
# thoenes® SF TRD 401

***thoenes***® SF TRD 401 is a gasket material based on expanded graphite with excellent chemical and thermal resistance. Due to the very high creep resistance and the very high compressibility, the sealing material can be used under demanding conditions in the chemical and petrochemical industry.

**Basis:** Expanded natural graphite (purity > 99 %)

**Colour:** Black

**Surface coating:** Standard - without non-stick coating

**Certifications:** DIN-DVGW, KTW, HTB

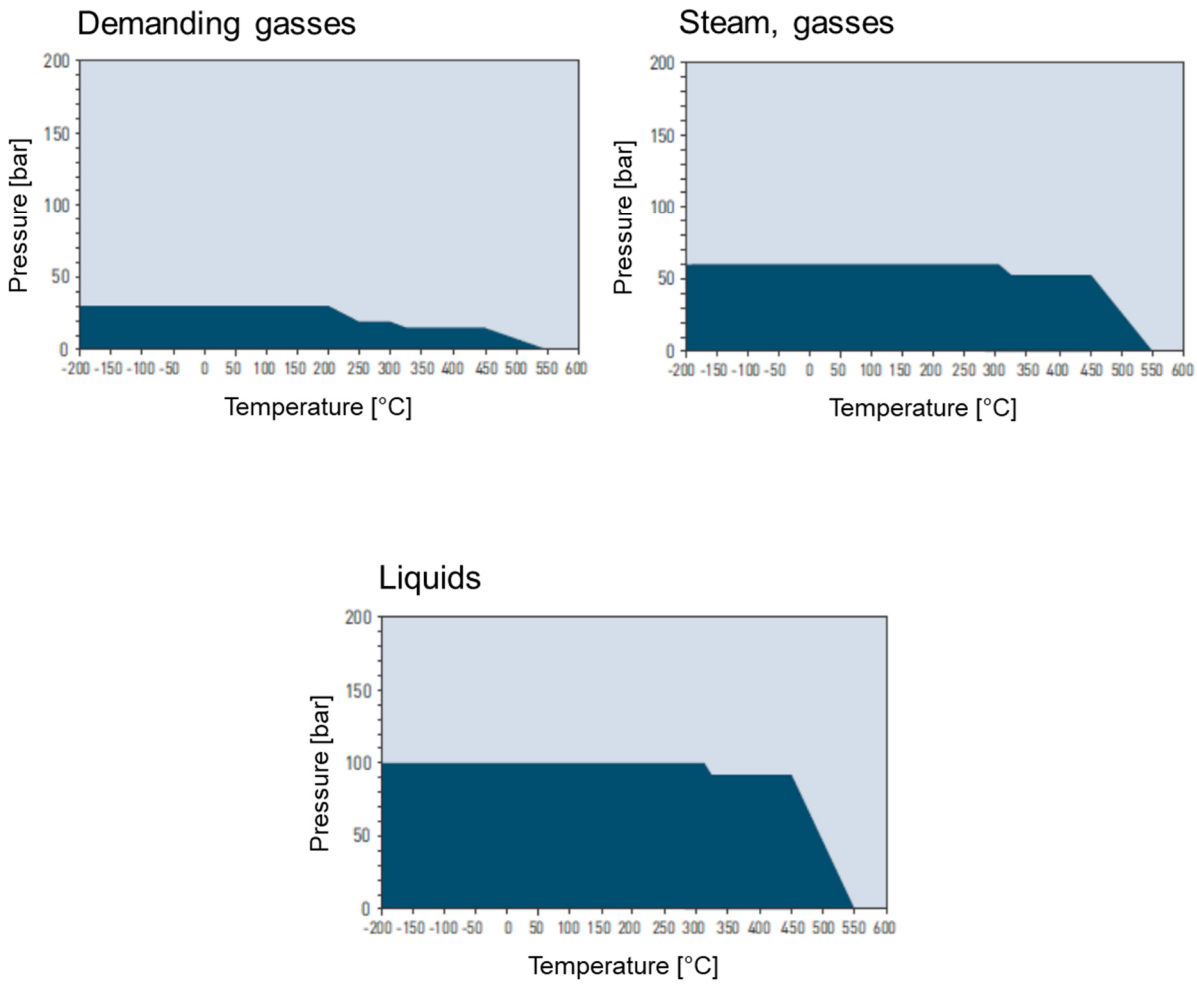
**Applications:** Use in gas supply, compressors and pumps. Ideal sealing material under high temperatures and pressures, during mechanical and thermal cycles and shock loads. Expanded graphite is suitable for steam and for almost all chemical media, except for strongly oxidizing, such as nitric and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

## Technical specifications (typical values 2 mm thickness)

| | | | |
|---|---|---|---|
| **Description** | DIN 28091-4 | | GR-10-O-O |
| **Density** | DIN 28090-2 | g/cm³ | 1.0 |
| **Compressibility** | ASTM F 36/A | % | 45 |
| **Resilience** | ASTM F 36/A | % | 13 |
| **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 | % | 41 |
| **Cold rebound value ε KRW** | DIN 28090-2 | % | 5,0 |
| **Warm setting value ε WSW/300 °C** | DIN 28090-2 | % | 0.9 |
| **Warm rebound value ε WRW/300°C** | DIN 28090-2 | % | 4.0 |
| **Operating conditions** | | | |
| Minimum temperature | | °C | -200 |
| Continuous temperature | | | |
| Oxidizing atmosphere | | °C | 550 |
| Reducing or inert atmosphere | | °C | 700 |
| Pressure | | | |
| Demanding gasses | | bar | 30 |
| Steam, gasses | | bar | 60 |
| Liquids | | bar | 100 |

**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.*

# thoenes® SF

thoenes®

## 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.