thoenes® SP TRD 401

thoenes® SP TRD 401 is a gasket material based on graphite with tanged stainless steel sheet insert. The tanged stainless steel sheet insert achieves a higher surface load and protection against blowing out. The material has excellent chemical, thermal and mechanical resistance. Due to its excellent properties, it is used in many industrial sectors, in gas and steam supply as well as in the chemical and petrochemical industry.

Basis: Expanded natural graphite (purity > 99 %), tanged stainless steel sheet insert

Colour: Black

Surface coating: Standard - without non-stick coating

Certifications: DIN-DVGW, KTW, HTB

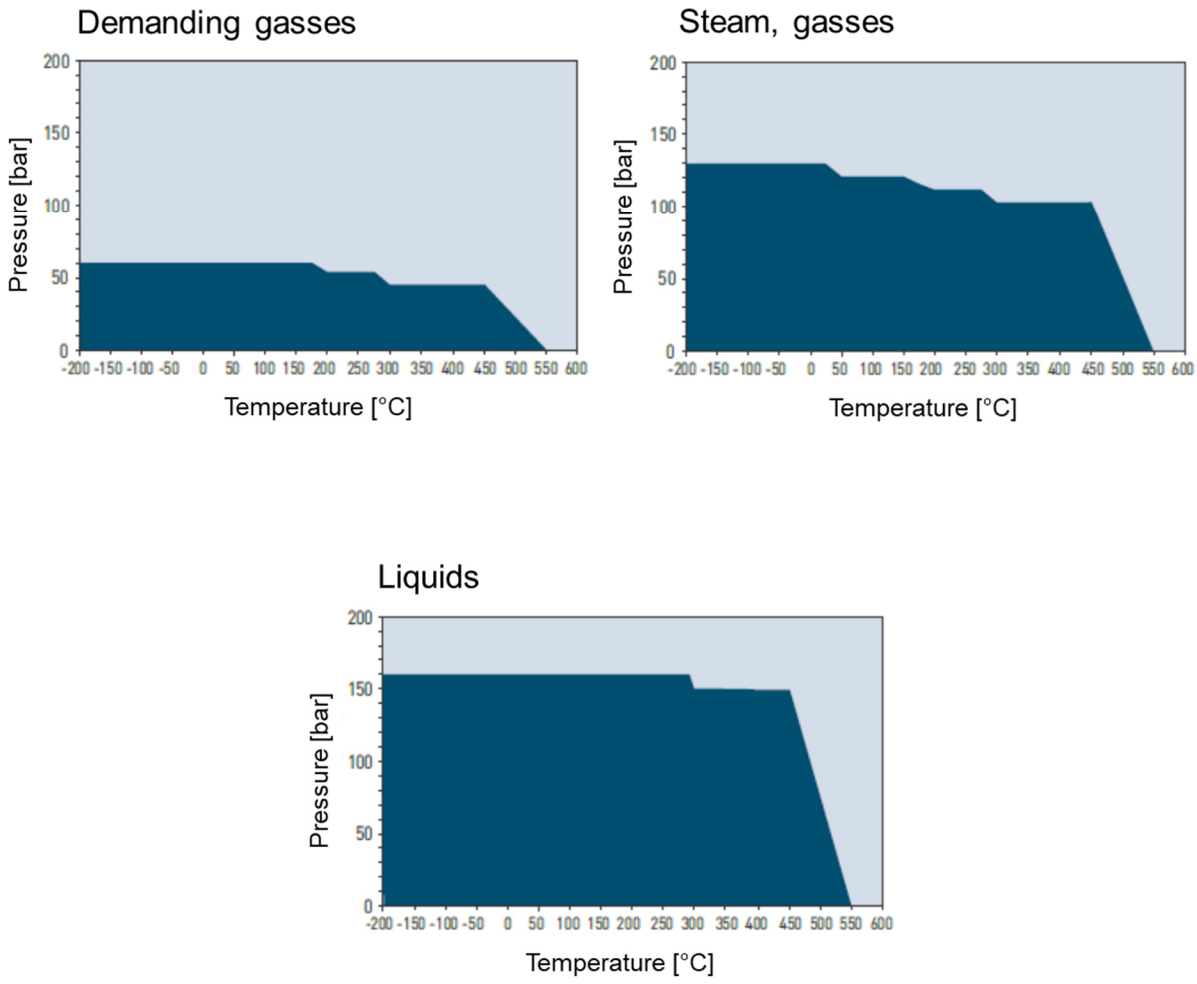
Applications: Use in gas supply, compressors and pumps. Ideal sealing material under high temperatures and pressures, during mechanical and thermal cycles and shock loads. Expanded graphite is suitable for steam and for almost all chemical media, except for strongly oxidizing, such as nitric and chromic acid.

Technical specifications (typical values 2 mm thickness)

Description	DIN 28091-4		GR-10-0-1M-Cr
Density	DIN 28090-2	g/cm³	1.5
Compressibility	ASTM F 36/A	%	35
Resilience	ASTM F 36/A	%	17
Pressure resistance	DIN 52913		
50 MPa, T= 300°C, 16 h		MPa	49
Specific leakage rate	DIN 3535/6	mg/m*s	0.05
Leachable chloride content	FSA NMG 202	ppm	20
Leachable fluoride content	FSA NMG 203	ppm	20
Ash content of graphite	DIN 51903	%	< 1
Cold compression value ε KSW	DIN 28090-2	%	34
Cold rebound value ε KRW	DIN 28090-2	%	4.2
Warm setting value ε WSW/300 °C	DIN 28090-2	%	1,2
Warm rebound value ε WRW/300°C	DIN 28090-2	%	3.3
Operating conditions			
Minimum temperature		°C	-200
Continuous temperature			
Oxidizing atmosphere		°C	550
Reducing or inert atmosphere		°C	700
Pressure			
Demanding gasses		bar	60
Steam, gasses		bar	130
Liquids		bar	160

Dimensions: Plate sizes * 1000 mm x 1000 mm; 1500 mm x 1500 mm
Thicknesses * 0.5 mm; 1.0 mm; 1.5 mm; 2.0 mm; 3.0 mm
* Different sizes and thicknesses on request

Recommendations for use



General suitability - Under common installation practices and chemical compatibility.

Limited suitability – Technical consultation is mandatory.

The indicated temperatures and pressures are peak values and should not be used simultaneously. The information can only serve as a guideline, as these are not only dependent on the sealing material, but also on the installation conditions. Very important influencing factors are: seal thickness, type of medium, flange type and surface stress. Special care should be taken with steam applications. In case of doubt, our experts are always ready to find the optimal sealing solution for the application.

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Chemical resistance chart

Legend

- ☑ Resistant
- ☑ Resistance/ recommendation depends on operation conditions
- ☑ Not resistant

Substance				Substance				Substance			
Acetamide	☐	☑	☐	Dioxane	☑	☐	☐	Oleic acid	☑	☐	☐
Acetic acid, 10 %	☑	☐	☐	Diphyl (Dowtherm A)	☑	☐	☐	Oleum (Sulfuric acid, fuming)	☐	☐	☑
Acetic acid, 100 % (Glacial)	☐	☑	☐	Esters	☑	☐	☐	Oxalic acid	☐	☑	☐
Acetone	☑	☐	☐	Ethane (gas)	☑	☐	☐	Oxygen (gas)	☑	☐	☐
Acetonitrile	☑	☐	☐	Ethers	☑	☐	☐	Palmitic acid	☑	☐	☐
Acetylene (gas)	☑	☐	☐	Ethyl acetate	☑	☐	☐	Paraffin oil	☑	☐	☐
Acid chlorides	☐	☑	☐	Ethyl alcohol (Ethanol)	☑	☐	☐	Pentane	☑	☐	☐
Acrylic acid	☑	☐	☐	Ethyl cellulose	☑	☐	☐	Perchloroethylene	☑	☐	☐
Acrylonitrile	☑	☐	☐	Ethyl chloride (gas)	☑	☐	☐	Petroleum (Crude oil)	☑	☐	☐
Adipic acid	☑	☐	☐	Ethylene (gas)	☑	☐	☐	Phenol (Carbolic acid)	☑	☐	☐
Air (gas)	☑	☐	☐	Ethylene glycol	☑	☐	☐	Phosphoric acid, 40 %	☐	☑	☐
Alcohols	☑	☐	☐	Formaldehyde (Formalin)	☑	☐	☐	Phosphoric acid, 85 %	☐	☑	☐
Aldehydes	☑	☐	☐	Formamide	☑	☐	☐	Phthalic acid	☑	☐	☐
Alum	☐	☑	☐	Formic acid, 10 %	☐	☑	☐	Potassium acetate	☑	☐	☐
Aluminium acetat	☐	☑	☐	Formic acid, 85 %	☐	☑	☐	Potassium bicarbonate	☑	☐	☐
Aluminium chlorate	☐	☑	☐	Formic acid, 100 %	☐	☑	☐	Potassium carbonate	☑	☐	☐
Aluminium chloride	☐	☐	☑	Freon-12 (R-12)	☑	☐	☐	Potassium chloride	☑	☐	☐
Aluminium sulfate	☑	☐	☐	Freon-134a (R-134a)	☑	☐	☐	Potassium cyanide	☑	☐	☐
Amines	☑	☐	☐	Freon-22 (R-22)	☑	☐	☐	Potassium dichromate	☐	☑	☐
Ammonia (gas)	☑	☐	☐	Fruit juices	☑	☐	☐	Potassium hydroxide	☑	☐	☐
Ammonium bicarbonate	☑	☐	☐	Fuel oil	☑	☐	☐	Potassium iodide	☑	☐	☐
Ammonium chloride	☐	☑	☐	Gasoline	☑	☐	☐	Potassium nitrate	☑	☐	☐
Ammonium hydroxide	☑	☐	☐	Gelatin	☑	☐	☐	Potassium permanganate	☐	☑	☐
Amyl acetate	☑	☐	☐	Glycerine (Glycerol)	☑	☐	☐	Propane (gas)	☑	☐	☐
Anhydrides	☑	☐	☐	Glycols	☑	☐	☐	Propylene (gas)	☑	☐	☐
Aniline	☑	☐	☐	Helium (gas)	☑	☐	☐	Pyridine	☑	☐	☐
Anisole	☑	☐	☐	Heptane	☑	☐	☐	Salicylic acid	☑	☐	☐
Argon (gas)	☑	☐	☐	Hydraulic oil (Glycol based)	☑	☐	☐	Seawater/ brine	☐	☑	☐
Asphalt	☑	☐	☐	Hydraulic oil (Mineral type)	☑	☐	☐	Silicones (oil/ greases)	☑	☐	☐
Barium chloride	☐	☑	☐	Hydraulic oil (Phosphate ester based)	☑	☐	☐	Soaps	☑	☐	☐
Benzaldehyde	☑	☐	☐	Hydrazine	☑	☐	☐	Sodium aluminate	☑	☐	☐
Benzene	☑	☐	☐	Hydrocarbons	☑	☐	☐	Sodium bicabonate	☑	☐	☐
Benzoic acid	☑	☐	☐	Hydrochloric acid, 10 %	☐	☐	☑	Sodium bisulfite	☑	☐	☐
Bio-diesel	☑	☐	☐	Hydrochloric acid, 37 %	☐	☐	☑	Sodium carbonate	☑	☐	☐
Bio-ethanol	☑	☐	☐	Hydrofluoric acid, 10 %	☐	☐	☑	Sodium chloride	☑	☐	☐
Black liquor	☐	☑	☐	Hydrofuoric acid, 48 %	☐	☐	☑	Sodium cyanide	☑	☐	☐
Borax	☑	☐	☐	Hydrogen (gas)	☑	☐	☐	Sodium hydroxide	☑	☐	☐
Boric acid	☑	☐	☐	Iron sulfate	☑	☐	☐	Sodium hypochlorite (Bleach)	☐	☐	☑
Butadiene (gas)	☑	☐	☐	Isobutane (gas)	☑	☐	☐	Sodium silicate (Water glass)	☑	☐	☐
Butane (gas)	☑	☐	☐	Isooctane	☑	☐	☐	Sodium sulfate	☑	☐	☐
Butyl alcohol (Butanol)	☑	☐	☐	Isoprene	☑	☐	☐	Sodium sulfide	☐	☑	☐
Butyric acid	☑	☐	☐	Isopropyl alcohol (Isopropanol)	☑	☐	☐	Starch	☑	☐	☐
Calcium chloride	☐	☑	☐	Kerosene	☑	☐	☐	Steam	☑	☐	☐
Calcium hydroxide	☑	☐	☐	Ketones	☑	☐	☐	Stearic acid	☑	☐	☐
Carbon dioxide (gas)	☑	☐	☐	Lactid acid	☐	☑	☐	Styrene	☑	☐	☐
Carbon monoxide (gas)	☑	☐	☐	Lead acetate	☑	☐	☐	Sugars	☑	☐	☐
Cellosolve	☑	☐	☐	Lead arsenate	☑	☐	☐	Sulfur	☑	☐	☐
Chlorine (gas)	☐	☑	☐	Magnesium sulfate	☑	☐	☐	Sulfur dioxide (gas)	☑	☐	☐
Chlorine (in water)	☐	☐	☑	Maleic acid	☑	☐	☐	Sulfuric acid, 20 %	☐	☐	☑
Chlorobenzene	☑	☐	☐	Malic acid	☐	☑	☐	Sulfuric acid, 98 %	☐	☐	☑
Chloroform	☑	☐	☐	Methane (gas)	☑	☐	☐	Sulfuryl chloride	☐	☐	☑
Chloroprene	☑	☐	☐	Methyl alcohol (Methanol)	☑	☐	☐	Tar	☑	☐	☐
Chlorosilanes	☐	☑	☐	Methyl chloride (gas)	☑	☐	☐	Tartaric acid	☐	☑	☐
Chromic acid	☐	☐	☑	Methylene dichloride	☑	☐	☐	Tetrahydrofuran (THF)	☑	☐	☐
Citric acid	☐	☑	☐	Methyl ethyl ketone (MEK)	☑	☐	☐	Titanium tertachloride	☐	☐	☑
Copper acetate	☑	☐	☐	N-Methyl-pyrrolidone (NMP)	☑	☐	☐	Toluene	☑	☐	☐
Copper sulfate	☑	☐	☐	Milk	☑	☐	☐	2,4-Toluenediisocyanate	☑	☐	☐
Creosote	☑	☐	☐	Mineral oil (ASTM no. 1)	☑	☐	☐	Transformer oil (Mineral type)	☑	☐	☐
Cresols (Cresylic acid)	☑	☐	☐	Motor oil	☑	☐	☐	Trichloroethylene	☑	☐	☐
Cyclohexane	☑	☐	☐	Naphtha	☑	☐	☐	Vinegar	☑	☐	☐
Cyclohexanol	☑	☐	☐	Nitric acid, 10 %	☐	☑	☐	Vinyl chloride (gas)	☑	☐	☐
Cyclohexanone	☑	☐	☐	Nitric acid, 65 %	☐	☑	☐	Vinylidene chloride	☑	☐	☐
Decalin	☑	☐	☐	Nitrobenzene	☑	☐	☐	Water	☑	☐	☐
Dextrin	☑	☐	☐	Nitrogen (gas)	☑	☐	☐	White spirits	☑	☐	☐
Dibenzyl ether	☑	☐	☐	Nitrous gases (NO_x)	☐	☑	☐	Xylenes	☑	☐	☐
Dibutyl phthalate	☑	☐	☐	Octane	☑	☐	☐	Xylenol	☑	☐	☐
Dimethylacetamide (DMA)	☑	☐	☐	Oils (Essential)	☑	☐	☐	Zinc sulfate	☑	☐	☐
Dimethylformamide (DMF)	☑	☐	☐	Oils (Vegetable)	☑	☐	☐		☐	☐	☐

The recommendations made here serve only as a guideline for the selection of a suitable gasket. Since the function and durability of a gasket depends on a large number of factors, the information provided cannot be used to substantiate warranty claims. If there are special approval regulations, these must be observed.