EUROGUARCO

GASKET MATERIALS

Gasket Division

EUROGUARCO SpA
Italy

EUROGUARCO

La Spezia, *Plant 1*

Cremona, *Plant 1*

Cremona, *Plant 2*

The Company

Since its foundation, in 1958, the company has steadily expanded by growth and acquisitions, focusing on the manufacturing and trading of different lines of products: Industrial gaskets and gasket materials, valves, piping and insulating products.

Customers around the globe, in a variety of industries - such Oil & Gas, Chemical Processing, Power Generation, Transportation, … - rely on our high-quality products, backed by our special attention for customer service and technical support.

Euroguarco Quality System is certified according to ISO 9001. Sector certifications include: EN 9100, ISO/TS 29001, API 6D license, Directive 97/23/CE (PED), ATEX.

La Spezia, *Plant 2*

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Euroguarco gasket materials are designed for fabrication of flat gaskets covering a wide range of industrial applications, providing sealing performance with a variety of specifications. With heightened awareness of safety and environmental issues, reducing emissions from flanged assemblies has become a major priority for industry. It is therefore crucial that the correct material is selected and installed appropriately, to achieve a safe and reliable seal. Detailed Technical Datasheets, Material Safety Datasheets and gasket assembly factors are available for each material style. Assembly and Tightness Parameters of gasketed bolted joints can be calculated in order to achieve best gasket performance and ensure joint tightness by using GUARCO-AID, a simple PC application based either on ASME Boiler and Pressure Vessel Code (gasket factors m and y) or on PVRC method (gasket factors Gb, a, Gs).

Further information on gasket materials and criteria for material selection are provided in the Euroguarco handbook Guide to Gaskets for Static Joints.

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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 fibres, heat-resistant fillers, elastomeric binders and various chemicals, which is vulcanised into sheet form under the pressure of two counter-rotating steel rollers (calenders).

The effectiveness of FASIT gaskets is due to their resistance against plastic deformation, provided by the network of reinforcing fibres interlocked with the fillers and the elastomeric matrix.

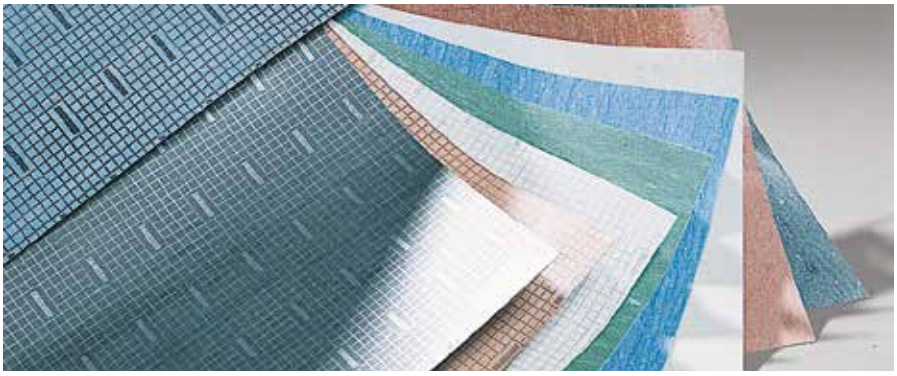
Fibres
The reinforcing fibres are the most crucial components.

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

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

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 specific surface of the fibre, so enhancing their interlocking with the other components. Fibres are also doped with chemicals that affect their surface electrostatic charge, in order to improve their mixing within the elastomeric matrix.



Aramid fibres owe their excellent thermal, chemical and mechanical properties to their chemical composition: carbon-nitrogen double bonds provide stiffness to 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 fibres is left up to the shield provided by the rubber matrix.

Glass, mineral, and carbon fibres withstand higher temperature compared to aramid fibres, but they are more brittle, have no fibrils (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 fibres in FASIT styles that are suitable for steam and high temperature applications.
For applications with non-aggressive media at low temperature, organic fibres such as polyester and cellulose are used in price-effective 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 fibres and fillers.
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 fibres and fillers, and by matching and filling up all the irregularities of the flange faces.

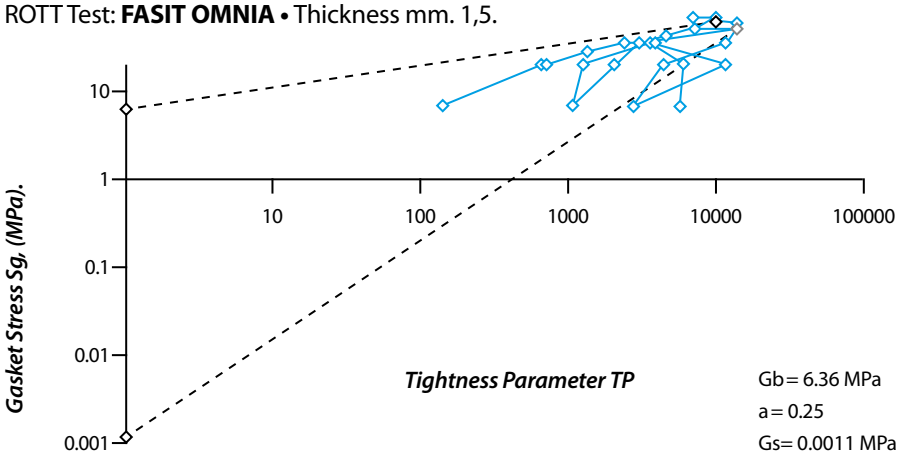
Moreover, it protects the gasket fibres and fillers from chemical attack.
The softening of the binder between 100 and 150°C is beneficial to gasket tightness, as it helps the binder to flow and fill up all porosity. Above this temperature, however, and over time, the binder starts to harden. Nevertheless, since the gasket mechanical properties are provided by the fibres, this effect 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 weight) have their own relevance too, essentially linked to their shape, specific surface ad electrostatic charge: all factors that affect their ability to intimately mix with the reinforcing fibres.
Their structure can be fibrous (rock wool, glass wool, ceramics), flaky (graphite), or granular (kaolin, sulphates, oxide particles, etc.), with dimensions that range from sub-micron to hundreds of microns, and a specific surface 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 fibres, NBR.	Synthetic fibres, NBR.	Aramid fibres, NBR.	Aramid fibres, NBR.
Main characteristics and applications	Price effective. 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 fibres, CSM.	Mineral fibres, Aramid fibres, NBR.	Aramid fibres, NBR lamellar graphite.	Aramid fibres, NBR lamellar graphite, wire insertion.	Glass fibres, Aramid fibres, NBR.	Carbon fibres, Aramid fibres, 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 fluids.	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 provides high resistance to temperature and mechanical stress. Suitable for steam, fuels, oils, alkalis and weak acids.	For elevated and fluctuating 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 fire. Excellent flexibility.
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.

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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	3	3	3	2	3	3	3	3	3
Acetamide	1	1	1	1	1	1	1	1	1
Acetic acid	1	1	1	1	1	1	1	1	1
Acetic anhydride	2	2	2	2	2	2	2	2	2
Acetone	3	3	2	1	2	2	3	2	2
Acetylene	1	1	1	1	1	1	2	1	1
Acrylic Acid	3	3	3	2	3	3	3	3	3
Acrylonitrile	3	3	3	3	3	3	3	3	3
Adipic acid	1	1	1	1	1	1	1	1	1
Air	1	1	1	1	1	1	1	1	1
Aluminum Acetate	1	1	1	1	1	1	1	1	1
Aluminum Chlorate	1	1	1	1	1	1	2	1	1
Aluminum Chloride	1	1	1	1	1	1	1	1	1
Aluminum Sulfate	1	1	1	1	1	1	1	1	1
Alums (aluminum potassium sulfate)	1	1	1	1	1	1	1	1	1
Ammonia, Liquid	2	2	1	1	2	1	2	2	1
Ammonia, Gas	2	2	2	2	2	2	2	2	2
Ammonium Bicarbonate	1	1	1	1	1	1	2	1	1
Ammonium Chloride	1	1	1	1	1	1	2	1	1
Ammonium Hydroxide, Liquid	2	2	1	1	1	1	2	2	1
Ammonium Nitrate	2	2	2	2	2	2	2	2	2
Ammonium Phosphate	1	1	1	1	1	1	1	1	1
Ammonium Sulfate	1	1	1	1	1	1	1	1	1
Amyl Acetate	2	2	2	2	2	2	2	2	2
Amyl Alcohol	1	1	1	1	1	1	1	1	1
Aniline, Aniline Oil	3	3	3	3	3	3	3	3	3
Asphalt	1	1	1	2	1	1	1	1	1
Barium Chloride	1	1	1	1	1	1	1	1	1
Barium Hydroxide	1	1	1	1	1	1	1	1	1
Barium Sulfide	1	1	1	1	1	1	1	1	1
Beer	2	1	1	1	1	2	2	1	1
Benzaldehyde	3	3	3	3	3	3	3	3	3
Benzene, Benzol	2	2	2	3	2	2	2	2	2
Benzoic Acid	1	1	1	1	1	1	1	1	1
Bio-diesel	3	1	1	1	1	1	1	1	1
Borax	1	1	1	1	1	1	1	1	1
Boric Acid	1	1	1	1	1	1	1	1	1
Butadiene	3	3	3	3	3	3	3	3	3
Butane	1	1	1	1	1	1	3	1	1
Butyl Alcohol	1	1	1	2	1	1	1	1	1
Butyl Methacrilate	3	3	3	3	3	3	3	3	3
Butyric Acid	1	1	1	1	1	1	1	1	1
Calcium Hydroxide (Limewater)	1	1	1	1	1	1	1	1	1
Calcium Hypochlorite	3	3	3	2	2	2	3	2	2
Calcium Nitrate (Lime Salrpeter)	3	3	3	3	3	3	3	3	3
Carbon Dioxide	1	1	1	1	1	1	1	1	1
Carbon Disulfide	3	3	3	3	3	3	3	3	3
Carbon Monoxide	2	2	2	2	2	2	2	2	2
Carbonic Acid	1	1	1	1	1	1	1	1	1
Chlorine	3	3	2	2	2	2	3	2	2
Chlorobenzene	3	3	3	3	3	3	3	3	3
Chloroethane	3	3	3	3	3	3	3	3	3
Chloroethylene	3	3	3	3	3	3	3	3	3
Chloroform (Trichloromethane)	2	2	2	2	2	2	3	2	2
Chromates	3	3	2	2	3	3	3	2	2
Chromic Acid	3	3	3	2	3	3	3	3	3
Citric Acid	1	1	1	1	1	1	1	1	1
Coke Oven Gas	1	1	1	1	1	1	1	1	1
Copper Acetate	1	1	1	1	1	1	1	1	1
Copper Chloride	1	1	1	1	1	1	1	1	1
Copper Sulfate	1	1	1	1	1	1	1	1	1
Cresols, Cresylic Acid	3	2	2	2	2	2	3	2	2
Crude Oil	3	1	1	1	1	1	1	1	1
Cyclohexane	1	1	1	1	1	1	2	1	1
Cyclohexanone	3	3	2	2	2	2	3	2	2
Dichloromethane (Methylene chloride)	3	3	3	3	3	3	3	3	3
Diesel Oil, Diesel Fuel	1	1	1	2	1	1	1	1	1
Dimethyl Ether	2	2	2	2	2	2	2	2	2
Dowtherm	2	2	2	2	2	2	3	2	2
Ethane	1	1	1	1	1	1	2	1	1
Ethyl Acetate	2	2	2	2	2	2	3	2	2

Medium	202-205	Oil	Omnia	Kemit	Steam	400	400 FE	HT	CF
Ethyl Alcohol	1	1	1	1	1	1	1	1	1
Ethylbenzene	3	3	3	3	3	3	3	3	3
Ethyl Chloride	3	2	2	3	2	2	2	2	2
Ethyl Ether	2	2	2	2	2	2	2	2	2
Ethylene	1	1	1	1	1	1	2	1	1
Ethylene Glycol	1	2	1	1	1	1	1	1	1
Ethylene Oxide	3	3	3	3	3	3	3	3	3
Fuorine, Gas or Liquid	3	3	3	3	3	3	3	3	3
Formaldehyde	1	1	1	1	1	1	1	1	1
Formic Acid	2	2	1	1	2	1	3	2	1
Freon 12	2	1	1	1	1	1	3	2	1
Freon 22	3	2	2	1	2	2	3	2	2
Freon 134a	3	1	1	2	1	1	3	1	1
Fuel Oil	1	1	1	1	1	1	1	1	1
Furfurol	3	3	3	3	3	3	3	3	3
Gasoline	2	1	1	1	1	1	1	1	1
Glycerine, Glycerol	1	1	1	1	1	1	1	1	1
Glycol (Mono Ethylen Glycol)	2	1	1	1	1	1	1	1	1
Grease, Petroleum Base	1	1	1	1	1	1	1	1	1
Heptane	2	1	1	1	1	1	2	1	1
Hexane	1	1	1	1	1	1	1	1	1
Hydraulic Oils	2	1	1	1	1	1	1	1	1
Hydrazine	1	1	1	1	1	1	2	1	1
Hydrochloric Acid	3	3	2	1	3	2	3	2	2
Hydrocyanic Acid	1	1	1	1	1	1	1	1	1
Hydrofluoric Acid	3	3	3	3	3	3	3	3	3
Hydrogen	1	1	1	1	1	1	2	1	1
Hydrogen Fluoride	3	3	3	3	3	3	3	3	3
Hydrogen Peroxide (Oxygenated Water)	3	3	2	2	2	2	3	2	2
Hydrogen Sulfide, Dry or Wet	2	2	2	2	2	2	2	2	2
Isobutane	1	1	1	2	1	1	3	1	1
Isobutyl alcohol	1	1	1	1	1	1	1	1	1
Isooctane	2	1	1	1	1	1	1	1	1
Isopropyl Alcohol	1	1	1	1	1	1	1	1	1
Kerosene (Paraffin Oil)	1	1	1	1	1	1	2	1	1
Lactic Acid	1	1	1	1	1	1	1	1	1
Lead salts	1	1	1	1	1	1	1	1	1
Lithium Bromide	1	1	1	1	1	1	2	1	1
Lubricating Oils, Mineral or Refined	1	1	1	2	1	1	1	1	1
Magnesium Chloride	1	1	1	1	1	1	1	1	1
Magnesium Hydroxide	2	2	2	2	2	2	2	2	2
Magnesium Sulfate	1	1	1	1	1	1	1	1	1
Maleic Acid	1	1	1	1	1	1	1	1	1
Maleic Anhydride	3	3	3	3	3	3	3	3	3
Mercury	1	1	1	1	1	1	1	1	1
Methane	1	1	1	1	1	1	2	1	1
Methanol, Methyl Alcohol	1	1	1	1	1	1	1	1	1
Mathyl Aldehyde (Formaldehyde)	1	1	1	1	1	1	1	1	1
Methyl Chloride	3	2	2	2	2	2	3	2	2
Methylene Chloride and Dichloride	3	3	3	2	3	3	3	3	3
Methyl Ethyl Ketone (Butanone)	3	2	2	2	3	2	3	2	2
Milk	1	1	1	1	1	2	2	1	1
Mineral Oil ASTM N.1	1	1	1	1	1	1	1	1	1
Naphta	2	1	1	2	1	1	1	1	1
Nitric Acid	3	3	3	2	3	3	3	3	2
Nitrobenzene	3	3	3	3	3	3	3	3	3
Nitrogen	1	1	1	1	1	1	1	1	1
Nitrogen Oxide	3	3	3	3	3	3	3	3	3
Nitromuriatic Acid (acqua ragia)	3	3	3	3	3	3	3	3	3
Octane	2	1	1	1	1	1	1	1	1
Oils, animal and vegetable	1	1	1	2	1	1	1	1	1
Oleic Acid	1	1	1	1	1	1	1	1	1
Oxalic Acid	2	2	2	1	2	2	2	2	2
Oxygen, gas	1	1	1	1	1	2	3	1	1
Ozone	3	3	3	3	3	3	3	3	3
Palmitic Acid	1	1	1	1	1	1	2	1	1
Paraffin	1	1	1	1	1	1	1	1	1
Pentane	2	1	1	1	1	1	2	1	1
Perchloric Acid	3	3	3	3	3	3	3	3	3
Perchloroethylene	2	2	2	2	2	2	2	2	2
Petroleum Oils	1	1	1	2	1	1	1	1	1

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

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

EUROGUARCO

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 difference 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 flaky 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 gaskets, of sealing rings and of smooth or corrugated tapes.

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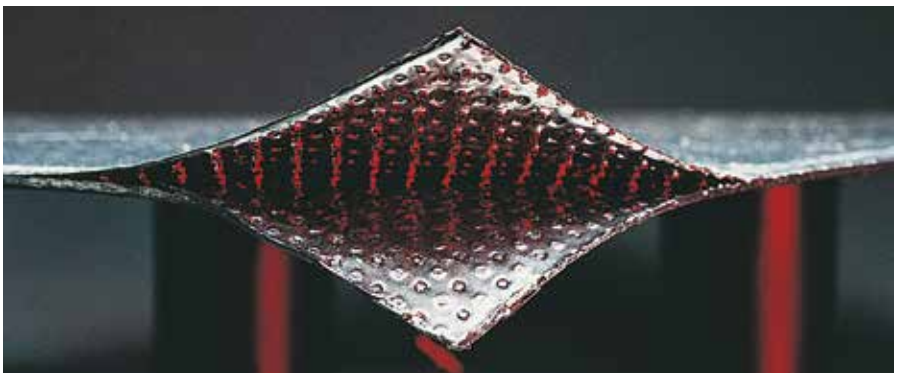
Density
The standard density of GRA-FLEX graphite is 1 g/cm3, but it can be requested in the range 0.7 - 1.3 g/cm3: higher density corresponds to lower gas permeability and higher mechanical strength, but also to lower conformability.

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.

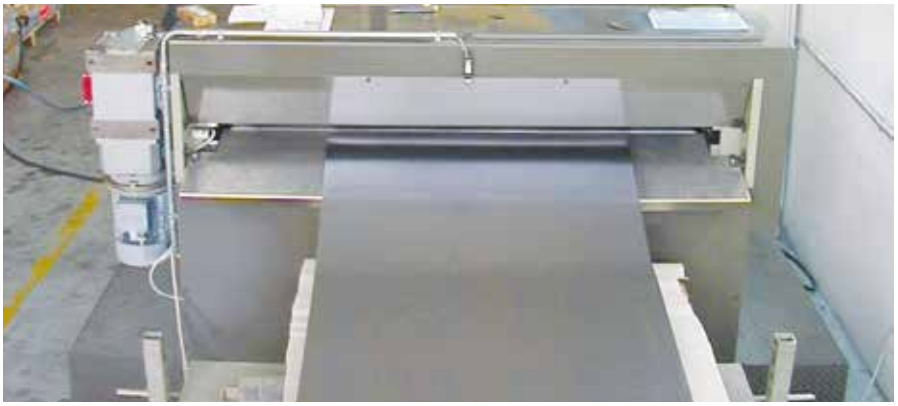
Such ashes contain mainly harmless elements, like silicon and aluminium, but also contaminants, usually residues from the mineral gangue of the natural graphite, such as quartz, silicates or mica: these disturb the orderly laminar structure of the graphite, producing channels and irregular pores that reduce the sealing effectiveness 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 fluorine: 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:

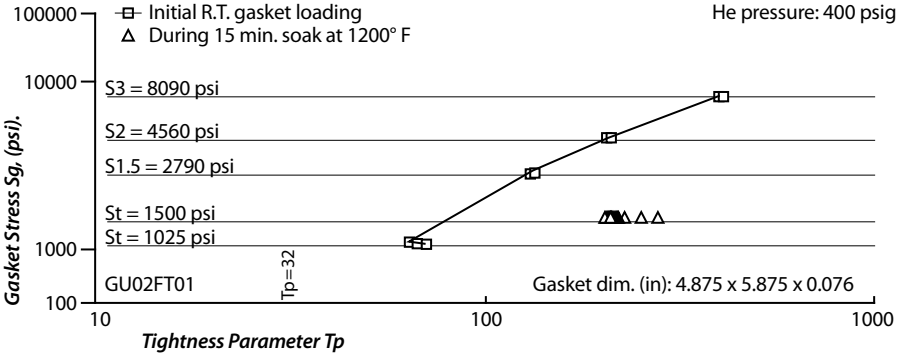
Grade:			STANDARD	PREMIUM
Ashes	ASTM C 561	%	< 1	< 0,5
Leachable chloride ions	ASTM F 1277	ppm	< 40	< 20
Leachable fluoride ions	ASTM F 1277	ppm	< 40	< 20



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 fluids.
- **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 flange, including light, very large size, irregular and poorly planar flanges, 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 fire, such as with toxic or flammable media.
- **Health safety:** GRA-FLEX does not contain toxic components, nor any type of fibres.

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 filler 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 fire-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.

EUROGUARCO

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.

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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.

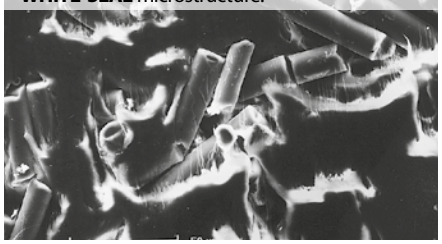
PTFE

The PTFE (poly-tetra-fluoro-ethylene, formula $(CF_2)_n$) 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 fluorine atoms.

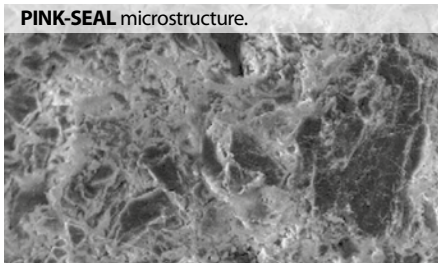
The carbon-fluorine bond is the strongest of all organic chemistry: as a result, its stability is barely affected by thermal excitation or chemical attacks.

Because of its structure, the PTFE is resistant to almost all chemicals, exceptions being melt alkaline metals, fluorine gas, hydrogen fluoride 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.

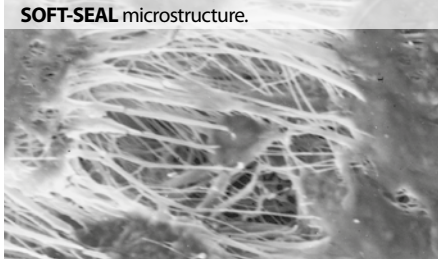
WHITE-SEAL microstructure.



PINK-SEAL microstructure.



SOFT-SEAL microstructure.



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 media
  - relevant for uses with high purity media, i.e. pharmaceutical and painting industry
- anti-stick surface
  - relevant when flanges have to be opened frequently
- low abrasion coefficient
  - 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 affected by plastic deformation, even at room temperature (cold flow). In order to overcome this problem, GUAFLON sheets are typically filled with inorganic particles, such as glass fibers or silica grains, 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 modification in the polymeric structure (integration of the PPVE modifier at low concentration in the polymer linear chain). The advantages of the modified 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.

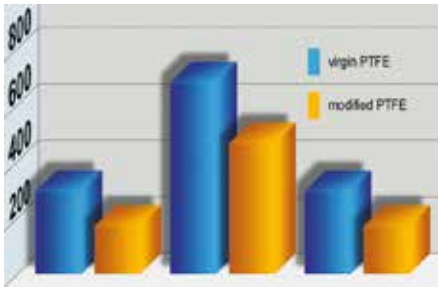
As a consequence, GUAFLON gaskets are especially recommended for the control of fugitive emissions, in presence of polluting or hazardous media.

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

Elastic Modulus (N/mm^2)

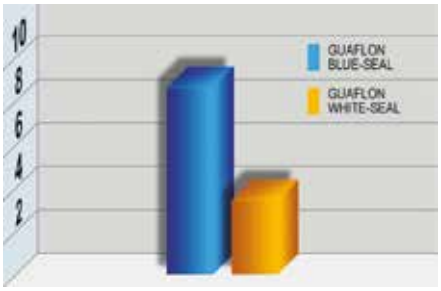
Temperature (°C)

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.

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GUAFLON®

Sheet Style	BLUE-SEAL	WHITE-SEAL	PINK-SEAL	SOFT-SEAL
Composition	Virgin PTFE, glass fibres.	Modified PTFE, glass fibres.	Modified PTFE, silica filler.	Expanded PTFE.
Main characteristics and applications	Price effective. 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 flange 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%

EUROGUARCO

Chemical Resistance Chart - GRA-FLEX® & GUAFLON®

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

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

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

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

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Application Quality Control Parameters

Joint tightness requires that the gasket surface load, applied through bolt torque, remains always between defined minimum and maximum limits, which depend on operating conditions and joint geometry.

In general higher-loaded, but not over-loaded, gaskets have a longer life and show better resistance against aggressive media than under-loaded ones.

Retorquing: Every gasket settles, especially after a long period without loading. Therefore bolts should be retorqued to 100% before commissioning. FASIT and GUAFLON gaskets that have been already exposed to high or cryogenic temperature should be retorqued only in cold conditions, with great care and in several steps, to prevent destruction of the hardened organic components.

Low Temperature service below -40°C will harden organic binders.
To ensure safe service at low temperatures we recommend that FASIT and GUAFLON gaskets are fitted dry at room temperature only.

Gasket thickness is important and a given material should be selected as thin as possible, yet sufficiently thick to accommodate surface imperfections and irregularities of the flanges.

A thinner gasket requires less load to achieve a tight seal, it can accommodate higher gasket loads and has better torque retention properties which helps maintain a good seal throughout the lifetime of the gasket. Gasket width has a significant effect on the maximum permissible gasket stress. We recommend a minimum thickness to width ratio of 1/5.

Storage conditions must be respected to ensure long life to gasket materials and gaskets.

We recommend to store flat at:
- temperature < 25°C;
- relative humidity <60%;
- away from sources of UV/Natural light.

Looking for the right product for your project?

Need specification help for your system?

Our Engineering team is available for assistance no matter where you are located.

EUROGUARCO'S QUALITY APPROVED

Euroguarco Divisions

Piping

Conforming to ANSI, BWG, AWG, BS and other international standards: line pipe, boiler pipe, hat-exchanger tube, tube expanders, torque wrenches, condenser tube, boiler and heater tubes, U-tubes, assembly bundle tubes, finned tube for air-cooling systems; Carbon steel, stainless steel, Cu-Ni, admirality brass, cast iron, special alloys.

Insulation

High temperature textiles (fabrics, tapes, ropes, sleeves), insulating blankets, felts, millboards, papers and mouldables, pre-formed insulating jackets, welding blankets, polymeric foam insulating boards, acoustic boards and sound barriers, fire-resistant textiles, compensation joints. Speciality items for marine, oil & gas, steel, glass industries.

Engineering

Often in cooperation with partners, Euroguarco has performed several turn-key and sub-contract works for the engineering, supply and construction of industrial and civil projects.
Based on the project, Euroguarco can offer his customers with advantageous solution by reducing the cost impact of many services that normally EPCs give in outsource.
Some cases:
- Piping system engineering, fabrication and testing
- Pig Launcher & Receiver (Iraq, Libya)
- Gas/Oil Tanker Jetty (Iran)
- Gas, oil or finished products Pipeline project (Turkey, Iran, Iraq)
- Slug Catcher (Iran)
- Steel & alloy piping structure (Mexico)
- Air and water cooling systems (Iraq)
- Insulation cut-on-design and supply for piping and pressure vessels (Kazakhstan, Italy)
- Flares and burners (Iraq)
- LPG storage and distribution system (Ghana, Tanzania)
- LPG filling station (Tanzania)
- Railway project (Ghana)
- Pumping station (Russia)
- Stations on skid (Iraq)

Euroguarco is also active in environment friendly projects, in cooperation or in consortium with specialized partner companies.

Valve

Gate, Swing-Check, Globe valves. Ball valves (trunnion, floating, through conduit), wrench and gear operator. Forged and cast steel types. Butterfly, Wafer-type,- Diaphragm and Knife-Gate valves. Valves in bronze and brass: gate, globe, swing check and ball type. Conforming to dimensional standards ASME, ANSI, API, BS.
Materials: carbon steel, stainless steel, cast iron, ductile iron and alloys.
Sizes from 1/4" to 60", depending on the type of valve. Rating from 150 to 2500 Lbs.

Gasket

Conforming to ASME, DIN, EN and BS standards: compressed jointing sheets FASIT®,flexible graphite GRAFLEX®, PTFE based sheets GUAFLON®, mica compound sheets GUARMICA®, gland packings, o-rings,die-cut gaskets, Weaveline gaskets, spiral-wound gaskets, metal-jacketed gaskets, ring-joint gaskets, flat metal gaskets, laminated gaskets, rubber gaskets, cam-profile gaskets, textile gaskets, manhole gaskets, etc.

Selected References

- ABB (Italy)
- ADOC Japan (UAE)
- Agip (Italy)
- Agip KCO (Kazakhstan)
- AGOCO (Libya)
- Ameira Petroleum (Egypt)
- Ansaldo Energia (Italy)
- ASRY Shipyards (Bahrain)
- Attok Refinery (Pakistan)
- Bangladesh Gas Field Co. (Bangladesh)
- Banias Power Co. (Syria)
- Banias Refinery (Syria)
- Bateman-Litwin (France)
- BP (Iraq)
- Brega (Libya)
- Cairo Refining (Egypt)
- CERN (Switzerland)
- Daura Refinery (Iraq)
- Dongang Boiler Group (China)
- Eastern Refinery (Bangladesh)
- EcoPetrol (Colombia)
- Eni (Italy)
- Enppi (Egypt)
- Foster Wheeler (Italy)
- Gas Transmission Co. Ltd (Bangladesh)
- GAZPROM (Russia)
- GE Nuovo Pignone (USA, Italy)
- Homs Refinery (Syria)
- Jordan Petroleum Refinery (Jordan)
- LukOil (Russia)
- MAERSK OIL (Kazakhstan)
- Magotteaux (Belgium)
- Mari Gas Co. (Pakistan)
- McDermott (USA)
- Midland Refinery (Iraq)
- National Refinery (Pakistan)
- NIGC (Iran)
- North Oil Company (Iraq)
- NPCC (UAE)
- OPET Petrol (Turkey)
- ORYXGAS (Switzerland)
- PDI-Pemex (Mexico)
- Petrojet (Egypt)
- Qatar Gas (Qatar)
- Ras Gas (Qatar)
- Saipem (Italy)
- SCOP (Iraq)
- Sirte Oil Co. (Libya)
- Snam (Italy)
- South Oil Company (Iraq)
- KalaNaft (Iran)
- Kordestan Petrolchemical (Iran)
- MAPNA (Iran)
- Nargan (Iran)
- POGC (Iran)
- SungKyong (South Korea)
- Tecnimont (Italy)
- Tehran Refinery (Iran)
- Waha Oil Company (Egypt)

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