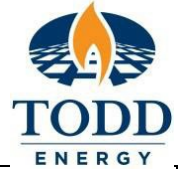


PTW Safety Checklist No. 59

MAKING AND BREAKING FLANGES



Other Checklists that may be relevant:		18 , 21 , 25 , 47 , 54 , 68 , 70
Permit Number:		Date:
Rev 3.3	Issue Date: 20/09/2023	Authorised By: PSM

PRIOR TO PERMIT ISSUE:

- | | Y | N | N/A |
|--|--------------------------|---|--------------------------|
| 1 Marked up Appendix B, Flange Assembly Control Sheet from the Flange Bolt Torquing Engineering Specification.pdf , and drawings completed. | <input type="checkbox"/> | | <input type="checkbox"/> |
| 2 Prior to the use of lifting lugs on manway flange closures or hatches ensure visual checks have been carried out by a Facilities inspector or Mechanical engineer and approved for use.

Inspector sign and date _____ | <input type="checkbox"/> | | <input type="checkbox"/> |
| 3 Are any Parallel threaded fittings to be reinstated? i.e., header box plugs.
If Yes, ensure manufacturer torque settings and specifications are followed. | <input type="checkbox"/> | | <input type="checkbox"/> |
| 4 Are any Screwed threaded fittings to be reinstated? i.e., NPT plugs / Threaded pipe.
If Yes, review and comply with Todd Energy document, Piping Design, Fabrication and Inspection Standard.pdf Section 4.8 Threaded Piping. | <input type="checkbox"/> | | <input type="checkbox"/> |
| 5 Is the system one that may contain Ammonia (KGTP only)?
Refer to: <ul style="list-style-type: none"> • Checklist 62 - Work in CO2 Plant.pdf, • Dealing with Ammonia SOP.pdf • Health Hazard Registers | <input type="checkbox"/> | | <input type="checkbox"/> |
| 6 Is this system one that may contain Benzene?
Refer to: <ul style="list-style-type: none"> • Checklist 21 - Dealing with Benzene .pdf • Dealing with Benzene Standard Operating Procedure.pdf • Health Hazard Registers | <input type="checkbox"/> | | <input type="checkbox"/> |
| 7 Is this system one that may contain Mercury contamination?
Refer to: <ul style="list-style-type: none"> • Checklist 25 - Mercury.pdf • Dealing with Mercury SOP.pdf • Health Hazard Registers | <input type="checkbox"/> | | <input type="checkbox"/> |
| 8 Is the system one that may contain Asbestos?
Refer to: <ul style="list-style-type: none"> • Checklist 68 - Working with Asbestos.pdf • Health Hazard Registers | <input type="checkbox"/> | | <input type="checkbox"/> |

- 9 Is the system one that may contain Pyrophoric Iron?
- Refer to:
- Standard Operating Procedure [Pyrophoric Iron Sulphide.pdf](#)
- Caution:** Pyrophoric Iron sulfide can be present where any loose scale, black sludge or coating is found. If found, wet down immediately

PRIOR TO COMMENCING TASK:

- | | Y | N | N/A |
|--|--------------------------|---|--------------------------|
| 10 SDS has been read and understood. | <input type="checkbox"/> | | <input type="checkbox"/> |
| 11 The work party are familiar with the Flange Bolt Torquing Engineering Specification.pdf , and have referred to the appropriate section relevant to work scope. See three torque charts at end of this checklist on Page 3 and 4 | <input type="checkbox"/> | | |
| 12 If flanges are to be broken, a competent Operations representative shall be in attendance during initial breaking into process equipment, pipework, or valves. | <input type="checkbox"/> | | <input type="checkbox"/> |
| Name: _____ | | | |
| 13 Individual(s) breaking a flange are to satisfy themselves that the equipment is proven to be isolated and depressurised. | <input type="checkbox"/> | | |
| 14 Flanges requiring Cathodic Protection Flange Insulation Kits (FIKs) are identified and the specific torque settings are known. | <input type="checkbox"/> | | <input type="checkbox"/> |
| 15 When breaking flanges on cathodic protected underground pipelines that use sacrificial anodes or impressed current systems, such as gathering and export cross-country lines, the flanges are bridged before breaking. | <input type="checkbox"/> | | <input type="checkbox"/> |
| Impressed current rectifiers should be switched off prior to applying a bridge. | | | |
| 16 When draining / depressurising vessels or pipework to drains or atmosphere: Refer to Checklist 54 - Bleeding Down Vessels Containing Hazardous Fluids to Drains or Atmosphere.pdf | <input type="checkbox"/> | | <input type="checkbox"/> |

ON COMPLETION OF TASK:

- | | Y | N | NA |
|---|--------------------------|---|--------------------------|
| 17 Quality Assurance (QA) results are recorded on the Flange Assembly Control sheet, located in the Flange Bolt Torquing Engineering Specification.pdf . | <input type="checkbox"/> | | <input type="checkbox"/> |
| 18 All Flange Assembly Tags have been fitted and completed correctly as per Flange Bolt Torquing Engineering Specification.pdf . | <input type="checkbox"/> | | |
| 19 A 'line walk' has been conducted to ensure all equipment is reinstated and in the correct startup orientation as per reinstatement section of an approved isolation procedure and Statement of Fitness - Asset Restart Procedure.pdf completed if required | <input type="checkbox"/> | | |
| 20 Ensure any test results carried out, items 3,4 & 5 for Ammonia, Benzene or Mercury are entered into the Health Hazard Registers | <input type="checkbox"/> | | <input type="checkbox"/> |

Table 1 below from [Flange Bolt Torquing Engineering Specification.pdf](#) Appendix A 16 August 2021 Rev1

ASME B16.5 Flange Torque Ratings for Carbon Steel and Duplex Flanges

Nut Factor **0.16**

Pipe Size inch	Flange Class 150				Flange Class 300				Flange Class 600				Flange Class 900				Flange Class 1500				Flange Class 2500			
	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft
1/2	1/2	0.126	50	40	1/2	0.126	50	40	1/2	0.126	50	40	3/4	0.302	35	105	3/4	0.302	35	105	3/4	0.302	35	105
3/4	1/2	0.126	50	40	5/8	0.202	50	85	5/8	0.202	50	85	3/4	0.302	35	105	3/4	0.302	35	105	3/4	0.302	35	105
1	1/2	0.126	50	40	5/8	0.202	50	85	5/8	0.202	50	85	7/8	0.419	35	170	7/8	0.419	35	170	7/8	0.419	35	170
1 1/2	1/2	0.126	50	40	3/4	0.302	50	150	3/4	0.302	50	150	1	0.551	35	255	1	0.551	35	255	1 1/8	0.728	35	380
2	5/8	0.202	50	85	5/8	0.202	50	85	5/8	0.202	50	85	7/8	0.419	35	170	7/8	0.419	35	170	1	0.551	35	255
2 1/2	5/8	0.202	50	85	3/4	0.302	50	150	3/4	0.302	50	150	1	0.551	35	255	1	0.551	35	255	1 1/8	0.728	35	380
3	5/8	0.202	50	85	3/4	0.302	50	150	3/4	0.302	50	150	7/8	0.419	35	170	1 1/8	0.728	35	380	1 1/4	0.929	35	540
4	5/8	0.202	50	85	3/4	0.302	50	150	7/8	0.419	50	245	1 1/8	0.728	45	490	1 1/4	0.929	35	540	1 1/2	1.405	35	985
5	3/4	0.302	50	150	3/4	0.302	50	150	1	0.551	50	365	1 1/4	0.929	45	695	1 1/2	1.405	35	985	1 3/4	1.979	35	1615
6	3/4	0.302	50	150	3/4	0.302	50	150	1	0.551	50	365	1 1/8	0.728	45	490	1 3/8	1.155	35	740	2	2.652	30	2120
8	3/4	0.302	50	150	7/8	0.419	50	245	1 1/8	0.728	50	545	1 3/8	1.155	45	955	1 5/8	1.680	35	1275	2	2.652	30	2120
10	7/8	0.419	50	245	1	0.551	50	365	1 1/4	0.929	50	775	1 3/8	1.155	45	955	1 7/8	2.303	35	2015	2 1/2	4.291	30	4290
12	7/8	0.419	50	245	1 1/8	0.728	50	545	1 1/4	0.929	50	775	1 3/8	1.155	45	955	2	2.652	35	2475				
14	1	0.551	50	365	1 1/8	0.728	50	545	1 3/8	1.155	50	1060	1 1/2	1.405	45	1265	2 1/4	3.422	30	3080				
16	1	0.551	50	365	1 1/4	0.929	50	775	1 1/2	1.405	50	1405	1 5/8	1.680	45	1640	2 1/2	4.291	30	4290				
18	1 1/8	0.728	50	545	1 1/4	0.929	50	775	1 5/8	1.680	50	1820	1 7/8	2.303	45	2590								
20	1 1/8	0.728	50	545	1 3/4	0.929	50	775	1 5/8	1.680	50	1820	2	2.652	45	3180								
24	1 1/4	0.929	50	775	1 1/2	1.405	50	1405	1 7/8	2.303	50	2880	2 1/2	4.291	45	6435								

Notes:

1. Flange Rating ASME B16.5
2. Flange Materials ASTM 105, ASTM A350 Grade LF2, ASTM A182 F51 (S31803)
3. Bolting Materials ASTM A193 Grade B7, ASTM A320 Grade L7, K500 Monel, Super Duplex UNS S32760 FLT
4. Gasket Type Compressed Fibre (Class 150 only), Spiral Wound (all sizes), RTJ (Class 1500 and 2500)
5. Service Temperature Minus -46C to +120C
6. Lubricant Molykote P37 or Loctite 771
7. Pipe spec 50, 50D applicable for pipe sizes < 2" NB. For pipe sizes ≥ 2" NB, refer API 6A flange torque table.

Table 2 below from [Flange Bolt Torquing Engineering Specification.pdf](#) Appendix A 16 August 2021 Rev1

ASME B16.5 Flange Torque Ratings for Carbon Steel and Duplex Flanges - PTFE Coated (unlubricated) Studbolts

Nut Factor **0.12**

Pipe Size inch	Flange Class 150				Flange Class 300				Flange Class 600				Flange Class 900				Flange Class 1500				Flange Class 2500			
	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft	Stud inch	Area in ²	Stress ksi	Torque lbf.ft
1/2	1/2	0.126	50	30	1/2	0.126	50	30	1/2	0.126	50	30	3/4	0.302	35	80	3/4	0.302	35	80	3/4	0.302	35	80
3/4	1/2	0.126	50	30	5/8	0.202	50	65	5/8	0.202	50	65	3/4	0.302	35	80	3/4	0.302	35	80	3/4	0.302	35	80
1	1/2	0.126	50	30	5/8	0.202	50	65	5/8	0.202	50	65	7/8	0.419	35	130	7/8	0.419	35	130	7/8	0.419	35	130
1 1/2	1/2	0.126	50	30	3/4	0.302	50	115	3/4	0.302	50	115	1	0.551	35	195	1	0.551	35	195	1 1/8	0.728	35	285
2	5/8	0.202	50	65	5/8	0.202	50	65	5/8	0.202	50	65	7/8	0.419	35	130	7/8	0.419	35	130	1	0.551	35	195
2 1/2	5/8	0.202	50	65	3/4	0.302	50	115	3/4	0.302	50	115	1	0.551	35	195	1	0.551	35	195	1 1/8	0.728	35	285
3	5/8	0.202	50	65	3/4	0.302	50	115	3/4	0.302	50	115	7/8	0.419	35	130	1 1/8	0.728	35	285	1 1/4	0.929	35	405
4	5/8	0.202	50	65	3/4	0.302	50	115	7/8	0.419	50	185	1 1/8	0.728	45	370	1 1/4	0.929	35	405	1 1/2	1.405	35	740
5	3/4	0.302	50	115	3/4	0.302	50	115	1	0.551	50	275	1 1/4	0.929	45	520	1 1/2	1.405	35	740	1 3/4	1.979	35	1210
6	3/4	0.302	50	115	3/4	0.302	50	115	1	0.551	50	275	1 1/8	0.728	45	370	1 3/8	1.155	35	555	2	2.652	30	1590
8	3/4	0.302	50	115	7/8	0.419	50	185	1 1/8	0.728	50	410	1 3/8	1.155	45	715	1 5/8	1.680	35	955	2	2.652	30	1590
10	7/8	0.419	50	185	1	0.551	50	275	1 1/4	0.929	50	580	1 3/8	1.155	45	715	1 7/8	2.303	35	1510	2 1/2	4.291	30	3220
12	7/8	0.419	50	185	1 1/8	0.728	50	410	1 1/4	0.929	50	580	1 3/8	1.155	45	715	2	2.652	35	1855				
14	1	0.551	50	275	1 1/8	0.728	50	410	1 3/8	1.155	50	795	1 1/2	1.405	45	950	2 1/4	3.422	30	2310				
16	1	0.551	50	275	1 1/4	0.929	50	580	1 1/2	1.405	50	1055	1 5/8	1.680	45	1230	2 1/2	4.291	30	3220				
18	1 1/8	0.728	50	410	1 1/4	0.929	50	580	1 5/8	1.680	50	1365	1 7/8	2.303	45	1945								
20	1 1/8	0.728	50	410	1 3/4	0.929	50	580	1 5/8	1.680	50	1365	2	2.652	45	2385								
24	1 1/4	0.929	50	580	1 1/2	1.405	50	1055	1 7/8	2.303	50	2160	2 1/2	4.291	45	4830								

Notes:

1. Flange Rating ASME B16.5
2. Flange Materials ASTM 105, ASTM A350 Grade LF2, ASTM A182 F51 (S31803)
3. Bolting Materials ASTM A193 Grade B7, ASTM A320 Grade L7, K500 Monel, Super Duplex UNS S32760 FLT
4. Gasket Type Compressed Fibre (Class 150 only), Spiral Wound (all sizes), RTJ (Class 1500 and 2500)
5. Service Temperature Minus -46C to +120C
6. Lubricant None
7. Pipe spec 50, 50D applicable for pipe sizes < 2" NB. For pipe sizes ≥ 2" NB, refer API 6A flange torque table.

Table 3 below from [Flange Bolt Torquing Engineering Specification.pdf](#) Appendix A 16 August 2021 Rev1

ASME B16.5 Flange Torque Ratings for Stainless Steel Flanges

Nut Factor 0.16

Pipe Size	Flange Class 150				Flange Class 300				Flange Class 600				Flange Class 900			
	Stud	Area	Stress	Torque	Stud	Area	Stress	Torque	Stud	Area	Stress	Torque	Stud	Area	Stress	Torque
inch	inch	in ²	ksi	lbf.ft	inch	in ²	ksi	lbf.ft	inch	in ²	ksi	lbf.ft	inch	in ²	ksi	lbf.ft
1/2	1/2	0.126	47.5	40	1/2	0.126	47.5	40	1/2	0.126	47.5	40	3/4	0.302	47.5	145
3/4	1/2	0.126	47.5	40	5/8	0.202	47.5	80	5/8	0.202	47.5	80	3/4	0.302	47.5	145
1	1/2	0.126	47.5	40	5/8	0.202	47.5	80	5/8	0.202	47.5	80	7/8	0.419	45	220
1 1/2	1/2	0.126	47.5	40	3/4	0.302	47.5	145	3/4	0.302	47.5	145	1	0.551	45	330
2	5/8	0.202	47.5	80	5/8	0.202	47.5	80	5/8	0.202	47.5	80	7/8	0.419	45	220
2 1/2	5/8	0.202	47.5	80	3/4	0.302	47.5	145	3/4	0.302	47.5	145	1	0.551	45	330
3	5/8	0.202	47.5	80	3/4	0.302	47.5	145	3/4	0.302	47.5	145	7/8	0.419	45	220
4	5/8	0.202	47.5	80	3/4	0.302	47.5	145	7/8	0.419	45	220	1 1/8	0.728	45	490
5	3/4	0.302	47.5	145	3/4	0.302	47.5	145	1	0.551	45	330	1 1/4	0.929	45	695
6	3/4	0.302	47.5	145	3/4	0.302	47.5	145	1	0.551	45	330	1 1/8	0.728	45	490
8	3/4	0.302	47.5	145	7/8	0.419	45	220	1 1/8	0.728	45	490	1 3/8	1.155	40	845
10	7/8	0.419	45	220	1	0.551	45	330	1 1/4	0.929	45	695	1 3/8	1.155	40	845
12	7/8	0.419	45	220	1 1/8	0.728	45	490	1 1/4	0.929	45	695	1 3/8	1.155	40	845
14	1	0.551	45	330	1 1/8	0.728	45	490	1 3/8	1.155	40	845				
16	1	0.551	45	330	1 1/4	0.929	45	695								
18	1 1/8	0.728	45	490	1 1/4	0.929	45	695								
20	1 1/8	0.728	45	490	1 1/4	0.929	45	695								
24	1 1/4	0.929	45	695												

Notes:

- Flange Rating ASME B16.5
- Flange Materials ASTM A182 F316L
- Bolting Materials ASTM A193 Grade B8M Class 2
- Gasket Type Spiral Wound
- Service Temperature Minus -120C to +120C
- Lubricant Molykote P37 or Loctite 771