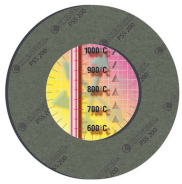
DATA SHEET (Rev.January 2015)[1]

MILAM PSS

(Details/Seals made with a sheet cutting process with these characteristics)



MATERIAL COMPOSITION

Milam PSS is an asbestos-free sealing material on mica base with a perforated 0,1 mm thick stainless steel reinforcement 1.4401 or AISI316. It is impregnated with high-quality silicone oil. The phlogopite mica, an aluminosilicate of mineral origin, has a fiber-free lamellar structure.

PROPERTIES

Hight-Temperature gasket Material. For temperature up to 900°C and higher. The special proerties of the material are its thermal stability (Weight loss at 800°C less than 5%). Together with itys extreme resistance toward chemical **substances such as solvent, aggressive acids, bases and mineral oils, interesting application option became avaiable.**

APPLICATIONS

Because of its specific properties, Milam PSS can be used advantageously upward of 100°C. Originally used in the emissionarea at high temperature up to 1000°C, often with an inner eyelet, it is now increasingly used with high-temperature processes. If contact pressures of 40MPa and more can be realized, tightnesses comparable to those of common sealing materials can be reached. Application such as HNO3-azeotropic acid systems at 6bar and 400°C, NO gas at 4 bar and 400°C, salt reactors above 400°C and catalysis processes at over 800°C with dimension of more than 6 mm diameter demostrate the potential of this material.

Typical values		PSS 130	PSS 200	PSS 300
Compressibility ASTM F 36 J	%	12 - 16	13 - 19	17 - 25
Recovery ASTM F 36 J	%	35 - 45	35 - 45	30 - 40
Stress relaxation DIN 52913 50 MPa, 16 h/300 °C	MPa	40	40	30
Tensile strength DIN 52910	MPa	22	21	20
Tensile strength ASTM F 152	MPa	25	24	21
Ignition loss DIN 52911	%	<5	<5	<15
Sealability for nitrogen at 30 MPa and 6 bar, temperature within 100 to 400 °C (Sample size 90 x 50 mm) max.	ml/min	0.20	0.20	a.A.
Thickness increase ASTM F 146 Oil JRM 903: 5 h/150 °C	%	12	12	5
Weight increase ASTM F 146 Oil JRM 903: 5 h/150 °C	%	26	26	28
Max. gasket load	MPa	100	80	80
Density DIN 3754	g/cm³	2.1	2.1	1.8
Max. temperature*	°C	900	900	900
Thickness	mm	1.3	2.0	3.2

* depending on installation and service conditions.

DIMENSION OF STANDARD SHEETS

Size of Plates: 1000x1200 mm. Thickness: (PSS130 - 1,3 mm)(PSS200 - 2,0 mm)(PSS300 - 3,2 mm) +/-10%

FUNCTION AND DURABILITY

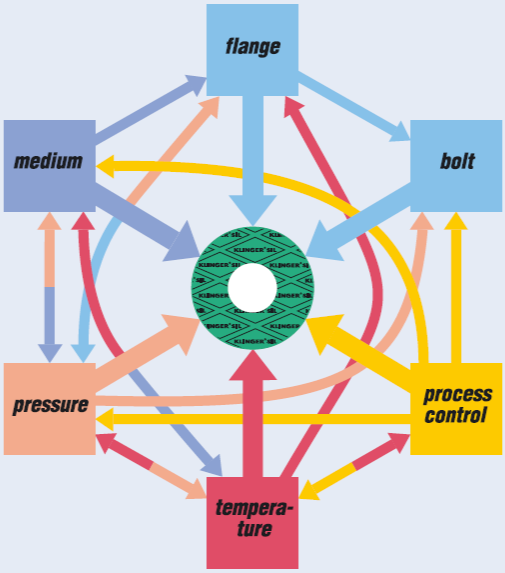
The perfoirmance and service life of gaskets depend in large measure on proper storage and fitting, factor's beyond the manu-factor's control.With this in mind, please also observe our installation instruction.

1The values indicated here are given for guidance purposes and are to be considered as a guideline for the selection of the material and not an absolute truth. The parameters described refer to tests carried out in certain conditions and with certain characteristics of the gasket, the joint, the type of tightening and the thermal/mechanical shock. therefore they can only be indicated for indicative purposes. The Company does not assume any responsibility for inappropriate use of the product.

Generally the operating temperature and pressure limits do not apply simultaneously. They depend on a variety of factors (state of the joints, dimensions, tightening, fluid, thermal or mechanical shock) so they can only be indicated for indicative purposes.

The many, varied demands placed on gaskets

A common perception is that the suitability of a gasket for any given application depends upon the maximum temperature and pressure conditions. This is not the case.



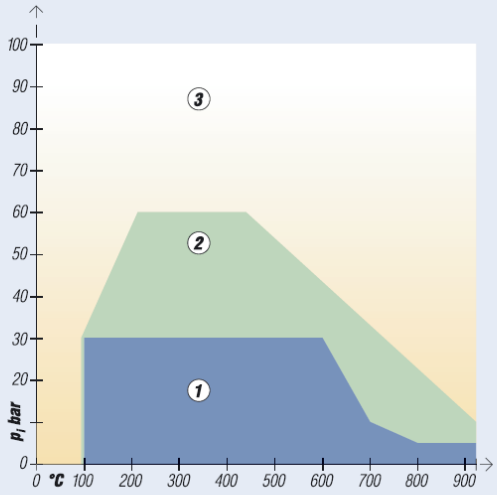
Maximum temperature and pressure values alone can not define a material's suitability for an application. These limits are dependent upon a multiplicity of factors as shown in the diagram opposite. It is always advisable to consider these factors when selecting a material for a given application.

Selecting gaskets with pT diagrams

The Klinger pT diagram provides guidelines for determining the suitability of a particular gasket material for a specific application based on the operating temperature and pressure only.

Additional stresses such as fluctuating load may significantly affect the suitability of a gasket in the application and must be considered separately.

Always refer to the chemical resistance of the gasket to the fluid.



Areas of Application

(1) In area one, the gasket material is normally suitable when a minimum gasket load of 40 MPa is guarenteed.

(2) In area two, the gasket materials may be suitable but a technical evaluation is recommended.

(3) In area three, do not install the gasket without a technical evaluation.

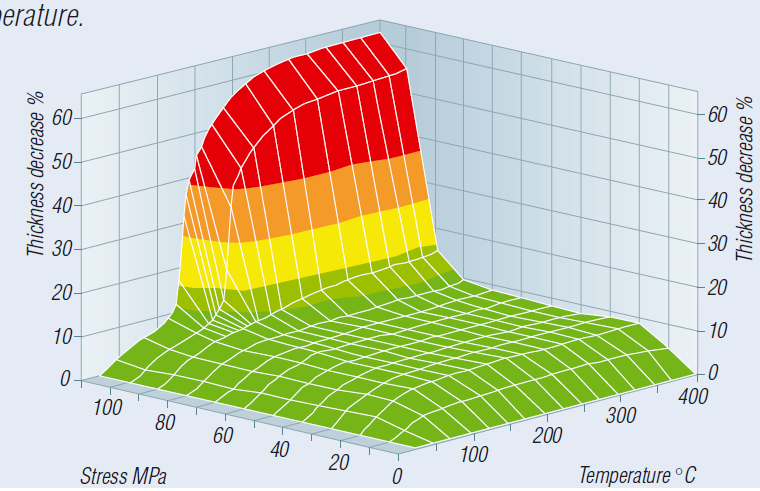
Thickness reduction under pressure and temperature

This diagram shows the thickness reduction of the sealing material under flange compression and simultaneous temperature admission.

Excessive thickness reduction with flange connections leads to unreliable operation since the bolt tension decreases too much. A thickness decrease of approx. 20 – 25% can normally still be tolerated.

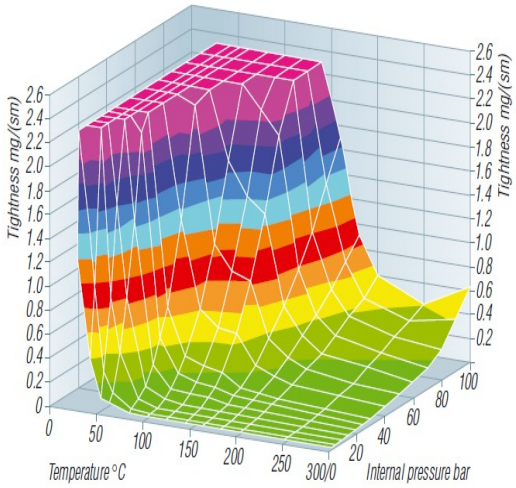
The diagram therefore helps to define the max. permissible contact pressure (σ_{BO}) depending on the temperature.

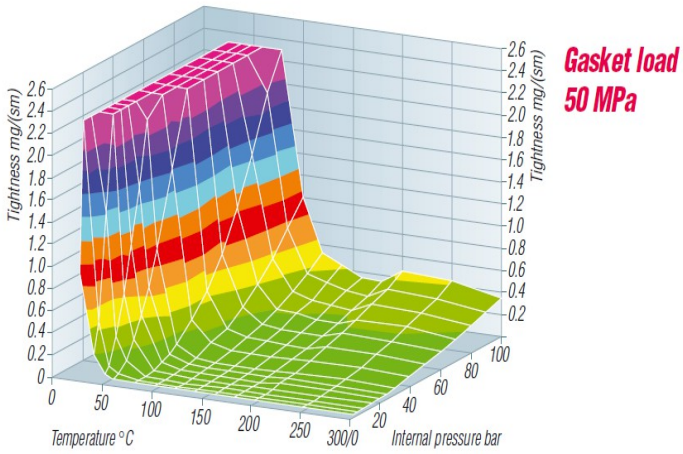
This allows correct dimensioning of the sealing joint.

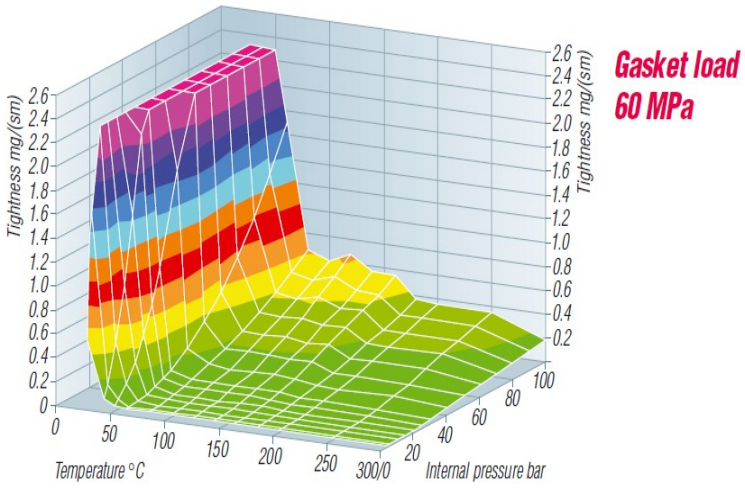


MILAM PSS Information for your safety

Tighhtness at high temperatures is measured at different temperatures and internal pressures. Nitrogen is used as the medium. The load and the temperatureare kept constant at increasing internal pressure. The holding time for each measured value is two hours. A new gasketis used for each individual load and temperature. Tightness is measured with a mass flower meter. The pressure is controlled by a pressure regolator.







Important notes:

Growing environmental and safety awareness leads to constantly increasing requirements on the tightness of flange connection. Therfore, it becames more and more important for the user to choose the most suitable gasket for the respective application and to install it correctly is reached.

As a conseguence of high requirements on tightness (e.g.leackage class L0,01), respectively high surface pressures must often be applied to the gasket as the internal pressure increase. The planned flange connection must therfore be examined for their suitability for such operating condictions whether they are actually suitable to whitstand these loads without undue mechanical stress. The sealing joint remains tight when the contact pressure encountered during the operation condiction is greather then the required minimum contact pressure and the max. Permissible contact pressure of the sealing joint is not exceeded during operating condictions. More densely compressed but not overly compressed gaskets exhibit a longer life than those with smaller pressure.

If an exclusively static load on the installed gasket cannot be guaranteed or if tension variations can be expected during intermittent operation then sealing materials must be used that do not exhibit excessive embrittlement under temperature. In such cases, the sealing thicness should be kept as thin as technically possible and useful. The multiple use of gasket is generaly discouraged for safety reason.

CHEMICAL RESISTANCE TABLE

Medium		Medium		Medium		Medium	
Acetaldehyde	■	Chloroform	■	Lead acetate	●	Sodium chloride	●
Acetamide	■	Chromic acid	■	Lead arsenate	●	Sodium cyanide	●
Acetic acid ester	■	Citric acid	●	Linseed oil	●	Sodium hydrogen carbonate	●
Acetic acid 10%	●	Clophen T64	●	**Magnesium sulfate**	●	Sodium hydroxide	●
Acetic acid 100%	●	Coagulating baths (up to 10%)	●	M.E.K. Butanone	■	Sodium silicate	●
Acetone	■	Condensed water	●	Methane	■	Sodium sulfate	●
Acetylene	■	Copper acetate	●	Methyl alcohol	■	Sodium sulfide	●
Adipic acid	●	Copper sulfate	●	Methyl chloride	■	Spirit	●
Air	●	Cresol	●	Methylene chloride	■	Starch	●
Alum	●	Cyclohexanol	●	Mineral oil No. 1	●	Steam	●
Aluminium acetate	●	**Decaline**	●	Mineral oil No. 3	●	Stearic acid	●
Aluminium chlorate	●	Dibenzyl ether	■	Monochlormethane	■	Sugar	●
Aluminium chloride	●	Dibutyl phthalate	●	**Naphta**	●	Sulfuric acid 20%	●
Ammonia	●	Diesel oil	●	Natural gas	■	Sulfuric acid 40%	●
Ammonium carbonate	●	Dimethyl formamide	▲	Nitro benzene	●	Sulfuric acid 96%	●
Ammonium chloride	●	Diphyl	■	Nitrogen	●	Sulfur dioxide	●
Ammonium hydrogenphosphate	●	Diethyl ether	■	**Octane**	●	Sulfuric acid	▲
Ammonium hydroxide	●	Dye baths (alkaline, neutral,acidic)	●	Oleic acid	●	Sulfurous acid	●
Amyl acetate	●	**Ethane**	●	Oleum	●	**Tannic acid**	●
Aniline	■	Ethanol	■	Oxalic acid	●	Tar (asphalt)	●
Anon (Cylohexanone)	■	Ethyl acetate	■	Oxygen	●	Tartaric acid	●
Arcton 12	▲	Ethyl alcohole	■	**Palmitic acid**	●	Tetrachlorethane	■
Arcton 22	▲	Ethylene	■	Pentane	●	Tetralin	●
Asphalt (tar)	●	Ethylene chloride	■	Petroleum	●	Toluene	●
Barium chloride	●	Ethylenediamine	■	Petroleum ether	■	Transformer oil	●
Benzene	■	Ethylene glykol	●	Perchlorethylene	■	Trichlorethylene	■
Benzoic acid	●	**Fluorosilicic acid**	●	Phenol	●	Triethanolamine	●
Benzol	■	Formaldehyde	■	Phosphoric acid	●	Turpentine	●
Blast furnace gas	●	Formamide	■	Phthalic acid	●	**Urea**	●
Bleaching liquor	●	Formic acid 10%	▲	Potassium acetate	●	**Vinyl acetate**	●
Borax	●	Formic acid 85%	●	Potassium carbonate	●	**Water**	●
Boric acid	●	Freon 12	▲	Potassium chlorate	●	Water-glass	●
Brine	●	Freon 22	▲	Potassium chloride	●	White Spirit	●
Boiler feed water (alkaline)	●	Fuel gases	■	Potassium chromium sulfate	●	**Xylol**	●
Butane	▲	**Generator gas**	▲	Potassium cyanide	●		
Butanol	■	Glycerol	●	Potassium dichromate	●		
Butanone	■	Glacial acetic acid	●	Potassium hydroxide	●		
Butyric acid	■	**Heating oil**	●	Potassium hypochloride	●		
Butyl acetate	■	Heptane	▲	Potassium iodide	●		
Butyl alkohol	■	Hydraulic oil (mineral)	●	Potassium nitrate	●		
Butylamine	■	Hydraulic oil (phosphat ester)	●	Potassium nitrate (salpetre)	●		
Calcium chloride	●	Hydraulic oil (glycol based)	●	Potassium permanganate	●		
Calcium hydroxide	●	Hydrazine hydrate	●	Propane	▲		
Calcium hypochlorite	●	Hydrochloric acid 20%	●	Pyridrine	■		
Calcium sulfate	●	Hydrochloric acid 37%	●	**Rapeseed oil**	●		
Castor oil	●	Hydrofluoric acid 10%	●	**Salicylic acid**	●		
Carbolic acid	●	Hydrofluoric acid 40%	■	Salt (rock salt, common salt)	●		
Carbon disulfide	■	Hydrogen	●	Seawater	●		
Carbon tetrachloride	■	Hydrogen chloride (dry)	●	Silicone oil	●		
Chlorine (wet)	▲	Hydrogen peroxide	●	Skydrol 500	●		
Chlorine (dry)	■	**Isooctane**	●	Soap	●		
Chlorine ethyl	■	Isopropyl alcohol	■	Soda	●		
Chlorine methyl	▲	**Kerosene**	●	Sodium aluminate	●		
Chlorine water	●	**Lactic acid 50%**	●	Sodium bisulfite	●		

● Resistant
■ Condit. recommended
▲ Not recommended

MILAM PSS INSTALLATION NOTES

Please observe the general installation notes for sealing material. The following special notes represent important information for the correct use of sealing material. MILAM PSS is a special high temperature sealing material up to 900°C and higher. It is laminated from mica and a perforated stainless steel reinforcement. Mica is an alimino silicate and can consist of different mixed crystals. Because of its lamellar structure, the comosition can be pictured as a compilationof small lamina. A small amount of silicone resin serves as bonding agent.

DRY INSTALLATION

Milam PSS must be absolutely not be installed moist. If a gasket becames wet by the sealing surfaces before compression, e.g. because of water residues from previous pressure test, it must be replaced. Likewise, greases or pastes may not be used on the sealing surface.

TIGHTNESS

Because of it composition, MILAM PSS requires greater than normal gasket load to became gas-tight. A minimum value of approx. 40MPa should be aimend at. In the flange area, tongue/groove flanges and possibly also male/female flanges or higher pressure levels from the ANSI range are required for this purpouse.
MILAM PSS is therfore also well suitable for tongue/groove connection. Appropriate contact pressures should be observed with constructed connections. Lower contact pressures are normaly sufficient for exhaust gas systems because the internal pressure are very low. Please note our diagrams for thickness reduction and tightness in the brochure. Please note also that the mounted connection must be heated to at last 100°C to perform good adaptation of the gasket and achieve good tightnesses. Whitout this heating process, the sealing connection will exhibit leakages even with highest compressions when performing e leakage test with leak detection spry.
The diagrams printed in this data sheet provide you with guide values regarding compression, leakage and temperature behavior. Please contact us if larger gasket dimension need to be made up of sevreal segments. We have already successfully realized segment gaskets with over 6 m in diameter.

ATTENTION: Values obtained from tests carried out on normal flanged joints where the support surface is much greater than the thickness. For gaskets with a small band (e.g. fittings, ...) it is necessary to carry out field tests.
Values derived from tests performed on a normal flanged joint where the surface of the support is much greater than the thickness. For small-band gaskets (for example fittings, ...), specific application tests must be performed.

APPROVALS

The products we make are obtained with a cold cutting process which does not alter the chemical/physical properties of the material. However, it is a NON-aseptic industrial process which can leave traces of powders (Talc, ...) which do not alter its properties. Cleaning/sterilization is therefore necessary before use where necessary.

ATTENTION: The gaskets and our products in general are not safety devices. Where there are dangers to the safety of people (high pressures, high temperatures, dangerous fluids, ...) provide additional certified safety devices.

It is the task of the system designer to choose the appropriate type of material and evaluate any dangers of breakage of the product (gasket, strip, bumpers, ...) and prevent them.

Approvals:

DNV GL