

AE4-1219 R17

September 2019

## Torque Values on Copeland™ Brand Products

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### Revision Tracking R17 (September 2019)

Pg. 2 – Table 1 updated with some notes and corrected values for Cylinder Head/Two Center Bolts torque values.

### Revision Tracking R16 (May 2019)

Pg. 4 – Rotalock Coupling torque values updated in Table 2.

Pg. 6 – Steel cap with copper gasket torque requirement added into Section 3 Valve Stem Caps.

## 1. Recommended Torque with Lubricated Bolts

\*See S.A.E. Grade Identification on **Table 4** for remaining bolts not specified in this table.

**Table 1**

Bolt Usage	Size inches	Grade *	Models					
			H, K inch pounds (Nm)	E, 3A, 3R, L inch pounds (Nm)	N inch pounds (Nm)	M, 2, 3D, 9 inch pounds (Nm)	4D, 4R, 6D, 6R, 8D, 8R inch pounds (Nm)	4D/6D*N, 4D/6D*X <sup>1</sup> inch pounds (Nm)
Bottom Plate	5/16-18	8	300 (34)					
	3/8-16	5		400 (45)	400 (45)	400 (45)	400 (45)	400 (45)
	3/8-16	8		525 (59)	525 (59)	525 (59)	525 (59)	525 (59)
Capacity Control Valve	3/8-16	8				275 (31)	275 (31)	275 (31)
	1/2-13	8						275 (31)
Cylinder Head Bolts	5/16-18	8	300 (34)					300 (34)
	3/8-16	8		525 (59)	525 (59)	525 (59)	550 (62)	
	1/2-13	8						1230 (139)
Cylinder Head Two Center Bolts	5/16-18	8	225 (25) <sup>2</sup>					
Cadmium Plated Head Two Center Bolts	5/16-18		250 (28)					
	5/16-18		200 (23)					
Crankcase Heater Plug	3/8 pipe					400 (45)	400 (45)	400 (45)
	1/2 pipe						450 (51)	450 (51)
Housing Cover	5/16-18	8	355 (40)					
	3/8-16	5		400 (45)	400 (45)	400 (45)		
	3/8-16	8					550 (62)	550 (62)
Oil Cooler Tee Fitting							120 (14)	120 (14)
Oil Pump or Bearing Cover to Housing Cover	1/4-20	5	100 (11)					
	5/16-18	5		250 (28)				
	5/16-18	8			300 (34)	300 (34)	300 (34)	300 (34)
Oil Schrader Fitting				180 (20)	180 (20)	180 (20)	180 (20)	180 (20)
Oil Sight Glass Cover Plate					145 (16)	145 (16)		
Oil Sight Glass	Retainer nuts		100 (11)	100 (11)				
	Bolts with 'O' ring	5			40 (4)	40 (4)	40 (4)	40 (4)
		8			75 (8)	75 (8)	75 (8)	75 (8)
Oil Supply Magnetic Plug	3/4-16					1200 (136)		
	1-16						1200 (136)	1200 (136)

<sup>1</sup> 4D/6D\*N & X indicates Discus III standard, blocked suction unloading and Digital compressors.

<sup>2</sup> Only applicable to K models. K models have two center bolts in the head.

Table 1 – Continued.

Bolt Usage	Size inches	Grade *	H, K inch pounds (Nm)	E, 3A, 3R, L inch pounds (Nm)	N inch pounds (Nm)	M, 2, 3D, 9 inch pounds (Nm)	4D, 4R, 6D, 6R, 8D, 8R inch pounds (Nm)	4D/6D*N, 4D/6D*X <sup>3</sup> inch pounds (Nm)
Stator Cover	5/16-18	8	325 (37)					
	3/8-16	5		400 (45)	400 (45)	400 (45)		
	3/8-16	8		525 (59)	525 (59)	525 (59)		
	1/2-13	5					625 (71)	625 (71)
Service Valves (Mounting bolts)	5/16-18	5	225 (25)	225 (25)	225 (25)	225 (25)		
	1/2-13	5		500 (56)	500 (56)	500 (56)	500 (56)	500 (56)
	1/2-13	8					650 (73)	650 (73)
	5/8-11	5					950 (107)	950 (107)
Service Valves (Adapter flange)	5/16-18	8				100-200 (11-22)	100-200 (11-22)	100-200 (11-22)
	1/2-13	5				120-480 (14-54)	120-480 (14-54)	120-480 (14-54)
	5/8-11	5				120-480 (14-54)	120-480 (14-54)	120-480 (14-54)
	3/4-10	5					120-480 (14-54)	120-480 (14-54)
Terminal Plate	5/16-18	8		300 (34)	300 (34)	300 (34)		
	3/8-16	8					525 (59)	525 (59)
Terminal Screws & Nuts, Internal	#10-32			35 (4)	35 (4)	35 (4)		
	1/4-28						50 (6)	50 (6)
Terminal Screws & Nuts, External	#6-32		9 (1)	9 (1)	9 (1)	9 (1)		
	#8-32		18 (2)	18 (2)	18 (2)	18 (2)		
	#10-24						20 (2)	20 (2)
	#10-32		23 (3)	23 (3)	23 (3)	23 (3)		
	1/4-20						50 (6)	50 (6)
	1/4-28				50 (6)	50 (6)		
Terminal Jumper Bars Nut	1/4-28					80 (9)	80 (9)	80 (9)
Terminal Fused Cluster	1/4-20				45 (5)	45 (5)	75 (8)	75 (8)
Terminal Block Screws	#10-32		23 (3)	23 (3)	23 (3)	23 (3)		
Terminal Cover	#8-18		40 (5)	40 (5)	40 (5)	40 (5)		

<sup>3</sup> 4D/6D\*N & X indicates Discus III standard, blocked suction unloading and Digital compressors.

**Table 2**

Part Usage	Size inches	Torque inch pounds (Nm)
Flare Nuts (Double Flared, copper or steel)	1/4	150 (17)
	5/16	220 (25)
	3/8	300 (34)
	1/2	400 (45)
	5/8	600 (68)
Pipe Plugs*	1/8	200 (23)
	1/4	300 (34)
	3/8	420 (47)
	1/2	480 (54)
	3/4	600 (68)
	1**	700 (79)
Rotalock Couplings	3/4-16	120-240 (14-27)
	1-14	180-300 (20-34)
	1 1/4-12	240-360 (27-41)
	1 1/2-12	300-420 (34-47)
	1 3/4-12	360-480 (41-54)
Sentronic Sensor		720-780 (81-88)
Rotalock Sight Glass***	1 1/4-12	300-360 (34-41)

Under tension, metal parts will tend to stretch slightly, and gaskets may relax. Thus, it is quite probable after a period of time in which changes in temperature take place, that bolt torques will be somewhat reduced from the original setting.

If oil or refrigerant leaks should occur, the bolts should be retightened to the original setting. Retorquing of all bolts is recommended. However, pipe plugs with sealant applied at the factory are not to be retorqued or seal broken, as this may create a leak path in the cured sealant.

- \* Approved pipe thread sealer:  
Loctite anaerobic PST # 12928/12929  
Teflon sealer.  
Apply sparingly to all threads only.  
Do Not apply to end surface.
- \*\* Internal pressure relief valve:  
Use Loctite RC-620 to first two threads only.
- \*\*\* New sight glass design on 1.5 to 8 HP refrigeration scroll compressor after 14L serial number date code.

**Table 3**

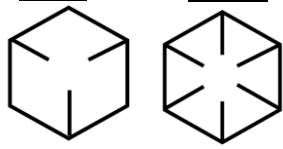
Condensing Units	Size inches	Torque inch pounds (Nm)
Fan Blade Mtg. Nut	1/4-20	42 (5)
Fan Blade Mtg. Screws	1/4-28	75 (8)
	5/16-24	155 (17)
Fan Guard Mtg. Screws	5/16-18	110 (12)
1/4 Flare Gage Port Cap	7/16-20	96 (11)
Receiver Mtg. Studs:		
Steel Bases	3/8-16	240 (27)
Noryl Plastic Bases	3/8-16	90 (10)

**Table 4**

General Torque Wrench Settings			
Steel Bolts	Size Inches	Torque Inches Pounds (Nm)	
		Grade 5	Grade 8
	1/4-20	100 (11)	135 (15)
	5/16-18	250 (28)	300 (34)
	3/8-16	400 (45)	525 (59)
	1/2-13	450 (51)	1200 (136)
	5/8-11	950 (107)	2400 (271)

**S.A.E Grade Identification**

**Grade 5**      **Grade 8**



**Figure 1** through **Figure 4** illustrate different styles of valves. Variances in valve stem packing materials, procedures, and torque values will be present. The

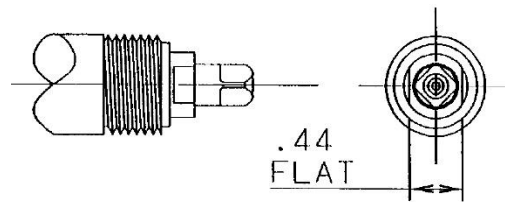
## 2. Valve Stems

following procedures should be followed to reduce the chance for leaks.

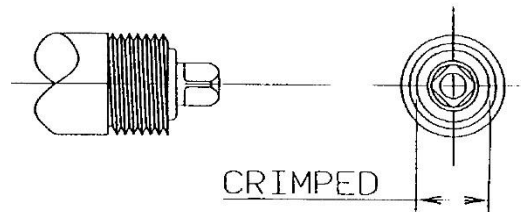
**Figure 1** style contains packing material. Before activating the valve stem, first loosen the brass gland nut (7/16" wrench). Front or back seat the valve stem and then re-torque the brass gland nut, per torques in **Table 5**.

**Figure 2** style contains an 'O' ring seal without provision for gland adjustment. The end is crimped over.

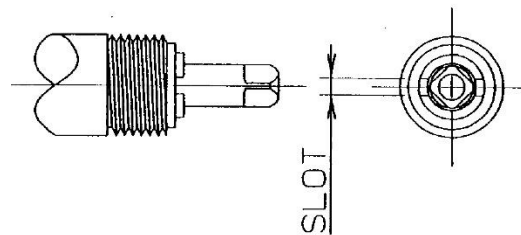
**Figure 3** style contains an 'O' ring seal with a gland nut. However, DO NOT loosen the gland nut. If the gland nut is loosened, the seal could be damaged and leak. If the 'O' ring does leak, it may be repaired by removing the gland nut with a special tool, picking out, and carefully replacing the 'O' ring. Do NOT force the 'O' ring, as force may shear the ring. Replace the gland nut using 96-120 inch pounds (11-14Nm) torque.



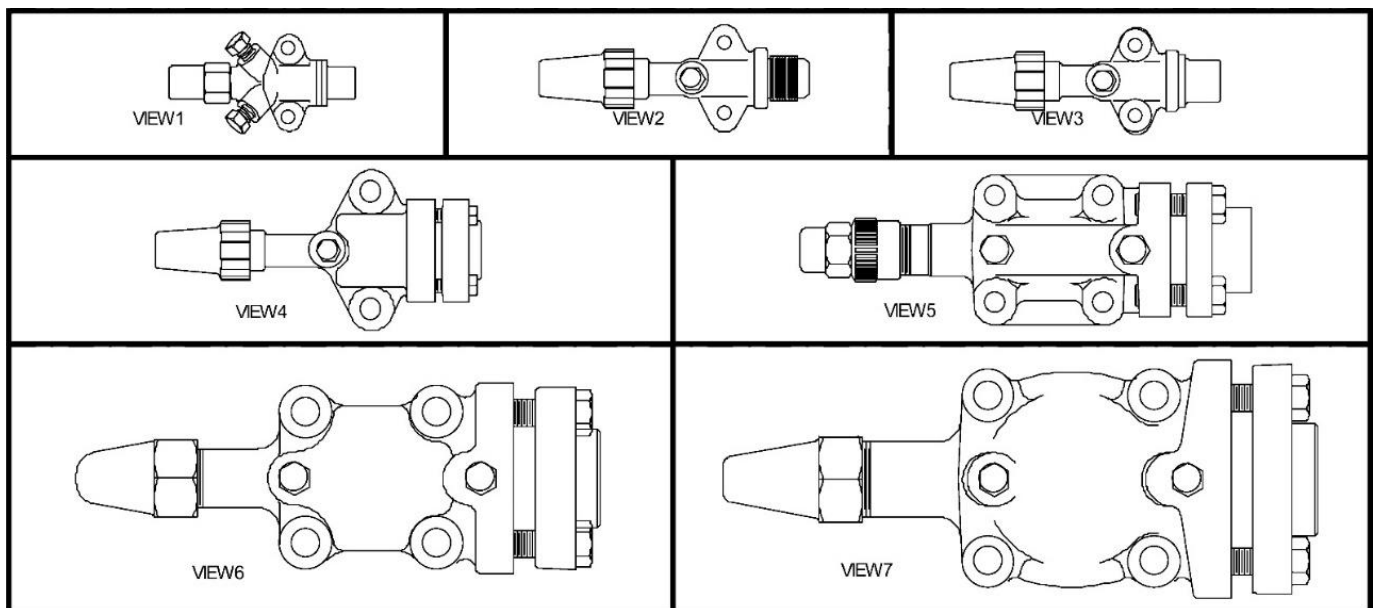
**Figure 1**



**Figure 2**



**Figure 3**



**Figure 4**

### 3. Valve Stem Caps

To insure a leak free seal, all valve stem access caps must be employed, with sealing surfaces in good condition, and tightened to the following:

Plastic caps with rubber gasket: Hand tighten only.

Metal cap with rubber gasket: Hand tighten only.

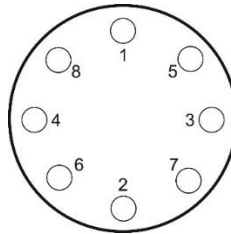
Steel cap with copper gasket: 40-50 inch pounds (4-6Nm)

Brass cap with copper gasket: 20-30 inch pounds (2-4Nm)

### 4. Torque Patterns

For all cover plates (heads, bottom plates, shipping pads, valves, etc.) to achieve a proper seal, it is important when applying torque to use a criss-cross pattern. Follow the steps below.

Do not apply torque in a circular pattern. **For the initial torque, apply no more than 70% of the final torque using a diagonal criss-cross pattern, similar to the example in Figure 5.** Once the initial torque has been applied, apply the proper full torque value, again using a criss-cross pattern. Once the final torque has been applied, start at any bolt, and circle the entire part in sequence. This will verify that a bolt has not been missed and that final torque has been applied.



**Figure 5 - Diagonal Criss-Cross Pattern**

**Table 5 -**

Valve Body	Stem	Packing Gland
3/4 hex	62-106 (7-12)	72-96 (8-11)
7/8 square	72-90 (8-10)	72-96 (8-11)
1 1/8 square, 1/4 valve stem	132-150 (15-17)	72-96 (8-11)
1 1/8 square, 5/16 valve stem	264-480 (30-54)	60-240 (7-27)
1 3/8 square	180-210 (20-24)	180-240 (20-27)
1 7/8 square	240-270 (27-30)	264-324 (30-36)
View 1	144-216 (16-24)	144-240 (16-27)
View 2	144-216 (16-24)	144-240 (16-27)
View 3	360-480 (41-54)	180-300 (20-34)
View 4	360-480 (41-54)	180-300 (20-34)
View 5	360-600 (41-68)	300-420 (34-47)
View 6	360-600 (41-68)	360-480 (41-54)
View 7	480-840 (54-95)	480-840 (54-95)
All torques in inch pounds (Newton meters).		

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