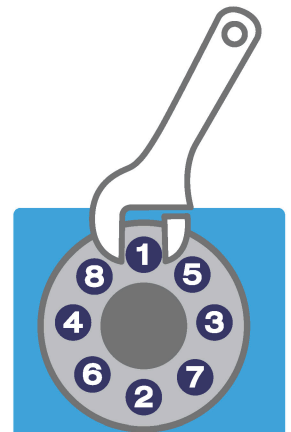


To achieve a reliable seal, adequate gasket stress must be applied during installation. This table provides an estimation of torque for use during assembly of standard design steel pipe flanges. The user must verify these conditions, as outlined, are appropriate for the specific application. The user must confirm that torque values do not exceed pipe manufacturer's torque recommendation.

Caution should be used when using this documentation as proof of flange design. It is the user's responsibility to meet all applicable local laws and requirements. This estimation does not account for the influence of flange rotation, flange strength, external forces, temperature expansion, pressure peaks and installation error.

NPS (in.)	Class 150		Class 300		Class 400		Class 600	
	Min Torque	Max Torque	Min Torque	Max Torque	Min Torque	Max Torque	Min Torque	Max Torque
0.5	30	40	30	40	30	40	30	40
0.75	30	40	60	70	60	70	60	70
1	30	40	60	70	60	70	60	70
1.25	30	40	60	70	60	70	60	70
1.5	30	60	100	120	100	120	100	120
2	60	90	60	70	60	70	60	70
2.5	60	110	100	120	100	120	100	120
3	90	120	100	120	100	120	100	120
3.5	60	90	100	120	160	190	170	210
4	70	120	100	140	160	200	190	240
5	100	160	110	160	210	260	280	360
6	130	200	110	160	190	240	260	330
8	180	200	180	260	310	400	400	510
10	170	320	250	290	340	440	500	590
12	240	320	360	420	510	640	500	610
14	300	490	360	420	500	890	680	800
16	310	490	500	590	680	800	800	940
18	500	710	500	680	680	810	1100	1290
20	430	710	500	740	800	940	1100	1290
24	620	1000	800	1030	1500	1750	2000	2340

NPS (in.)	Class 900		Class 1500		Class 2500	
	Min Torque	Max Torque	Min Torque	Max Torque	Min Torque	Max Torque
0.5	70	120	70	120	50	100
0.75	70	120	70	120	70	100
1	110	190	110	190	110	160
1.25	110	190	135	190	210	250
1.5	170	290	200	290	310	360
2	110	190	130	190	220	250
2.5	170	290	190	290	300	360
3	140	230	265	360	460	500
4	255	420	415	520	Not Applicable. Use ORWIR.	
5	360	600	585	800		
6	300	500	530	680		
8	485	800	845	1100		
10	505	800	1565	2000		
12	570	850	Not Applicable. Use ORWIR.			
14	630	940				
16	910	1290				
18	1570	2340				
20	1745	2570				
24	Not Applicable. Use ORWIR.					



## Torque Values Requirement

- Torque Values are in ft.-lbs., and use of well lubricated ASTM A193 Grade B7 bolts.
- Installation practices according to ASME PCC-1.
- The above torques values are for general use only. For critical or extreme applications (high temperature/pressure), consult with Masterpac Engineering Division.

## Torque Estimation Conditions

- Gasket dimensions according to ASME B16.20
- Flange dimensions according to ASME B16.5
- Maximum working pressure based upon pressure class and certain operating conditions according to ASME B16.5, not hydrotest pressure.

## Install and Tighten Bolts

**Always use proper tools:** calibrated torque wrench or other controlled tensioning device.

**Consult Masterpac for guidance on torque specifications:**

**Always torque nuts in a cross bolt tightening pattern:**

**Tighten the nuts in multiple steps:**

- Step 1 – Tighten all nuts initially by hand (larger bolts may require a small hand wrench).
- Step 2 – Torque each nut to approximately 30% of full torque.
- Step 3 – Torque the nuts to approximately 60% of full torque.
- Step 4 – Torque each nut to full torque, again using the cross bolt tightening pattern.
- Step 5 – Apply at least one final full torque to all nuts in a clockwise direction until all torque is uniform.

All technical information and advice given here is based on our previous experiences and/or test results. We give this information to the best of our knowledge, but assume no legal responsibility. Customers are asked to check the suitability and usability in the specific application, since the performance of the product can only be judged when all necessary operating data are available.