JUNTAS BESMA

Gasket materials are designed for fabrication of fl t gaskets covering a wide range of industrial applications, providing sealing performance with a variety of specific tions. With heightened awareness of safety and environmental issues, reducing emissions from flange assemblies has become a major priority for industry. I

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Compressed Synthetic Fibre Gasket Materials

FASIT®

FASIT is a line of highly versatile gasket sheet materials, widely used with pipes and pressure vessels thanks to the ability to effectively seal over an extremely broad range of service conditions.

FASIT CSF jointing sheets are manufactured from a viscous granular mixture of high-strength short fib es, heat-resistant filler , elastomeric binders and various chemicals, which is vulcanised into sheet form under the pressure of two counter-rotating steel rollers (calenders).

The e ectiveness of FASIT gaskets is due to their resistance against plastic deformation, provided by the network of reinforcing fib es interlocked with the filler and the elastomeric matrix.

Fibres

The reinforcing fib es are the most crucial components.

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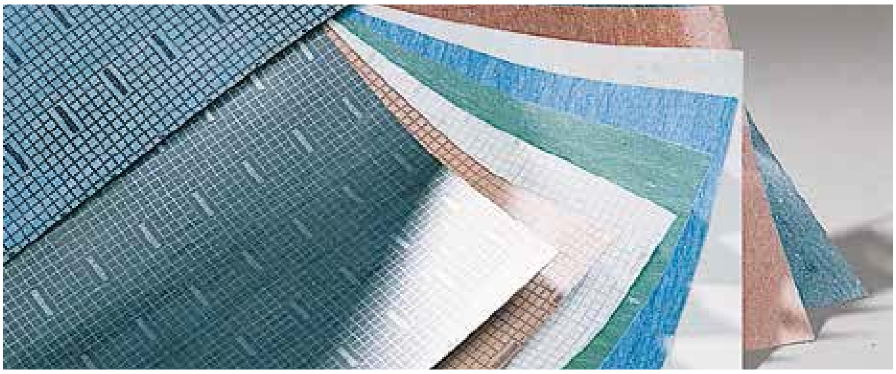
They must have high modulus and tensile strength, thermal and chemical stability, and capacity to hook up to the other ingredients.

Several types of fib es have been tested over the intervening years since asbestos was banned in the early 1990's. The best performances have been shown by aramid fib es (i.e. Dupont's Kevlar®), specificall poly-para-phenylene-terephthalamide fib es. These fib es make a percentage, typically ranging from 7 to 15%, of the mixture in the form of "pulp" of short fib es that undergo a process of fib illation, which leads to the formation of thin branches (fib ils).

Micro-photo of aramid Kevlar® (right) and inorganic (left) fibre in a FASIT sheet. Well-opened fibrils on the Kevlar® fibre surface allow interlocking with the elastomeric matrix, thereby imparting to the material excellent resistance against plastic deformation. This characteristic results in high stress retention and sealing performance of the gasket.

Fibrils drastically increase the specifi surface of the fib e, so enhancing their interlocking with the other components. Fibres are also doped with chemicals that a ect their surface electrostatic charge, in order to improve their mixing within the elastomeric matrix.



Aramid fib es owe their excellent thermal, chemical and mechanical properties to their chemical composition: carbon-nitrogen double bonds provide stiffness o the polymeric chain, which develops along ordered parallel planes.

Such a structure is, however, subject to attack by steam, which hydrolyzes the inter-molecular bonds, and by strong acids and alkalis. When such media are present, the integrity of aramid fib es is left up to the shield provided by the rubber matrix.

Glass, mineral, and carbon fib es withstand higher temperature compared to aramid fib es, but they are more brittle, have no fib ils (that is less interlocking ability), and have a tendency to line along the rolling direction during the calendering process, which leads to mechanical anisotropy in the sheets. As a consequence they are used always in combination with aramid fib es in FASIT styles that are suitable for steam and high temperature applications.
For applications with non-aggressive media at low temperature, organic fib es such as polyester and cellulose are used in price-e ective products.

Binders
The elastomeric binder typically represents 10 to 25% of the sheet weight. Only certain types of rubber can be used, in relation to their rheological properties and ability to wet fib es and filler .
Most common binders are NBR, SBR, NR, CR, EPDM and CSM. In a CSF gasket it is essentially the binder that blocks the path of the sealed medium by closing the porosity between fib es and filler , and by matching and filling up all th irregularities of the flange fa es.

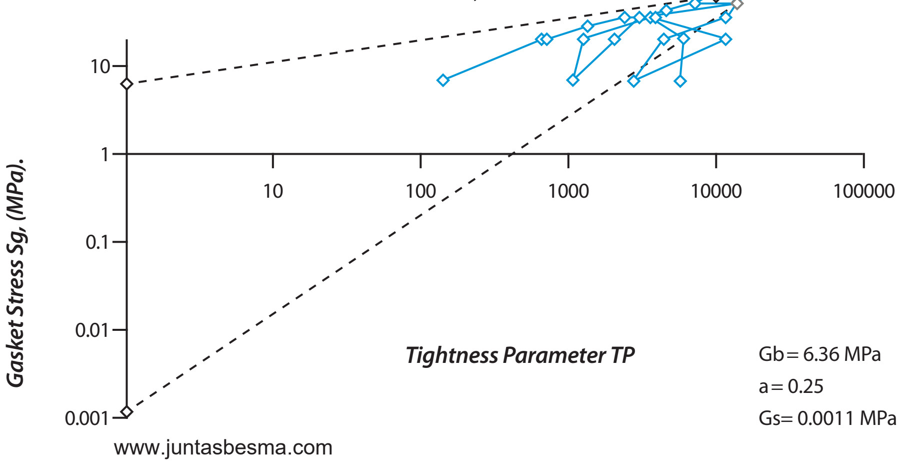
Moreover, it protects the gasket fib es and fillers f om chemical attack.
The softening of the binder between 100 and 150°C is beneficial o gasket tightness, as it helps the binder to fl w and fill up all po osity. Above this temperature, however, and over time, the binder starts to harden. Nevertheless, since the gasket mechanical properties are provided by the fib es, this e ect does not hinder the gasket performance.

In conclusion, the binder is selected essentially with reference to the chemical resistance that it will impart to the gasket. CSM or EPDM binders are used in CSF styles that must operate in chemically-aggressive environments.

Fillers
The fillers (70 - 80% in eight) have their own relevance too, essentially linked to their shape, specific su face ad electrostatic charge: all factors that a ect their ability to intimately mix with the reinforcing fib es.
Their structure can be fib ous (rock wool, glass wool, ceramics), fla y (graphite), or granular (kaolin, sulphates, oxide particles, etc.), with dimensions that range from sub-micron to hundreds of microns, and a specific su face that can exceed 100 m2/g, as it is the case for micro-porous active silica.

Inserts
The composition of some CSF styles includes reinforcing inserts, such as wire net or mesh, or metallic perforated sheet: such inserts increase the capacity of the gasket to withstand compressive load and therefore extend its suitability to higher service pressure.

ROTT Test: **FASIT OMNIA** • Thickness mm. 1,5.



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FASIT®

Sheet Style	202	205	OIL	OMNIA
Composition	Cellulose and synthetic fib es, NBR.	Synthetic fib es, NBR.	Aramid fib es, NBR.	Aramid fib es, NBR.
Main characteristics and applications	Price e ective. Suitable for thermo-hydraulic applications at low bolt loads. For use with water, oils, alcohols and glycols.	Suitable for water and acqueous solutions, oils, fuels, alcohols, glycols, weak alkalis and organic acids at low bolt loads.	Suitable for water and acqueous solutions, oils, fuels, alcohols, glycols, weak alkalis and organic acids.	Universal purpose in the oil, energy and chemical industries. Oils, fuels, solvents, gases, cooling agents, alcohols, weak alkalis, organic acids. Excellent sealability.
Recommended Service Limits (°C)*				
Max. short term temperature	180	200	280	350
Max. continuous temperature with non-aggressive media	140	150	220	250
Max. continuous temperature with steam	120	120	180	200
Max. operating pressure (bar)	40	60	80	100
Stress retention (N/mm2) - DIN 52913				
16 hrs, 175°C, 50 N/mm2	20	23	25	28
16 hrs, 300°C, 50 N/mm2			20	22
Specific leakage rate (mg/m.sec) DIN 3535/6	0.08	0.08	0.07	0.05
Compressibility (%) - ASTM F36	5 ÷ 10	5 ÷ 10	5 ÷ 10	5 ÷ 10
Recovery (%) - ASTM F36	50	50	45	55
Tensile strength - across grain (N/mm2) - DIN 52910	7	8	9	11
Thickness increase after immersion (%) - ASTM F146				
Oil IRM 903 for 5 hrs at 150°C	10	10	8	8
ASTM Fuel B for 5 hrs at 23°C	10	10	8	8
Specifications	FDA 21 CFR/175.300, DVGW KTW for use with alimentary.	DIN 28091 FA-Z1-0.	DIN 28091 FA-A1-0 DVGW DIN 3536/6, KTW, W270, WRAS WQc, TA-Luft (VDI 2440) Germanische Lloyd	DIN 28091 FA-A1-0 BS 7531 grade Y DVGW DIN 3536/6, KTW, W270, WRAS WQc, BAM (oxygen) TA-Luft (VDI 2440) Germanische Lloyd.

* Service limits are given for proper seating conditions and gasket design. Max. temperature and pressure limits do not apply simultaneously. Lower limits must be considered when sealing aggressive media, or when thermal or mechanical disturbances are relevant.

Standard Supply Data

- **Sheet size:** 1,500 x 1,500 mm.
  Upon request: 1,500 x 3,000 mm,
  1,500 x 4,500 mm.
  Tolerance: ± 50 mm.
- **Sheet thickness:**
  0.3 ÷ 5 mm. - *Tolerance: ± 10%*

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KEMIT	STEAM	400	400 Fe	HT	CF
Aramid fib es, CSM.	Mineral fib es, Aramid fib es, NBR.	Aramid fib es, NBR lamellar graphite.	Aramid fib es, NBR lamellar graphite, wire insertion.	Glass fib es, Aramid fib es, NBR.	Carbon fib es, Aramid fib es, NBR.
For chemically aggressive media: alkaline solutions, several acids, oils and fuels, alcohols. Since it contains no pigments, it is advised for use with high purity fluid .	Recommended in presence of thermal cycling, saturated or overheated steam. Suitable for oils, fuels and solvents.	Use with dynamic loads, as the embedded graphite flakes p ovides high resistance to temperature and mechanical stress. Suitable for steam, fuels, oils, alkalis and weak acids.	For elevated and flu tuating pressures and temperatures. Suitable for steam, fuels, oils.	Very high temperature applications, in presence of gases, fuels, oils, mild organic and inorganic acids, steam.	Outstanding sealability at high temperatures; gases, hydrocarbon, steam, mild acids and a wide range of strong alkalis. Tightness retention after fi e. Excellent flexibili y.
200	350	350	400	440	400
150	270	280	350	350	300
120	230	250	230	250	280
60	100	100	140	100	100
25	35 30	35 25	39 36	35 30	35 25
0.06	0.06	0.08	0.5	0.08	0.05
5 ÷ 10	5 ÷ 10	5 ÷ 10	5 ÷ 10	5 ÷ 10	5 ÷ 10
45	55	50	55	50	55
10	7	9	25	8	8
HNO_3 40% 18h 23°C: 10% H_2SO_4 65% 48h 23°C: 8%	7 7	5 8	5 8	8 8	7 7
DIN 28091 FA-AZ–0 TA-Luft (VDI 2440).	DIN 28091 FA-GA1–0 BS 7531 grade X DVGW DIN 3536/6, KTW, W270, WRAS WQc, BAM (oxygen).	DIN 28091 FA-AC1–0, BS 7531 grade Y BAM (oxygen).	DIN 28091 FA-AC1–St, BS 7531 grade Y Germanische Lloyd.	DIN 28091 FA-GA1–0, BS 7531 grade X DVGW DIN 3536/6, DVGW VP 401, TA-Luft (VDI 2440) Germanische Lloyd.	DIN 28091 FA-AC1–0, BS 7531 grade X DVGW DIN 3536/6, KTW, VP 401 BAM (oxygen) Germanische Lloyd.

Available Surface Finish

4AS anti-stick coating on both sides is standard in all styles.

PTFE, graphite or silicone coating is available upon request.

Chemical Resistance Chart - FASIT®

The information in this chart is intended to be a guideline for the selection of the suitable gasket quality. Because the function and durability of the products depend upon a number of factors that could not be included in the chart, the data may not be used to support any warranty claims.

- Suitable
- Suitability depends on operating conditions
- Non suitable

Medium	202-205	Oil	Omnia	Kemit	Steam	400	400 FE	HT	CF
Acetaldehyde	Non suitable	Non suitable	Non suitable	Depends	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Acetamide	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Acetic acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Acetic anhydride	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Acetone	Non suitable	Non suitable	Depends	Suitable	Depends	Depends	Non suitable	Depends	Depends
Acetylene	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Acrylic Acid	Non suitable	Non suitable	Non suitable	Depends	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Acrylonitrile	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Adipic acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Air	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Aluminum Acetate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Aluminum Chlorate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Aluminum Chloride	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Aluminum Sulfate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Alums (aluminum potassium sulfate)	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Ammonia, Liquid	Depends	Depends	Suitable	Suitable	Depends	Suitable	Depends	Depends	Suitable
Ammonia, Gas	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Ammonium Bicarbonate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Ammonium Chloride	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Ammonium Hydroxide, Liquid	Depends	Depends	Suitable	Suitable	Suitable	Suitable	Depends	Depends	Suitable
Ammonium Nitrate	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Ammonium Phosphate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Ammonium Sulfate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Amyl Acetate	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Amyl Alcohol	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Aniline, Aniline Oil	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Asphalt	Suitable	Suitable	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable
Barium Chloride	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Barium Hydroxide	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Barium Sulfid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Beer	Depends	Suitable	Suitable	Suitable	Suitable	Depends	Depends	Suitable	Suitable
Benzaldehyde	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Benzene, Benzol	Depends	Depends	Depends	Non suitable	Depends	Depends	Depends	Depends	Depends
Benzoic Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Bio-diesel	Non suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Borax	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Boric Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Butadiene	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Butane	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Non suitable	Suitable	Suitable
Butyl Alcohol	Suitable	Suitable	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable
Butyl Methacrilate	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Butyric Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Calcium Hydroxide (Limewater)	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Calcium Hypochlorite	Non suitable	Non suitable	Non suitable	Depends	Depends	Depends	Non suitable	Depends	Depends
Calcium Nitrate (Lime Salrpeter)	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Carbon Dioxide	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Carbon Disulfid	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Carbon Monoxide	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Carbonic Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Chlorine	Non suitable	Non suitable	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Chlorobenzene	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Chloroethane	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Chloroethylene	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Chloroform (Trichloromethane)	Depends	Depends	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Chromates	Non suitable	Non suitable	Depends	Depends	Non suitable	Non suitable	Non suitable	Depends	Depends
Chromic Acid	Non suitable	Non suitable	Non suitable	Depends	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Citric Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Coke Oven Gas	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Copper Acetate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Copper Chloride	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Copper Sulfate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Cresols, Cresylic Acid	Non suitable	Depends	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Crude Oil	Non suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Cyclohexane	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Cyclohexanone	Non suitable	Non suitable	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Dichloromethane (Methylene chloride)	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Diesel Oil, Diesel Fuel	Suitable	Suitable	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable
Dimethyl Ether	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Dowtherm	Depends	Depends	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Ethane	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Ethyl Acetate	Depends	Depends	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Ethyl Alcohol	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Ethylbenzene	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Ethyl Chloride	Non suitable	Depends	Depends	Non suitable	Depends	Depends	Depends	Depends	Depends
Ethyl Ether	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Ethylene	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Ethylene Glycol	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Ethylene Oxide	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Fuorine, Gas or Liquid	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Formaldehyde	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Formic Acid	Depends	Depends	Suitable	Suitable	Depends	Suitable	Non suitable	Depends	Suitable
Freon 12	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Non suitable	Suitable	Suitable
Freon 22	Non suitable	Depends	Depends	Suitable	Depends	Depends	Non suitable	Depends	Depends
Freon 134a	Non suitable	Suitable	Suitable	Depends	Suitable	Suitable	Non suitable	Suitable	Suitable
Fuel Oil	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Furfurol	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Gasoline	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Glycerine, Glycerol	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Glycol (Mono Ethylen Glycol)	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Grease, Petroleum Base	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Heptane	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Hexane	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Hydraulic Oils	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Hydrazine	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Hydrochloric Acid	Non suitable	Non suitable	Depends	Suitable	Non suitable	Depends	Non suitable	Depends	Depends
Hydrocyanic Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Hydrofluo ic Acid	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Hydrogen	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Hydrogen Fluoride	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Hydrogen Peroxide (Oxygenated Water)	Non suitable	Non suitable	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Hydrogen Sulfid , Dry or Wet	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Isobutane	Suitable	Suitable	Suitable	Depends	Suitable	Suitable	Non suitable	Suitable	Suitable
Isobutyl alcohol	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Isooctane	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Isopropyl Alcohol	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Kerosene (Paraffin Oi	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Lactic Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Lead salts	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Lithium Bromide	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Lubricating Oils, Mineral or Refine	Suitable	Suitable	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable
Magnesium Chloride	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Magnesium Hydroxide	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Magnesium Sulfate	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Maleic Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Maleic Anhydride	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Mercury	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Methane	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Methanol, Methyl Alcohol	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Mathyl Aldehyde (Formaldehyde)	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Methyl Chloride	Non suitable	Depends	Depends	Depends	Depends	Depends	Non suitable	Depends	Depends
Methylene Chloride and Dichloride	Non suitable	Non suitable	Non suitable	Depends	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Methyl Ethyl Ketone (Butanone)	Non suitable	Depends	Depends	Depends	Non suitable	Depends	Non suitable	Depends	Depends
Milk	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Depends	Suitable	Suitable
Mineral Oil ASTM N.1	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Naphta	Depends	Suitable	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable
Nitric Acid	Non suitable	Non suitable	Non suitable	Depends	Non suitable	Non suitable	Non suitable	Non suitable	Depends
Nitrobenzene	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Nitrogen	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Nitrogen Oxide	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Nitromuriatic Acid (acqua ragia)	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Octane	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Oils, animal and vegetable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable
Oleic Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Oxalic Acid	Depends	Depends	Depends	Suitable	Depends	Depends	Depends	Depends	Depends
Oxygen, gas	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Non suitable	Suitable	Suitable
Ozone	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Palmitic Acid	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Para n	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Pentane	Depends	Suitable	Suitable	Suitable	Suitable	Suitable	Depends	Suitable	Suitable
Perchloric Acid	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable	Non suitable
Perchloroethylene	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends	Depends
Petroleum Oils	Suitable	Suitable	Suitable	Depends	Suitable	Suitable	Suitable	Suitable	Suitable

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Medium	202-205	Oil	Omnia	Kemit	Steam	400	400 FE	HT	CF
Phenol	Red	Red	Red	Yellow	Red	Red	Red	Red	Red
Phosgene	Red	Red	Red	Red	Red	Red	Red	Red	Red
Phosphoric Acid	Red	Red	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Phtalic acid	Red	Red	Red	Red	Red	Red	Red	Red	Red
Polyacrilonitrile	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Acetate	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Bicarbonate	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Carbonate (Potash)	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
Potassium Chloride	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Chromate	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Cyanide	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Hydroxide (Caustic Potash)	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Red	Yellow	Green
Potassium Iodide	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Nitrate, Acqueous Solution	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Nitrate, Melt (Saltpeter)	Red	Red	Red	Red	Red	Red	Red	Red	Red
Potassium Sulfate	Red	Yellow	Green	Green	Green	Green	Yellow	Green	Green
Propane	Yellow	Green	Green	Green	Green	Green	Yellow	Green	Green
Propyl Alcohol	Green	Green	Green	Green	Green	Green	Green	Green	Green
Propylene	Red	Red	Red	Red	Red	Red	Red	Red	Red
Prussic acid, Hydrocyanic Acid	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
Salicylic Acid	Green	Green	Green	Green	Green	Green	Green	Green	Green
Silicone Oil	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
Silver Nitrate	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Soap	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sodium Aluminate	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sodium Bicarbonate, Baking Soda	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
Sodium Bisulfate	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sodium Carbonate, Soda	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sodium Chlorate, Acqueous Solution	Red	Red	Red	Red	Red	Red	Red	Red	Red
Sodium Chloride	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sodium Hydroxide	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Sodium Hypochloride (bleach)	Red	Red	Red	Yellow	Red	Red	Red	Red	Red
Sodium Nitrate (Chile Saltpeter)	Red	Red	Red	Red	Red	Red	Red	Red	Red

Medium	202-205	Oil	Omnia	Kemit	Steam	400	400 FE	HT	CF
Sodium Perborate	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Sodium Phosphate	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Sodium Silicate	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Sodium Sulfate	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sodium Sulfid	Green	Green	Green	Green	Green	Green	Green	Green	Green
Stannic Chloride	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Starch	Green	Green	Green	Green	Green	Green	Green	Green	Green
Steam, Saturated	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Steam, Superheated	Red	Red	Red	Red	Yellow	Yellow	Red	Yellow	Yellow
Stearic Acid	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
Styrene	Red	Red	Red	Red	Red	Red	Red	Red	Red
Sugar Solution	Green	Green	Green	Green	Green	Green	Green	Green	Green
Sulfur Dioxide	Red	Red	Red	Red	Red	Red	Red	Red	Red
Sulfuric Acid	Red	Red	Red	Yellow	Red	Red	Red	Red	Yellow
Sulfurous Acid	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Tannic Acid	Green	Green	Green	Green	Green	Green	Green	Green	Green
Tar	Green	Green	Green	Green	Green	Green	Green	Green	Green
Tartaric Acid	Green	Green	Green	Green	Green	Green	Green	Green	Green
Tetrachloroethylene (Perchlorate)	Red	Red	Red	Red	Red	Red	Red	Red	Red
Toluene	Yellow	Green	Green	Green	Green	Green	Green	Green	Green
Transformer Oil (Mineral Type)	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
Trichloroethane	Red	Red	Red	Red	Red	Red	Red	Red	Red
Trichloroethylene	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Urea	Red	Red	Yellow	Green	Yellow	Yellow	Red	Yellow	Yellow
Vinyl Acetate	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Vinyl Methacrylate	Red	Red	Red	Red	Red	Red	Red	Red	Red
Water, Distilled	Green	Green	Green	Green	Green	Green	Green	Green	Green
Water, Seawater	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
Water, Tap	Green	Green	Green	Green	Green	Green	Green	Green	Green
Wines	Yellow	Green	Green	Green	Green	Yellow	Yellow	Green	Green
Xylene	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green
Zinc Chloride	Green	Green	Green	Green	Green	Green	Green	Green	Green
Zinc Sulfate	Green	Green	Green	Green	Green	Green	Green	Green	Green

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Expanded Flexible Graphite Gasket Materials

GRA-FLEX®

Structure
It can be seen as a paradox that graphite, a very soft and pliant substance, is formed of the same element - carbon - which produces the diamond, the hardest material known in nature.

The di erence between the two materials is all in their crystalline structure:
while diamond shows a tetrahedral crystal lattice (sp3 hybridisation) symmetric in the three directions, graphite's structure is hexagonal (sp2 hybridisation), with carbon atoms tightly bonded within the planes and loosely bonded between the planes.

Such an asymmetry is the cause of the peculiar anisotropy found in the mechanical, thermal and electrical properties of the graphite, as well as of its inherent lubricity.

The fla y microstructure of **GRA-FLEX** expanded graphite.

GRA-FLEX is available as homogeneous foil, in roll or sheet format, or as inserted sheet.

GRA-FLEX foil is mainly used for fabrication of laminated gasket sheets, of semi-metallic gaskets, such as spiral-wound, metal-jacketed and kam-profile gasket , of sealing rings and of smooth or corrugated tapes.

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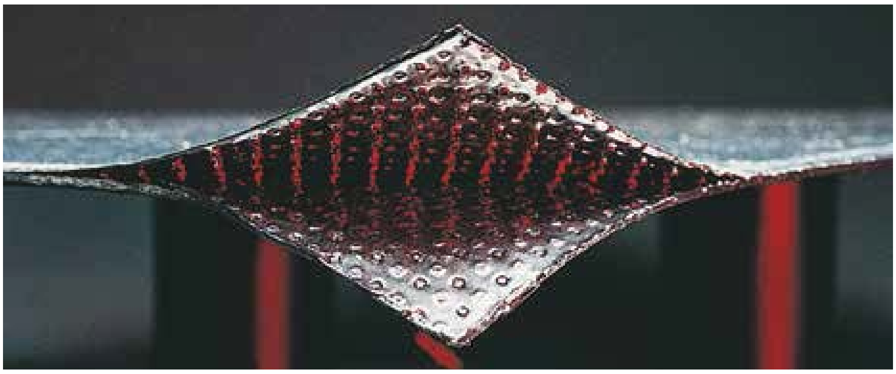
Density
The standard density of GRA-FLEX graphite is 1 g/cm3, but it can be requested in the range 0.7 - 1.3 g/cm3: higher density corresponds to lower gas permeability and higher mechanical strength, but also to lower conformability.

Purity
The purity of graphite is evaluated in terms of its carbon content, or, conversely, in terms of its content of ashes, which represent the residue after burning the graphite in air.



Such ashes contain mainly harmless elements, like silicon and aluminium, but also contaminants, usually residues from the mineral gangue of the natural graphite, such as quartz, silicates or mica: these disturb the orderly laminar structure of the graphite, producing channels and irregular pores that reduce the sealing e ectiveness of the gasket. Moreover, as the ash content increases, the mechanical strength is also reduced and there is a greater risk of corrosion.

For this reason standard grade GRA-FLEX ash content is 1%, that is lower than that of the majority of graphites currently available on the market. In expanded graphite there are usually traces of sulphur, chlorine and fluo ine: under certain conditions, these elements can contribute to activate corrosion processes in metallic assemblies. In such cases, one can use "premium" grade GRA-FLEX, where such impurities are further limited.

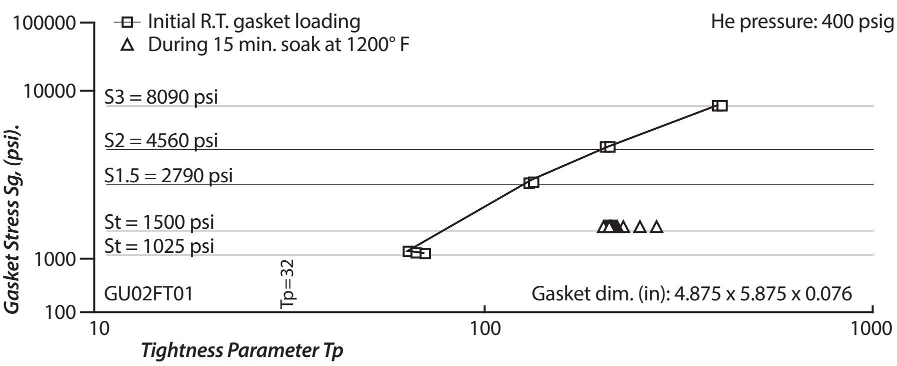
Purity grades of GRA-FLEX® expanded graphite:

Grade:			STANDARD	PREMIUM
Ashes	ASTM C 561	%	< 1	< 0,5
Leachable chloride ions	ASTM F 1277	ppm	< 40	< 20
Leachable fluo ide ions	ASTM F 1277	ppm	< 40	< 20

Properties

- **Thermo-mechanic strength:** this characteristic leads to excellent retention of the gasket stress, even at very high temperature and in presence of thermal and dynamic cycles and shocks. Because the gasket creep is so low, bolt re-tightening is no longer necessary.
- **Chemical resistance:** GRA-FLEX is resistant to most media, including steam, hydrocarbons and most acids. Exceptions are strong oxidizing fluid .
- **Temperature stability:** since the material elasticity is due to its own physical structure and not to elastomeric components, this remains suitable from cryogenic (-200°C) to extremely high temperatures (+3000°C in inert or reducing atmosphere).
- **Conformability:** GRA-FLEX good conformability allows its use with practically any type of flang , including light, very large size, irregular and poorly planar flange , without the need of high gasket thickness.
- **No ageing:** GRA-FLEX does not lose its resiliency with time, either in storage or in service, even if exposed at high temperature. GRA-FLEX gaskets are thus recommended for joints that may relax over time.
- **Fire resistance:** being free of organic components, GRA-FLEX gaskets are ideal for applications where the seal must be retained during and after a fi e, such as with toxic or flammable media
- **Health safety:** GRA-FLEX does not contain toxic components, nor any type of fib es.

GRA-FLEX GR 1/16" Thick Sheet Gasket. Gasket Stress vs Tightness for Entire Test.



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GRA-FLEX®

Inserted Sheet Style	S	GR	R
Insert	None.	Perforated tanged stainless steel sheet 0.10 mm thick.	Smooth stainless steel AISI 316 sheet 0.05 mm thick.
Main characteristics and applications	Typically used as fille for semi-metallic gaskets. It can be used also for gaskets where no insert is required.	Universal purpose for a high temperature and pressure applications, in presence of mechanical and thermal cycles and shocks. Suitable for steam, hydrocarbons and most chemicals.	High temperature applications. Very homogeneous distribution of the assembly load. Easy to cut and handle.
Max. operating temperature (°C)*			
Medium: air or oxidizing media	450	450	450
Medium: reducing or inert, but joint exposed to air	550	550	550
Medium and joint atmosphere: reducing or inert	3000	700	700
Max. operating pressure (bar)*	80	120	80
Stress retention (N/mm2) - DIN 52913 16 hrs, 300°C, 50 N/mm2	49	49	>48
Specific leakage rate (mg/m.sec) DIN 3535/6	0.05	0.08	0.05
Compressibility (%) - ASTM F36	40 ÷ 50	35 ÷ 45	40 ÷ 50
Recovery (%) - ASTM F36	10 ÷ 15	15 ÷ 20	10 ÷ 15
Compression modulus (%) DIN 28090/2			
at room temp. ε_{KSW}	45	32	41
at elevated temp. $\varepsilon_{WSW/300°C}$	< 4	1.2	1.1
Percentage creep relaxation (%) DIN 28090/2			
at room temp. ε_{KRW}	4.5	4.5	4.5
at elevated temp. $\varepsilon_{WRW/300°C}$	4.5	4	4
Recovery R (mm)	0.08	0.085	0.08
Specifications	DIN 28091-4 GR-O-0.	DIN 28091-4 GR-O-1M-Cr FITT fi e-safety.	DIN 28091-4 GR-O-1K-Cr.

* Service limits are given for proper seating conditions and gasket design. Max. temperature and pressure limits do not apply simultaneously. Lower limits must be considered when sealing aggressive media, or when thermal or mechanical disturbances are relevant.

Standard Supply Data

All standard sheet styles are made with “standard” grade GRA-FLEX, but they are also available from “premium” grade.

S style density: 1 g/cm3
Upon request: 0.7 ÷ 1.3 g/cm3
Tolerance: ± 5%

- **Sheet size:**
  1,000 x 1,000 or 1,500 x 1,500 mm.
  Tolerance: ± 50 mm.

RX	G	N	AUTO	ALU
Multiple smooth stainless steel AISI 316 sheets 0.05 mm thick.	Fiberglass fabric 0.2 mm thick.	Stainless steel wire net.	Perforated tanged carbon steel sheet 0.20 mm thick.	Alluminum foil on both faces.
Multiple stainless steel inserts allow the gasket to withstand very high gasket stresses and, therefore, to be used at very high service pressures.	High temperature and moderate pressure applications. Maximum chemical resistance. Easy to cut and handle.	High temperature applications. Good mechanical strength.	Extra strong insert, mainly used for automotive application.	High temperature and moderate pressure applications. Maximum chemical resistance. Easy to cut and handle.
450	450	450	450	450
550	550	550	550	550
700	600	700	700	650
200	60	80	150	60
49	>45	>48	>48	>48
0.05	0.08	0.08	0.08	0.05
35 ÷ 45	40 ÷ 50	40 ÷ 50	40 ÷ 50	40 ÷ 50
15 ÷ 20	10 ÷ 15	10 ÷ 15	10 ÷ 15	10 ÷ 15
30 ÷ 40	38	35	30	38
< 4	1	1.5	1.5	<4
4	5	4.5	4.5	4.5
4	4.5	4	4	4.5
DIN 28091-4 GR-O-3K-Cr.	DIN 28091-4 GR-O-1K-Z.	DIN 28091-4 GR-O-1M-Cr.	DIN 28091-4 GR-O-1M-St.	DIN 28091-4 GR-O-2K-Al.

- **Sheet thickness:**
  0.5 ÷ 5 mm (depending on styles)
  Tolerance: ± *10%.*
- **Foil roll size:**
  1,000 or 1,500 mm x 50 or 100 m.
  Tolerance: ± 50 mm
- **Foil roll thickness:**
  0.25 ÷ 1 mm.
  Tolerance: ± *5%.*

Anti-stick coating available upon request.

PTFE-based Gasket Materials

GUAFLON®

GUAFLON® line includes several types of PTFE-based gasket sheets, which are designed mainly for application in the chemical, petrol-chemical, food and pharmaceutical industry.

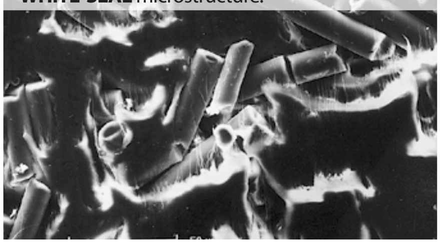
PTFE

The PTFE (poly-tetra-fluo o-ethylene, formula (CF2)n) owes its fundamental characteristic - an outstanding chemical resistance - to a molecular structure in which very long linear chains of carbon atoms are fully wrapped and protected by fluo ine atoms.

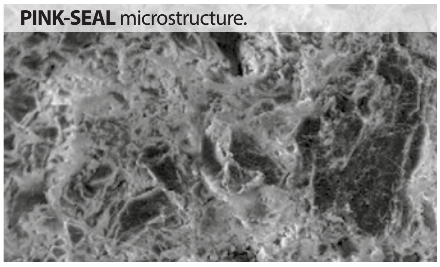
The carbon-fluo ine bond is the strongest of all organic chemistry: as a result, its stability is barely a ected by thermal excitation or chemical attacks.

Because of its structure, the PTFE is resistant to almost all chemicals,

WHITE-SEAL microstructure.



PINK-SEAL microstructure.



SOFT-SEAL microstructure.

exceptions being melt alkaline metals, fluo ine gas, hydrogen fluo ide and materials that can produce these compounds; while its physical properties remain suitable for use throughout an extremely wide range of operative temperatures: from cryogenic values up to about 300°C.

Other characteristics which make PTFE an excellent material for gasket application are:

- excellent ageing resistance
- physiological safety
  - relevant for alimentary use
- no contamination of confined medi
  - relevant for uses with high purity media, i.e. pharmaceutical and painting industry
- anti-stick surface
  - relevant when flange have to be opened frequently
- low abrasion coeffici t
  - relevant for dynamic seals

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Fillers
The main drawback of PTFE is its relatively poor mechanical strength, due to the absence of bonds or electrostatic forces between the molecular chains: this causes gaskets that are made from pure PTFE to be easily a ected by plastic deformation, even at room temperature (cold fl w). In order to overcome this problem, GUAFLON sheets are typically filled with ino ganic particles, such as glass fibers or silica rains, that increase the material stability under compression.

Modified PTFE
Some GUAFLON styles are obtained from a particular variety of PTFE, known “as modified PTFE , whose characteristic is a modific tion in the polymeric structure (integration of the PPVE modifier t low concentration in the polymer linear chain). The advantages of the modifie PTFE are greater strength against compressive stress, higher elasticity, lower porosity and permeability.

A remarkable property of GUAFLON gaskets is in their high tightness effectiveness, defined by low values of gasket constants, resulting in minimized leakage rates.

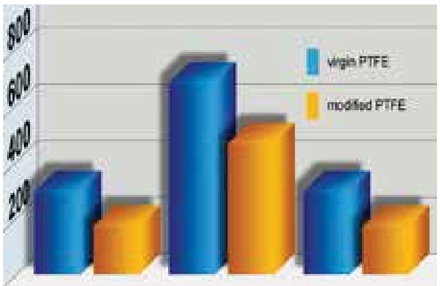
As a consequence, GUAFLON gaskets are especially recommended for the control of fugitive emissions, in presence of polluting or hazardous media.

Expanded PTFE
The expanded PTFE that makes the GUAFLON SOFT-SEAL does not contain filler , but owns its properties to a microscopic cellular structure that leads to outstanding compressibility, especially suitable for application with light, irregular or poorly planar flange . Because expanded PTFE gaskets becomes very thin when assembled between the flange , their ability to retain the gasket stress is excellent even at high loads and temperatures.

Elastic Modulus (N/mm^2)

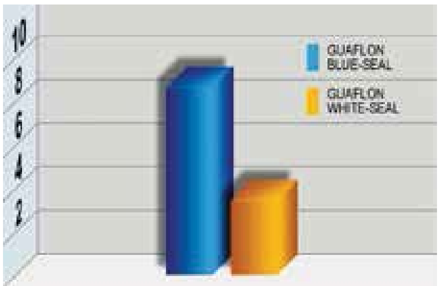
Temperature (°C)

Permeability (cm^3 / m^2 • d • bar)
DIN 53380, sheet thickness: 1mm



SO_2 at 23°C HCl at 50°C Cl_2 at 50°C

Permanent Deformation (%)
15 N/mm^2, 100 hrs, 23°C.



GUAFLON SOFT-SEAL is available not only as sheet, but also in form of sealing tape, designed for joint maintenance, as well as for use with large size flanges, where gaskets obtained from the cutting of sheets would be very expensive.

GUAFLON®

Sheet Style	BLUE-SEAL	WHITE-SEAL	PINK-SEAL	SOFT-SEAL
Composition	Virgin PTFE, glass fib es.	Modified PTF , glass fib es.	Modified PTF , silica fille .	Expanded PTFE.
Main characteristics and applications	Price e ective. Suitable for a wide range of applications with chemicals at low bolt loads.	Universal use for most chemically aggressive media and high tightness requirements.	For high mechanical loads, where superior recovery and compression strength are requested.	Maximum chemical resistance. Suitable for very high pressure. Extra compressibility to match any flang irregularities and assure a tight seal even at low bolt loads.
Recommended Service Limit (°C)*				
Max. short term temperature	260	260	260	315
Max. continuous temperature	210	260	260	270
Max. operating pressure (bar)	60	80	85	200
Stress retention (N/mm2) - DIN 52913 16 hrs, 150°C, 30 N/mm2	14	16	17	23
Specific leakage rate (mg/m.sec) **DIN 3535/6** λ2.0 (30 N/mm2, N2 at 40 bar)	0.05	0.01	0.01	< 0.01
Compressibility (%) - ASTM F36	7 ÷ 15	7 ÷ 15	7 ÷ 15	68
Recovery (%) - ASTM F36	35	45	55	11
Tensile strength - across grain (N/mm2) - DIN 52910	17	12	12	14.5
Compression modulus (%) **DIN 28090/2**				
at room temp. ε_{KSW}	11	7	8	
at elevated temp. $\varepsilon_{WSW/300°C}$	45	37	15	
Percentage creep relaxation (%) **DIN 28090/2**				
at room temp. ε_{KRW}	3	3	3	
at elevated temp. $\varepsilon_{WRW/300°C}$	4	5	4	
Recovery R (mm.) - DIN 28090/2	0.08	0.09	0.07	
Specifications	DIN 28091 TF-G-O	DIN 28091 TF-G-O	DIN 28091 TF-M-O	DIN 28091 TF-O-O FDA 21 CFR/177.1550

* Service limits are given for proper seating conditions and gasket design. Max. temperature and pressure limits do not apply simultaneously. Lower limits must be considered when thermal or mechanical disturbances are relevant.

Standard Supply Data

- **Sheet size:** 1,500 x 1,500 mm.
  Tolerance: ± 50 mm.
- **Sheet thickness:** 0.5 ÷ 3 mm.
  For GUAFLON SOFT-SEAL: 1 ÷ 6 mm
  Tolerance: ± 10%

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Chemical Resistance Chart - GRA-FLEX® & GUAFLON®

	GRAFLEX	GUAFLON			
Medium	All Styles	Blue-Seal	White-Seal	Pink-Seal	Soft-Seal
Acetaldehyde	green	green	green	green	green
Acetamide	green	green	green	green	green
Acetic acid	green	green	green	green	green
Acetic Anhydride	yellow	green	green	green	green
Acetone	green	green	green	green	green
Acetonitrile	green	green	green	green	green
Acetylene	green	green	green	green	green
Acrylamide	green	green	green	green	green
Acrylic Acid	green	green	green	green	green
Acrylic Anhydride	green	green	green	green	green
Acrylonitrile	green	green	green	green	green
Adipic acid	green	green	green	green	green
Air	yellow	green	green	green	green
Aluminum Acetate	green	green	green	green	green
Aluminum Chlorate	green	green	green	green	green
Aluminum Chloride	green	green	green	green	green
Aluminum Fluoride	green	red	red	red	green
Aluminum Nitrate	yellow	green	green	green	green
Aluminum Sulfate	green	green	green	green	green
Alums (aluminum potassium sulfate)	green	green	green	green	green
Ammonia, Liquid	green	yellow	yellow	green	green
Ammonia, Gas	green	yellow	yellow	green	green
Ammonium Bicarbonate	green	green	green	green	green
Ammonium Chloride	green	green	green	green	green
Ammonium Hydroxide, Liquid	green	yellow	yellow	green	green
Ammonium Nitrate	yellow	green	green	green	green
Ammonium Phosphate	green	green	green	green	green
Ammonium Sulfate	green	green	green	green	green
Amyl Acetate	green	green	green	green	green
Amyl Alcohol	green	green	green	green	green
Aniline, Aniline Oil	green	green	green	green	green
Asphalt	green	green	green	green	green
Barium Chloride	green	green	green	green	green
Barium Hydroxide	green	green	green	green	green
Barium Sulfid	green	green	green	green	green
Beer	green	green	green	green	green
Benzaldehyde	green	green	green	green	green
Benzene, Benzol	green	green	green	green	green
Benzidine	green	green	green	green	green
Benzoic Acid	green	green	green	green	green
Benzonitrile	green	green	green	green	green
Benzotrichloride	green	green	green	green	green
Benzoyl choride	green	green	green	green	green
Benzyl alcohol	green	green	green	green	green
Benzyl Chloride	green	green	green	green	green
Bio-diesel	green	green	green	green	green
Biphenil	green	green	green	green	green
Black Sulfate Liquor	green	red	red	red	green
Borax	green	green	green	green	green
Boric Acid	green	green	green	green	green
Bromine	red	green	green	green	green
Bromine Trifluo ide	red	red	red	red	red
Butadiene	green	green	green	green	green
Butane	green	green	green	green	green
2-Butadone	green	green	green	green	green
Butyl Acetate	green	green	green	green	green
Butyl Alcohol	green	green	green	green	green
n-Butyl Amine	green	green	green	green	green
Butyl Methacrilate	green	green	green	green	green
Butyric Acid	green	green	green	green	green
Calcium Hydroxide (Limewater)	green	green	green	green	green
Calcium Hypochlorite	green	green	green	green	green
Calcium Nitrate (Lime Salrpeter)	yellow	green	green	green	green
Caprolactam	green	green	green	green	green
Captan	green	green	green	green	green
Carbon Dioxide	yellow	green	green	green	green
Carbon Disulfid	green	green	green	green	green
Carbon Monoxide	yellow	green	green	green	green
Carbon Tetrachloride	green	green	green	green	green
Carbonic Acid	green	green	green	green	green
Carbonyl Sulfid	green	green	green	green	green
Cesium melt	red	red	red	red	red
Chlorine, Dry	green	green	green	green	green
Chlorine, Wet	red	yellow	yellow	yellow	green
Chlorine Dioxide	red	yellow	yellow	yellow	green
Chlorine Trifluo ide	red	red	red	red	yellow
Chloroacetic acid	green	green	green	green	green
Chlorobenzene	green	green	green	green	green

	GRAFLEX	GUAFLON			
Medium	All Styles	Blue-Seal	White-Seal	Pink-Seal	Soft-Seal
Chloroethane	green	green	green	green	green
Chloroethylene	green	green	green	green	green
Chloroform (Trichloromethane)	green	green	green	green	green
Chloromethyl Methyl Ether	green	green	green	green	green
Chloroprene	green	green	green	green	green
Chlorosulfonic Acid	green	green	green	green	green
Chromates	yellow	green	green	green	green
Chromic Acid	yellow	green	green	green	green
Chromic Anhydride	red	green	green	green	green
Chromic Trioxide	red	green	green	green	green
Citric Acid	green	green	green	green	green
Coke Oven Gas	green	green	green	green	green
Copper Acetate	green	green	green	green	green
Copper Chloride	green	green	green	green	green
Copper Sulfate	green	green	green	green	green
Creosote	green	green	green	green	green
Cresols, Cresylic Acid	green	green	green	green	green
Crude Oil	green	green	green	green	green
Cumene (Isopropyl Benzene)	green	green	green	green	green
Cyclohexane	green	green	green	green	green
Cyclohexanone	green	green	green	green	green
Decalin	green	green	green	green	green
Dibenzylether	green	green	green	green	green
Dibutyl Phthalate	green	green	green	green	green
Dichlorobenzene	green	green	green	green	green
Dichloroethane	green	green	green	green	green
Dichloroethylene	green	green	green	green	green
Dichloroethyl Ether	green	green	green	green	green
Dichloromethane (Methylene chloride)	green	green	green	green	green
Dichloropropane	green	green	green	green	green
Diesel Oil, Diesel Fuel	green	green	green	green	green
Diethanolamine	green	green	green	green	green
Dimethyl Ether	green	green	green	green	green
Dimethylformamide	green	green	green	green	green
Dinitrotoluene	green	green	green	green	green
Dioxane	green	green	green	green	green
Diphenylhydrazine	green	green	green	green	green
Dowtherm	green	green	green	green	green
Ethane	green	green	green	green	green
Ethyl Acetate	green	green	green	green	green
Ethyl Acrylate	green	green	green	green	green
Ethyl Alcohol	green	green	green	green	green
Ethylbenzene	green	green	green	green	green
Ethyl Chloride	green	green	green	green	green
Ethyl Ether	green	green	green	green	green
Ethylene	green	green	green	green	green
Ethylene Bromide	green	green	green	green	green
Ethylene Dichloride	green	green	green	green	green
Ethylene Glycol	green	green	green	green	green
Ethylene Oxide	green	red	red	yellow	green
Fuorine, Gas or Liquid	red	red	red	red	red
Fluorine dioxide	red	red	red	red	red
Fluorosilicic acid	yellow	red	red	red	green
Formaldehyde	green	green	green	green	green
Formic Acid	green	green	green	green	green
Freon 12	green	green	green	green	green
Freon 22	green	green	green	green	green
Freon 134a	green	green	green	green	green
Fuel Oil	green	green	green	green	green
Furfurol	green	green	green	green	green
Gasoline	green	green	green	green	green
Glycerine, Glycerol	green	green	green	green	green
Glycol (Mono Ethylen Glycol)	green	green	green	green	green
Grease, Petroleum Base	green	green	green	green	green
Green Sulfate Liquor	red	red	red	red	red
Heptachlor	green	green	green	green	green
Heptane	green	green	green	green	green
Hexachlorobenzene	green	green	green	green	green
Hexachloroethane	green	green	green	green	green
Hexamethylene Diisocyanate	green	green	green	green	green
Hexane	green	green	green	green	green
Hydraulic Oils	green	green	green	green	green
Hydrazine	green	green	green	green	green
Hydrobromic Acid	green	green	green	green	green
Hydrochloric Acid	green	green	green	green	green
Hydrocyanic Acid	green	green	green	green	green
Hydrofluo ic Acid	green	red	red	yellow	green
Hydrofluo osilic Acid	green	red	red	red	green

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	GRAFLEX	GUAFLON			
Medium	All Styles	Blue-Seal	White-Seal	Pink-Seal	Soft-Seal
Hydrogen	Green	Green	Green	Green	Green
Hydrogen Fluoride	Yellow	Orange	Orange	Orange	Green
Hydrogen Peroxide (Oxygenated Water)	Green	Green	Green	Green	Green
Hydrogen Sulfid , Dry or Wet	Green	Green	Green	Green	Green
Hydroquinone	Green	Green	Green	Green	Green
Isobutane	Green	Green	Green	Green	Green
Isobutyl alcohol	Green	Green	Green	Green	Green
Isooctane	Green	Green	Green	Green	Green
Isopropyl Alcohol	Green	Green	Green	Green	Green
Kerosene (Paraffin Oi	Green	Green	Green	Green	Green
Lactic Acid	Green	Green	Green	Green	Green
Lead salts	Green	Green	Green	Green	Green
Lithium Bromide	Green	Green	Green	Green	Green
Lithium melt	Yellow	Orange	Orange	Orange	Orange
Lubricating Oils, Mineral or Refine	Green	Green	Green	Green	Green
Lye	Yellow	Orange	Orange	Orange	Green
Magnesium Chloride	Green	Green	Green	Green	Green
Magnesium Hydroxide	Green	Green	Green	Green	Green
Magnesium Sulfate	Green	Green	Green	Green	Green
Maleic Acid	Green	Green	Green	Green	Green
Maleic Anhydride	Green	Green	Green	Green	Green
Mercury	Green	Green	Green	Green	Green
Methane	Green	Green	Green	Green	Green
Methanol, Methyl Alcohol	Green	Green	Green	Green	Green
Methylacrilic Acid	Green	Green	Green	Green	Green
Mathyl Aldehyde (Formaldehyde)	Green	Green	Green	Green	Green
Methyl Bromide	Green	Green	Green	Green	Green
Methyl Chloride	Green	Green	Green	Green	Green
Methylene Chloride and Dichloride	Green	Yellow	Yellow	Green	Green
Methyl Ethyl Ketone (Butanone)	Green	Green	Green	Green	Green
Methyl Isobutil Ketone	Green	Green	Green	Green	Green
Milk	Yellow	Green	Green	Green	Green
Mineral Oil ASTM N.1	Green	Green	Green	Green	Green
Naphta	Green	Green	Green	Green	Green
Nitric Acid	Yellow	Green	Green	Green	Green
Nitrobenzene	Green	Green	Green	Green	Green
Nitrogen	Green	Green	Green	Green	Green
Nitrogen Oxide, Wet	Orange	Green	Green	Green	Green
Nitrogen Oxide, Dry	Yellow	Green	Green	Green	Green
Nitrogen Tetroxide	Orange	Green	Green	Green	Green
Nitromuriatic Acid (acqua ragia)	Orange	Green	Green	Green	Green
Nitrosulfuric Acid	Orange	Green	Green	Green	Green
Octane	Green	Green	Green	Green	Green
Oils, animal and vegetable	Green	Green	Green	Green	Green
Oleic Acid	Green	Green	Green	Green	Green
Oxalic Acid	Green	Green	Green	Green	Green
Oxygen, gas	Yellow	Green	Green	Green	Green
Ozone	Yellow	Green	Green	Green	Green
Palmitic Acid	Green	Green	Green	Green	Green
Para n	Green	Green	Green	Green	Green
Pentane	Green	Green	Green	Green	Green
Perchloric Acid	Orange	Green	Green	Green	Green
Perchloroethylene	Green	Green	Green	Green	Green
Petroleum Oils	Green	Green	Green	Green	Green
Phenol	Green	Green	Green	Green	Green
Phosgene	Green	Green	Green	Green	Green
Phosphate Esters	Green	Green	Green	Green	Green
Phosphoric Acid	Green	Yellow	Yellow	Green	Green
Phosphorus Trichloride	Green	Green	Green	Green	Green
Phtalic acid	Green	Green	Green	Green	Green
Phtalic Anhydride	Green	Green	Green	Green	Green
Piperidine	Green	Green	Green	Green	Green
Polyacrilonitrile	Green	Green	Green	Green	Green
Potassium melt	Yellow	Orange	Orange	Orange	Orange
Potassium Acetate	Green	Green	Green	Green	Green
Potassium Bicarbonate	Green	Green	Green	Green	Green
Potassium Bromate, Acqueous Solution	Orange	Green	Green	Green	Green
Potassium Carbonate (Potash)	Green	Green	Green	Green	Green
Potassium Chlorate	Orange	Green	Green	Green	Green
Potassium Chloride	Green	Green	Green	Green	Green
Potassium Chromate	Yellow	Green	Green	Green	Green
Potassium Cyanide	Green	Green	Green	Green	Green
Potassium Hydroxide (Caustic Potash)	Yellow	Orange	Orange	Yellow	Green
Potassium Iodide	Green	Green	Green	Green	Green
Potassium Nitrate, Acqueous Solution	Green	Green	Green	Green	Green

	GRAFLEX	GUAFLON			
Medium	All Styles	Blue-Seal	White-Seal	Pink-Seal	Soft-Seal
Potassium Nitrate, Melt (Saltpeter)	Orange	Green	Green	Green	Green
Potassium Permanganate	Green	Green	Green	Green	Green
Potassium Sulfate	Green	Green	Green	Green	Green
Propane	Green	Green	Green	Green	Green
Propyl Alcohol	Green	Green	Green	Green	Green
Propyl Nitrate	Green	Green	Green	Green	Green
Propylene	Green	Green	Green	Green	Green
Propylene Dichloride	Green	Green	Green	Green	Green
Propylene Oxide	Green	Green	Green	Green	Green
Prussic acid, Hydrocyanic Acid	Green	Green	Green	Green	Green
Pyridine	Green	Green	Green	Green	Green
Salicylic Acid	Green	Green	Green	Green	Green
Silicone Oil	Green	Green	Green	Green	Green
Silver Nitrate	Green	Green	Green	Green	Green
Soap	Green	Green	Green	Green	Green
Sodium Aluminate	Green	Green	Green	Green	Green
Sodium Bicarbonate, Baking Soda	Green	Green	Green	Green	Green
Sodium Bisulfate	Green	Green	Green	Green	Green
Sodium Carbonate, Soda	Green	Green	Green	Green	Green
Sodium Chlorate, Acqueous Solution	Yellow	Green	Green	Green	Green
Sodium Chloride	Green	Green	Green	Green	Green
Sodium Cyanide	Green	Yellow	Yellow	Yellow	Green
Sodium melt	Yellow	Orange	Orange	Orange	Orange
Sodium Hydroxide	Green	Orange	Orange	Yellow	Green
Sodium Hypochloride (bleach)	Green	Green	Green	Green	Green
Sodium Nitrate (Chile Saltpeter)	Yellow	Green	Green	Green	Green
Sodium Perborate	Yellow	Green	Green	Green	Green
Sodium Peroxide	Orange	Green	Green	Green	Green
Sodium Phosphate, Monobasic	Green	Green	Green	Green	Green
Sodium Phosphate, Dibasic or Tribasic	Green	Yellow	Yellow	Yellow	Green
Sodium Silicate	Green	Orange	Yellow	Green	Green
Sodium Sulfate	Green	Green	Green	Green	Green
Sodium Sulfid	Green	Green	Green	Green	Green
Sodium Superoxide	Orange	Green	Green	Green	Green
Stannic Chloride	Green	Green	Green	Green	Green
Starch	Green	Green	Green	Green	Green
Steam, Saturated	Green	Green	Green	Green	Green
Steam, Superheated	Green	Yellow	Yellow	Yellow	Yellow
Stearic Acid	Green	Green	Green	Green	Green
Styrene	Green	Yellow	Yellow	Yellow	Yellow
Sugar Solution	Green	Green	Green	Green	Green
Sulfur Chloride	Green	Green	Green	Green	Green
Sulfur Dioxide	Green	Green	Green	Green	Green
Sulfur, Molten	Green	Green	Green	Green	Green
Sulfur Trioxide	Orange	Green	Green	Green	Green
Sulfuric Acid	Yellow	Green	Green	Green	Green
Sulfuric Acid, Fuming (Oleum)	Orange	Orange	Orange	Orange	Green
Sulfurous Acid	Green	Green	Green	Green	Green
Tannic Acid	Green	Green	Green	Green	Green
Tar	Green	Green	Green	Green	Green
Tartaric Acid	Green	Green	Green	Green	Green
Tetrachlorethane	Green	Green	Green	Green	Green
Tetrachloroethylene (Perchlorate)	Green	Green	Green	Green	Green
Thionyl Chloride	Green	Green	Green	Green	Green
Titanium Tetrachloride	Green	Green	Green	Green	Green
Toluene	Green	Green	Green	Green	Green
Transformer Oil (Mineral Type)	Green	Green	Green	Green	Green
Trichloroethane	Green	Green	Green	Green	Green
Trichloroethylene	Green	Green	Green	Green	Green
Triethanolamine	Green	Green	Green	Green	Green
Triethylamine	Green	Green	Green	Green	Green
Trimethylaluminum	Green	Orange	Orange	Orange	Orange
Uranium Hexafluo ide	Orange	Orange	Orange	Orange	Orange
Urea	Green	Green	Green	Green	Green
Vinyl Acetate	Green	Green	Green	Green	Green
Vinyl Bromide	Green	Green	Green	Green	Green
Vinyl Chloride	Green	Green	Green	Green	Green
Vinyl Methacrylate	Green	Green	Green	Green	Green
Water, Distilled	Green	Green	Green	Green	Green
Water, Seawater	Green	Green	Green	Green	Green
Water, Tap	Green	Green	Green	Green	Green
Wines	Yellow	Green	Green	Green	Green
Xylene	Green	Green	Green	Green	Green
Zinc Chloride	Green	Green	Green	Green	Green
Zinc Sulfate	Green	Green	Green	Green	Green

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