85-95	Higher carbon content than 302HQ or 304. ductile, often used in wire-typic products such as springs, screens, cables; common material for flat washers.
302HQ	17-19%	8-10%	.08% Usually .02 or less	2%	.045%	.03%		1%	3-4%		80,000-140,000 usual range. After cold work: 100,000-120,000 typical for 1/4"-5/8" dia. 45,000-65,000 typical for 3/4" & over dia.	40,000 min. After cold work: 80,000-90,000 typical for 1/4"-5/8" dia. 45,000-65,000 typical for 3/4" & over dia.	B85-95	Extra copper reduces work hardening during cold forming; commonly used for machine screws, metal screws, small nuts
XM7	17-19%	8-10%	10%	2%	.045%	.03%		1%	3-4%		See 302HQ	See 302HQ		Similar to 302HQ
303	17-10%	8-10%	.15%	2%	.02%	15 Mn		1%			90,000-125,000	40,000 min.	B85-95	Good for machinability in products such as large nuts; not for cold forming; higher carbon and sulfur may lower corrosion resistance.
304	18-20%	8-10.5%	.08%	2%	.045%	.03%		1%			85,000-150,000 usual range. After cold work: 125,000 typical for 1/4"-5/8" dia. 100,000 typical for 3/4"-1" dia. 90,000 typical above 1" dia.	40,000 min. After cold work: 90,000 typical for 1/4"-5/8" dia. 50,000-70,000 typical for 3/4" & over dia.	B85-95	Most popular stainless for hex head cap screws; also frequently used for flat washers.
304L	18-20%	8-12%	.03%	2%	.045%	.03%		1%			Slightly lower than 304 due to lower carbon content			Low carbon increases corrosion resistance and welding capacity.
305	17-19%	10.5-13%	.12%	2%	.045%	.03%		1%			See 302HQ	See 302HQ		High nickel content lowers work hardening during severe cold forming and keeps parts non-magnetic.
316	16-18%	10-14%	.08%	2%	.045%	.03%	2-3%	1%			85,000-140,000 usual range. After cold work: 120,000 typical for 1/4"-5/8" dia. 95,000 typical for 3/4"-1" dia. 80,000 typical above 1" dia.	40,000 min. After cold work: 80,000-90,000 typical for 1/4"-5/8" dia. 50,000-70,000 typical for 3/4" & over dia.	B85-95	Addition of molybdenum increases corrosion resistance to chloride and sulfides.
309	22-24%	12-15%	.2%	2%	.045%	.03%		1%			100,000-120,000	60,000-80,000	B85-95	Higher chromium and nickel give better corrosion resistance at high temperatures (1900 deg. F.)
310	24-26%	19-22%	.25%	2%	.045%	.03%		1.5%			See 309	See 309		Similar to 309 at high temperatures; extra corrosion resistance to salt
317	18-20%	11-15%	.08%	2%	.045%	.03%	3-4%	1%			See 309	See 309		High chromium and nickel with added molybdenum give greater tensile strength and corrosion resistance at high temperatures.
321	17-19%	9-12%	.08%	2%	.045%	.03%		1%		Titanium - 5 times carbon content	See 309	See 309		Titanium improves intergranular corrosion resistance by avoiding carbide precipitation; good for intermittent heating applications and corrosion resistance to 1600 deg. F.
347	17-19%	9-13%	.08%	2%	.045%	.03%		1%		Columbian & Tantalum: 10 times carbon.	See 309	See 309		Columbian and Tantalum give similar properties to 321.



**LISTE DES COMPOSANTES DES DIFFÉRENTS ACIERS INOXYDABLES - (SUITE)**

Chromium	Nickel	Max. Carbon	Max. Mangan.	Max. Phosph.	Max. Sulfur	Molybd.	Max. Silicon	Copper	Other Elements	Tensile	Yield	Approx. Hardness	Special Characteristics
400 SERIES MARTENSITIC STAINLESS: About 5% of stainless fasteners; magnetic; no nickel and high carbon content mean the lowest corrosion resistance among the different types of stainless.													
11.5-14.5% 1.4%		.30% Usually .15-.30%	1.25% Usually 1%	.06% Usually .04%	.15% Usually .03%		1%			180,000-250,000 if heat treated	150,000-200,000 if heat treated	C34-C45	Often a mixture of different 400 materials, usually with carbon content towards high and of max. giving greater strength but lowering corrosion resistance.
11.5-13.9%		.15%	1%	.04%	.03%		1%			180,000 heat treated	150,000 heat treated	C34	Higher carbon content gives strength; most popular of the grades with 12% chrome, used in highly stressed conditions.
12-14%		.15%	1.25%	.06%	.15%		1%			See 410			Higher sulfur content helps machinability but lowers corrosion resistance.
12-14%		.30% Nom. 15% Min.	1%	.04%	.03%		1%			250,000 heat treated	200,000 heat treated	C45	Higher carbon gives greater strength but lowers corrosion resistance.
FERRITIC STAINLESS: A few percent of stainless fasteners; magnetic; not hardenable by heat treatment; high chromium content helps corrosion resistance.													
11.5-14.5%		.08%	1%	.04%	.03%		1%		1-3% Alum	70,000-75,000	40,000-45,000	B65-B75	Low corrosion resistance; added aluminum lowers tensile strength
16-18%		.12%	1%	.04%	.03%		1%				See 405		Most popular of ferritic stainless; higher carbon content adds strength, used for cold forming and hot forging but low machinability.
PRECIPITATION HARDENED STAINLESS, MONEL, AND ALUMINUM													
15.5-17.5%	3.5%	.07%	1%	.04%	.03%	1%		3-5%	Columbian & Tantalum : 15.4 5%	135,000	105,000	C28	Frequently used; high corrosion resistance; strength and ductility in high and low temperatures due to solution annealing and hardening.
63-70%		.3%	2%		.5%				2.5% Iron, .5% Alum., .15% Sulf., remainder copper	80,000-125,000	40,000-70,000	B70	Most commonly used nickel-copper alloy for cold forming; excellent corrosion resistance in hot and salt water
.1%		.3-.9%			.5%			3.8-4.9%	.25% Zinc, 1.2-1.8% Magnesium, remainder Alum.	60,000 heat treated	50,000 heat treated	B60 heat treated	Most popular of aluminum alloys; needs heat treatment for strength.
BRASS AND BRONZE													
Brass Alloy 270								65%	35% Zinc	70,000	45,000	B65	Good cold forming due to high copper content; also used for milled from bar nuts
Brass Alloy 360								61.5%	3% Lead remainder Zinc	50,000	30,000	B55	Good machinability due to added lead; good for screw machine parts.
Commercial Brass								60-65%	35-40% Zinc, .05-1% Lead	55,000	35,000	B60	Easier to cold form as copper content increases; as copper content decreases, the metal becomes stronger and harder
Bronze Alloy 651			.07%				2.6%	96.0% min.	.05% Lead max. 1.5% Zinc max.	70,000-80,000	35,000-45,000	B70-B75	Generally used for hex head cap screws.
Bronze Alloy 655	0.6%		1.5%				3.8%	94.8% min	.05% Lead max. 1.5% Zinc max.		See Bronze 651		Used for hot forged fasteners.
Commercial Bronze							2-4%	94-96%	.05-.8% Lead, .05-1.5% Zinc.		See Bronze 651		Addition of lead helps machinability
Phosphorus Bronze				.3%				95%	5% Tin	60,000	35,000	B60	Tin increases strength; phosphorus helps against stress corrosion; excellent cold forming properties.
Naval Bronze								59-62%	5-1% Tin, 2% Lead remainder Zinc	70,000	30,000	B65	Addition of tin gives better corrosion resistance against salt water.





## GUIDE DE CORROSION

Les acheteurs, métallurgistes et ingénieurs sont continuellement face à une question :

**Quel matériel devrais-je utiliser pour cette application ?**

Ce guide se veut une source d'aide pour toutes vos questions de ce type.

Il est très important d'utiliser ce guide comme information de base, pour choisir le meilleur matériel pour une dite application. Toutes les conditions environnementales doivent aussi être considérées afin de déterminer votre choix.

La compilation des données de la plupart de métaux primaire et produits de plastique sont représentés sur ce tableau. Cependant il peut y avoir certains conflits d'opinion sur la corrosion, la plus basse à été considéré dans chacun des cas listés.

	Brass and Naval Bronze	Silicon Bronze	Monel Metal	Stainless Types 410, 416 and 430 (Magnetic)	Stainless Types 302, 303, 304 and 305 18-8 (A2)	Stainless Type 316 (A4)	Copper	Aluminum	Nylon
Acetate Solvents, Crude	Fair	Good	Good	Good	Excel	Excel	Good	Excel	Good
Acetate Solvents, Pure	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Acetate Acid, Crude	Fair <sup>1</sup>	Good	Good	Poor <sup>2</sup>	Good	Excel	Good	Good	Poor
Acetate Acid, Pure	Fair <sup>1</sup>	Good	Good	Poor <sup>2</sup>	Good	Excel	Good	Excel	Poor
Acetic Acid Vapors	Poor	Good	Fair	Poor	Good	Excel	Good	Good	Poor
Acetic Anhydride	Poor	Good	Good	Poor	Good	Excel	Good	Excel	Poor
Acetone	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Acetylene	<sup>3</sup>	Poor	Good	Excel	Excel	Excel	Poor	Excel	
Alcohols	Good	Excel	Excel	Excel	Excel	Excel	Excel	Good	Good
Aluminum Sulfate	Fair <sup>1</sup>	Good	Good	Poor	Fair	Good	Good	Fair	Poor
Alums	Fair <sup>1</sup>	Good	Good	Poor	Fair	Good	Good	Excel	Fair
Amonia Gas <sup>4</sup>	Poor <sup>56</sup>	<sup>6</sup>	<sup>6</sup>	Excel	Excel	Excel	<sup>6</sup>	Excel	Good <sup>36</sup>
Ammonium Chloride	Fair <sup>1</sup>	Good	Excel	Fair	Fair	Excel	Good	Poor	Fair
Ammonium Hydroxide	Poor	Poor	Fair	Excel	Excel	Excel	Poor	Good	Good <sup>36</sup>
Ammonium Nitrate	Poor	Fair	Fair	Excel	Excel	Excel	Fair	Excel	Fair
Ammonium Phosphate (Ammoniacal)	Poor	Poor	Good	Excel	Excel	Excel	Poor	Poor	Good
Ammonium Phosphate (Neutral)	Fair	Fair	Good	Good	Excel	Excel	Fair	Fair	Excel
Ammonium Phosphate (Acid)	Fair <sup>1</sup>	Fair	Good	Fair	Good	Excel	Fair	Fair	Fair
Ammonium Sulfate	Fair <sup>1</sup>	Fair	Good	Good	Excel	Excel	Fair	Good <sup>35</sup>	Fair
Asphalt	Good	Excel	Excel	Good	Excel	Excel	Excel	Excel	Excel
Beer	Good	Good	Excel	<sup>7</sup>	Excel	Excel	Good	Excel	Excel
Beet Sugar Liquors	Good	Excel	Excel	Good	Excel	Excel	Excel	Excel	Good
Benzene or Benzol <sup>8</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Benzine <sup>8</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Borax	Good	Good	Excel	Excel	Excel	Excel	Good	Good	Good
Boric Acid	Fair <sup>1</sup>	Good	Excel	Fair	Good	Excel	Good	Excel	Good
Butane, Butylene, Butadiene <sup>9</sup>	Excel <sup>34</sup>	Excel <sup>34</sup>	Excel	Excel <sup>10</sup>	Excel <sup>10</sup>	Excel <sup>10</sup>	Excel <sup>34</sup>	Excel	Excel
Calcium Bisulfite	Poor	Good	Poor	Poor	Good	Excel	Good	Poor	Good
Calcium Hypochlorite	Fair	Fair	Fair	Poor	Fair	Good	Fair	Poor	Fair
Cane Sugar Liquors	Good	Excel	Excel	Good	Excel	Excel	Excel	Excel	Good
Carbon Dioxide (Dry)	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel



**GUIDE DE CORROSION - SUITE**

	Brass and Naval Bronze	Silicon Bronze	Monel Metal	Stainless Types 410, 416 and 430 (Magnetic)	Stainless Types 302, 303, 304 and 305 18-8 (A2)	Stainless Type 316 (A4)	Copper	Aluminum	Nylon
Carbon Dioxide (Wet & Aqueous)	Fair <sup>11</sup>	Good <sup>11</sup>	Good <sup>11</sup>	Excel <sup>11</sup>	Excel	Excel	Good <sup>11</sup>	Excel	Excel
Carbon Disulfide	Fair	Poor	Fair	Good	Excel	Excel	Poor	Excel	Excel
Carbon Tetrachloride <sup>12</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Good	Excel
Chlorine (Dry)	Good	Good	Excel	Good	Good	Good	Good	Poor	Poor
Chlorine (Wet)	Poor	Fair	Fair	Poor	Poor	Fair	Fair	Poor	Poor
Chromic Acid	Poor	Poor	Fair	Fair	Good	Excel	Poor	Poor	Poor
Citric Acid	Fair <sup>1</sup>	Good	Good	Fair	Good	Excel	Good	Good	Good
Coke Oven Gas	Fair	Fair	Good	Excel	Excel	Excel	Fair	Good	Fair
Sulfate	Poor	Fair	Fair	Excel	Excel	Excel	Fair	Poor	Fair
Core Oils	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Cottonseed Oil	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Creosote	Fair	Good	Excel	Excel	Excel	Excel	Good	Good	
Ethers	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Ethylene Glycol	Good	Excel	Excel	Excel	Excel	Excel	Excel	Good	Good
Ferric Chloride	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Ferric Sulfate	Poor	Fair	Fair	Excel	Excel	Excel	Fair	Good	Poor
Formaldehyde	Good	Good	Excel	Excel	Excel	Excel	Good	Good	Good
Formic Acid	Fair <sup>1</sup>	Good	Good	Poor	Good	Excel	Good	Poor	Poor
Freon	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Good	Excel
Furfural	Good	Good	Excel	Excel	Excel	Excel	Good	Excel	Excel
Gasoline (Sour)	Fair	Poor	Poor	Fair	Excel	Excel	Poor	Poor	Excel
Gasoline (Refined)	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Gelatin	Fair <sup>13</sup>	Excel <sup>13</sup>	Excel	Fair <sup>13</sup>	Excel	Excel	Excel <sup>13</sup>	Excel	Excel
Glucose	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Glue	Fair	Excel	Excel	Excel	Excel	Excel	Excel	Fair	Excel
Glycerine or Glycerol	Good	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Good
Hydrochloric Acid	Poor	Fair <sup>14</sup>	Fair <sup>14</sup>	Poor	Poor	Poor	Fair <sup>14</sup>	Poor	Poor
Hydrocyanic Acid (Hydrogen Cyanide)	Poor	Poor	Good	Fair	Excel	Excel	Poor	Excel	Excel
Hydrofluoric Acid	Poor	Fair	Excel	Poor	Poor	Poor	Fair	Poor	Poor
Hydrogen Fluoride	Fair	Good	Excel	Fair	Good	Good	Good	Poor	Poor
Hydrogen <sup>9</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Hydrogen Peroxide	Poor	Fair	Good	Excel	Excel	Excel	Fair	Good	Fair
Hydrogen Sulfide (Dry)	Fair <sup>6</sup>	Poor <sup>6</sup>	Fair <sup>6</sup>	Good	Excel	Excel	Poor <sup>6</sup>	Excel	Good <sup>37</sup>
Hydrogen Sulfide (Wet & Aqueous)	Fair	Poor	Fair	Fair <sup>15</sup>	Good	Excel	Poor	Excel	Good <sup>37</sup>
Lacquers and Lacquer Solvents	Fair	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Lime-Sulfur	Poor	Fair	Good	Good	Excel	Excel	Fair	Poor	Good
Magnesium Chloride	Fair	Good	Excel	Fair	Good	Excel	Good	Poor	Excel
Magnesium Hydroxide	Good	Excel	Excel	Excel	Excel	Excel	Excel	Fair	Good
Magnesium Sulfate	Good	Excel	Excel	Excel	Excel	Excel	Excel	Good	Excel
Mercuric Chloride	Poor	Poor	Poor	Poor	Poor	Fair <sup>16</sup>	Poor	Poor	
Mercury	Poor	Poor	Good	Excel	Excel	Excel	Poor	Poor	Excel
Milk	Fair	Fair	Fair	Good	Excel	Excel	Fair	Excel	Excel
Molasses	Good	Excel	Excel	Good	Excel	Excel	Excel	Excel	Excel



**GUIDE DE CORROSION - SUITE**

	Brass and Naval Bronze	Silicon Bronze	Monel Metal	Stainless Types 410, 416 and 430 (Magnetic)	Stainless Types 302, 303, 304 and 305 18-8 (A2)	Stainless Type 316 (A4)	Copper	Aluminum	Nylon
Natural Gas	Good	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Nickel Chloride <sup>17</sup>	Poor	Fair	Good	Poor	Fair	Good	Fair	Poor	Poor
Nickel Sulfate <sup>17</sup>	Fair	Good	Excel	Fair	Good	Excel	Good	Poor	Poor
Nitric Acid	Poor	Poor	Poor	Good <sup>18</sup>	Good	Good	Poor	Fair	Poor
Oleic Acid	Fair <sup>19</sup>	Good <sup>24</sup>	Excel	Good <sup>20</sup>	Good <sup>20</sup>	Excel	Good <sup>24</sup>	Excel	Excel
Oxalic Acid	Fair	Good	Excel	Fair	Good	Excel	Good	Poor	Poor
Oxygen <sup>9</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Good
Palmitic Acid	Fair <sup>19</sup>	Good <sup>24</sup>	Excel	Good <sup>20</sup>	Good <sup>20</sup>	Excel	Good <sup>24</sup>	Excel	Excel
Petroleum Oils (Sour)	Fair	Poor	Poor	Fair	Excel	Excel	Poor	Poor	Excel
Petroleum Oils (Refined)	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Phosphoric Acid 25%	Poor	Good <sup>21</sup>	Good <sup>22</sup>	Poor	Fair <sup>23</sup>	Excel	Good <sup>21</sup>	Poor	Poor
Phosphoric Acid 25%, 50%	Poor	Good <sup>21</sup>	Good <sup>22</sup>	Poor	Poor	Good	Good <sup>21</sup>	Poor	Poor
Phosphoric Acid 50%, 85%	Poor	Good <sup>21</sup>	Good <sup>22</sup>	Poor	Poor	Good	Good <sup>21</sup>	Excel	Excel
Picric Acid	Poor	Poor	Poor	Good	Excel	Excel	Poor	Fair	Poor
Potassium Chloride	Fair	Good	Excel	Fair	Good	Excel	Good	Poor	Excel
Potassium Hydroxide	Poor	Fair	Excel	Excel	Excel	Excel	Fair	Poor	Good <sup>39</sup>
Potassium Sulfate	Good	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Propane <sup>9</sup>	Excel	Excel	Excel	Excel <sup>10</sup>	Excel <sup>10</sup>	Excel <sup>10</sup>	Excel	Excel	Excel
Rosin (Dark)	Good	Good	Excel	Excel	Excel	Excel	Good	Excel	Excel
Rosin (Light)	Poor	Poor	Good	Excel	Excel	Excel	Poor	Good	Excel
Shellac	Good	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Soda Ash (Sodium Carbonate)	Good	Good	Excel	Excel	Excel	Excel	Excel	Poor	Excel
Sodium Bicarbonate	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Good	Excel
Sodium Bisulfate	Fair <sup>1</sup>	Good	Excel	Poor	Poor	Excel	Good	Fair	Fair
Sodium Chloride	Fair	Good	Excel	Fair	Good	Excel	Good	Good	Excel
Sodium Cyanide	Poor	Poor	Good	Excel	Excel	Excel	Poor	Poor	Good
Sodium Hydroxide	Poor	Fair	Excel	Excel	Excel	Excel	Fair	Excel	Good <sup>39</sup>
Sodium Hypochlorite	Excel	Fair	Fair	Excel	Fair	Good	Fair	Excel	Fair
Sodium Metaphosphate	Fair	Good	Excel	Good	Excel	Excel	Good	Fair	Excel
Sodium Nitrate	Fair	Good	Excel	Excel	Excel	Excel	Good	Excel	Excel
Sodium Perborate	Fair	Good	Excel	Excel	Excel	Excel	Good	Fair	
Sodium Peroxide	Fair	Good	Excel	Excel	Excel	Excel	Good	Fair	Fair
Sodium Phosphate (Alkaline)	Fair	Good	Excel	Excel	Excel	Excel	Good	Poor	Good
Sodium Phosphate (Neutral)	Good	Excel	Excel	Excel	Excel	Excel	Excel	Poor	Excel
Sodium Phosphate (Acid)	Fair	Good	Excel	Poor	Good	Excel	Good	Poor	Fair
Sodium Silicate	Fair	Good	Excel	Excel	Excel	Excel	Good	Good	Good
Sodium Sulfate	Good	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Sodium Sulfide	Poor	Poor	Good	Excel	Excel	Excel	Poor	Poor	Good
Sodium Thiosulfate (Hypo)	Poor	Poor	Good	Excel	Excel	Excel	Poor	Excel	Good <sup>39</sup>
Sludge Acid	Poor	Good	Good	Poor	Poor	Fair	Good	Poor	
Stearic Acid	Fair <sup>19</sup>	Good <sup>24</sup>	Excel	Good <sup>20</sup>	Good <sup>20</sup>	Excel	Good <sup>24</sup>	Excel	Excel
Sulfate Liquors	Poor	Poor	Good	Poor	Poor	Poor	Excel	Excel	Good





**GUIDE DE CORROSION  
SUITE**

	Brass and Naval Bronze	Silicon Bronze	Monel Metal	Stainless Types 410, 416 and 430 (Magnetic)	Stainless Types 302, 303, 304 and 305 18-8 (A2)	Stainless Type 316 (A4)	Copper	Aluminum	Nylon
Sulfur	Fair	Fair	Fair	Excel	Excel	Excel	Fair	Excel	Good
Sulfur Chloride	Poor	Poor	Good	Poor	Fair	Good	Poor	Poor	Poor
Sulfur Dioxide (Dry) <sup>9</sup>	Fair	Excel	Excel	Excel	Excel	Excel	Excel	Good	Good
Sulfur Dioxide (Wet)	Poor	Good	Poor	Poor	Good	Excel	Good	Fair	Fair
Sulfuric Acid 10%	Poor	Good <sup>25</sup>	Good <sup>25</sup>	Poor	Poor	Good <sup>25</sup>	Good	Poor	Poor
Sulfuric Acid 10%, 75%	Poor	Fair	Good	Poor	Poor	Poor	Fair	Poor	Poor
Sulfuric Acid 75%, 95%	Poor	Fair <sup>26</sup>	Fair <sup>26</sup>	Fair <sup>27</sup>	Fair <sup>27</sup>	Good <sup>27</sup>	Fair <sup>26</sup>	Poor	Poor
Sulfuric Acid 95%	Poor	Fair	Poor	Good	Good	Good	Poor	Fair	Poor
Sulfurous Acid	Poor	Good	Poor	Poor	Fair	Good	Good	Poor	Fair
Tar	Good	Excel	Excel	Good	Excel	Excel	Excel	Excel	Excel
Tartaric Acid	Fair <sup>1</sup>	Good	Good	Fair	Good	Excel	Good	Good	Fair
Toluene or Toluol <sup>8</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Trichloroethylene <sup>12</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Good
Turpentine	Fair <sup>28</sup>	Excel	Excel	Good <sup>28</sup>	Excel	Excel	Excel	Excel	Excel
Varnish <sup>29</sup>	Good	Good	Excel	Excel	Excel	Excel	Good	Excel	Excel
Vegetable Oils <sup>29</sup>	Good	Good	Excel	Excel	Excel	Excel	Good	Excel	Excel
Vinegar <sup>25</sup>	Poor	Good	Good	Fair	Good	Excel	Good	Excel	Fair
Water (Acid Mine Water)	Poor	<sup>30</sup>	<sup>30</sup>	<sup>31</sup>	<sup>31</sup>	<sup>31</sup>	<sup>30</sup>	Fair	Good
Water (Fresh)	Fair <sup>32</sup>	Good	Excel	Excel	Excel	Excel	Good	Excel	Excel
Water (Salt)	Fair <sup>32</sup>	Good	Excel	Fair <sup>33</sup>	Good <sup>33</sup>	Good <sup>33</sup>	Good	Good	Excel
Whiskey	Good	Good	Good	Fair	Excel	Excel	Good	Fair	Excel
Wines	Good	Good	Good	Fair	Excel	Excel	Good	Fair	Excel
Xylene or Xylol <sup>8</sup>	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel	Excel
Zinc Chloride	Poor	Good	Excel	Poor	Poor	Good	Good	Poor	Good <sup>39</sup>
Zinc Sulfate	Fair	Good	Excel	Fair	Good	Excel	Good	Good	Good <sup>39</sup>

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- Subject to dezincification and/or stress corrosion; especially at elevated temperatures and with concentrated solutions.
- May be useful with cold dilute acid.
- Alloys containing up to 60% copper acceptable; high copper alloys not acceptable.
- Temperature assumed to be below that at which gas cracks and liberates nascent nitrogen.
- Subject to stress corrosion with low concentrations.
- Apparently resistant to dry gas at ordinary temperatures; attacked rapidly by moist gas and by hot gas.
- Not recommended for use with beverage grade.
- Chemicals used for treating in manufacture assumed to be absent.
- Temperature assumed to be no higher than that normally encountered in compression, storage, and distribution.
- Useful at elevated temperatures.
- Not recommended for use with carbonated beverages.
- Water assumed to be absent.
- Not recommended for use with edible grades.
- Only with dilute or unaerated solutions.
- Subject to stress corrosion by moist gas; and to severe general corrosion by saturated aqueous solution.
- Subject to stress corrosion.
- None of these materials recommended for use with nickel plating solutions.
- Higher chromium alloys (over 18%) preferred.
- Not recommended for temperature over 100° C (212°F).
- Alloys with less than 18% Cr. not recommended for temperatures over 100° C (212°F). Others not recommended for temperatures over 200° C (390°F).
- Up to 60° C (140° F).
- Up to 90° C (200° F).
- At room temperature.
- Not recommended for temperatures over 200° C (390° F.)
- Non-ferrous alloys preferred when unaerated and at temperatures above normal. Stainless Steel best when aerated and at normal to moderate temperatures.
- With cold acid only.
- In the absence of exposure to moist air.
- Crude produce may contain acids which corrode these materials.
- Some of these ratings may not apply when handling light colored products at elevated temperatures (200° C) (390° F).
- Good with water containing no oxidizing salts; fair with water containing oxidizing salts.
- Excellent with water containing oxidizing salts; not good with water containing no oxidizing salts.
- Subject to dezincification with hot and/or aerated waters.
- Subject to pitting attack.
- Copper may act as a catalyst for undesirable reactions.
- Free sulphuric acid absent.
- Good at concentrations under 10% and below 38° C (100° F).
- Suitable for limited service at concentrations under 50% and below 38° C (100° F).
- Good only at concentrations under 10% and below 38° C (100° F).
- Good only at concentrations under 20% and below 38° C (100° F).



## TABLE DE CONVERSION POUR FORETS

### ÉQUIVALENT DÉCIMAL ET MÉTRIQUE POUR DIAMÈTRE DES FORETS

Dia. de foret	Équiv. déc.	MM	Dia. de foret	Équiv. déc.	MM	Dia. de foret	Équiv. déc.	MM	Dia. de foret	Équiv. déc.	MM
1/64"	.0156	0.40	-	.1142	2.90	5	.2055	5.22	41/64"	.6406	16.27
1/32"	.0313	0.80	32	.1160	2.95	4	.2090	5.31	21/32"	.6562	16.67
60	.0400	1.02	31	.1200	3.05	3	.2130	5.41	43/64"	.6719	17.07
59	.0410	1.04	1/8"	.1250	3.18	7/32"	.2188	5.56	11/16"	.6875	17.46
58	.0420	1.07	30	.1285	3.26	2	.2210	5.61	45/64"	.7031	17.86
57	.0430	1.09	-	.1299	3.30	1	.2280	5.79	23/32"	.7188	18.26
56	.0465	1.18	29	.1360	3.45	15/64"	.2344	5.95	47/64"	.7344	18.65
3/64"	.0469	1.19	28	.1405	3.57	1/4"	.2500	6.35	3/4"	.7500	19.05
55	.0520	1.32	9/64"	.1406	3.58	F	.2570	6.53	49/64"	.7656	19.45
54	.0550	1.40	27	.1440	3.66	-	.2638	6.70	25/32"	.7812	19.84
53	.0595	1.51	26	.1470	3.73	17/64"	.2656	6.75	13/16"	.8125	20.64
1/16"	.0625	1.59	25	.1495	3.80	9/32"	.2812	7.15	27/32"	.8438	21.43
52	.0635	1.61	24	.1520	3.86	19/64"	.2969	7.54	7/8"	.8750	22.23
51	.0670	1.70	23	.1540	3.91	5/16"	.3125	7.94	57/64"	.8906	22.62
50	.0700	1.78	5/32"	.1562	3.97	21/64"	.3281	8.33	29/32"	.9062	23.02
49	.0730	1.85	22	.1570	3.99	-	.3346	8.50	59/64"	.9219	23.42
48	.0760	1.93	21	.1590	4.04	11/32"	.3438	8.73	15/16"	.9375	23.81
5/64"	.0781	1.98	20	.1610	4.09	23/64"	.3594	9.13	61/64"	.9531	24.21
47	.0785	1.99	-	.1654	4.20	U	.3600	9.35	31/32"	.9688	24.61
-	.0787	2.00	19	.1660	4.22	3/8"	.3750	9.53	63/64"	.9844	25.00
46	.0810	2.06	18	.1695	4.31	25/64"	.3906	9.92	1"	1.0000	25.40
45	.0820	2.08	11/64"	.1719	4.37	-	.4016	10.20	1 1/32"	1.0312	26.19
44	.0860	2.18	17	.1730	4.39	13/32"	.4062	10.32	1 1/16"	1.0625	26.98
43	.0890	2.26	16	.1770	4.50	27/64"	.4219	10.72	1 3/32"	1.0938	27.78
42	.0935	2.37	15	.1800	4.57	7/16"	.4375	11.11	1 1/8"	1.1250	28.58
3/32"	.0938	2.38	14	.1820	4.62	29/64"	.4531	11.51	1 5/32"	1.1562	29.37
41	.0960	2.44	13	.1850	4.70	15/32"	.4688	11.91	1 3/16"	1.1875	30.16
40	.0980	2.49	3/16"	.1875	4.76	31/64"	.4844	12.30	1 7/32"	1.2188	30.96
-	.0984	2.50	12	.1890	4.80	1/2"	.5000	12.70	1 1/4"	1.2500	31.75
39	.0995	2.53	11	.1910	4.85	33/64"	.5156	13.10	1 9/32"	1.2812	32.54
38	.1015	2.58	10	.1935	4.91	17/32"	.5313	13.50	1 5/16"	1.3125	33.34
37	.1040	2.64	9	.1960	4.98	35/64"	.5469	13.90	1 11/32"	1.3438	34.13
36	.1065	2.71	-	.1969	5.00	9/16"	.5625	14.29	1 3/8"	1.3750	34.93
7/64"	.1094	2.78	8	.1990	5.05	37/64"	.5781	14.68	1 13/32"	1.4062	35.72
35	.1100	2.79	7	.2010	5.11	19/32"	.5938	15.08	1 7/16"	1.4375	36.51
34	.1110	2.82	13/64"	.2031	5.16	39/64"	.6094	15.48	1 15/32"	1.4688	37.31
33	.1130	2.87	6	.2040	5.18	5/8"	.6250	15.88	1 1/2"	1.5000	38.10

### VITESSES DE PERÇAGE - RPM

Forets HSS			
Diamètre	Acier doux	Aluminium et laiton	Acier inoxydable
1/16"	4900	6110	2450
3/32"	3250	4070	1500
1/8"	2450	3060	1200
5/32"	1950	2450	950
3/16"	1630	2040	800
7/32"	1400	1750	700
1/4"	1220	1530	600
5/16"	980	1220	500
3/8"	820	1020	400
7/16"	700	870	350
1/2"	610	760	300
5/8"	490	610	250
3/4"	410	510	200
7/8"	350	440	170
1"	305	380	150
1 1/8"	276	340	130
1 1/4"	245	310	120

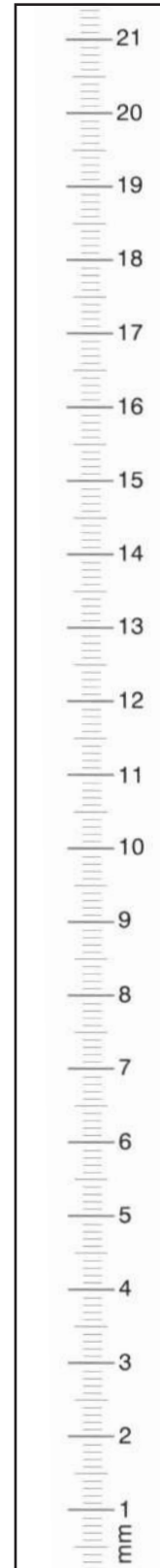
Scies emporte-pièce HSS			
Diamètre	Acier doux	Aluminium et laiton	Acier inoxydable
1"	350	500	175
2"	170	240	85
3"	115	160	55
4"	85	120	40
5"	70	95	30
6"	50	75	30

Pour les scies emporte-pièces au carbure, multiplier la vitesse par 2.5.

### VITESSES DE COUPES MAXIMALES POUR TARAUDS EN ACIER RAPIDE - RPM

Diamètre du taraud	Acier doux	Inox	Aluminium
#6	800	500	1,600
#8	570	400	1,500
#10	600	350	1,400
#12	550	300	1,200
1/4"	450	250	1,000
5/16"	370	200	850
3/8"	300	150	700
7/16"	260	120	600
1/2"	230	100	500

Vitesses maximales recommandées pour trous débouchants. Pour trous borgnes, réduire la vitesse d'un tiers. S'assurer que le trou borgne est assez profond pour permettre l'accumulation des copeaux au fond.



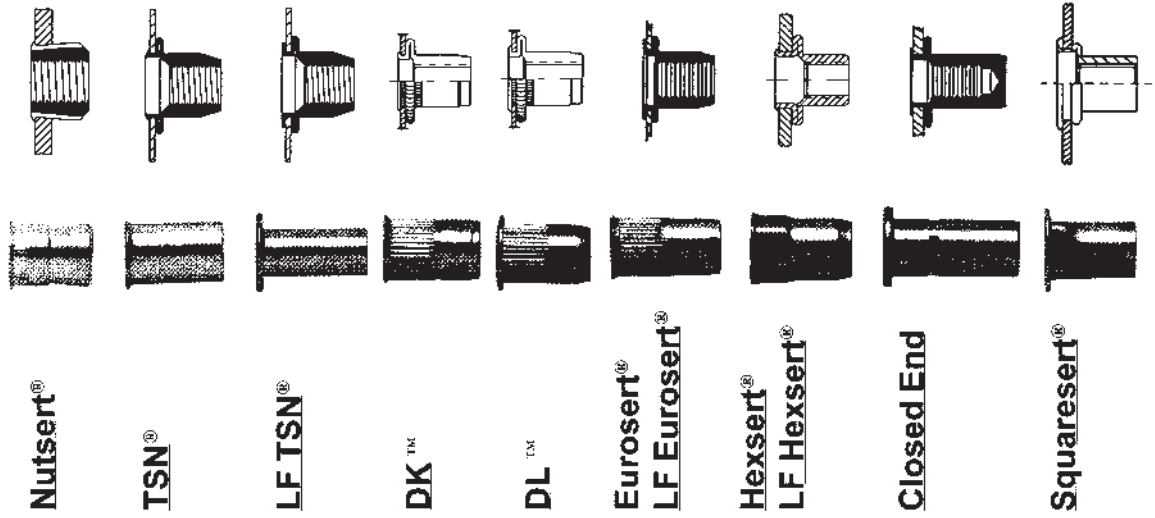
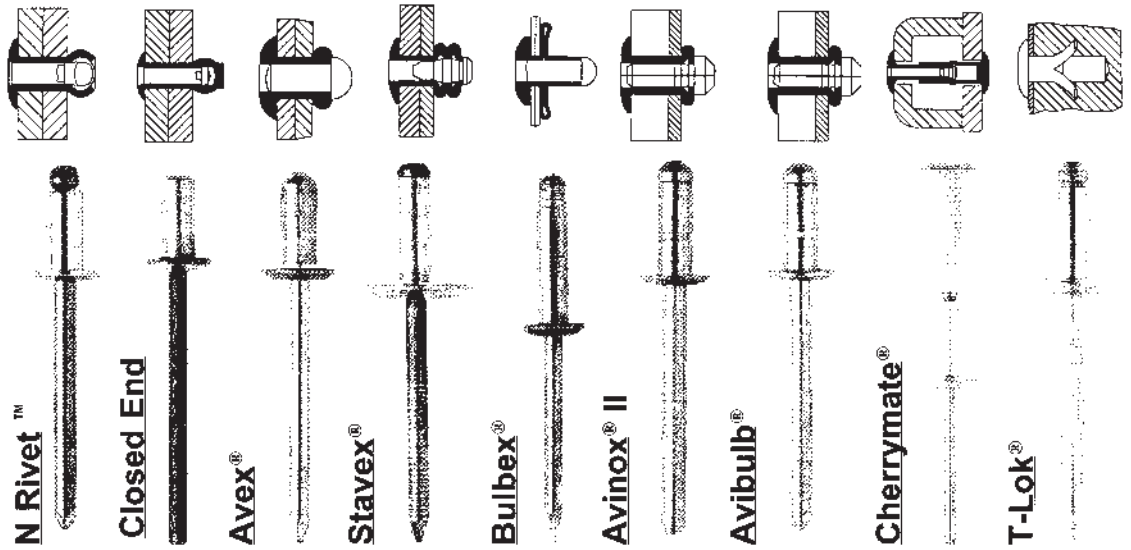
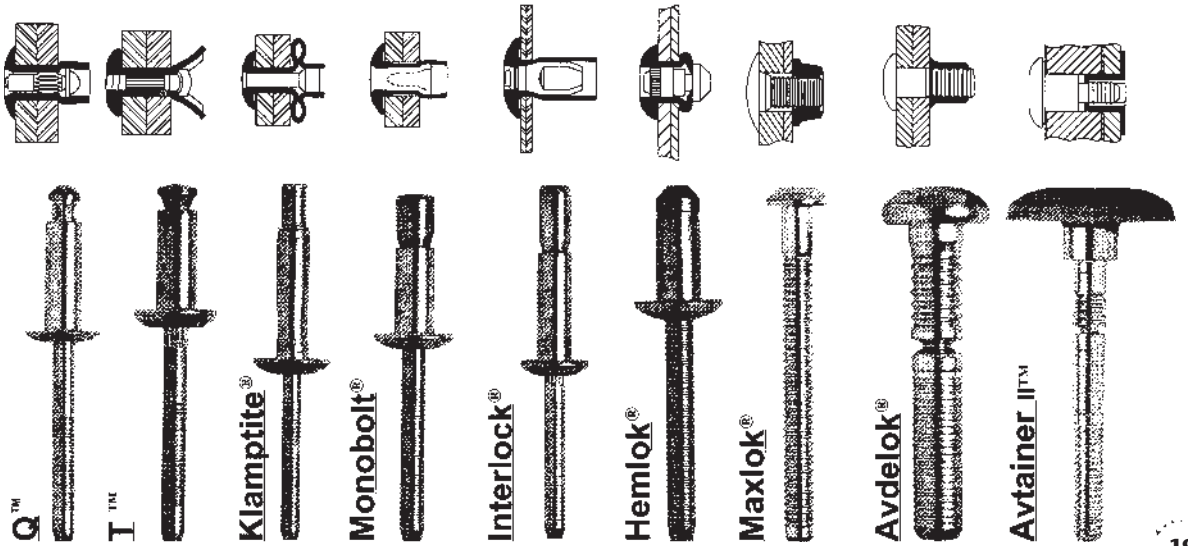




**GUIDE DE PERÇAGE POUR TARAUDS / STANDARD ET MÉTRIQUE**

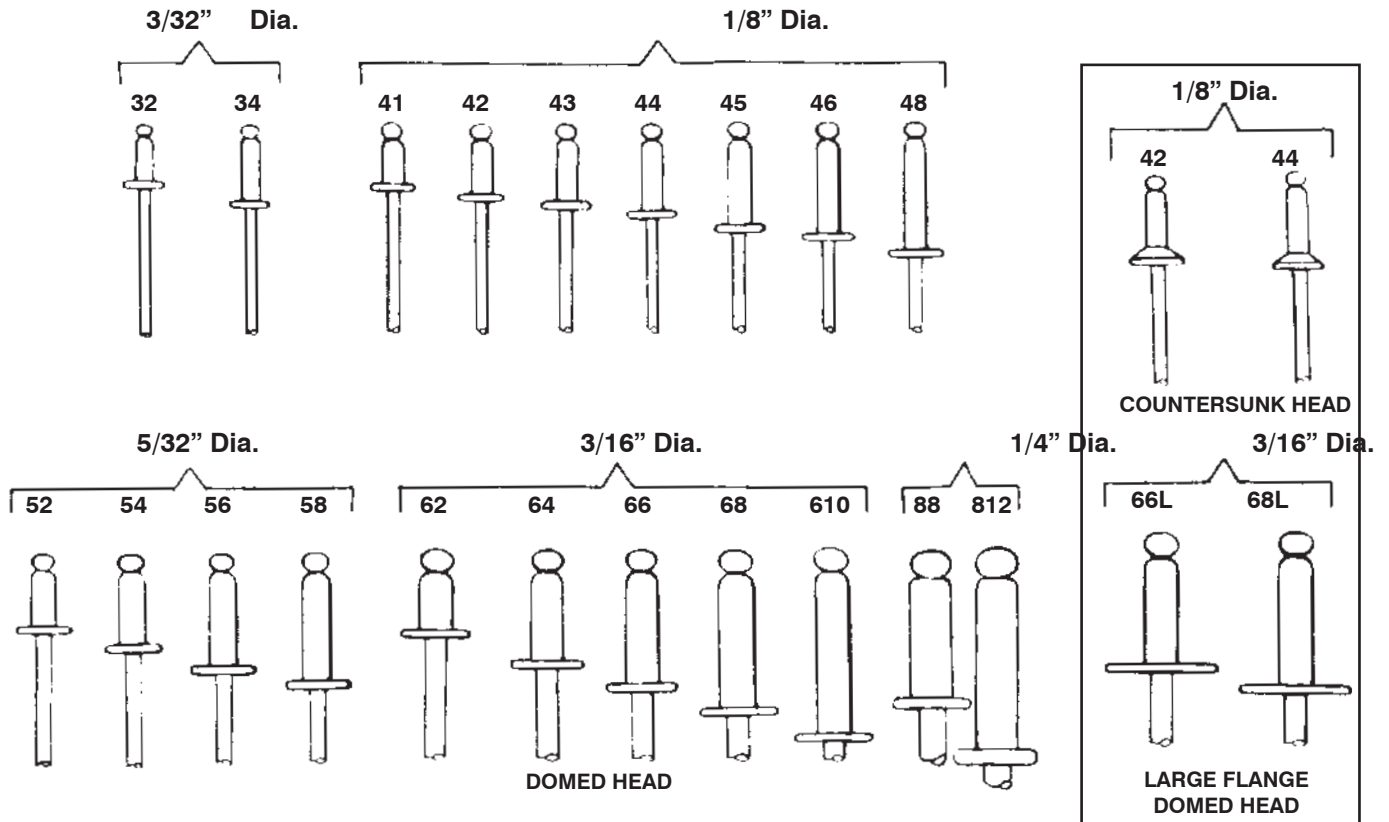
Dia. Taraud Tap Dia.	Filets Threads	Filets Threads	Dia. mèche Drill Dia.	Dia. mèche Drill Dia.	Diamètre (décimal)		Taraud Tap		Dia. mèche Drill Dia.	Pas Pitch	Dia. mèche Drill Dia.
					"	mm	Dia. mm	Pas/Pitch Gros filet Coarse thread		Gros filet Coarse thread	
0	-	80	-	3/64	.0600	1.52	-	-	-	-	-
-	-	-	-	-	.0629	1.60	01.6	0.35	3/64	0.2	-
1	64	72	53	53	.0730	1.85	-	-	-	-	-
-	-	-	-	-	.0787	2.00	2	0.4	1/16	0.25, 0.35	-
2	56	64	50	50	.0860	2.18	-	-	-	-	-
-	-	-	-	-	.0984	2.50	2.5	0.45	46	0.35	-
3	48	56	47	45	.0990	2.51	-	-	-	-	-
4	40	48	43	42	.1120	2.84	-	-	-	-	-
-	-	-	-	-	.1181	3.00	3	0.5	40	0.35, 0.6	-
5	40	44	38	37	.1250	3.18	-	-	-	-	-
-	-	-	-	-	.1575	4.00	4	0.7	30	0.5, 0.75	-
8	32	36	29	29	.1640	4.17	-	-	-	-	-
10	24	32	25	21	.1900	4.83	-	-	-	-	-
-	-	-	-	-	.1969	5.00	5	0.8	19	0.5, 0.75, 0.9	-
12	24	28	16	14	.2160	5.49	-	-	-	-	-
-	-	-	-	-	.2362	6.00	6	1	9	0.5, 0.75	-
1/4	20	28	7	3	.2500	6.35	-	-	-	-	-
-	-	-	-	-	.2756	7.00	7	1	15/64	0.5, 0.75	-
5/16	18	24	F	I	.3125	7.94	-	-	-	-	-
-	-	-	-	-	.3150	8.00	8	1.25	17/64	-	-
3/8	16	24	5/16	Q	.3750	9.53	-	-	-	-	-
-	-	-	-	-	.3937	10.00	10	1.5	Q	1.25	11/32
7/16	14	20	U	25/64	.4375	11.11	-	-	-	-	-
-	-	-	-	-	.4724	12.00	12	1.75	Y	1.25	27/64
1/2	13	20	27/64	29/64	.5000	12.70	-	-	-	-	-
-	-	-	-	-	.5512	14.00	14	2	15/32	1.5	31/64
9/16	12	18	31/64	33/64	.5625	14.29	-	-	-	-	-
5/8	11	18	17/32	37/64	.6250	15.88	-	-	-	-	-
-	-	-	-	-	.6299	16.00	16	2	35/64	1.5	9/16
-	-	-	-	-	.7087	18.00	18	2.5	39/64	1.5	41/69
3/4	10	16	21/32	11/16	.7500	19.05	-	-	-	-	-
-	-	-	-	-	.7874	20.00	20	2.5	11/16	1.5	23/32
-	-	-	-	-	.8661	22.00	22	2.5	-	1.5	-
7/8	9	14	49/64	13/64	.8750	22.23	-	-	-	-	-
-	-	-	-	-	.9449	24.00	24	3	53/64	2	55/64
1	8	*12-14	7/8	59/64	1.0000	25.40	-	-	-	-	-
-	-	-	-	-	1.0630	27.00	27	3	-	2	-
1 1/8	7	12	63/64	1 3/64	1.1250	28.58	-	-	-	-	-
-	-	-	-	-	1.1811	30.00	30	3.5	1 3/64	2	1 7/64
1 1/4	7	12	1 7/64	1 11/64	1.2500	31.75	-	-	-	-	-
-	-	-	-	-	1.2992	33.00	33	3.5	1 11/64	2	1 7/32
1 3/8	6	12	1 7/32	1 19/64	1.3750	34.93	-	-	-	-	-
-	-	-	-	-	1.4173	36.00	36	4	1 1/4	3	1 19/64
1 1/2	6	12	1 11/32	1 27/64	1.5000	38.10	-	-	-	-	-
-	-	-	-	-	1.5354	39.00	39	4	1 3/8	3	1 27/64
-	-	-	-	-	1.5748	40.00	40	-	-	3	-
1 5/8	5 1/2	12	-	-	1.6250	41.28	-	-	-	3	-
-	-	-	-	-	1.6535	42.00	42	4.5	-	1.5, 2, 3, 4	-
1 3/4	5	12	1 9/64	-	1.7500	44.45	-	-	-	-	-
1 7/8	5	12	-	-	1.8700	47.22	-	-	-	-	-
-	-	-	-	-	1.8898	48.00	48	5	-	1.5, 2, 3, 4	-
2	4 1/2	12	1 25/32	-	2.0000	50.80	-	-	-	-	-
-	-	-	-	-	2.0472	52.00	52	5	-	1.5, 2, 3, 4	-
-	-	-	-	-	2.2047	56.00	56	5.5	-	1.5, 2, 3, 4	-
2 1/4	4 1/2	12	-	-	2.2500	57.15	-	-	-	-	-
-	-	-	-	-	2.3622	60.00	60	5.5	-	1.5, 2, 3, 4	-
2 1/2	4	12	-	-	2.5000	63.50	-	-	-	-	-
-	-	-	-	-	2.5197	64.00	64	6	-	1.5, 2, 3, 4	-

DIFFÉRENTS TYPES DE RIVET  
**Avdel Cherry** **TEXTRON**





**GUIDE DE MESURES POUR RIVETS (GRANDEUR RÉELLE)**



**TYPES D'ALLIAGES POUR RIVETS**

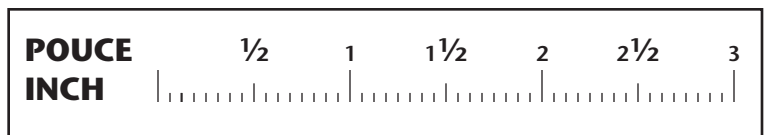
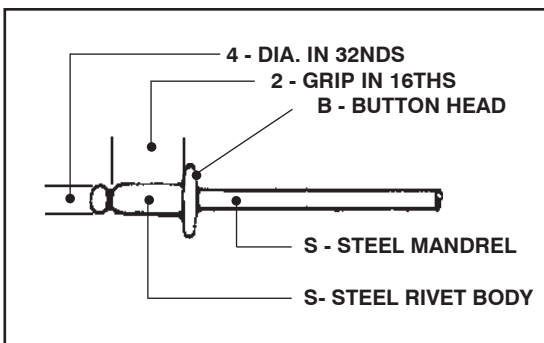
- All Aluminium
- Aluminium and Steel
- All Steel
- Stainless and Steel
- All Stainless
- Cooper and Cooper Plated
- Button Head
- Countersunk
- Large Flange

- AA
- AS
- SS
- TS
- TT
- CC
- B
- C
- L



**PLUSIEURS OUTILS À RIVETER**

**EXEMPLE - BSS42**





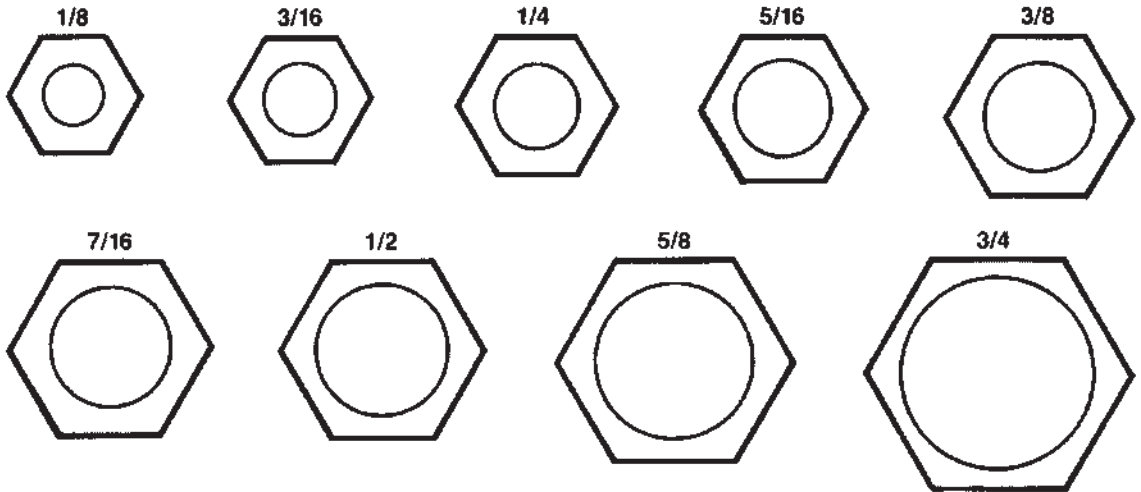
IDENTIFICATION ET DESCRIPTION D'UN RACCORD - (FITTING)					
IDENTIFICATION	FLARED FITTINGS	PIPE	FLARELESS FITTINGS	PIPE	FITTINGS
<b>V I S U A L</b>	<p><b>SHORT NUT</b> Short nut may be used when vibration is not a factor.</p> <p><b>LONG NUT</b> Use long nut when excessive vibration may be encountered.</p>		<p>Short nut may be used when vibration is not a factor.</p> <p><b>LONG NUT</b> Use long nut when excessive vibration may be encountered.</p>		<p><b>THREADED SLEEVE (DOUBLE COMPRESSION)</b> Copper, brass, aluminum and plastic tubing. Not recommended for steel tubing. Soft plastic tubing requires support inside.</p> <p><b>COMPRESSION</b> Copper, brass, aluminum and plastic tubing. Not recommended for steel tubing. Soft plastic tubing requires support inside.</p>
<b>USED WITH</b>	<b>SAE 45° FLARED</b> Copper, brass, aluminum, plastic and welded steel hydraulic tubing that can be flared.	<b>PIPE</b> Brass or iron pipe.	<b>INVERTED FLARED</b> Copper, brass, aluminum, plastic and welded steel hydraulic tubing that can be flared.	<b>PIPE</b> Brass or iron pipe.	<b>THREADED SLEEVE (DOUBLE COMPRESSION)</b> Copper, brass, aluminum and plastic tubing. Not recommended for steel tubing. Soft plastic tubing requires support inside.
<b>PRESURE</b>	Depends on tubing used. Will stand burst pressures of standard tube up to 5000 P.S.I. with Bundyweld (double flared) and 3500 P.S.I. with copper tube depending on size.	1,200 P.S.I. operating. Proof pressure to 15,000 P.S.I. on 1/8" and 1/4" pipe 5,000 P.S.I. on larger sizes.	Depends on tubing used. Will stand burst pressures of standard tube up to 5000 P.S.I. with Bundyweld (double flared) and 3500 P.S.I. with copper tube depending on size.	Up to 2000 P.S.I. on 1/8" to 1/4" tubing, 1000 P.S.I. on 5/16" to 1/2" tubing and 750 P.S.I. on 3/4" to 1" size.	500 P.S.I. maximum for 1/8" to 1/4" sizes, 250 P.S.I. for 5/16" and 3/8" sizes.
<b>TEMPERATURE</b>	-65° to +250° F. at maximum operating pressures. Has been used at 400° F. at pressures under 1000 P.S.I.	-65° to +250° F.	-65° to +250° F. at maximum operating pressures. Has been used at 400° F. at pressures under 1000 P.S.I.	-65° to +250° F.	-65° to +250° F.
<b>VIBRATION</b>	Good vibration characteristics depending on tubing used.	Not good for severe vibration service.	Excellent vibration characteristics depending on tubing used.	Poor vibration characteristics. A little better than threaded sleeve. Long nut improves vibration factors.	Very poor vibration characteristics.
<b>ADVANTAGES</b>	Low cost, availability, reusability. Available in long and short nut style.	Availability	Very low costs. Seats and threads are recessed and protected. Shorter bodies fit tighter places. Short nut affords very close tube bends. Reusable Broad selection of styles of fittings. Nut available in brass and steel.	Low cost, availability, no flaring required. Easy to assemble. Available with long and short nut.	Low cost, no flaring. Easy to assemble.
<b>DISADVANTAGES</b>	Must flare tube	Higher cost, must thread pipe not as versatile as tube fittings and tubing.	Must flare tube	Poor vibration characteristics.	Limited in pressure rating. Poor vibration characteristics.
<b>TYPICAL APPLICATION</b>	Fuel oil, air, waterlines, LP and natural gas lines, refrigeration (except where frost nuts are required), hazardous liquids or gaseous chemicals not corrosive to tubing material and brass.	Water, air, oil, natural gas, and liquefied petroleum products.	Automotive brake, oil, and fuel lines, LP and natural gas connections. Hazardous liquids, air, water, fuel, oil, or gaseous chemicals not corrosive to tubing material and brass.	Air, oil, water, and natural gas.	Air, oil, or waterlines. Popular on grease lubrication systems.



**GABARIT POUR MESURER LES RACCORDS (GRANDEUR RÉELLE)**

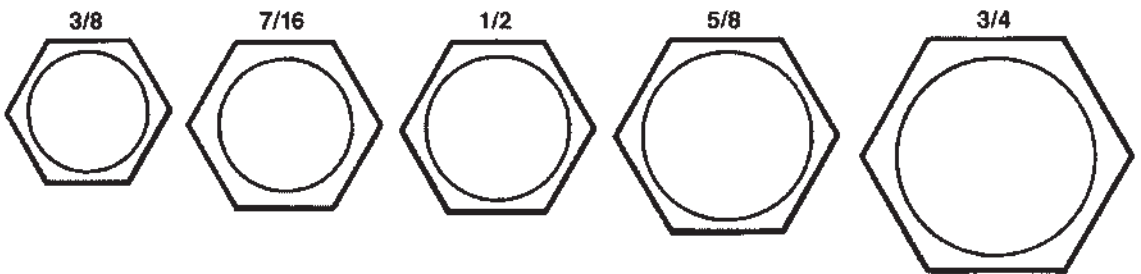
**S.A.E. Flare and Inverted Flare**

Standard Sizes for Male Threads



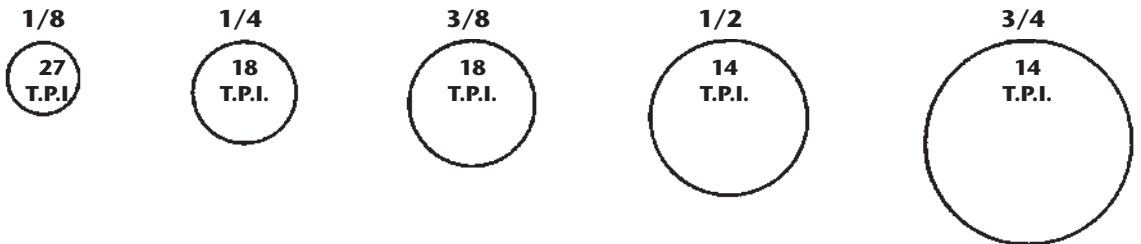
**Compression and Threaded Sleeve**

1/8 to 5/16 Inclusive  
Same Outside Diameter as Flared Types



**Pipe Thread Actual Sizes**

Match End to Determine Correct Fitting

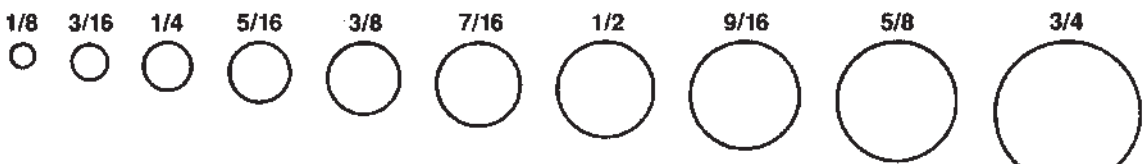


**CODE**

#A #B #C #D #E

**Copper Tubing**

Match Tubing to Determine Actual Size



**CODE**

#2 #3 #4 #5 #6 #7 #8 - #10 #12