Trelleborg Sealing Solutions - Gasket Install Form

Disclaimer: Although Trelleborg Sealing Solutions Chemical Transportation developed torque recommendations in cooperation with the tank car builders, it is important to always refer to the tank car builder's torque specifications as well. If the two recommendations differ, be sure to follow the tank car builder's specifications.

Customer: _____ **Car Number**: _____

Gasket Dimensions: _____ _____ _____ **Compressed Gasket Width: _____**
(ID) (OD) (Thickness)

Gasket Material (See Chart Below): Hard Soft
(Circle One)

Lubrication Type: _____

Flange Size: 150lb 300lb **Flange Material**: _____
(Circle One) (For aluminum, consult with Trelleborg or tank car owner)

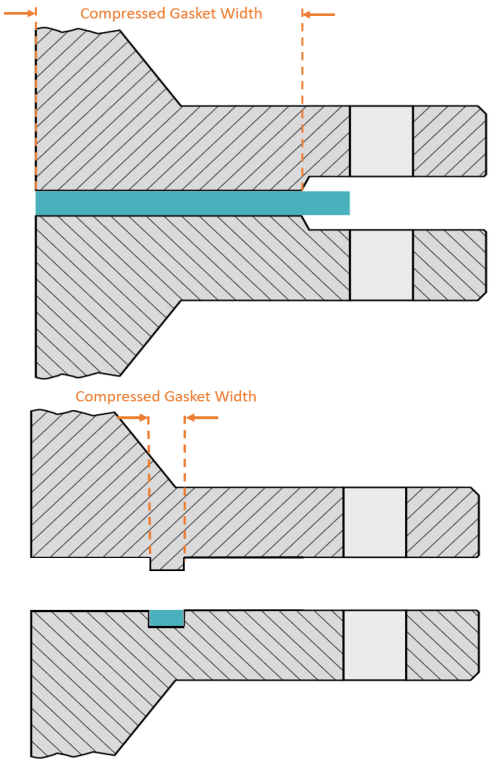
Flange Type: Full Faced Raised Face Tongue & Groove
(Circle One)

Bolt Type (See Chart Below): Low Strength High Strength **Bolt Diameter**: _____
(Circle One)

Number of Bolts: _____ **Target Torque (See Next Page)**: _____

Hard Gasket Materials	Soft Gasket Materials
Garlock 2900/2950/3000	NBR
Gylon 3500/3504/3510/3545	EPDM
HMF 10/17/31/41/42/45	Neoprene
Durlon 7900/7925/8300/8500	Silicone
Durlon 9000	Viton A
Klinger C-4401	Viton B
Sigraflex Hochdruck	Viton GF-S
Teadit 1570	FFKM

High Strength Bolts	Low Strength Bolts
A193 B7	A193 B5
A320 L7/B7	A320 B8/B8M Class 1
A320 B8/B8M Class 2	A193 B8/B8M Class 1
A193 B8/B8M Class 2	A307 Grade B
Bolts with similar yield strength	Bolts with similar yield strength



Installer: _____ **Date**: _____

Trelleborg Flange Gasket Installation Instructions

Inspection

- Remove old gasket and all residue from surface of flange carefully
- Inspect flange surface and new gasket for any defects prior to install
- Verify gasket material is as required for compatibility
- Repair all nicks/gouges (>1/32'' in depth) and replace where needed
    - Radial scratches MUST be repaired or replaced due to seal difficulty
- Inspect all fasteners and repair/replace accordingly

Gasket Install

- Align flanges surfaces and bolt holes
- Ensure flanges are parallel to each other
- Insert gasket between the flanges on required sealing surface
    - If gasket contains bolt holes, ensure proper alignment
- ID of gasket should never be smaller than ID of flange
- Carefully compress mating flange down onto gasket
- Adhesive is only recommended when absolutely necessary
    - Coat minimum amount of gasket required to fix in place

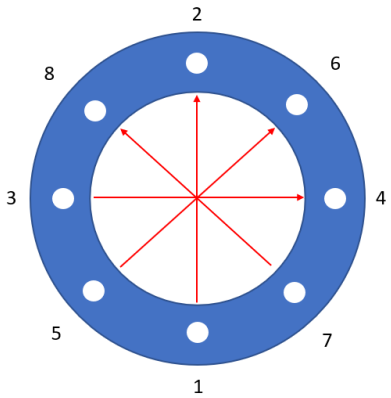
Lubrication and Fasteners

- Confirm lubricant compatible with application parameters
- Recommended lubricant friction coefficient K < 0.17
- Liberally lubricate all bolt threads, washers, and nuts
    - Be careful not to contaminate gasket with lubricant
    - Hardened washers are recommended

Bolt Tightening

- Prior to tightening, consult torque tables based on application parameters to find target torque
- Never torque bolts under pressure
- If deviating from table parameters, further calculation required (consult Trelleborg engineering team)
- Utilize calibrated torque wrench during install
- Follow torque sequence and torque in star pattern as indicated below
- Final pass should be in **clockwise** fashion
- Depending on material, retorque bolts 24 hours after install

Torque Sequence	
1st Pass	Finger Tight
2nd Pass	30%
3rd Pass	60%
4th Pass	100%
Final Pass	100%



Torque Recommendations

Raised Face Torque

Although Trelleborg Sealing Solutions Chemical Transportation developed torque recommendations in cooperation with the tank car builders, it is important to always refer to the tank car builder's torque specifications as well. **If the two recommendations differ, be sure to follow the tank car builder's specifications.**

NOTES:

The torque recommendations below are for:

- Raised face flanges acc. B16.5 class 300
- Stainless Steel and Carbon Steel flanges only. If using a softer flange type, consult the Trelleborg Sealing Solutions Chemical Transportation engineering team.
- 1/8" or thinner PTFE and Aramid Fibre, and 1/16'' or thinner Graphite gaskets

- To prevent over-compression when working with graphite gaskets, consider using a thinner than typical gasket.
- Consider decreasing the gasket thickness when using gaskets with a small compressed gasket width.
- Raised face flange gasket sizing is established by ASME B16.5 class 150 and class 300
- For the purpose of the calculation used to generate the recommended torque values in the charts below:
  - Lubrication with a coefficient of friction of 0.14 is assumed.
  - The bolt's utilization factor of yield point (UFYP) should be between 25 and 65%. A reduced level is needed for small dimensions.

DISCLAIMER: The included tables are recommendations based on the above assumptions. If deviating from these assumptions, be sure to perform further calculations to determine the appropriate torque. The torque specifications do NOT guarantee the performance of the gasket and should only be used as guidelines.

Torque recommendations valid for the following bolt grades:
A193 B7 (104 ksi), A320 L7 (105 ksi), A320 B7 (105 ksi), A320 B8/B8M Class 2 (100-125 ksi), A193 B8/B8M Class 2 (100-125 ksi), others with similar yield strength

Class	Bolt Size	# Bolts	Torque	Torque	Compressed Gasket Width	
	(inch)		(ft*lbs)	(Nm)	inch	
150	1/2	4	25	34	0.274	Recommended: <=1/16'' gasket
150	1/2	4	35	47	0.313	
150	1/2	4	51	69	0.350	
150	1/2	4	66	89	0.423	
150	1/2	4	66	89	0.492	
150	5/8	4	131	178	0.632	
150	5/8	4	131	178	0.626	
150	5/8	4	131	178	0.748	
150	5/8	8	131	178	0.742	
150	5/8	8	131	178	0.850	
150	3/4	8	232	315	0.880	
150	7/8	12	374	507	1.000	
150	1	12	561	761	1.118	
150	1 1/8	16	795	1078	1.504	

Class	Bolt Size	# Bolts	Torque	Torque	Compressed Gasket Width	
	(inch)		(ft*lbs)	(Nm)	inch	
300	1/2	4	25	34	0.274	Recommended: <=1/16'' gasket
300	5/8	4	50	68	0.313	
300	5/8	4	61	83	0.350	
300	5/8	4	101	137	0.423	
300	3/4	4	161	218	0.492	
300	5/8	8	101	137	0.632	
300	3/4	8	143	194	0.626	
300	3/4	8	197	267	0.748	
300	3/4	8	232	315	0.742	
300	3/4	8	232	315	0.850	
300	3/4	8	232	315	0.880	
300	7/8	12	374	507	1.002	
300	1	16	561	761	1.000	
300	1 1/8	20	734	995	1.118	

Torque recommendations valid for the following bolt grades:
A193 B5 AISI 501 (80 ksi), A320 B8/B8M Class 1 (75 ksi), A193 B8/B8M Class 1 (75 ksi), others with similar yield strength

Class	Bolt Size	# Bolts	Torque	Torque	Compressed Gasket Width	
	(inch)		(ft*lbs)	(Nm)	inch	
150	1/2	4	27	37	0.274	Recommended: <=1/16'' gasket
150	1/2	4	39	53	0.313	
150	1/2	4	50	68	0.350	
150	1/2	4	50	68	0.423	
150	1/2	4	50	68	0.492	
150	5/8	4	100	136	0.632	
150	5/8	4	100	136	0.626	
150	5/8	4	100	136	0.748	
150	5/8	8	100	136	0.742	
150	5/8	8	100	136	0.850	
150	3/4	8	100	136	0.880	
150	7/8	12	286	388	1.000	
150	1	12	428	580	1.118	
150	1 1/8	16	607	823	1.504	

Class	Bolt Size	# Bolts	Torque	Torque	Compressed Gasket Width	
	(inch)		(ft*lbs)	(Nm)	inch	
300	1/2	4	27	37	0.274	Recommended: <=1/16'' gasket
300	5/8	4	46	62	0.313	
300	5/8	4	62	84	0.350	
300	5/8	4	100	136	0.423	
300	3/4	4	164	222	0.492	
300	5/8	8	100	136	0.632	
300	3/4	8	150	203	0.626	
300	3/4	8	178	241	0.748	
300	3/4	8	178	241	0.742	
300	3/4	8	178	241	0.850	
300	3/4	8	178	241	0.880	
300	7/8	12	286	388	1.002	
300	1	16	428	580	1.000	
300	1 1/8	20	607	823	1.118	

Torque Recommendations

Tongue & Groove Torque

Although Trelleborg Sealing Solutions Chemical Transportation developed torque recommendations in cooperation with the tank car builders, it is important to always refer to the tank car builder's torque specifications as well. **If the two recommendations differ, be sure to follow the tank car builder's specifications.**

NOTES:

The torque recommendations below are for:

- Tongue and groove flanges acc. B16.5 class 300
- Stainless Steel and Carbon Steel flanges
- 1/8" or thinner PTFE and Aramid Fibre, and 1/16'' or thinner Graphite gaskets

- To prevent over-compression when working with graphite gaskets, consider using a thinner than typical gasket.
- Consider decreasing the gasket thickness when using gaskets with a small compressed gasket width.
- For the purpose of the calculation used to generate the recommended torque values in the charts below:
- Lubrication with a coefficient of friction of 0.14 is assumed.
- The bolt's utilization factor of yield point (UFYP) should be between 15 and 65%. A reduced level is needed for small dimensions.

DISCLAIMER: The included tables are recommendations based on the above assumptions. If deviating from these assumptions, be sure to perform further calculations to determine the appropriate torque. The torque specifications do NOT guarantee the performance of the gasket and should only be used as guidelines.

Recommendations valid for bolt grades:
A193 B7 (104 ksi), A320 L7 (105 ksi), A320 B7 (105 ksi), A320 B8/B8M Class 2 (100-125 ksi), A193 B8/B8M Class 2 (100-125 ksi), others with similar yield strength

Class	Bolt Size	# Bolts	Torque	Torque	Compressed Gasket Width
	(inch)		(ft*lbs)	(Nm)	inch
300	1/2	4	20	27	0.195
300	5/8	4	30	41	0.195
300	5/8	4	50	68	0.252
300	5/8	4	81	110	0.305
300	3/4	4	125	169	0.374
300	5/8	8	71	96	0.376
300	3/4	8	89	121	0.370
300	3/4	8	107	145	0.374
300	3/4	8	197	267	0.496
300	3/4	8	232	315	0.506
300	7/8	12	345	468	0.628
300	1	16	431	584	0.744
300	1 1/8	20	489	663	0.744

Recommended: <=1/16'' gasket

Recommendations valid for bolt grades:
A193 B5 AISI 501 (80 ksi), A320 B8/B8M Class 1 (75 ksi), A193 B8/B8M Class 1 (75 ksi), others with similar yield strength

Class	Bolt Size	# Bolts	Torque	Torque	Compressed Gasket Width
	(inch)		(ft*lbs)	(Nm)	inch
300	1/2	4	20	27	0.195
300	5/8	4	30	41	0.195
300	5/8	4	50	68	0.252
300	5/8	4	81	110	0.305
300	3/4	4	125	169	0.374
300	5/8	8	71	96	0.376
300	3/4	8	89	121	0.370
300	3/4	8	107	145	0.374
300	3/4	8	178	241	0.496
300	3/4	8	178	241	0.506
300	7/8	12	286	388	0.628
300	1	16	431	584	0.744
300	1 1/8	20	489	663	0.744

Recommended: <=1/16'' gasket