



**LOW INERTIA  
CLUTCHES AND BRAKES  
&  
HI-TORQUE CLUTCHES**

**INSTALLATION AND MAINTENANCE  
INSTRUCTIONS**

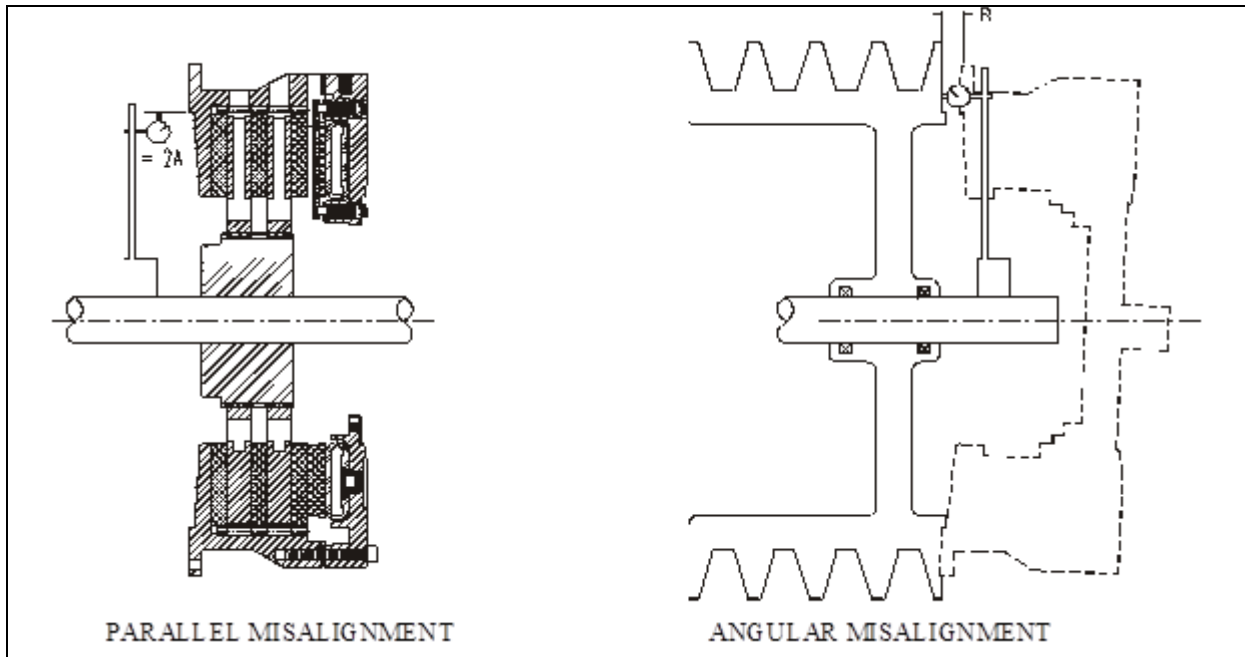
**FOR 6" THRU 60"**

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# INSTALLATION & MAINTENANCE INSTRUCTIONS

## I. CLUTCH/BRAKE ALIGNMENT INSTRUCTIONS

1. Check to see if both clutch/brake elements run square and true by indicating to the frame of the machine.
2. If bearing clearance will not position shaft axially, then some method of positioning shaft will be necessary during alignment.
3. Dial indicator is to be located as shown in figures below. The readings should not exceed limitations set in table below.
4. The readings under A and B are maximum deviations advisable for a normal running of the clutch/brake unit with no excessive wear on friction materials and no additional load on parts or machine bearings.
5. Consult general arrangement drawing of machine for initial cold offset setting of shafts to compensate for thermal expansion of gear case under running conditions.



SIZE	A = T.I.R.		B = T.I.R.	
	MILLIMET	INCHES	MILLIMET	INCHES
6	0.08	0.003	0.08	0.003
8	0.10	0.004	0.10	0.004
11	0.15	0.006	0.15	0.006
14	0.18	0.007	0.18	0.007
16	0.20	0.008	0.20	0.008
18	0.23	0.009	0.23	0.009
21	0.28	0.011	0.28	0.011
24	0.30	0.012	0.30	0.012
24H	0.30	0.012	0.30	0.012
27	0.36	0.014	0.36	0.014
30	0.38	0.015	0.38	0.015
30H	0.38	0.015	0.38	0.015
36	0.46	0.018	0.46	0.018
42	0.53	0.021	0.53	0.021
48	0.61	0.024	0.61	0.024
60	0.76	0.030	0.76	0.030

## II. INSTALLATION

1. Slide hub (4) into correct position on shaft.
2. It is preferable that the hub of the clutch be axially restrained. This may be achieved by using a stepped shaft and an end plate, a taper key or a set screw fitted in a tapped hole in the hub.
3. **If clutch/brake is to be mounted as an assembled unit**, slide the unit over the hub (4) ensuring that the teeth on the center plate (3) are properly engaged in the teeth of the hub.
4. Insert mounting bolts in ring (1) and tighten. (See Table 2, pages 9, 10, & 11 for torque values.) Connect air supply to clutch/brake using a flexible hose.
5. Although clutches/brakes are correctly set before leaving our factory, the clearance should be checked before being put into operation. (See limits in Tables 1A/1B, page 7 & 8.)
6. Clearance can be checked by applying and releasing air to the clutch and measuring the total axial movement of the release spring bolt (6). (See Section 7)
7. If clearance is incorrect, the removal or addition of shims (14) is required. (See Section 8)
8. To modify shim thickness, unscrew all capscrews (15) and remove airtube holding plate (10), airtube (9) and pressure plate (5) as sub-assembly. Modify shim thickness and replace capscrews (15). Tighten capscrews. (See Table 2, pages 9, 10, & 11 for torque values.)
9. **If the clutch/brake is to be mounted disassembled follow Part II, steps 1, 2, 4, and 5.**
10. Slide ring (1) over hub (4), insert mounting bolts through ring (1) into mating surface and tighten bolts. (See Table 2, pages 9, 10, & 11 for torque values.)
11. Follow steps in Part V.

## III. LUBRICATION

1. CLUTCH/BRAKE: No lubrication is required.
2. ROTO-COUPLING (12): Normally no lubrication is required. Rotating air unions which are equipped with grease fittings or oil cups require periodic lubrication, and in this instance any good bearing oil (depending on type of nipple, grease) can be used, but care should be taken not to over lubricate.

## IV. AIR SUPPLY CONTROLS

1. Use flexible hose between control valve and clutch.
2. When fast engagement/disengagement is required, use ample diameter pipe, hose, and valves using bends rather than elbows to ensure good airflow. Keep length of pipe/hose as short as possible to shorten filling time.
3. The low inertia clutch and brake design operating air supply pressure is  $5.5 \pm 0.4$  Bar [80  $\pm$ 6 PSIG], not to exceed 6.5 Bar [94 PSIG]. Lower pressure reduces the available torque. Higher pressure increases the response time.

## V. REPLACEMENT OF FRICTION DISCS (2)

1. Friction discs (2) should be replaced when the maximum clearance (see Tables 1A/1B, page 7 & 8) has been reached.
2. Disconnect air supply to clutch/brake. Remove capscrews (15).
3. Remove as a sub-assembly: airtube holding plate (10), airtube (9), and pressure plate (5).
4. Slide out friction discs (2) and center plates (3).
5. Re-assemble in reverse order, using new discs. Tighten capscrews. (See Table 2, page 5 for torque values.)
6. When friction discs (2) are replaced, also replace all release springs (7). If release springs are fitted between the friction discs, ensure that the springs are correctly located in their counterbores.

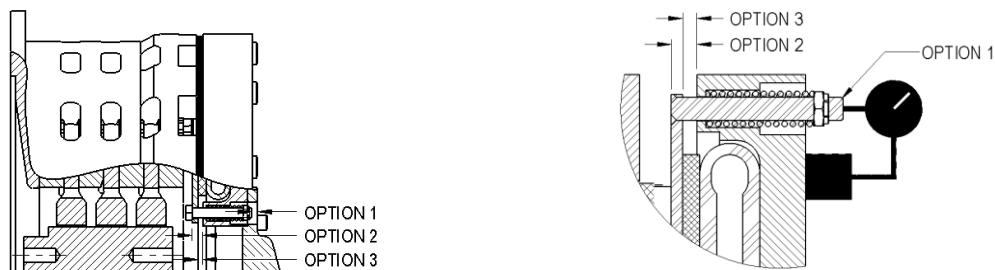
## VI. REPLACEMENT OF AIRTUBE

1. To replace airtube (9), disconnect air supply to clutch/brake. Disconnect airline on clutch/brake and remove quick release valves or elbows from airtube connections.
2. If release springs (7) are fitted between the friction discs (2), wedge or clamp friction discs so that release springs (7) stay in place.
3. Remove capscrews. Remove as a sub-assembly: airtube holding plate (10), airtube (9), pressure plate (5), and pressure plate lugs (lugs used on sizes 24" and larger only). To remove airtube (9) from airtube holding plate (10): remove release spring nuts (8) from release spring bolts (6), remove release springs (7), remove release spring bolts (6) and pressure plate lugs, remove pressure plate (5), remove airtube (9) from airtube holding plate (10). Replace with new airtube. Re-assemble in reverse order. Where release springs (7) are fitted in the airtube holding plate (10), make sure that the nuts are tightened equally so that only 1-2 threads show through the nut. Check clearance by following steps 6-8 in Part VII. Tighten capscrews. (See Section 10 Table 2, pages 9, 10, & 11 for torque values.)

## VII. CHECKING CLEARANCE

### **⚠ Danger**

Do not operate the unit when clearance is beyond the maximum allowance. If a shim is not removed when required, the unit's torque may deteriorate to the point where the equipment will not engage and disengage properly.



1. As the friction material wears, adjustment of the unit will be required to keep the unit's actuation within proper clearance. See Section 10 Tables 1A & 1B for proper clearance of unit.
2. Operating clearance is calculated by measuring the distance of travel between pressure plate and the actuation plate. Measure distance while unit is engaged and log, then again while unit is dis-engaged and log. Therefore "engaged" minus "dis-engaged" equals OPERATING CLEARANCE.
3. If maximum clearance has been reached shim removal is required. (See Part VIII)

## VIII. REMOVAL OF SHIMS

### **⚠ Warning**

Failure to remove an equal quantity of equal thickness shims during clearance adjustment could cause unit to malfunction.

Note: There may not be shim adjustment for all single disc units. When unit torque decreases, inspect the friction material, drive plates, and replace any worn components.

1. Mark the shim/ 's that are to be removed to ensure that the right quantity is removed. Shims must always be removed as a complete set only.
2. Loosen the bolt one turn at a time, using an alternating pattern to keep the Actuator assembly square to the Hub. Continue to loosen the bolts until the force of the Release Springs is relieved, allowing for access to the shims.
3. Remove or replace shims as needed for proper clearance and operation.

### **⚠ Warning**

Collect ALL shim pieces as they are removed. Shim pieces could lodge in the Unit components and prevent the Unit from properly engaging/releasing.

4. While supporting the weight of the Actuator Assembly, tighten the bolts. Make sure to tighten one turn at a time, using an alternating pattern to keep the actuator square to the hub. Continue until the Actuator is seated firmly against the Hub. Torque the bolts to the appropriate value. (See Section 10 Table 2, pages 9, 10, & 11 for torque values.)

### **⚠ Caution**

Tighten bolts gradually and evenly to prevent damage to the Unit components.

## IX. RECOMMENDED SPARES

Recommended spares should be held by customer to greatly reduce costly “down time”, with the exception of the airtubes, which have a limited shelf life. The airtubes may deteriorate faster on the shelf than in service. These are normally stock items at the factory or local distributor and can be shipped from stock.

When replacing any part, it is recommended to replace hardware.

- 1) Replace hardware with equal grade hardware.
- 2) Maintain proper thread engagement: Thread engagement must be 1.5 times diameter of bolt minimum and less than tapped hole depth.
- 3) Re-tap hole after removing old hardware followed by compressed air to remove trapped debris.

Due to the many variations obtainable in a basic type and size of clutch, spare parts lists are issued against specific serial numbers. Anytime you require information about your unit or place an order for parts from the factory or your distributor, please furnish the serial number of the unit which is located on the face of the airtube holding plate. For general guidance, the normal recommended spares are listed below.

#### FRICITION DISCS (2)

Discs should be replaced when the maximum clearance, as stated in Section 10 Tables 1A & 1B, has been reached. Discs should be kept clean, dry, free from oil or grease and stored flat to prevent warping.

#### RELEASE SPRINGS (7)

It is strongly recommended that release springs are renewed every time the friction discs are replaced.

#### AIRTUBE (9)

Failures may occasionally occur if the airtube becomes excessively hot, over-expanded or saturated by lubrication oil. Over-expansion is usually due to excessively worn friction linings. Store airtubes flat in a cool dry place.

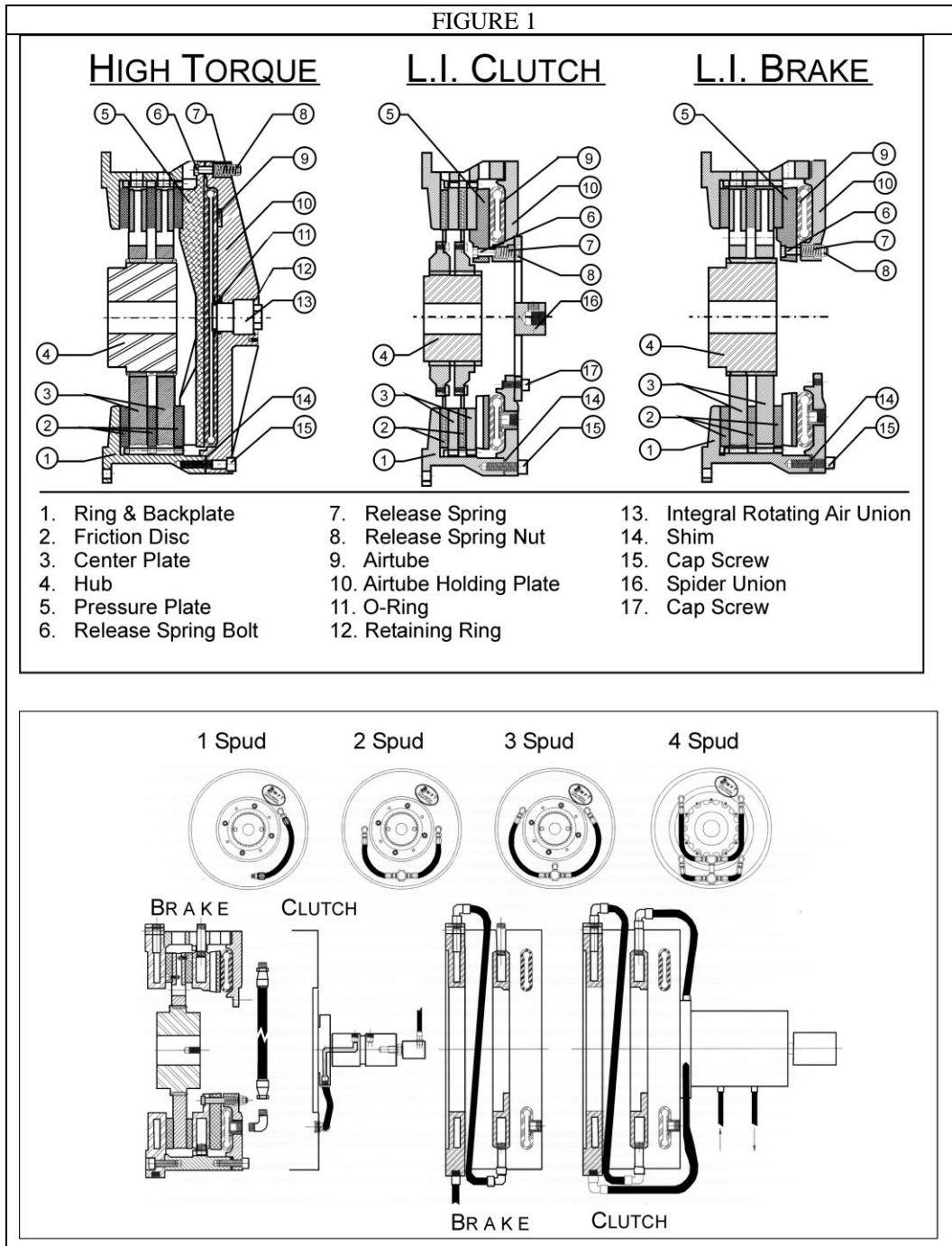
## QUICK RELEASE VALVES

If the quick release valves are fitted, they should be dismantled and cleaned about every 6 months.

**TO DISMANTLE:** Hold valve body with spanner and disconnect air hose. Unscrew valve from airtube. Place body of valve in a vise and remove end cap. **DO NOT** attempt to remove the end cap while valve is fitted to the airtube as valve may break at thread neck. Keep complete replacement unit in stock.

## ROTO-COUPLING (13)

Roto-couplings are sometimes damaged by an external blow or can wear out prematurely if restrained by non-flexible hose connections. It is recommended that a replacement unit be kept in stock.



X. TABLES

Note: For Normal Cycle Application use Table 1A, for High Cycle Applications use Table 1B

Table 1A		
L.I., HI TORQUE OPERATING CLEARANCE		
UNIT	RECOMMENDED MIN/MAX CLEARANCE [mm]	
104	1/32" - 1/16"	[0.79] - [1.59]
204	1/16" - 3/32"	[1.59] - [2.38]
106	1/16" - 3/32"	[1.59] - [2.38]
206	1/16" - 3/32"	[1.59] - [2.38]
108	1/16" - 1/8"	[1.59] - [3.18]
208	3/32" - 5/32"	[2.38] - [3.97]
308	1/8" - 3/16"	[3.18] - [4.76]
111	1/16" - 1/8"	[1.59] - [3.18]
211	3/32" - 5/32"	[2.38] - [3.97]
311	1/8" - 3/16"	[3.18] - [4.76]
114	1/16" - 1/8"	[1.59] - [3.18]
214	3/32" - 5/32"	[2.38] - [3.97]
314	1/8" - 3/16"	[3.18] - [4.76]
116	1/16" - 1/8"	[1.59] - [3.18]
216	3/32" - 5/32"	[2.38] - [3.97]
316	1/8" - 3/16"	[3.18] - [4.76]
118	1/16" - 1/8"	[1.59] - [3.18]
218	3/32" - 5/32"	[2.38] - [3.97]
318	1/8" - 3/16"	[3.18] - [4.76]
121	1/16" - 1/8"	[1.59] - [3.18]
221	3/32" - 5/32"	[2.38] - [3.97]
321	1/8" - 3/16"	[3.18] - [4.76]
124	3/32" - 5/32"	[2.38] - [3.97]
224	1/8" - 3/16"	[3.18] - [4.76]
324	5/32" - 7/32"	[3.97] - [5.56]
127	3/32" - 5/32"	[2.38] - [3.97]
227	1/8" - 3/16"	[3.18] - [4.76]
327	5/32" - 7/32"	[3.97] - [5.56]
130	3/32" - 5/32"	[2.38] - [3.97]
230	1/8" - 3/16"	[3.18] - [4.76]
330	3/16" - 1/4"	[4.76] - [6.35]
136	3/32" - 7/32"	[2.38] - [5.56]
236	1/8" - 1/4"	[3.18] - [6.35]
336	3/16" - 5/16"	[4.76] - [7.94]
142	1/8" - 1/4"	[3.18] - [6.35]
242	5/32" - 9/32"	[3.97] - [7.14]
342	3/16" - 5/16"	[4.76] - [7.94]
148	1/8" - 1/4"	[3.18] - [6.35]
248	5/32" - 9/32"	[3.97] - [7.14]
348	3/16" - 5/16"	[4.76] - [7.94]
260	3/16" - 5/16"	[4.76] - [7.94]
360	1/4" - 3/8"	[6.35] - [9.53]
460	5/16" - 7/16"	[7.94] - [11.11]

Note: For Normal Cycle Application use Table 1A, for High Cycle Applications use Table 1B

<b>Table 1B</b>		
<b>High-Cycle Operating Clearance</b>		
<b>Unit</b>	<b>Recommended Min/Max Clearance [mm]</b>	
106	1/16" - 3/32"	[1.59] - [2.38]
206	1/16" - 3/32"	[1.59] - [2.38]
306	3/32" - 1/8"	[2.38] - [3.17]
108	1/16" - 1/8"	[1.59] - [3.18]
208	3/32" - 5/32"	[2.38] - [3.97]
308	1/8" - 5/32"	[3.18] - [3.97]
111	1/16" - 1/8"	[1.59] - [3.18]
211	3/32" - 5/32"	[2.38] - [3.97]
311	1/8" - 5/32"	[3.18] - [3.97]
114	1/16" - 1/8"	[1.59] - [3.18]
214	3/32" - 5/32"	[2.38] - [3.97]
314	1/8" - 5/32"	[3.18] - [3.97]
116	1/16" - 1/8"	[1.59] - [3.18]
216	3/32" - 5/32"	[2.38] - [3.97]
316	1/8" - 5/32"	[3.18] - [3.97]
118	1/8" - 3/16"	[3.18] - [4.76]
218	5/32" - 7/32"	[3.97] - [5.56]
318	3/16" - 1/4"	[4.76] - [6.35]
121	1/8" - 3/16"	[3.18] - [4.76]
221	5/32" - 7/32"	[3.97] - [5.56]
321	3/16" - 1/4"	[4.76] - [6.35]
124	5/32" - 7/32"	[3.97] - [5.56]
224	3/16" - 1/4"	[4.76] - [6.35]
324	7/32" - 9/32"	[5.56] - [7.14]
127	5/32" - 7/32"	[3.97] - [5.56]
227	3/16" - 1/4"	[4.76] - [6.35]
327	7/32" - 9/32"	[5.56] - [7.14]
130	5/32" - 7/32"	[3.97] - [5.56]
230	3/16" - 1/4"	[4.76] - [6.35]
330	1/4" - 5/16"	[6.35] - [7.93]
136	5/32" - 7/32"	[3.97] - [5.56]
236	3/16" - 1/4"	[4.76] - [6.35]
336	1/4" - 5/16"	[6.35] - [7.93]
142	3/16" - 1/4"	[4.76] - [6.35]
242	7/32" - 9/32"	[5.56] - [7.14]
342	1/4" - 5/16"	[6.35] - [7.94]
148	3/16" - 1/4"	[4.76] - [6.35]
248	7/32" - 9/32"	[5.56] - [7.14]
348	1/4" - 5/16"	[6.35] - [7.94]
160	1/4" - 3/8"	[6.35] - [9.53]
260	5/16" - 7/16"	[7.94] - [11.11]
360	3/8" - 1/2"	[9.53] - [12.7]



**TABLE 2: BOLT TORQUE VALUES**

<b>TORQUE VALUES FOR SOCKET HEAD AND HEX HEAD CAPSCREWS</b>						
<b>SOCKET HEAD CAP SCREWS</b>						
<b>BOLT SIZE INCHES</b>	<b>As Received</b>			<b>Lubricated**</b>		
	<b>lbf-ft</b>	<b>lbf-in</b>	<b>N-m</b>	<b>lbf-ft</b>	<b>lbf-in</b>	<b>N-m</b>
1/4	13	150	17	10	120	13
5/16	23	305	34	18	244	27
3/8	45	545	62	36	436	49
7/16	70	840	95	56	672	76
1/2	108	1300	147	86	1040	117
9/16	155	1860	210	124	1488	168
5/8	211	2530	286	168	2024	228
3/4	367	4400	497	293	3520	397
7/8	583	7000	791	466	5600	632
1	867	10400	1175	693	8320	940
1 1/8	1242	14900	1684	993	11920	1347
1 1/4	1750	21000	2374	1400	16800	1899
1 3/8	2317	27800	3142	1853	22240	2513
1 1/2	3042	36500	4125	2433	29200	3300
1 3/4	4950	59400	6714	3960	47520	5371
2	7492	89900	10161	5993	71920	8128
<b>HEX HEAD CAP SCREWS - Grade 8</b>						
<b>BOLT SIZE INCHES</b>	<b>As Received</b>			<b>Lubricated**</b>		
	<b>lbf-ft</b>	<b>lbf-in</b>	<b>N-m</b>	<b>lbf-ft</b>	<b>lbf-in</b>	<b>N-m</b>
1/4	8	100	11	6	80	9
5/16	17	200	23	13	160	18
3/8	30	360	41	24	288	32
7/16	48	570	64	38	456	51
1/2	83	990	112	66	792	89
9/16	107	1285	145	85	1028	116
5/8	143	1714	194	114	1371	155
3/4	256	3070	347	204	2456	277
7/8	417	5000	565	333	4000	452
1	625	7500	848	500	6000	678
<b>HEX HEAD CAP SCREWS - Grade 5</b>						
<b>BOLT SIZE INCHES</b>	<b>As Received</b>			<b>Lubricated**</b>		
	<b>lbf-ft</b>	<b>lbf-in</b>	<b>N-m</b>	<b>lbf-ft</b>	<b>lbf-in</b>	<b>N-m</b>
1/4	6	71	8	5	56	6
5/16	12	142	16	9	113	12
3/8	22	260	29	17	208	23
7/16	34	410	46	27	328	36
1/2	53	636	72	42	508	57
9/16	74	890	101	59	712	80
5/8	104	1250	141	83	1000	112
3/4	183	2200	249	146	1760	199
7/8	298	3570	403	238	2856	322
1	440	5280	597	352	4224	477
1 1/8	553	6640	750	442	5312	600
1 1/4	775	9300	1051	620	7440	840
1 3/8	1012	12140	1372	809	9712	1097
1 1/2	1350	16200	1831	1080	12960	1464

**\*\* NOTE: For Loctite use lubricated values**

**Table 2-continued-**

**Caution: Torque values on assembly drawings override torque values on these charts.**

**Torque Values for Metric Socket Head and Hex Head Capscrews**

4.6 Class							8.8 Class						
Bolt Size	Dry			Lubricated**			Bolt Size	Dry			Lubricated**		
	lbf•ft	lbf•in	N•m	lbf•ft	lbf•in	N•m		lbf•ft	lbf•in	N•m	lbf•ft	lbf•in	N•m
5	1.8	21.2	2.4	1.3	16.8	1.9	5	4.6	54.9	6.2	3.4	40.7	4.6
6	3	36.3	4.1	2.3	29.2	3.3	6	7.7	92.9	10.5	5.8	69.9	7.9
8	7.3	87.6	9.9	5.5	69.9	7.9	8	18.8	226	25.5	14.1	169	19.1
10	14.5	173	19.6	10.8	139	15.7	10	37.2	447	50.5	27.9	335	37.8
12	25.2	302	34.1	18.9	242	27.3	12	64.9	779	88	48.7	584	66
14	40.1	481	54.3	30.1	385	43.5	14	103	1239	140	77.5	929	105
16	62.5	750	84.8	46.9	600	67.8	16	161	1938	219	121	1451	164
18	86.3	1035	117	64.5	826	93.3	18	229	2752	311	172	2062	233
20	122	1460	165	91.5	1168	132	20	325	3903	441	244	2929	331
22	166	1991	225	124	1593	180	22	443	5310	600	332	3983	450
24	211	2531	286	158	2027	229	24	562	6744	762	422	5062	572
27	308	3699	418	231	2965	335	27	823	9868	1115	617	7407	837
30	419	5027	568	314	4018	454	30	1117	13408	1515	838	10054	1136
33	570	6841	773	428	5469	618	33	1520	18240	2061	1140	13682	1546
36	732	8788	993	549	7027	794	36	1952	23426	2647	1464	17567	1985
39	948	11372	1285	711	9098	1028	39	2527	30320	3426	1895	22736	2569

10.9 Class							12.9 Class						
Bolt Size	Dry			Lubricated**			Bolt Size	Dry			Lubricated**		
	lbf•ft	lbf•in	N•m	lbf•ft	lbf•in	N•m		lbf•ft	lbf•in	N•m	lbf•ft	lbf•in	N•m
5	6.5	77.9	8.8	4.9	58.4	6.6	5	7.6	91.2	10.3	5.7	68.1	7.7
6	11.1	133	15	8.3	100	11.3	6	12.9	155	17.5	9.7	117	13.2
8	26.9	323	36.5	20.2	242	27.3	8	31.4	377	42.6	23.6	283	32
10	53.3	639	72.2	39.9	480	54.2	10	62.2	747	84.4	46.7	560	63.3
12	92.9	1115	126	69.7	836	94.5	12	109	1301	147	81.4	974	110
14	148	1770	200	111	1328	150	14	173	2071	234	130	1558	176
16	231	2770	313	173	2080	235	16	270	3230	365	202	2425	274
18	317	3806	430	238	2859	323	18	371	4452	503	278	3336	377
20	450	5399	610	337	4053	458	20	526	6310	713	394	4735	535
22	612	7346	830	459	5505	622	22	715	8585	970	537	6434	727
24	778	9337	1055	586	7000	791	24	909	10912	1233	682	8186	925
27	1138	13656	1543	854	10239	1157	27	1330	15957	1803	998	11965	1352
30	1546	18541	2095	1159	13912	1572	30	1806	21674	2449	1355	16257	1837
33	2103	25231	2851	1577	18921	2138	33	2458	29488	3332	1843	22116	2499
36	2701	32409	3662	2026	24302	2746	36	3157	37869	4279	2367	28409	3210
39	3495	41940	4739	2622	31453	3554	39	4085	49011	5538	3064	36763	4154

**\*\* NOTE: For Loctite use lubricated values**

Table 2-continued-

Torque Values for Stainless Steel and Brass HHCS and SHCS						
Standard / Inch				Metric		
Bolt Size	316 / 304 Stainless		Brass	Bolt Size	316 / 304 Stainless	
	Dry	Lubricated			Dry	Lubricated
	lbf-in (Nm)	lbf-in (Nm)	lbf-in (Nm)		lbf-in (Nm)	lbf-in (Nm)
6-32	10.1 (1.14)	8.60 (0.972)	7.9 (0.893)	3	8.9 (1.0)	8. (.9)
6-40	12.7 (1.43)	10.8 (1.22)	9.9 (1.12)	4	23. (2.6)	20.7 (2.3)
8-32	20.7 (2.34)	17.6 (1.99)	16.2 (1.83)	5	45.1 (5.1)	40.6 (4.6)
8-36	23.0 (2.60)	19.6 (2.21)	18.0 (2.03)	6	77.0 (8.7)	69.3 (7.8)
10-24	23.8 (2.69)	20.2 (2.28)	18.6 (2.10)	8	188 (21.2)	169 (19.1)
10-32	33.1 (3.74)	28.1 (3.17)	25.9 (2.93)	10	372 (42)	335 (38)
1/4-20	78.8 (8.90)	67.0 (7.57)	61.5 (6.95)		<b>lbf-ft (Nm)</b>	<b>lbf-ft (Nm)</b>
1/4-28	99.0 (11.2)	84.0 (9.49)	77.0 (8.70)	12	54.0 (73.2)	48.0 (65.1)
5/16-18	138 (15.6)	117 (13.2)	107 (12.1)	14	87.0 (118)	78.0 (106)
5/16-24	147 (16.6)	125 (14.1)	116 (13.1)	16	133 (180)	119 (161)
3/8-16	247 (27.9)	210 (23.7)	192 (21.7)	18	190 (258)	171 (232)
3/8-24	271 (30.6)	230 (26.0)	212 (24.0)	20	273 (370)	246 (334)
7/16-14	393 (44.4)	334 (37.7)	317 (35.8)	22	358 (485)	322 (437)
7/16-20	418 (47.2)	355 (40.1)	327 (36.9)	24	445 (603)	400 (542)
	<b>lbf-ft (Nm)</b>	<b>lbf-ft (Nm)</b>	<b>lbf-ft (Nm)</b>			
1/2-13	45.0 (61.0)	38.0 (51.5)	35.2 (47.7)			
1/2-20	47.0 (63.7)	40.0 (54.2)	37. (50.2)			
9/16-12	59.0 (80.0)	50.0 (67.8)	47. (63.7)			
9/16-18	65.0 (88.1)	55.0 (74.6)	51. (69.1)			
5/8-11	96.0 (130)	82.0 (111)	76. (103)			
5/8-18	108 (146)	92.0 (125)	85. (115)			
3/4-10	131 (178)	111 (150)	104 (141)			
3/4-16	129 (175)	110 (149)	102 (138)			
7/8-9	202 (274)	172 (233)	159 (216)			
7/8-14	201 (273)	171 (232)	158 (214)			
1 - 8	299 (405)	254 (344)	235 (319)			
1 - 14	270 (366)	230 (312)	212 (287)			
1-1/8 - 7	432 (586)	367 (498)	337 (457)			
1-1/8 - 12	408 (553)	347 (470)	318 (431)			
1-1/4 - 7	546 (740)	464 (629)	428 (580)			
1-1/4 - 12	504 (683)	428 (580)	394 (534)			
1-1/2 - 6	930 (1260)	791 (1070)	727 (986)			
1-1/2 - 12	732 (992)	622 (843)	575 (780)			