



Assembly and Operational Safety Instruction

In principle, lined pipes and fitting may not be welded, since otherwise the fluoroplastics can be destroyed.

Assembly work should only be carried out by properly qualified personnel (DIN CEN/TS 1591-4 Qualification of personnel competency in the assembly of bolted joints fitted to equipment subject to the Pressure Equipment Directive).

Protective Cover

All parts are provided with protective covers, for protecting the lining against dirt and mechanical damages by handling and storage and for holding down the flanges.

The protective covers should only be removed immediately before assembly!

Seals

Additional seals between the PTFE sealing surfaces are not necessary. This may, however, be necessary when mounting a flared surface to a flange made of, for example, metal, glass or ceramics.

Fittings

Flange fittings should be tightened evenly with a torque wrench, crosswise in several steps and in the end clockwise according to the following table.

Due to the flow characteristics of the lining, the fittings should be retightened after one day.

After the first temperature cycle and commissioning, we recommend a repeated tightening of the screws.

To avoid a deformation of the sealing surfaces by overtightening the screws during the assembly, the following torques are to be seen as a guideline:

Nominal Width DN	no. of bolts x thread PN 10	Tightening Torque Nm	no. of bolts x thread PN 16	Tightening Torque Nm	no. of bolts x thread PN 25	Tightening Torque Nm	no. of bolts x thread PN 40	Tightening Torque Nm
25	4 x M12	34	4 x M12	34	4 x M12	34	4 x M12	34
32	4 x M16	55	4 x M16	55	4 x M16	55	4 x M16	55
40	4 x M16	68	4 x M16	68	4 x M16	68	4 x M16	68
50	4 x M16	86	4 x M16	86	4 x M16	86	4 x M16	86
65	4 x M16	115	4 x M16	115	8 x M16	58	8 x M16	58
80	8 x M16	71	8 x M16	71	8 x M16	71	8 x M16	71
100	8 x M16	78	8 x M16	78	8 x M20	107	8 x M20	107
125	8 x M16	105	8 x M16	105	8 x M24	156	8 x M24	156
150	8 x M20	141	8 x M20	141	8 x M24	192	8 x M24	192
200	8 x M20	208	12 x M20		12 x M24	200	12 x M27	
250	12 x M20	166	12 x M24		12 x M27	296	12 x M30	
300	12 x M20	197	12 x M24		16 x M27	301	16 x M30	
350	12 x M20	240			16 x M30	479		
400	16 x M24	276			16 x M33	562		
500	20 x M24	288			20 x M33	609		
600	20 x M27	340			36 x M36	1049		

Nominal pipe size	ANSI B 16.5 Class 150			ANSI B 16.5 Class 300		
	NPS	no. of bolts x thread	Tightening Torque in		no. of bolts x thread	Tightening Torque in
ft-lbs			Nm	ft-lbs		Nm
1/2"	4 x 1/2"	10	14	4 x 1/2"	12	17
3/4"	4 x 1/2"	10	14	4 x 5/8"	12	17
1"	4 x 1/2"	10	14	4 x 5/8"	12	17
1 1/2"	4 x 1/2"	15	22	4 x 3/4"	16	22
2"	4 x 1/2"	25	35	8 x 5/8"	19	26
2 1/2"	4 x 5/8"	33	46	8 x 3/4"	29	40
3"	4 x 5/8"	40	58	8 x 3/4"	33	45
4"	8 x 5/8"	30	42	8 x 3/4"	47	65
5"	8 x 3/4"	45	63	8 x 3/4"	69	95
6"	8 x 3/4"	60	84	12 x 3/4"	73	100
8"	8 x 3/4"	75	105	12 x 7/8"	76	105
10"	12 x 7/8"	70	100	16 x 1"	83	115
12"	12 x 7/8"	90	125	16 x 1 1/8"	87	120
14"	12 x 1"	152	210			
16"	16 x 1"	143	198			
18"	16 x 1 1/8"	210	290			
20"	20 x 1 1/8"	190	262			
24"	20 x 1 1/4"	221	305			

The tightening torques are valid for lightly oiled/grease screws at normal temperature and are laid out for a slight flow of the lining in order to achieve an effective sealing.

A further increase in the specified torques does not necessarily lead to a better sealing, but may lead to a deformation of the flanges.

Vent holes

With the exception of blind flanges, reducing flanges as well as spacers "Form G", all PTFE parts have vent holes with a diameter of 3 mm. These vent holes serve for testing the tightness after the production as well as leakage indicator during operation.

During the assembly care should be taken to avoid that the vent holes are closed by paint or by the insulation. For environmental reasons or other regulations, these holes can be closed.

In this case, the manufacturer excludes any warranty for damages incurred.

Pressure-Temperature Resistance of Components according to DIN 2848 + 2874

The maximum thermal endurance amounts to 230°C. The allowable pressure above 120°C can be derived linearly from the values mentioned above.

PN	Temperature °C	-10	120	180
10	Pressure 10 ⁵ Pa	10	10	8,1
16*	Pressure 10 ⁵ Pa	16	16	12,9
25	Pressure 10 ⁵ Pa	25	25	20,2
40	Pressure 10 ⁵ Pa	40	40	32,4

*based on DIN 2848 + 2874

Vacuum Resistance of PTFE-lined Pipes

Standard Lining 10⁵PA

Nominal Width	Lining Thickness	RT	100°C	175°C	230°C
25 / 1"	3	0	0	0	0
32 / 1 1/4"	3	0	0	0	0
40 / 1 1/2"	3	0	0	0,1	0,15
50 / 2"	3	0	0	0,1	0,15
65 / 2 1/2"	3	0	0	0,15	0,2
80 / 3"	3	0	0	0,15	0,2
100 / 4"	3	0,1	0,15	0,2	0,25
125 / 5"	4	0,1	0,15	0,4	0,45
150 / 6"	4	0,15	0,25	0,4	0,45
200 / 8"	5	0,2	0,3	0,45	0,55
250 / 10"	5	0,35	0,4	0,55	0,8
300 / 12"	6	0,4	0,5	0,65	0,9

Nominal widths larger than DN300 on request.

Thick-walled Lining 10⁵PA

Nominal Width	Lining Thickness	RT	100°C	175°C	230°C
25 / 1"	3	0	0	0	0
32 / 1 1/4"	3	0	0	0	0
40 / 1 1/2"	4	0	0	0	0
50 / 2"	4	0	0	0	0
65 / 2 1/2"	4	0	0	0	0
80 / 3"	4	0	0	0,1	0,1
100 / 4"	4,5	0	0	0,1	0,1
125 / 5"	5	0	0	0,1	0,1
150 / 6"	5	0	0	0,1	0,1
200 / 8"	6	0	0	0,1	0,1
250 / 10"	6,5	0	0	0,1	0,1
300 / 12"	8	0	0	0,1	0,1

The vacuum resistance of fittings is partially different. Please contact the manufacturer if necessary.

General

PTFE and PFA have proven as long-time corrosion protection.

With electrically conductive lining (black) it is recommended to check the existing conductivity of components regularly.

In case of certain media, the conductivity can decrease by and by due to washing-out.

Depending on various factors, permeation as well as absorption effects may occur. Permeation is the transport of media through the lining.

This is based on two physical processes:

- First, on the diffusion of the medium through the molecule chains as well as the solubility of the medium in the polymer. The diffusion can be reduced by the selection of appropriate PTFE types, by a thicker lining as well as by a higher crystallinity.
However, in this case, the vulnerability to stress cracking increases, and therefore, in the interest of product safety it is important to weigh up between the different requirements.
- Absorption describes the diffusion of a medium into the lining. In case of cyclical temperature and pressure loads, this can lead, due to extension mechanisms, to accumulations or even to blistering. With given operating conditions, the insulation of such components can reduce this effect considerably or even avoid it.

Due to all these effects, we recommend, for reasons of operational safety, a regular checking of all components.



All our components have TÜV component mark and correspond to the PED (Pressure Equipment Directive), the TRR 100 (German technical regulations for metallic piping systems) as well as to the WHG (German Water Management Act). If requested, we can also produce linings with FDA approval (Food and Drug Administration) according to CFR177.1550 (Code of Federal Regulations) as well as with approved pigments.

We assume no responsibility for the adequacy of the components delivered by us with respect to the planned utilization. Our components are not suitable for medical applications.

For the assembly and the service of PTFE Expansion Joints, the corresponding instructions in our catalogue (on pages 56 – 70) have to be observed. Please also take note of the corresponding operating pressure diagrams in the catalogue. The admissible operating pressure curves are downward sloping with increasing temperature.

With standard wall thicknesses of the PTFE bellows, other diagrams than with thick-walled executions are valid.