

**Mondi Štětí a.s.**

## **STANDARD**

### **Part 13.08**

## **GASKETS FOR PIPING AND TANKS**

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# STANDARD

## Part 13.08

### GASKETS FOR PIPING AND TANKS

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## 1 GASKET DESCRIPTION

Standard thickness = 2 mm

Klingersil C 4400:	free from asbestos, suitable for light acids and liquors, allowable pH value 4 – 9, green colour at 150° C suitable up to 35 bar at 100° C suitable up to 50 bar
Klingersil C 4500:	free from asbestos, suitable for acids and liquors, allowable pH value 4 - 13, dark grey / black colour at 220° C suitable up to 50 bar
PTFE:	virginal teflon, suitable for acids and liquors, allowable pH value 0 – 14, white colour at 160° C suitable up to 20 bar
Mounting instruction:	Klingersil gaskets can be used only once. Normally they are stored for PN 16. Gaskets for higher pressure used according to norm (eventually cut out of plate).

It is necessary to consult with operation engineer in special cases.

## 2 CHEMICAL KEY

Ammonia	NH <sub>3</sub>	C 4400
Hydrochloric acid	HCL	PTFE
Nitric acid	HNO <sub>3</sub>	PTFE
Sulphur acid	H <sub>2</sub> SO <sub>4</sub>	PTFE
Caustic soda	NaOH	PTFE/C 4500
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>	PTFE
Sulphur dioxide	SO <sub>2</sub>	PTFE
Phosphoric acid	H <sub>3</sub> PO <sub>4</sub>	C 4400
Magnesium hydrate	Mg (OH) <sub>2</sub>	C 4500

### 3 SAFETY MEASURES

- Graphite threading flat strip self-adhesive gasket, suitable for steam, acids and oils, allowable pH value 1 – 12, silver grey colour, at 550° C suitable min. up to 30 bar
- PTFE-flat strip self-adhesive gasket, suitable for acids and liquors, allowable pH value 0 – 14, white colour, at 90° C suitable up to 100 bar
- To ensure correct function of the gaskets , it is necessary to tighten the bolts in appropriate torque ( like it is given to each bolt type - see catalogue lists)or it is necessary to calculate the correct torque in accordance of matter of use.

### 4 KEY ACCORDING TO AREA AND MEDIUM

Area in general		Paper mill area	
Description	Gasket	Description	Gasket
Steam low pressure up to 5 bar	metal (spiral)	Alum	C 4400
Steam medium pressure 5 -12 bar	metal (spiral)	Defoamer	C 4400
Steam medium pressure 5-12 bar	metal (spiral)	Dyes	C 4400
		Wires and felts cleaning agents	C 4400
Steam high pressure 12-80 bar	metal ** (ridge profile)	Optical brightener	C 4400
		Retention aid, Polymer	C 4400
Waste vapour	metal (spiral)	Detergent	C 4400
Condensate up to 5 bar	metal (spiral)	Urea 27 to 43 %	C 4400
ARPRIT ( ? ) air	C 4400	Broke	C 4400
Instrumental air	C 4400	Captured fibres from disc filter	C 4400
Waste air	C 4400	Additional fibres of disc filter	C 4400
Blown air	C 4400	Flotation	C 4400
Waste water	C 4400	Paper machine stock	C 4400
Fresh water	C 4400	Rejects	C 4400
Cooling water	C 4400	Pulp	C 4400
Sealing water	C 4400	Vacuum	C 4400
Hydraulic oil (mineral)	C 4400 / 4500		
Hydraulic oil (synthetic)	C 4400 / 4500		
Natural gas (Fabr. RAINZ / IBA)	AFM 34		

\*\* Flange connections only in extraordinary cases, standard welding

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<b>Pulp mill area</b>			
<b>Description</b>	<b>Gasket</b>	<b>Description</b>	<b>Gasket</b>
Waste condensate pH 1,5	PTFE	Clean filtrate	C 4400
Magnesium hydrate pH 10	C 4500	Turbid filtrate	C 4400
Gaseous oxygen	C 4400	Clean water Krofta	C 4400
Unbleached pulp pH 3-5	PTFE	Suction water	C 4400
Bleached pulp pH 6-7	PTFE	Wire water	C 4400
Filtrate	C 4400	Warm high pressure water (50 bar) 70° C	C 4400
Hot water 110° C	C 4400	Warm medium pressure water (25 bar) 100° C	C 4400
Hot water (filtrate) – high pressure 20 bar	C 4400	Warm low pressure water (10 bar) 150° C	C 4400
Acid water pH 1,5	PTFE	Paper machine stock for machine tank	C 4400
Tower acid pH 1-4	PTFE	Wire section, constant part	C 4400
Cooking plant	PTFE	Steam-condensate system	C 4400/4500
Diluted liquor pH 12-14	C 4500		
Heavy liquor pH 12-14	C 4500		
Evaporation plant	C 4500		
Liquor boiler	C 4500		
Chemicals recovery	C 4500/PTFE		

Flange connections only in extraordinary cases, standard welding

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## 5 FLANGED JOINT ASSEMBLY PROCEDURE

The behaviour of a flanged joint in service depends on whether or not the tension created in the fasteners will clamp the joint components together with a force great enough to resist failure of the seal, but small enough to avoid damage to the fasteners, joint components and gasket. The user or his designated agent should provide, or arrange to have provided, as appropriate, essential training and qualification testing of the joint assemblers who will be expected to follow procedures developed from this Guideline.

### Flange Disassembly

Before starting to disassemble the fasteners, ensure that you are in possession of a valid permit to work, check that the line has been de-pressurised, flushed or purged as appropriate. Take care, in case seepage has allowed pressure to build up again.

- Stand up wind of the flange assembly.
- Never stand in-line with the flange, stand to one side.
- Where possible loosen bolts furthest away from you.

There is an enormous amount of elastic energy stored in a fastened flange. In effect, the joint is a spring which has been held and compressed by the fasteners. As the fasteners are removed one by one, the stored energy of the joint may begin to load the remaining fasteners. This can have the effect of distorting the flange and may damage the flange surfaces. In some cases, the few fasteners remaining in a flange have actually been irreparably damaged or fractured as they attempted to hold the expanding joint together!

If you have experienced problems caused by taking the joints apart too casually, then the best advice is to use the reverse of the procedure which you used to tighten them:

- Use a cross bolt untightening procedure
- Use several passes - partially loosen each fastener before further loosening any of them
- Gradually slacken the nuts (by running them back along the fasteners) but do not remove them.
- Only when the fasteners are sufficiently loose to verify that the seal has been broken should the nuts be removed
- Handle the flange and fastener components carefully to avoid damage
- You may need to scrape out remnants of the gasket which have stuck to the flange surfaces - in which case use an implement (such as a brass brush or brass drift) which is softer than the flange material
- **Beware of pipe spring**

**Remember to consider the safety aspects**

**Are you or others in danger? Always double check and ask yourself:**

- **What if the flange is still under pressure?**
- **What if there is still gas or fluid in the line?**
- **What if the piping springs up on release?**
- **What if the load swings in my direction?**

**Clean and examine all “working” surfaces before assembly is started.**

- Examine the gasket contact surfaces of both joint flanges for appropriate surface finish and for damage to surface finish such as scratches, nicks, gouges, and burrs. **Damage running radially across the facing is of particular concern.** Report any questionable imperfections for appropriate disposition.
- Check gasket contact surfaces of both joint flanges for flatness, both radially and circumferentially. Report any questionable results.
- Examine bolt and nut threads and washer faces of nuts for damage such as rust, corrosion and burrs; report and replace inferior components. If washers are scored or cupped from previous use, replace with new through-hardened washers. Previously used bolts should be thoroughly cleaned to “as new” condition before being reused. Replace the nuts if they can’t be cleaned effectively.
- Examine nut-bearing surfaces on the back face of flanges for scores, burrs, etc.; remove protrusions, use a trough hardened washer to replace the bearing surface if needed.

**5.1 Alignment of mating surfaces**

Ensure flanges are aligned axially, rotationally, in parallel and without excessive gap. Report any questionable misalignment.

**Alignment to ASME PCC1 2013, measured when flanges are at rest.**

Lateral Alignment:	1.5mm Maximum
Parallel Alignment:	Maximum of 0.8mm difference between the narrowest and widest gaps.
Rotational Alignment:	3mm Maximum
Excessive spacing:	Twice the thickness of the gasket.



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## 5.2 Installation of gasket

Place a new gasket in position after determining the absence of unacceptable imperfections or damage.

- Verify that the gasket complies with the dimensional (OD, ID, thickness) and material specifications.
- Position the gasket to be concentric with the flange ID, taking suitable measures to ensure that it's adequately supported during the positioning process. No portion of the gasket should project into the flow path.
- Ensure that the gasket will remain in place during the joint assembly process; a very light dusting of spray adhesive on the gasket may be used. **Do not use tape strips radially across the gasket to hold it in position. Do not use grease or silicone.**

## 5.3 Lubrication of “working” surfaces

With one exception, liberally coat all internal and external thread surfaces and nut/washer faces with an appropriate lubricant; the exception is: lubricant is not to be applied to these “working” surfaces for use in oxygen service.

- Do not apply lubricant to the gasket or gasket-contact surfaces.
- Ensure that the lubricant is chemically compatible with the bolt/nut/washer materials and the process fluid. Particular care should be taken to avoid lubricant chemistry that could result in stress corrosion cracking.
- Ensure that the lubricant is suitable for the expected service temperature.

## 5.4 Installation of bolts

Install bolts and nuts hand-tight, then “snug up” or “nip” to 15 Nm to 30 Nm, but not to exceed 20% of the Target Torque. **If nuts will not hand tighten, check for cause and make necessary corrections, re-clean the studs and replace the nuts.**

### Bolt/Nut Specifications

Verify compliance with:

- Bolt and nut materials.
- Diameter, 2.5 to 3mm smaller than the bolt hole.
- Length of bolts, 2 to 3 threads must protrude from the nut

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- Thread pitch, and nut thickness equal to the nominal bolt diameter (heavy hex series nuts)
- Ensure the bolt and nut grades match.

#### **Mark the flange with a tightening sequence:**

Using the 1,3,2,4 method:

- Mark any hole with the number 1.
- Count the bolt holes starting at 1 and proceeding clockwise around the flange.
- Write the number of holes on the last bolt hole next to number 1.
- Starting at 1, proceed around the flange adding four for each bolt hole, until a number is reached that is greater than the total number of bolt holes in the flange.
- Move to the next number in the 1,3,2,4 sequence i.e. 3 and follow the above steps and repeat with sequence numbers 2 and 4.
- If the flange has been marked correctly the last number in this sequence will be the total number of bolt holes and it will be next to number 1

#### **Tighten the bolts in increments.**

- **Install:** Hand tighten, then “snug up” to 15 Nm to 30 Nm (not to exceed 20% of Target Torque). Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.
- **Round 1:** Tighten to 20% to 30% of Target Torque (see para. 12). Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.
- **Round 2:** Tighten to 50% to 70% of Target Torque (see para. 12). Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.
- **Round 3:** Tighten to 100% of Target Torque (see para. 12). Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.
- **Round 4:** Continue tightening the bolts, but on a rotational clockwise pattern until no further nut rotation occurs at the Round 3 Target Torque value.
- **Round 5:** Time permitting, wait a minimum of 4 hr and repeat Round 4; this will restore the short-term creep relaxation/embedment losses.

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The gap should be measured at four equally spaced locations for up to 8-bolt flanges, at every other bolt for greater than 8-bolt flanges through 32-bolt flanges, and at sixteen equally spaced locations for greater than 32-bolt flanges. The difference in gap width should not exceed 0.25mm.

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## Mondi Gasket Standard AA

Pure exfoliated graphite with a tanged stainless steel sheet reinforcement for improved blowout resistance and ease of handling. Due to the excellent chemical and thermal capabilities of graphite it is used extensively throughout the petrochemical and chemical industries for process duties and steam applications. **KLINGER PSM**

Flow Substance P&ID Code	Flow substance description	Design pressure	Temperature
DNO	SODIUM HYDROXIDE CAUSTIC SODA	6 Bar	60 Deg C
DNS	SODIUM SULPHATE (SALT CAKE )	Not specified	Not specified
EFC ,EFF	FIBRE CONTAINING EFFLUENT	Not specified	35 Deg C
ELB	BIOLOGICAL SLUDGE	6 Bar	37 Deg C
ELX , EMS, ENP,EOC,ERW,ESW	EFFLUENT	Not specified	Not specified
FL	LOW PRESSURE FEEDWATER	6 Bar	Not specified
GN	SASOL GAS	Not specified	Not specified
LB1 , LBH	BLACK LIQUOR	9 Bar	185 Deg C
OLH	LUBE or HYDRAULIC OIL	25 Bar	120 Deg C
PB	STOCK BLOW LINES	20 Bar	130 Deg C
PBB	REPULPER BALE STOCK	20 Bar	50 Deg C
PBC	BROWN STOCK	20 Bar	95 Deg C
PCA,	UNBLEACHED PULP	20 Bar	95 Deg C
PGB	BLEACHED + WASHED PULP. Not in bleach plant	20 Bar	95 Deg C
PP	BROKE	3 Bar	50 Deg C
WAB	WATER	10 Bar	80 Deg C
WTD	DEMIN WATER	10 Bar	80 Deg C