

# Consult the Manufacturer for Gasket Torque Values as Starting Place to Diminish Leaks

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Performing maintenance tasks correctly the first time has become increasingly important to end users. Today's end users are tasked with doing more work with less time, fewer resources and smaller staffs while responding to the increase in environmental and other equipment-related pressures. The ability to correct a mistake, such as a flange leak resulting from improper gasket selection or installation, is a luxury of the past.

Gasket selection and installation are two concerns that can be improved if the gasket material manufacturers are consulted from the beginning. However, using a gasket manufacturer's published torque data has pros and cons.

## Data Benefits

On one hand, a target torque value is one of several components of proper gasket installation. The target value is greatly preferred over simply tightening the bolts as much as possible. A gasket that is too tight often causes as many problems as one that is not tight enough.

Other essential components of effective flange sealing include the following:

- The use of a calibrated torque wrench or some sort of torque-limiting tool

			Tightness Class				
			T1	T2	T3	T4	T5
Flange size (NPS)	# of bolts	Bolt diameter	Minimum torque value per bolt				
(inch)		(inch)	(ft-lb)				
1/2	4	1/2	3	5	7	11	17 <sup>(5)</sup>
3/4	4	5/8	5	8	13	20	31 <sup>(5)</sup>
1	4	5/8	7	11	17	27	41 <sup>(5)</sup>
1-1/4	4	5/8	11	17	26	41	63 <sup>(5)</sup>
1-1/2	4	3/4	18	27	42	65	100 <sup>(5)</sup>
2	8	5/8	12	18	28	43	67 <sup>(5)</sup>
2-1/2	8	3/4	16	25	39	60	93 <sup>(5)</sup>
3	8	3/4	24	37	57	89	137 <sup>(5)</sup>
3-1/2	8	3/4	27	42	64	99	153 <sup>(5)</sup>
4	8	3/4	34	53	81	126	194 <sup>(5)</sup>
5	8	3/4	43	66	101	157	242 <sup>(5)</sup>
6	12	3/4	36	55	85	132	204 <sup>(5)</sup>
8	12	7/8	61	87	135	208	322 <sup>(5)</sup>
10	16	1	70	91	141	218	337 <sup>(5)</sup>
12	16	1-1/8	108	137	211	326	504 <sup>(5)</sup>
14	20	1-1/8	98	119	184	284	439 <sup>(5)</sup>
16	20	1-1/4	140	168	259	400	619 <sup>(5)</sup>
18	24	1-1/4	155	190	293	453	699 <sup>(5)</sup>
20	24	1-1/4	179	209	323	499	771 <sup>(5)</sup>
24	24	1-1/2	293	324	500	773	1195 <sup>(5)</sup>

**Note:**

1. Design pressure = 300 psi, assembly efficiency = 0.85 and friction factor = 0.2. The entire raised-face area is used as full contact gasket area in these calculations.
2. The calculated torque values are based on the gasket constants from actual tests.
3. The values should only be considered as approximate and for reference purpose only.
4. Please check the maximum torque permitted for the bolts.
5. Tightness for achieving the T5 class at this pressure is beyond the maximal tightness measured in the test. Please consult the manufacturer for further information.

Table 1. Typical torque table and cautionary notes (Courtesy of the Fluid Sealing Association)

- The use of the correct bolting materials, including hardened flat washers
- The use of a multi-step, star-pattern tightening sequence
- The proper use of a lubricant, conditions permitting
- The selection of the best gasket material/design for the application.

The flange design (such as weld neck or slip-on) should also be carefully considered.

**Potential Drawbacks**

On the other hand, many end users mistakenly believe that using a published torque value guarantees no leaks.

Published torque values are based only on a specific set of parameters and act more as a snapshot in time of the equipment. These numbers are calculated in a test lab under near-perfect conditions and on ideal equipment. Piping misalignment, flange surface condition and flange location can influence the results.

The header of the published torque data table usually includes the vital information concerning the type or style number and the gasket material manufacturer, as well as the material thickness, flange design (American Society of Mechanical Engineers/American National Standards Institute raised face or flat face) and pressure class. Footnotes and warnings are often in small print at the bottom of each page of the table. These notes typically detail the following:

- The specific bolts (usually A193 B7 bolts/studs with A194 Grade 2H nuts) used in the testing
- The nut or friction factor assigned to the lubrication of the fasteners that were used in the testing (dry, well-lubricated or polytetrafluoroethylene-coated)
- A warning that certain values listed in the charts may exceed the capabilities of certain bolting materials
- The temperature—usually ambient
- The origin of the tightness classes, if they are listed

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- A suggestion to consult a factory representative for specific torque values for any given application
- A disclaimer

The torque values are meant to be a reference or starting point when deciding on a specific target torque value for a specific application. As long as the end user is aware of the limitations, these tables can prove extremely useful. However, a gasket material manufacturer would much rather be directly involved in calculating torque values for end users.

The properties of materials, such as relaxation, cold flow or recovery, behave differently under different conditions. Testing helps the

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manufacturer understand how these materials differ. Furthermore, a manufacturer has information on the tensile strength of bolting materials and the effect that lubrication has on the transfer of bolt torque to gasket stress while tightening the fasteners. While impractical for every installation, involving the gasket material manufacturer is always preferred over simply consulting torque tables. ■

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