

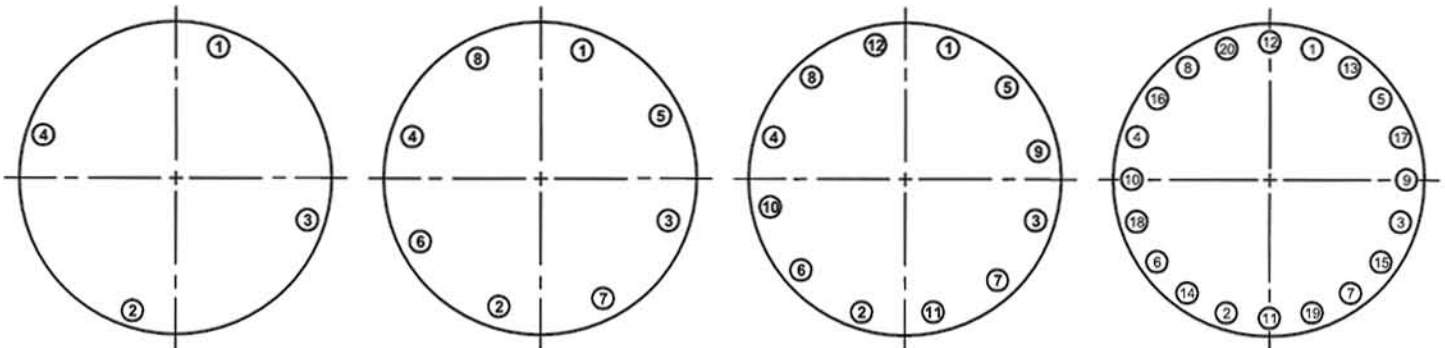
## GASKET RESOURCES INC. DURLON® GASKETING - BOLT TIGHTENING WORK SHEET

Location/Identification: \_\_\_\_\_ Nominal Bolt Size: \_\_\_\_\_

Gasket Contact Surface Finish on Flange: \_\_\_\_\_; Lubricant Used: \_\_\_\_\_

**(Initial each step in space provided below.)**

- \_\_\_ 1. Visually examine and clean flanges, bolts, nuts and washers. Replace components if necessary.
- \_\_\_ 2. Install new gasket. **DO NOT USE MULTIPLE GASKETS.**
- \_\_\_ 3. **Lubricate bolts, nuts, AND flange surface AROUND BOLT HOLES.**
- \_\_\_ 4. Number bolts in cross-pattern sequence according to the appropriate sketch below.
- \_\_\_ 5. Install nuts. **HAND TIGHTEN nuts all around until snug. NEXT, using a torque wrench PRE-TIGHTEN BOLTS to 10-20 ft-lbs torque using the cross-pattern tightening sequence below.**
- \_\_\_ 6. Check gap for uniformity.
- \_\_\_ 7. Use the appropriate cross-pattern tightening sequence in the sketch below to hand tighten, pre-tighten and for Rounds 1, 2, and 3. Each tightening sequence in the sketch below constitutes a "Round."



- **Target Torque:** \_\_\_\_\_ ft-lbs (from torque table)

LUBRICATE, HAND TIGHTEN, PRE-TIGHTEN, then TIGHTEN, bolts in stages using cross pattern sequence

**Pre-Tighten** - 10-20 ft-lbs

**Round 1** - Tighten to \_\_\_\_\_ ft-lbs (30% of target torque)

**Round 2** - Tighten to \_\_\_\_\_ ft-lbs (60% of target torque)

**Round 3** - Tighten to \_\_\_\_\_ ft-lbs (100% of target torque)

Check gap around the circumference between each of these rounds, measured at every other bolt. If the gap is not reasonably uniform around the circumference, make the appropriate adjustments by selective bolt tightening before proceeding.

- \_\_\_ **Rotational Round** – Starting with Bolt No. 1 tighten in a ROTATIONAL, clockwise tightening sequence at 100% of Final Torque (same as Round 3 above), for at least one complete round. If necessary, continue until no further nut rotation occurs at 100% of the Final Torque value for any nut.

**TIGHTENING METHOD USED:**

Hand Wrench       Manual Torque Wrench       Hydraulic Torque Wrench  
 Impact Wrench       Other

Joint Assembler: \_\_\_\_\_ Date: \_\_\_\_\_

DURLON® Gaskets; Typical Tank car Torque Values<sup>1</sup>

General Purpose Cars

Component	Material	Style	Gasket Material/Dimensions			Bolting	Torque (ft-lbs)	
			Thk.	OD	ID		Dry	Lubricated
Manway Cover	Durlon 9000 (Hard Dimensions)	AAR-1	1/8"	21-5/8"	19-1/2"	1"/A307	250	210
		UTC-1	1/8"	21-1/2"	19-7/16"	1"/A307	250	210
		TRN-1	1/8"	21-11/16"	19-5/8"	7/8"/A449	395	335
	Viton® GF-S (Elastomeric Dimensions)	AAR-1	1/4"	21-11/16"	19-1/2"	1"/A307	85	70
		UTC-1	1/8"	21-1/2"	19-7/16"	1"/A307	85	70
		TRN-1	1/4"	21-1/2"	19-1/4"	7/8"/A449	90	75
Cover Flange	Durlon 9000	-	1/8"	17-1/8"	15"	1"/A193-B7	480	410
		-	1/8"	17"	16"	3/4"/J429 Gr 5	200	170
		-	1/8"	16-1/8"	14"	1"/A193-B7	480	410
Air / Liquid Valves	Durlon 9000	-	1/8"	4-1/8"	2-3/4"	5/8"/A193-B7	120	100
	Durlon 9200W	-	1/8"	4-1/8"	2-3/4"	5/8"/A193-B8M	55	45
	Durlon 9000	-	1/8"	5-3/8"	4-1/8"	5/8"/A193-B7	133	113
	Durlon 9200W	-	1/8"	5-3/8"	4-1/8"	5/8"/A193-B8M	55	45
Gage Device	Durlon 9000	-	1/8"	3-3/8"	2-1/2"	3/4"/A193-B7	90	80
		T/G	1/8"	2-1/4"	1-1/2"	5/8"/A193-B7	45	40
Safety Valve	Durlon 9000	-	1/8"	5-3/8"	4-1/8"	3/4"/A193-B7	155	130
		-	1/8"	5-1/4"	3-5/8"	3/4"/J429 Gr 5	165	140
Bottom Outlet	Viton® GF-S	-	1/8"	7-1/8"	4-1/2"	5/8"/A307	60	50
	Durlon 9000	-	1/8"	8-1/2"	7-1/2"	3/4"/A193-B7	160	135
		T/G	1/8"	8-7/16"	7-9/16"	3/4"/A574	230	200

Pressure Cars

Component	Material	Style	Gasket Material/Dimensions			Bolting	Torque (ft-lbs)	
			Thk.	OD	ID		Dry	Lubricated
Manway / Base (pressure) Plate	Durlon 9000	-	1/8"	20-1/4"	19-1/4"	1-1/8"	717	609
			1/8"	22-1/4"	21-1/4"	1-1/8"	717	609
Angle Valve / Gauging Device	Durlon 9000	-	1/8"	2-1/4"	1-1/2"	3/4"	198 / 218 (C)	168 / 185 (C)
			1/8"	4"	3-1/4"	3/4"	198 / 218 (C)	168 / 185 (C)
Safety	Durlon 9000	-	1/8"	4-3/4"	4"	3/4"	198 / 218 (C)	168 / 185 (C)
		-	1/8"	6-3/4"	6"	7/8"	321 / 353 (C)	273 / 300 (C)
		-	1/8"	2-1/4"	1-1/2"	3/4"	198 / 218 (C)	168 / 185 (C)

<sup>1</sup> Number of bolts, bolt grade and lubrication can vary. A never seize type lubricant used for above examples.

\* Special configuration. (C) designates a torque using a crow's foot wrench.

For torque worksheet by car set, contact GRI Technical Services at 713-856-9445 or tech@durlon.com.

The Effect of Bolt Lubrication

Bolt lubrication greatly affects the torque values used when installing gaskets. To achieve the same gasket compression, a much higher torque value is required for a dry bolt versus using an effective lubricant such as molybdenum disulfide.

In a dry bolt up, or where an inefficient lubricant is used, the effort used in tightening is overcome by the frictional forces between the bolts and nuts and to a greater extent between the nuts and nut facings.

This can result in a lower gasket load and inadequate stress on the bolts, which can result in torque loss and eventual leakage in service.

