

James Walker®

Gaskets & Jointings Guide

Issue 7.7

*James Walker's comprehensive
guide to quality gasket products
for industry worldwide*



High Performance Sealing Technology



Introduction & Index

James Walker is a dynamic global manufacturing organisation that supplies a vast range of specialised products and services to virtually every industrial sector.

We have more than 50 production, engineering, distribution and customer support facilities worldwide — backed by extensive IT networks, e-commerce systems and logistics operations — to serve customers in over 100 countries.

Our world-leading expertise and capabilities in high performance fluid sealing and bolting technology, led by engineering design and materials science, embraces the complete industrial cycle from research, development and manufacture to product application and plant monitoring. These activities help keep global industry running safely, efficiently and with improved environmental performance, year-in, year-out.

Flange sealing technology

Our work at the frontier of sealing technology gives us a clear understanding of the roles that gaskets must play, for example:

- *If joint faces are absolutely flat and aligned true.*
 - *If flanges do not distort under load.*
 - *If loaded bolts do not stretch or relax...*
- ...*There is no need for a gasket, because the joint will be perfect.*

In the real world, such perfection is very expensive to achieve and almost impossible to maintain. Therefore a gasket is the most practical and cost effective way to seal a bolted flange joint.

The problem for designers and maintenance engineers is to select the correct gaskets to ensure the integrity and safe operation of their fluid handling plant.

In the following pages we give details of our vast range of gaskets and jointings. These include brand names such as our Chieftain® and Centurion® non-asbestos jointings, Supagraf® expanded graphite jointings, Moorside® ring joints, and Metaflex® spiral wound and Metakamm® Kammprofile gaskets.

Worldwide service for industry

Our teams of local experts, applications engineers and materials scientists will help you select gaskets to match your exact operational specifications. If off-the-shelf gaskets will not solve your flange sealing problem, then they can custom-design products that will.

We also establish long-term partnering contracts with industrial corporations for the global supply of products to their plants.

These contracts are administered by dedicated managers with teams of specialists who are responsible for servicing the needs of a customer's sites across different countries and continents. Our service covers not only planned maintenance and unscheduled shut-downs, but also expert help with complex fluid sealing problems and the generation of *best-value* solutions to introduce cost savings for the plant operator.



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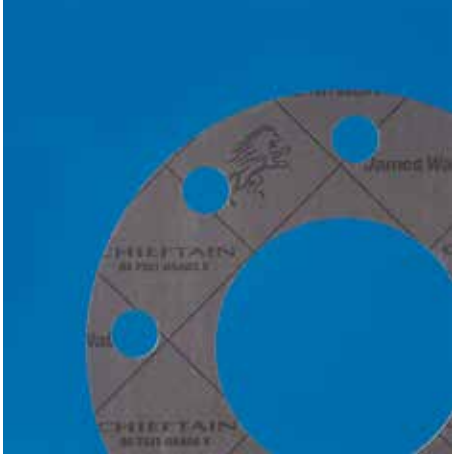
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Non-asbestos sheet jointings

Chieftain®



Prime features

- Carbon fibre for strength and stability.
- 450°C maximum temperature.
- Outstanding chemical and steam resistance.
- User friendly – easy to cut, handle and remove from flanges.

Specifications

- Easily meets the requirements of BS 7531 Grade X.
- Suitable for ASME Class 300 flange ratings to at least 260°C.

Physical properties

(Typical values for 1.5mm thick material)

Density, Mg/m ³	1.6	
Transverse tensile strength, MPa	9.0	(ASTM F152A)
Residual stress, MPa	28.0	(BS 7531)
Compressibility, %	9.0	(BS 7531)
Recovery, %	60.0	(ASTM F36J)
Gas permeability, ml/min	<1.0	(BS 7531)
Leachable chloride ion content, ppm	<100	

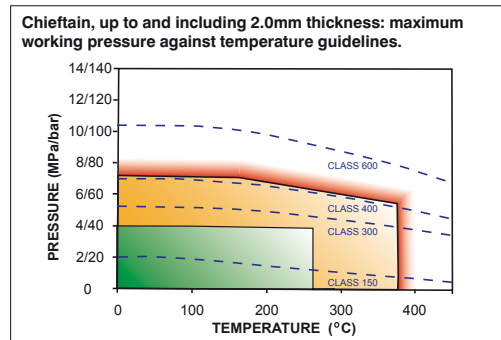
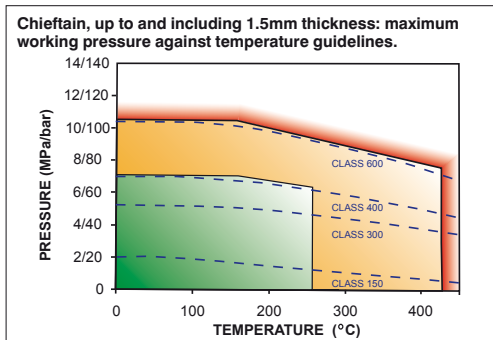
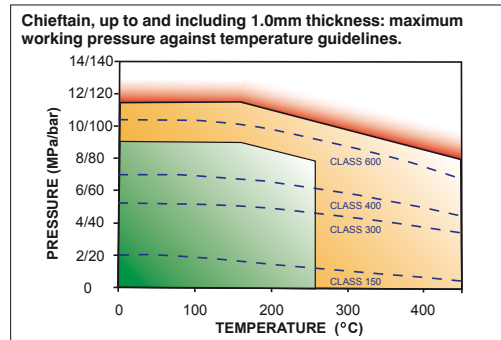
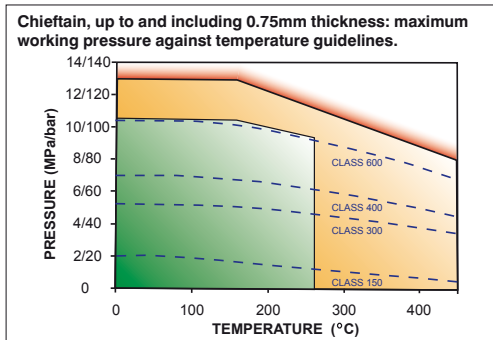
Description

Chieftain® is James Walker's premium grade universal sheet jointing. Its formulation contains an advanced carbon fibre material and a nitrile rubber (NBR) binder. An anti-stick finish to both surfaces is supplied as standard.

Fluid immersion properties

IRM 903, % thickness increase, 5h @ 150°C	6.0	(BS 7531)
ASTM Fuel B, % thickness increase, 5h @ RT	8.0	(ASTM F146)
Water, % thickness increase, 5h @ 100°C	5.0	(BS 7531)
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Service capability graphs



Service capability

For applications falling into the green zone of each graph, the product may normally be used without consultation. In the amber zone we recommend that our Technical Support Team be contacted for confirmation of suitability. If the pressure/temperature combination is in the red zone then we must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 2.0m x 1.5m, 1.5m x 1.0m. Thicknesses: 0.5mm, 0.75mm, 1.0mm, 1.5mm, 2.0mm. Please note that 3.0mm is also available but is not recommended (see page 48 for advice on gasket use).

Non-asbestos sheet jointings

Centurion®



Prime features

- Well proven on industrial plants worldwide.
- Chemically and thermally stable for duties up to 440°C.
- Suitable for a wide range of media.
- Non-pigmented.

Specifications

- Meets the requirements of BS 7531 Grade X.

Physical properties

(Typical values for 1.5mm thick material)

Density, Mg/m ³	1.7	
Transverse tensile strength, MPa	9.0	(ASTM F152A)
Residual stress, MPa	27.0	(BS 7531)
Compressibility, %	9.0	(BS 7531)
Recovery, %	60.0	(ASTM F36J)
Gas permeability, ml/min	<1.0	(BS 7531)
Leachable chloride ion content, ppm	<100	

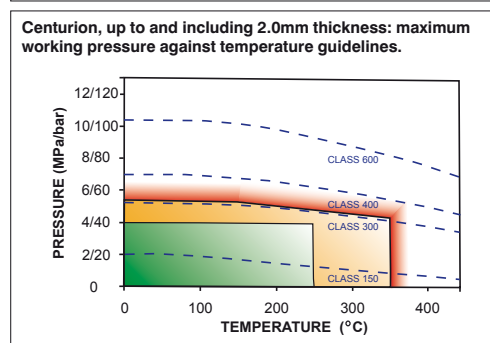
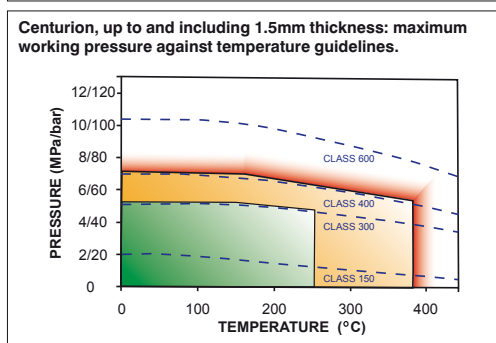
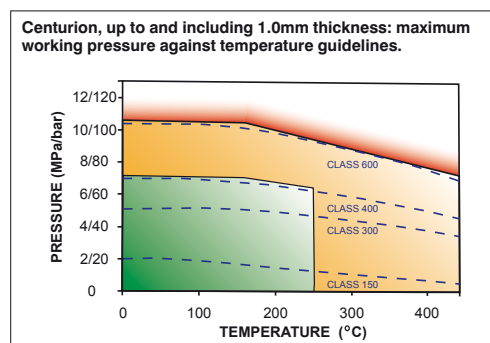
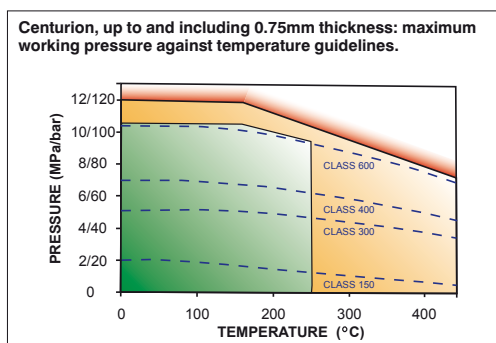
Description

Centurion® is a high performance sheet jointing, based on glass and aramid fibres with a nitrile rubber (NBR) binder. An anti-stick finish to both surfaces is supplied as standard.

Fluid immersion properties

IRM 903, % thickness increase, 5h @ 150°C	5.0	(BS 7531)
ASTM Fuel B, % thickness increase, 5h @ RT	7.0	(ASTM F146)
Water, % thickness increase, 5h @ 100°C	5.0	(BS 7531)

Service capability graphs



Service capability

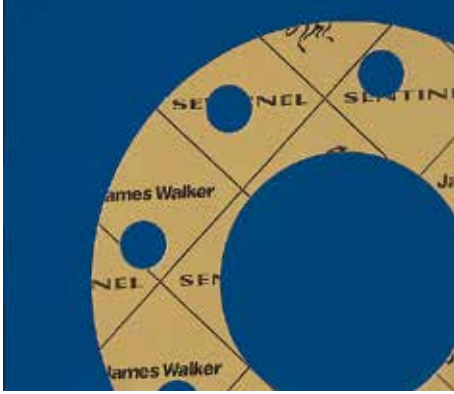
For applications falling into the green zone of each graph, the product may normally be used without consultation. In the amber zone we recommend that our Technical Support Team be contacted for confirmation of suitability. If the pressure/temperature combination is in the red zone then we must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 2.0m x 1.5m, 1.5m x 1.0m. Thicknesses: 0.5mm, 0.75mm, 1.0mm, 1.5mm, 2.0mm. Please note that 3.0mm is also available but is not recommended (see page 48 for advice on gasket use).

Non-asbestos sheet jointings

Sentinel®



Description

Sentinel® is James Walker's general purpose sheet jointing. It comprises compressed aramid fibres with nitrile rubber (NBR) binder. An anti-stick finish to both surfaces is supplied as standard.

Prime features

- Replaces CAF for most industrial duties up to 400°C.
- Suitable for wide range of media.
- Offers outstanding performance for its class.

Specifications

- Exceeds the property requirements of BS 7531 Grade Y.

Physical properties

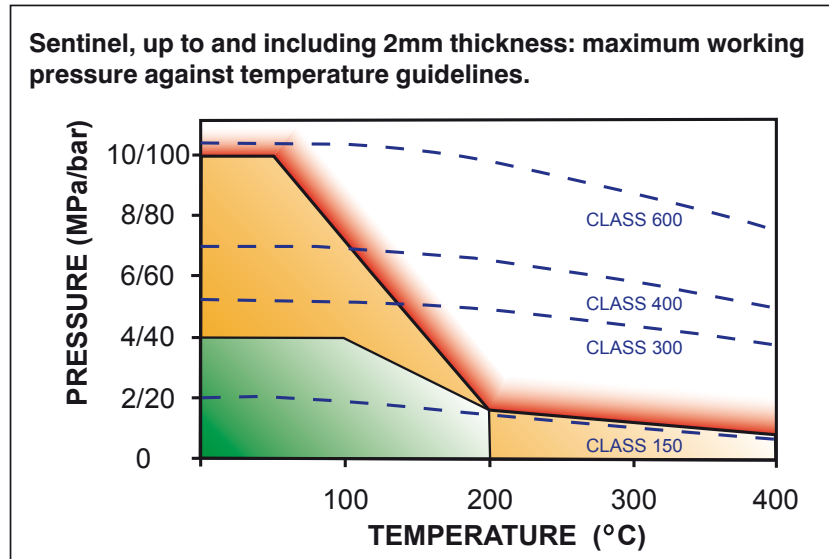
(Typical values for 1.5mm thick material)

Density, Mg/m ³	1.6	
Transverse tensile strength, MPa	8.0	(ASTM F152A)
Residual stress, MPa	25.0	(BS 7531)
Compressibility, %	10.0	(BS 7531)
Recovery, %	45.0	(ASTM F36J)
Gas permeability, ml/min	<1.0	(BS 7531)
Leachable chloride ion content, ppm	<100	

Fluid immersion properties

IRM 903, % thickness increase, 5h @ 150°C	5.0	(BS 7531)
ASTM Fuel B, % thickness increase, 5h @ RT	6.0	(ASTM F146)
Water, % thickness increase, 5h @ 100°C	9.0	(BS 7531)

Service capability graph



Service capability

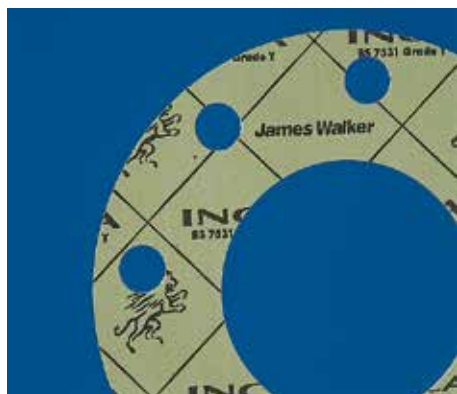
For applications falling into the green zone, the product may normally be used without consultation. In the amber zone we recommend that our Technical Support Team be contacted for confirmation of suitability. If the pressure/temperature combination is in the red zone then we must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 2.0m x 1.5m, 1.5m x 1.0m. Thicknesses: 0.5mm, 0.75mm, 1.0mm, 1.5mm, 2.0mm. Please note that 3.0mm is also available but is not recommended (see page 48 for advice on gasket use).

Non-asbestos sheet jointings

Inca



Description

Inca is a high quality and reliable, yet economically priced, jointing based on glass and aramid fibres combined with a nitrile (NBR) binder. It is supplied in a mid-green surface finish. An anti-stick finish to both surfaces is supplied as standard.

Prime features

- A durable jointing for general purpose, medium performance, duties.
- Suitable for steam, condensate, water, air, oils, solvents and a wide range of other media.
- Value engineered to provide excellent value for money.

Specification

- Readily meets all the requirements of BS 7531 Grade Y.

Physical properties

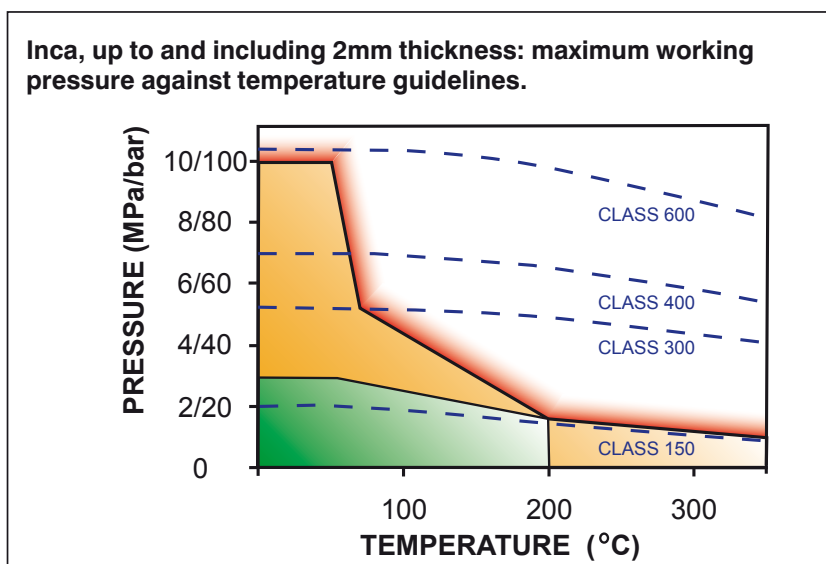
(Typical values for 1.5mm thick material)

Density, Mg/m ³	1.85	
Transverse tensile strength, MPa	7.0	(ASTM F152A)
Residual stress, MPa	23.0	(BS 7531)
Compressibility, %	10.0	(BS 7531)
Recovery, %	55.0	(ASTM F36J)
Gas permeability, ml/min	<1.0	(BS 7531)
Leachable chloride ion content, ppm	<100	

Fluid immersion properties

IRM 903, % thickness increase, 5h @ 150°C	5.0	(BS 7531)
ASTM Fuel B, % thickness increase, 5h @ RT	6.0	(ASTM F146)
Water, % thickness increase, 5h @ 100°C	5.0	(BS 7531)

Service capability graph



Service capability

For applications falling into the green zone, the product may normally be used without consultation. In the amber zone we recommend that our Technical Support Team be contacted for confirmation of suitability. If the pressure/temperature combination is in the red zone then we must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 2.0m x 1.5m, 1.5m x 1.0m. Thicknesses: 0.5mm, 0.75mm, 1.0mm, 1.5mm, 2.0mm. Please note that 3.0mm is also available but is not recommended (see page 48 for advice on gasket use).

Non-asbestos sheet jointings chemical suitability guide

● Suitable product.

Where chemical compatibility is not indicated, or a chemical is not listed, please consult our Technical Support Team for a recommendation to be made.

NON-ASBESTOS SHEET JOINTINGS	CHIEFTAIN®	CENTURION®	SENTINEL®	INCA
STEAM	●	●	●	●
STEAM CONDENSATE	●	●	●	●
WATER	●	●	●	●
AIR	●	●	●	●
ACETIC ACID	●	●	50%	50%
ACETONE	●	●	●	●
ACETYLENE	●	●	●	●
ADIPIIC ACID	●	●	●	●
ALUMINIUM CHLORIDE	●	●	NO	●
AMMONIA (ANHYDROUS, DRY)	●	●	●	●
AMMONIA (WET)	●	●	NO	●
AMMONIUM CHLORIDE	●	●	NO	●
AMMONIUM HYDROXIDE	●	●	10%	●
ANILINE	●	●	●	●
BENZENE	●	●	●	●
BITUMEN & HEAVY BOTTOMS	●	●	●	●
BLACK LIQUOR	●	●	NO	●
BLEACH SOLUTIONS	●	●	NO	NO
BOILER FEED WATER	●	●	●	●
BRINE	●	●	●	●
BROMINE	NO	NO	NO	NO
BUNKER FUEL	●	●	●	●
BUTANE	●	●	●	●
CALCIUM CHLORIDE	●	●	●	●
CALCIUM HYDROXIDE	●	●	●	●
CALCIUM HYPOCHLORITE	●	●	NO	NO
CARBON DIOXIDE	●	●	●	●
CARBON DISULPHIDE	NO	NO	NO	NO
CARBON TETRACHLORIDE	●	●	NO	NO
CHLORINE (DRY)	●	●	●	●
CHLORINE (WET)	●	NO	NO	NO
CHROMIC ACID	NO	NO	NO	NO
CREOSOTE	●	●	●	●
DIESEL OIL	●	●	●	●
DIETHYL ETHER	●	●	●	●
DOWTHERM™	●	●	NO	NO
ETHANE	●	●	●	●
ETHANOLAMINES	●	●	●	●
ETHER	●	●	●	●
ETHYL ALCOHOL (Ethanol)	●	●	●	●
ETHYLAMINE	●	●	●	●
ETHYLENE	●	●	●	●
ETHYLENE GLYCOL	●	●	NO	●
ETHYLENE OXIDE	NO	NO	NO	NO
FERRIC CHLORIDE (WET)	NO	NO	NO	NO
FLUORINE	NO	NO	NO	NO
FORMALDEHYDE	●	●	●	●
FORMIC ACID	●	●	50%	10%
GASOLINE	●	●	●	●
GREEN LIQUOR	●	●	NO	NO
HEAVY OILS	●	●	●	●
HYDROBROMIC ACID	NO	NO	NO	NO
HYDROCHLORIC ACID	NO	NO	NO	NO
HYDROFLUORIC ACID	NO	NO	NO	NO
HYDROGEN CHLORIDE GAS (DRY)	●	●	NO	NO
HYDROGEN PEROXIDE (<30%)	●	●	●	●
HYDROGEN SULPHIDE	●	●	NO	●
ISOPROPYL ALCOHOL	●	●	●	●
KEROSENE	●	●	●	●

NON-ASBESTOS SHEET JOINTINGS	CHIEFTAIN®	CENTURION®	SENTINEL®	INCA
LINSEED OIL	●	●	●	●
LIQUID PETROLEUM GAS	●	●	●	●
LYE	●	●	NO	●
METHANE	●	●	●	●
METHYL ALCOHOL (Methanol)	●	●	●	●
METHYL CHLORIDE	●	●	●	●
METHYL ETHYL KETONE	●	●	●	●
METHYL TERTIARY BUTYL ETHER	●	●	●	●
METHYLATED SPIRITS	●	●	●	●
METHYLENE CHLORIDE	●	NO	NO	NO
MINERAL OILS	●	●	●	●
NAPHTHA	●	●	●	●
NATURAL GAS	●	●	●	●
NITRIC ACID	NO	NO	NO	NO
NITROGEN	●	●	●	●
OCTANE	●	●	●	●
OLEUM	NO	NO	NO	NO
OXALIC ACID	●	●	NO	50%
OXYGEN	NO	NO	NO	NO
PERCHLOROETHYLENE	●	●	●	●
PHENOLS	●	●	NO	NO
PHOSPHORIC ACID (50%)	●	●	NO	10%
POTASSIUM DICHROMATE (10%)	●	●	●	●
POTASSIUM HYDROXIDE (50%)	70°C	70°C	NO	NO
PROPANE	●	●	●	●
PYRIDINE	●	●	NO	NO
RAPE SEED OIL	●	●	●	●
REFRIGERANT R12 (eg Freon® 12)	●	●	●	●
R22 (eg Freon® 22)	●	●	NO	NO
R134a (eg KLEA® 134a)	●	●	●	●
R404a (eg KLEA® 404a)	●	●	●	●
R407 series (eg KLEA® 407 series)	●	●	●	●
SEA WATER	●	●	●	●
SODA ASH	●	●	●	●
SODIUM CARBONATE	●	●	●	●
SODIUM DICHROMATE (10%)	●	●	●	●
SODIUM HYDROXIDE (50%)	70°C	70°C	NO	NO
SODIUM HYPOCHLORITE	NO	●	NO	NO
STARCH	●	●	●	●
STYRENE	●	●	●	●
SULPHUR DIOXIDE (DRY)	●	●	NO	NO
SULPHUR DIOXIDE (WET)	NO	NO	NO	NO
SULPHUR TRIOXIDE	NO	NO	NO	NO
SULPHURIC ACID	NO	NO	NO	NO
TANNIC ACID	●	●	●	NO
TITANIUM DIOXIDE	●	●	●	●
TITANIUM TETRACHLORIDE	●	●	NO	NO
TOLUENE (TOLUOL)	●	●	●	●
TRANSFORMER OIL	●	NO	NO	NO
TRICHLOROETHANE	●	●	NO	NO
TRICHLOROETHYLENE	●	●	●	●
TURPENTINE	●	●	●	●
UREA	●	●	●	●
VINYL ACETATE	●	●	●	●
VINYL CHLORIDE	●	●	●	●
WHITE LIQUOR	●	●	NO	NO
WHITE SPIRIT	●	●	●	●
XYLENE	●	●	●	●

Due to the complexity of making a recommendation for any given duty, this section on chemical suitability is intended only as a guide. The possible effect of elevated temperatures should be considered when determining the compatibility of these products with a chemical. If necessary, please contact our Technical Support Team for assistance.

Supagraf® expanded graphite jointings

General description

James Walker's Supagraf® comprises chemically expanded flake graphite that is calendered into sheets of controlled thickness. It is made without fillers or elastomeric content. This information and the **Prime features** shown below apply to all Supagraf products on pages 9 to 12.

Prime features

- Excellent chemical resistance.
- Exceptionally wide temperature range: from cryogenic up to 400°C in oxidising environments and, under certain circumstances, to 2500°C in inert conditions.
- Excellent resistance to stress relaxation, even at elevated temperatures.
- High levels of joint stability.
- Outstanding sealing integrity over extended periods.
- Accommodates flange distortions where traditional sheet jointings fail to seal.
- Exceptionally low leachable chloride content to resist corrosion.
- Totally compatible with steam, air and water.
- Recommended for use with heat transfer fluids and demineralised water.



Supagraf® Plain



Description

Sheet jointing of 98% pure exfoliated graphite. An **Ultra High Purity** (99.8%) grade is available for nuclear industry applications.

Prime features

- Widest temperature range.
- Very easy to cut – but large gaskets may need support during carriage and fitting.

Physical properties

(Typical values for 1.5mm thick sheet)

Density, Mg/m ³	1.0	
Compressibility, %	49	(ASTM F36J)
Recovery, %	16	(ASTM F36J)
Leachable chloride ion content, ppm	<50	

Service capabilities

Maximum temperature (oxidising media)	+400°C
Maximum temperature (*inert/reducing media)	+2500°C
Minimum temperature	-200°C

(* Ensure that temperatures above +400°C on atmosphere side of flange do not cause gasket to oxidise inwards from outside edge.)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets: 1m x 1m, 0.5m x 1m. Sheet thicknesses: 1.0mm, 1.5mm, 2.0mm, 3.0mm. Rolls up to 60m long; widths 1.0m. Roll thickness: 0.5mm.

Supagraf® expanded graphite jointings

Supagraf® Tanged T10



Prime features

- Exceptional resistance to blow-out and crushing.
- Extra strength for ease of handling and fitting.
- *Anti-stick coating available.

Physical properties

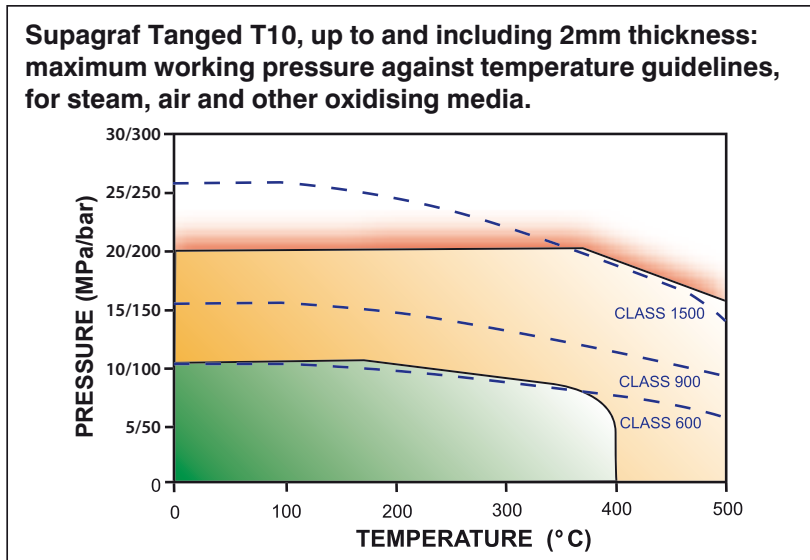
(Typical values for 1.5mm thick sheet)

Density (graphite), Mg/m ³	1.0	
Compressibility, %	35	(ASTM F36J)
Recovery, %	17	(ASTM F36J)
Leachable chloride ion content, ppm	<50	

Description

Sheet jointing of 98% pure exfoliated graphite reinforced with a central layer of 0.1mm thick tanged stainless steel. The graphite is compressed onto the perforated metal sheet to give a secure mechanical lock without adhesive.

Service capability graph



Service capabilities

For applications falling into the green zone, the product may normally be used without consultation. In the amber zone we recommend that our Technical Support Team be contacted for confirmation of suitability. If the pressure/temperature combination is in the red zone then we must be consulted before the product is used. Class lines refer to ASME B16.5. For inert/reducing media the maximum temperature is +700°C, but ensure that temperatures above +400°C on atmosphere side of flange do not cause gasket to oxidise inwards from the outside edge. Minimum operating temperature is -200°C.

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets: 1.5m x 1.5m (*1m x 1m if anti-stick). Thicknesses: 1.0mm, 1.5mm, 2.0mm, 3.0mm.

Supagraf® expanded graphite jointings

Supagraf® Laminated S10

**Description**

Sheet jointing of 98% pure exfoliated graphite with a bonded central layer of 50µm thick stainless steel foil. Sheets thicker than 2.0mm have two layers of metal foil and three of graphite.

Prime features

- Extra strength for ease of handling and fitting.
- Excellent sealing integrity.
- Can be cut with hand tools.

Physical properties

(Typical values for 2.0mm thick sheet.)

Density (graphite) Mg/m ³	1.0	
Compressibility, %	41	(ASTM F36J)
Recovery, %	22	(ASTM F36J)
Leachable chloride ion content, ppm	<50	

Service capabilities

Maximum temperature (oxidising media)	+400°C
Maximum temperature (*inert/reducing media)	+700°C
Minimum temperature	-200°C

(*Ensure that temperatures above +400°C on atmosphere side of flange do not cause gasket to oxidise inwards from the outside edge.)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.0m x 1.0m. Thicknesses: 1.0mm, 1.5mm, 2.0mm, 3.0mm.

Supagraf® Laminated N7

**Description**

Sheet jointing of 98% pure exfoliated graphite with a bonded central layer of 13µm thick nickel foil. Sheets thicker than 2.0mm have two layers of metal foil and three of graphite.

Prime features

- Extra strength for ease of handling and fitting.
- Excellent sealing integrity.
- Can be cut with hand tools.

Physical properties

(Typical values for 1.5mm thick sheet)

Density (graphite), Mg/m ³	0.7	
Compressibility, %	45	(ASTM F36J)
Recovery, %	17	(ASTM F36J)

Service capabilities

Maximum temperature (oxidising media)	+400°C
Maximum temperature (*inert/reducing media)	+1000°C
Minimum temperature	-200°C

(*Ensure that temperatures above +400°C on atmosphere side of flange do not cause gasket to oxidise inwards from the outside edge.)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 0.5m x 1.0m, 1.0m x 1.0m. Thicknesses: 1.0mm, 1.5mm, 2.0mm, 3.0mm.

Supagraf® products chemical suitability guide

● Suitable product.

Where chemical compatibility is not indicated, or a chemical is not listed, please consult our Technical Support Team for a recommendation to be made.

SUPAGRAF® PRODUCTS	SUPAGRAF® PLAIN & HIGH PURITY	SUPAGRAF® TANGED T10	SUPAGRAF® LAMINATED N7	SUPAGRAF® LAMINATED S10
STEAM	●	●	●	●
STEAM CONDENSATE	●	●	●	●
WATER	●	●	●	●
AIR	●	●	●	●
ACETIC ACID	●	NO	●	NO
ACETONE	●	●	●	●
ACETYLENE	●	●	●	●
ADIPIIC ACID	●	●	NO	●
ALUMINIUM CHLORIDE	●	●	NO	●
AMMONIA (ANHYDROUS, DRY)	●	●	●	●
AMMONIA (WET)	●	●	●	●
AMMONIUM CHLORIDE	●	●	●	●
AMMONIUM HYDROXIDE	●	NO	NO	NO
ANILINE	●	●	●	●
BENZENE	●	●	●	●
BITUMEN & HEAVY BOTTOMS	●	●	●	●
BLACK LIQUOR	●	●	NO	●
BLEACH SOLUTIONS	NO	NO	NO	NO
BOILER FEED WATER	●	●	●	●
BRINE	●	NO	NO	NO
BROMINE	NO	NO	NO	NO
BUNKER FUEL	●	●	●	●
BUTANE	●	●	●	●
CALCIUM CHLORIDE	●	●	●	●
CALCIUM HYDROXIDE	●	●	●	●
CALCIUM HYPOCHLORITE	30%	30%	30%	30%
CARBON DIOXIDE	●	●	●	●
CARBON DISULPHIDE	●	●	NO	●
CARBON TETRACHLORIDE	●	●	●	●
CHLORINE (DRY)	20°C	20°C	20°C	20°C
CHLORINE (WET)	NO	NO	NO	NO
CHROMIC ACID	NO	NO	NO	NO
CREOSOTE	●	●	●	●
DIESEL OIL	●	●	●	●
DIETHYL ETHER	●	●	●	●
DOWTHERM®	●	●	●	●
ETHANE	●	●	●	●
ETHANOLAMINES	●	●	●	●
ETHER	●	●	●	●
ETHYL ALCOHOL (Ethanol)	●	●	●	●
ETHYLAMINE	●	●	●	●
ETHYLENE	●	●	●	●
ETHYLENE GLYCOL	●	●	NO	NO
ETHYLENE OXIDE	●	●	NO	NO
FERRIC CHLORIDE (WET)	●	●	NO	●
FLUORINE	NO	NO	NO	NO
FORMALDEHYDE	●	●	●	●
FORMIC ACID	●	●	●	●
GASOLINE	●	●	●	●
GREEN LIQUOR	NO	NO	NO	NO
HEAVY OILS	●	●	●	●
HYDROBROMIC ACID	37%	NO	NO	NO
HYDROCHLORIC ACID	●	NO	NO	NO
HYDROFLUORIC ACID	●	NO	NO	NO
HYDROGEN CHLORIDE GAS (DRY)	●	●	●	●
HYDROGEN PEROXIDE (<30%)	●	●	●	●
HYDROGEN SULPHIDE	●	●	●	●
ISOPROPYL ALCOHOL	●	●	●	●
KEROSENE	●	●	●	●
LINSEED OIL	●	●	●	●
LIQUID PETROLEUM GAS	●	●	●	●

SUPAGRAF® PRODUCTS	SUPAGRAF® PLAIN & HIGH PURITY	SUPAGRAF® TANGED T10	SUPAGRAF® LAMINATED N7	SUPAGRAF® LAMINATED S10
LYE	●	●	●	●
METHANE	●	●	●	●
METHYL ALCOHOL (Methanol)	●	●	●	●
METHYL CHLORIDE	●	●	●	●
METHYL ETHYL KETONE	●	●	●	●
METHYL TERTIARY BUTYL ETHER	●	●	●	●
METHYLATED SPIRITS	●	●	●	●
METHYLENE CHLORIDE	●	●	●	●
MINERAL OILS	●	●	●	●
NAPHTHA	●	●	●	●
NATURAL GAS	●	●	●	●
NITRIC ACID (50%)	40°C	NO	NO	NO
NITROGEN	450°C	450°C	450°C	450°C
OCTANE	●	●	●	●
OLEUM	NO	NO	NO	NO
OXALIC ACID	●	●	●	●
OXYGEN	NO	NO	NO	NO
PERCHLOROETHYLENE	●	●	●	●
PHENOLS	●	●	●	●
PHOSPHORIC ACID (85%)	●	60°C	20°C	60°C
POTASSIUM DICHROMATE (10%)	●	●	●	●
POTASSIUM HYDROXIDE (50%)	●	●	●	●
PROPANE	●	●	●	●
PYRIDINE	●	●	●	●
RAPE SEED OIL	●	●	●	●
REFRIGERANT R12 (eg Freon® 12)	●	●	●	●
R22 (eg Freon® 22)	●	●	●	●
R134a (eg KLEA® 134a)	●	●	●	●
R404a (eg KLEA® 404a)	●	●	●	●
R407 series (eg KLEA® 407 series)	●	●	●	●
SEA WATER	●	20°C	20°C	20°C
SODA ASH	●	●	●	●
SODIUM CARBONATE	●	●	●	●
SODIUM DICHROMATE (10%)	●	●	●	●
SODIUM HYDROXIDE (50%)	●	●	●	●
SODIUM HYPOCHLORITE (25%)	●	NO	20°C	NO
STARCH	●	●	●	●
STYRENE	●	●	●	●
SULPHUR DIOXIDE (DRY)	●	●	●	●
SULPHUR DIOXIDE (WET)	●	●	●	●
SULPHUR TRIOXIDE	NO	NO	NO	NO
SULPHURIC ACID	70%	70%	50%	70%
TANNIC ACID	●	●	●	●
TITANIUM DIOXIDE	●	●	●	●
TITANIUM TETRACHLORIDE	●	●	●	●
TOLUENE (TOLUOL)	●	●	●	●
TRANSFORMER OIL	●	●	●	●
TRICHLOROETHANE	●	●	●	●
TRICHLOROETHYLENE	●	●	●	●
TURPENTINE	●	●	●	●
UREA	●	●	●	●
VINYL ACETATE	●	●	●	●
VINYL CHLORIDE	●	●	●	●
WHITE LIQUOR	NO	NO	NO	NO
WHITE SPIRIT	●	●	●	●
XYLENE	●	●	●	●

Due to the complexity of making a recommendation for any given duty, this section on chemical suitability is intended only as a guide. The possible effect of elevated temperatures should be considered when determining the compatibility of these products with a chemical. If necessary, please contact our Technical Support Team for assistance.

Spiral wound & metallic gaskets

Metaflex® Spiral Wound Gaskets

**Description**

This gasket is certified for emission control applications.

James Walker Metaflex® gaskets will seal flanges where temperature, pressure, vibration or flow rates are beyond the capability of conventional jointing materials.

They are wound in V-section metal strip and a softer filler material so that flange faces are presented with a spiral of alternate metal/filler layers.

Typical applications

Pipelines and pressure vessels on steam, petrochemical, metallurgical, nuclear, marine and hydraulic plant; also heat exchangers. **Metaflex® Lolode** gaskets are recommended for flange joints where bolt loading is limited.

Prime features

- Gaskets are made to a wide variety of sizes and shapes.
- Combinations of metal winding strip and filler are selected to suit the fluid media and other operating conditions.
- Quick to install and remove.
- Operate at temperatures from cryogenic up to +1000°C.
- System pressures from high vacuum to over 35MPa/350bar.
- Higher pressures (eg, 43MPa/430bar for Class 2500) are considered on request.
- Support rings, inside and/or outside of spiral winding, make gasket suitable for high line pressure on flat or raised flange faces.

Specifications

- Metaflex gaskets with graphite or PTFE fillers are certified as meeting TA-Luft emission control requirements.
- Fire test: Metaflex® type SG/IR is certified to API 6FB. This gasket type has stainless steel inner support ring and windings, SPG graphite filler, and carbon steel outer guide ring. For other fire-test certified gaskets, see Metaflex® SG/IR Fire-Safe and Corrusafe FS (Fire-Safe) on page 14.
- Products are manufactured in accordance with all relevant gaskets standards to suit flange designations: ASME B16.5, BS 1560 (only part 3.2 is still current), ASME B16.47 Series A (MSS-SP44), ASME B16.47 Series B (ASME B16.47 supersedes API 605), BS EN 1092 (supersedes BS 4504); plus DIN, JIS and NF.

Maximum operating temperatures of filler materials

SPG Standard purity graphite (oxidising media)	+500°C
SPG Standard purity graphite (inert/reducing media)	+600°C
SPG Standard purity graphite (steam)	+650°C
HPG High purity graphite (oxidising media)	+500°C
HPG High purity graphite (inert/reducing media)	+600°C
HPG High purity graphite (steam)	+650°C
Fluolion® PTFE	+260°C
HTF High temperature filler	+1000°C

Aluminium and lead fillers are also available.

Operating pressure

Metaflex gaskets seal efficiently up to 35MPa/350bar, although higher pressures can be considered.

Metal winding strips

Standard materials: stainless steels to BS EN 10088-2-1.4306 (formerly Grade 304L) and BS EN 10088-2-1.4404 (formerly Grade 316L). Other materials include a selection of alternative stainless steels, a wide range of nickel alloys, and titanium.

Support rings

Standard material: carbon steel. Other materials include wide ranges of stainless steels and nickel alloys; and Fluolion® PTFE (inner ring only).

Standard sizes

Nominal thickness (mm)	Compressed thickness (mm)	Minimum diameter (mm)	Maximum diameter (mm)
2.5	1.9 - 2.1	10	300
3.2	2.4 - 2.6	10	760
4.5	3.2 - 3.45	10	1520
7.3	4.7 - 4.9	60	3550

Non-standard gaskets well in excess of 5000mm diameter are manufactured.

How supplied

Almost any combination of component materials is available. Profiles include circular, obround, square, oval and diamond. Gaskets for non-standard flanges are made to order.

Spiral wound & metallic gaskets

Metaflex® SG/IR Fire-Safe



Description

Metaflex® SG/IR Fire-Safe is a fire-safe certified spiral wound gasket, comprising a stainless steel inner support ring and winding strip, and a carbon steel outer support ring.

It has PTFE filler in the inner sealing area, and graphite filler in the outer. PTFE enables the gasket to work with highly corrosive or high purity media. The graphite-filled area provides a secondary seal under fire conditions.

Specifications

- Fire Test certification to ANSI/API 607, Fifth edition; and ISO 10497: 2004. Third party tests were carried out by CEWAC/EID and witnessed by Lloyds.
- Manufactured in accordance with all relevant gasket standards to suit flange designations: ASME B16.5, BS 1560, ASME B16.47 Series A (MSS-SP44), ASME B16.47 Series B (API 605), BS EN 1092 (BS 4504); plus DIN, JIS and NF.

Typical applications

High pressure flange sealing duties in aggressive environments where it is essential to prevent leakage of flammable, corrosive or toxic media under emergency fire conditions. Recommended for pipelines and pressure vessels on steam, petrochemical, nuclear, marine and hydraulic plant; and heat exchangers.

Prime feature

- Recorded zero leakage under API 607/ISO 10497 test conditions that covered preliminary hydro test, fire type-testing and post burn leakage.

Materials

Winding strip & inner support ring: stainless steel to BS EN 10088-2-1.4404 (formerly Grade 316L). **Outer support ring:** carbon steel. Nickel alloys are available.

Service capabilities

Maximum temperature (continuous operation)	+260°C
Maximum operating pressure	35MPa/350bar

How supplied

Sizes: DN10 to DN1200, pressure ratings PN10 to PN40; ½" to 48", pressure ratings Classes 150 to 600.

Corrusafe FS (Fire-Safe)



Description

Corrusafe FS is a fire-safe certified gasket comprising corrugated support rings of stainless steel with dual material sealing faces.

The inner sealing envelope of PTFE is chemically inert to eliminate the risk of process contamination. The outer elements of graphite provide a secondary seal under fire conditions.

Specifications

- Fire Test certification to ANSI/API 607, Fifth edition; and ISO 10497: 2004. Third party tests were carried out by CEWAC/EID and witnessed by Lloyds.
- Manufactured in accordance with all relevant gasket standards to suit flange designations: ASME B16.5, BS 1560, ASME B16.47 Series A (MSS-SP44), ASME B16.47 Series B (API 605), BS EN 1092 (BS 4504); plus DIN, JIS and NF.

Typical applications

Flange sealing duties in aggressive environments where it is essential to prevent leakage of flammable, corrosive or toxic media under emergency fire conditions. Recommended for pipelines and pressure vessels on steam, petrochemical, nuclear, marine and hydraulic plant; and heat exchangers.

Prime feature

- Recorded zero leakage under API 607/ISO 10497 test conditions that covered preliminary hydro test, fire type-testing and post burn leakage.

Support ring material: stainless steel to BS EN 10088-2-1.4404 (formerly Grade 316L).

Service capabilities

Maximum temperature (continuous operation)	+260°C.
Maximum operating pressure	5MPa/50bar

How supplied

Sizes: DN10 to DN1200, pressure ratings PN10 to PN40; ½" to 48" for ASME flange Classes 150 to 600.

Spiral wound & metallic gaskets

Metakamm® Kammprofile Gaskets

**Description**

This gasket is certified for emission control applications.

Our grooved metal, Kammprofile-type gaskets comprise a metal core with concentric grooves on either side. They usually have a soft layer of sealing material bonded to both grooved faces.

Typical applications

Flanges of high temperature/pressure pipework and vessels where operating conditions can fluctuate. They are also recommended for heat exchangers.

Prime features

- Suit vast ranges of operating conditions.
- Work at line temperatures and pressures to +650°C or 25MPa/250bar.
- Undamaged cores can often be factory-fitted with new soft faces to reduce plant maintenance costs.
- **Metakamm® Easi-Fit (EF type)** gaskets come with two or four fitting lugs to aid installation.
- **Metakamm® Multifit** gasket fits flanges from Class 150 to 2500.

Specifications

- Metakamm® gaskets with facings of graphite or PTFE are certified as meeting TA-Luft emission control requirements.
- Products are manufactured in accordance with all relevant gaskets standards to suit flange designations: ASME B16.5, BS 1560 (only part 3.2 is still current), ASME B16.47 Series A (MSS-SP44), ASME B16.47 Series B (supersedes API 605), BS EN 1092 (supersedes BS 4504); plus DIN, JIS and NF.

Maximum operating temperatures of facing materials

SPG Standard purity graphite (oxidising media)	+500°C
SPG Standard purity graphite (inert/reducing media)	+600°C
SPG Standard purity graphite (steam)	+650°C
HPG High purity graphite (oxidising media)	+500°C
HPG High purity graphite (inert/reducing media)	+600°C
HPG High purity graphite (steam)	+650°C
Fluolion® PTFE	+260°C

Aluminium and silver facings are also available.

Operating pressure

Standard gaskets 25MPa/250bar (maximum)

Serrated metal cores

Available in wide ranges of stainless steels and nickel alloys, titanium and copper.

Sizes

Standard diameters: 10mm to 3600mm NB. Standard thicknesses: 3.0mm and 4.0mm cores with 0.5mm soft facings. Non-standard thicknesses: 2.0mm core upwards.

How supplied

Six designs for different flange faces, in any combination of component materials. Special profiles: oval, rectangular, and heat exchanger shapes with pass bars.

Metakamm® Easi-Fit (EF type)

For easier fitting and reduced material costs, larger Metakamm gaskets can be supplied as EF types with either two or four mounting lugs. The lugs aid fitting by minimising the number of flange bolts that need to be removed to allow accurate gasket positioning.

Metakamm® Multifit

Metakamm with four self-locating lugs that minimises the number of gaskets to fit flange Classes 150 to 2500. Sizes: ½" to 24" NB, and DIN equivalents to 600mm NB.

Corrugated metal gaskets

Description

Thin metal sheet gaskets with pressed corrugations — usually concentric to the bore.

Prime features

- Gaskets can adapt to irregular flanges without undue compressive load.
- Provide excellent seal under varying conditions of temperature and pressure.

Materials

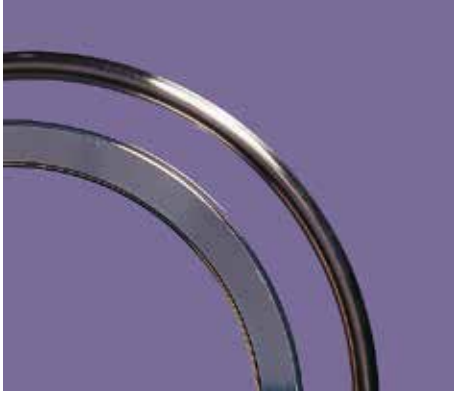
Usually 0.25mm thick brass, but virtually any malleable material will be considered.

How supplied

In material to suit the application, and to any practical shape, size and quantity.

Spiral wound & metallic gaskets

Moorside[®] Ring Joint Gaskets



Description

Manufactured in the UK by API licensee James Walker Moorflex, these precision machined ring joint gaskets are used worldwide in high-pressure oilfield applications as well as on refining and processing plant.

James Walker Moorflex is licensed under API Spec 6A-0038, by the American Petroleum Institute, to apply the API monogram to gaskets in accordance with API 6A PSL4 requirements.

Specifications

- To API 6A (oilfield use) standard.
- To ASME B16.20 (general use) standard.
- To fit ASME, BS and DIN flanges.

Ring joint types

- R type (oval and octagonal) solid sections to fit standard ring joint flanges with trapezoidal grooves.
- Types RX and BX with complex bevelled edge sections for wellhead pressures exceeding 69MPa/690bar (10,000psi).
- Lens section, convex, wedge, double cone, and weld ring types.

Materials

Standard: soft iron, low carbon steel, plus ranges of alloy steels and stainless steels. Non-standard: high nickel alloys, super alloy steels, and additional stainless steels.

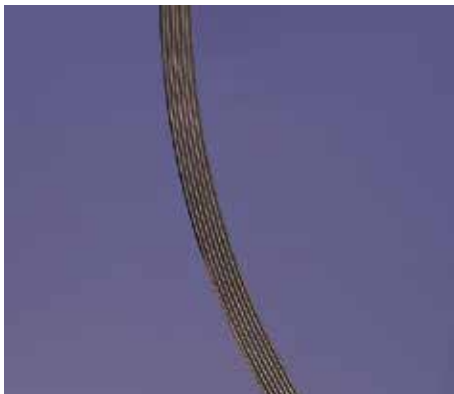
Ancillary equipment

- PTFE inner rings, for sitting in the cavity between the flange bore and ring joint to reduce turbulence and flange erosion.
- Flange protectors, for installation around the external diameter of flange joint to minimise ingress of moisture and dirt.
- Rubber coated ring joints: soft iron ring joint gaskets encapsulated in nitrile rubber for testing wellhead assemblies and valves. Rings can be reused and do not damage the flange grooves.

How supplied

All sizes and materials to the standards listed. We also manufacture customers' proprietary designs where confidentiality agreements are in force.

Machined Metal Gaskets



Description

Solid metal gaskets that are precision manufactured to a variety of complex profiles for high-specification industrial and defence duties.

Typical applications

Ultra-high vacuum equipment, refrigeration plant, hydraulic systems, etc.

Prime features

- Lens section — resists overstressing in high pressure duties.
- Convex section — centralised loading of gasket is achieved by a reduction in loaded area.
- Wedge section — positively locates a gasket in a cylindrical application. Gasket lip is energised by bolting or internal pressure.
- Double cone section — for large diameter, high pressure duties.
- Weld ring gaskets — for critical applications where a leak-proof joint is essential. Back-up gasket may be required.
- Ring joint orifice/blanking gaskets.

Materials

Include: soft carbon steel, stainless steels, alloy steels, and nickel alloys. Also Urea Grade stainless steel for highly corrosive environments.

How supplied

Manufactured to industry, national and international standards. We also manufacture customers' proprietary designs where confidentiality agreements are in force.

Spiral wound & metallic gaskets

Metcom® Gaskets



Description

This gasket is certified for emission control applications.

It comprises a thin corrugated steel joint with pressed concentric grooves 6mm wide. Two adjacent grooves on opposite surfaces are filled with beads of Supagraf® Tape — either standard or high purity grades. When compressed between flanges, the metal corrugations provide a sealing capability that is enhanced by the graphite beads.

Typical applications

Pipelines and pressure vessels with Class 150 to 2500 flanges, or equivalent.

Prime features

- Thinner than a spiral wound gasket and can usually be fitted in place of a sheet jointing gasket in a pipe run.
- Self locating, and often easier to install than a sheet graphite gasket.
- When supplied with taper-slot legs, this gasket can be used on a variety of flanges with differing bolt diameters and pitch circles.

Specifications

- Metcom® Type FG316L gasket is certified as meeting TA-Luft emission control requirements.

Physical properties

Standard metal cores in a selection of stainless steels. Other alloys are available.

Supagraf graphite thickness, mm	0.35 to 0.5
Nominal overall thickness, mm	1.5
Compressed thickness, mm	0.5

Service capabilities

Maximum temperature (oxidising media)	+500°C
Maximum temperature (non-oxidising)	+550°C
Maximum temperature (steam)	+650°C
Pressure rating (depending on temperature)	Vacuum to 40MPa/400bar

Optional groove filler material

PTFE is available for aggressive chemical conditions, but restricted service capabilities apply. Please contact our Technical Support Team for assistance.

How supplied

Multi-flange configuration: ½" to 12", Classes 150 – 2500.
Individual flange configuration: ½" to 24", Classes 150 – 2500.
Other sizes on application.

Metal Jacketed Gaskets



Description

Gasket with a soft pliable core, surrounded by a metal jacket that totally or partially encloses the filler. Pass partition bars can be incorporated, either integrally or welded into the gasket. The jacket may be corrugated.

Typical applications

- Heat exchangers.
- Boilers and flues.
- Autoclaves and other pressure vessels.
- Gas mains.
- Pumps and valve bonnets.
- Duties involving high temperature and dry heat.

Materials

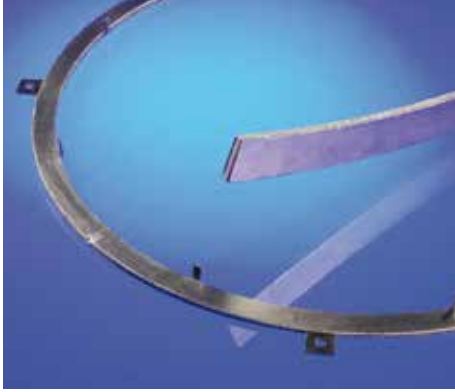
Fillers: inert organic compounds, expanded graphite, Fluolion® PTFE, ceramic fibre.
Jackets: soft iron, low carbon steels, stainless steels, nickel alloys, aluminium, brass, copper, titanium.

How supplied

To industry, national and international standards, or customer specification. Material combinations are selected to suit operating conditions.

Spiral wound & metallic gaskets

Supagraf® Furnasele



Description

These gaskets consist of a supporting metal ring with a relatively thick layer of graphite bonded to both faces. The support ring enables the graphite sealing faces to be positioned accurately on large vertical flanges. Without support, the graphite elements would have to be supplied and transported in segments.

By using thicker graphite layers than normal an effective seal can be made with a light bolt loading, and on applications where flanges are uneven or warped.

Typical applications

Supagraf® Furnasele was initially developed to solve sealing problems on blast furnace ducts with warped flanges. Long-term reliability and sealing performance has made it a standard fitment at many metallurgical plants. It also solves flange sealing problems in other industries where a large conformable one-piece gasket is needed for medium or high temperature duties — especially on vertical flanges.

Design features

- **Supagraf Furnasele Type A:** 7mm total thickness; for gaskets of 1m or greater overall diameter.
- **Supagraf Furnasele Type B:** 5mm total thickness; for gaskets of less than 1m overall diameter.
- Face widths are usually 40mm to 50mm.
- Other thickness combinations can be produced as required.
- On very hot applications, a thermal barrier can be supplied to protect the graphite from oxidation. This is usually unnecessary in metallurgical plants where the installation is water-cooled.

Materials of manufacture

Graphite: 98% purity expanded graphite.

Metal ring: Generally hot-rolled carbon steel. Stainless steels are readily available, with a range of nickel alloys supplied on request.

How supplied

Supagraf Furnasele gaskets are custom designed and manufactured to suit each application. Diameters range from 500mm to well in excess of 2000mm.

Metagraf Gaskets



Description

These gaskets have a corrugated metal core, normally of stainless steel, with Supagraf® expanded graphite facings. Available as **Metagraf PL** with a wide chemical compatibility for pipeline duties, and **Metagraf HX** for heat exchangers.

Temperature limits

Oxidising atmosphere	-200°C to +400°C
Steam	+650°C (maximum)

How supplied

Metagraf PL: To fit ASME Classes 150 and 300, and DIN flanges.

Metagraf HX: Custom made to order.

Spiral wound & metallic gaskets

chemical suitability guide

Notation:

A = Fully resistant (less than 0.009mm penetration per month)

B = Satisfactory (0.009mm-0.09mm per month)

C = Fairly resistant (0.09mm-0.25mm per month)

D = Slightly resistant (0.25mm-0.9mm per month)

E = Non-resistant (over 0.9mm per month)

0 = Insufficient data available.

Where chemical compatibility is not indicated, or a chemical is not listed, please consult our Technical Support Team for a recommendation to be made.

METAL COMPONENTS	STAINLESS STEELS UNS S30403, S32100, S34700	STAINLESS STEELS UNS S31600, S31603	NICKEL UNS N02200	NICKEL ALLOY UNS N04400	NICKEL-CHROME ALLOY UNS N06625
STEAM	A	A	A	A	A
STEAM CONDENSATE	A	A	A	A	A
WATER	A	A	A	A	A
AIR	A	A	A	A	A
ACETIC ACID (50% @ boiling)	C	B	B	A	B
ACETIC ANHYDRIDE (boiling)	A	A	A	A	A
ACETONE (boiling)	A	A	A	A	A
ALUMINIUM CHLORIDE (20°C)	D	C	B	B	C
AMMONIA LIQUOR (boiling)	A	A	C	C	A
AMMONIUM CHLORIDE (50%, boiling)	B	A	A	A	B
AMMONIUM NITRATE (boiling)	A	A	E	E	B
ANILINE (concentrated @ 20°C)	A	A	A	A	A
BARIUM CHLORIDE (boiling)	B	A	B	A	B
CHROMIUM PLATING BATH (20°C)	A	A	C	C	A
CITRIC ACID (15%, boiling)	B	A	B	A	A
COPPER SULPHATE (saturated, boiling)	A	A	C	C	C
CREOSOTE/COAL TAR (hot)	A	A	A	A	A
ETHER (20°C)	A	A	A	A	A
ETHYL ALCOHOL (boiling)	A	A	A	A	A
ETHYL CHLORIDE (20°C)	A	A	A	A	A
ETHYLENE CHLORIDE (20°C)	A	A	A	A	A
FERRIC CHLORIDE (1% @ 20°C)	B	A	B	C	C
FLUORINE (20°C)	E	E	A	A	A
FORMALDEHYDE (Formalin 40%)	B	A	A	A	A
FORMIC ACID (5% @ 65°C, still)	B	A	A	A	A
FUEL OIL (hot)	A	A	B	B	A
FUEL OIL (+sulphuric acid)	C	B	B	B	B
HYDROCHLORIC ACID (20°C)	E	E	B	B	C
HYDROFLUOSILICIC ACID (20°C)	E	D	A	A	B
HYDROGEN PEROXIDE (boiling)	B	A	0	0	0
HYDROGEN SULPHIDE (wet)	B	A	A	A	A
KEROSENE	A	A	A	A	A
LACTIC ACID (10% @ 65°C)	C	B	B	B	B
LINSEED OIL (20°C)	A	A	A	A	A
MAGNESIUM CHLORIDE (5%, hot)	C	B	A	A	A
MAGNESIUM SULPHATE (hot)	A	A	A	A	A

Filler & facing materials

Expanded graphite: See details for Supagraf® Plain on page 12.

HTF (High temperature filler): When used with suitable winding steel grades, this material resists the majority of common media including: hot oil, fuels, acids, alcohols, and esters. It should NOT be used with: sulphuric, phosphoric, hydrofluoric or other strong mineral acids.

Due to the complexity of making a recommendation for any given duty, this section on chemical suitability is intended only as a guide. The possible effect of elevated temperatures should be considered when determining the compatibility of these products with a chemical. If necessary, please contact our Technical Support Team for assistance.

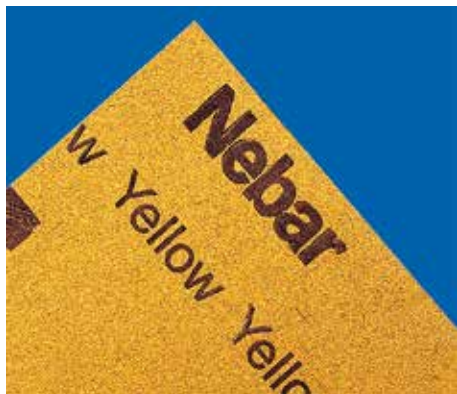
METAL COMPONENTS	STAINLESS STEELS UNS S30403, S32100, S34700	STAINLESS STEELS UNS S31600, S31603	NICKEL UNS N02200	NICKEL ALLOY UNS N04400	NICKEL-CHROME ALLOY UNS N06625
METHYL ALCOHOL (65°C)	C	B	A	A	A
NAPHTHA (20°C)	A	A	A	A	A
NICKEL CHLORIDE SOLUTION (20°C)	A	A	B	B	B
NICKEL SULPHATE (hot/cold)	A	A	A	A	A
NITRIC ACID (50% @ 20°C)	A	A	E	E	A
(65%, boiling)	B	B	E	E	D
OIL - CRUDE (hot/cold)	A	A	A	A	A
OIL - VEG/MINERAL (hot/cold)	A	A	A	A	A
OXALIC ACID (10%, boiling)	D	C	B	A	B
PHENOL	A	A	A	A	A
PHOSPHORIC ACID (10% @ 20°C)	C	B	B	B	B
PICRIC ACID (70%)	A	A	0	0	0
POTASSIUM BICHROMATE (20°C)	A	A	A	A	A
POTASSIUM CHLORIDE (5%, boiling)	A	A	A	A	A
POTASSIUM HYDROXIDE (50%, boiling)	B	A	A	A	A
POTASSIUM NITRATE (5%, hot)	A	A	A	A	A
POTASSIUM SULPHATE (5%, hot)	A	A	A	A	A
POTASSIUM SULPHIDE (salt)	A	A	A	A	A
SEA WATER	A	A	A	A	A
SEWAGE	A	A	A	A	A
SODIUM CARBONATE (5% @ 65°C)	A	A	A	A	A
SODIUM CHLORIDE (saturated, boiling)	B	A	A	A	A
SODIUM HYDROXIDE	A	A	A	A	A
SODIUM HYPOCHLORITE (5%, still)	B	A	C	C	C
SODIUM NITRATE (fused)	C	B	A	B	A
SODIUM SULPHATE (20°C)	A	A	A	A	A
SULPHUR DIOXIDE (moist, 20°C)	B	A	D	C	C
SULPHUR (wet)	B	A	B	B	A
SULPHURIC ACID (10% @ 20°C)	C	B	B	A	C
(fuming, 20°C)	C	B	C	B	B
SULPHUROUS ACID (saturated, 190°C)	C	B	E	E	E
TANNIC ACID (65°C)	A	A	A	A	A
TRICHLORACETIC ACID (20°C)	E	E	B	B	B
ZINC CHLORIDE (5%, boiling)	B	B	B	B	B
ZINC SULPHATE (25%, boiling)	A	A	A	A	A

PTFE (with 25% glass fibre): This material is chemically inert to most media, with a few exceptions as follows.

- It offers only fair resistance to: ammonium hydroxide, bromine, chromic acid, hydroboric acid, hydrochloric acid, hydrocyanic acid, nitric acid (0-50%), phenol, and sodium hydroxide.
- It should NOT be used with: fluorosilicic acid, hydrofluoric acid, hydrogen sulphide solution, or sodium silicate.

Cork-elastomer jointings

Nebar® Yellow: Premium Nitrile



Description

Premium quality, nitrile based cork-elastomer jointing developed to meet the requirements of Specification BS F 66. Previously designated Nebar® A/CT.

Recommended maximum system pressure is 0.5MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Resists a wide range of fluid media.
- 110°C maximum operating temperature in liquids.
- Retains flexibility down to -20°C.
- All Nebar products are easy to cut, handle and install.

Specifications

Conforms to BS F 66.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	60 to 75	(ASTM D1415)
Tensile strength (minimum), MPa	1.72	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	20 to 30	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-5 to +15	(ASTM F146)
IRM 903, 72h @ 100°C	+5 to +20	(ASTM F146)
ASTM Fuel A, 22h @ ambient	+5 to +15	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+1	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1.0m with a split surface finish. Thicknesses 0.75mm, 1mm, 1.5mm, 3mm.

Nebar® Red: Higher Gasket Loading



Description

A high quality blend of cork and polychloroprene that withstands higher pressures and gasket loading than other Nebar® grades, particularly in the electrical industry. Previously designated Nebar® HP.

Recommended maximum system pressure is 0.6MPa/6bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Developed for higher-pressure applications in switchgear and transformers.
- High resistance to mineral oils.
- Withstands higher gasket loading than other Nebar® grades.
- 110°C maximum operating temperature in liquids.
- Retains flexibility down to -30°C.

Specifications

Complies with ASTM F104 line call out F224000M2.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	70 to 85	(ASTM D1415)
Tensile strength (minimum), MPa	2.35	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	10 to 30	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-5 to +5	(ASTM F146)
IRM 903, 72h @ 100°C	+10 to +30	(ASTM F146)
ASTM Fuel A, 22h @ ambient	0 to +10	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+10	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1.0m for 0.75mm thickness; sheets 1.2m x 1.2m for thicknesses 1.5mm, 2.5mm, 3mm, 6mm, 6.4mm, 9.5mm, 22mm.

Cork-elastomer jointings

Nebar® Black: Hi-Performance Electrical

**Description**

Cork-elastomer jointing based on nitrile/polychloroprene blend. Previously designated Nebar® C947/3.

Recommended maximum system pressure is 0.5MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Specifically for hydrogen coolers or where SF₆ gas is present.
- 10¹⁰ohm.cm resistivity at 100Vdc.
- 110°C maximum operating temperature in liquids.
- Retains flexibility down to -15°C.

Specification

Complies with ASTM F104 line call out F224000M2.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	65 to 80	(ASTM D1415)
Tensile strength (minimum), MPa	2.45	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	15 to 25	(ASTM F36B)
Recovery, minimum %	85	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-2.7	(ASTM F146)
IRM 903, 72h @ 100°C	+10.5	(ASTM F146)
ASTM Fuel A, 22h @ ambient	+1	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+1.2	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1.0m for 2.5mm thickness; 1.8m x 1m for 3mm thickness; 1.2m x 1.2m for 5mm thickness.

Nebar® Brown: General Purpose

**Description**

General purpose, high quality cork-elastomer jointing. Below 3mm thickness it comprises a predominately nitrile bonded cork; 3mm and above the cork is bonded with a polychloroprene/nitrile blend. Previously designated Nebar® N1.

Recommended maximum system pressure is 0.5 MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Extensively used in automotive, engineering and electrical industries.
- Suitable for a wide range of flanges.
- 110°C maximum operating temperature in liquids.
- Retains flexibility down to -20°C (<3mm) or -30°C (≥3mm).

Specifications

Complies with ASEA 1169 5012E-204; and ASTM F104 line call out — <3mm, F224000M2; 3mm & >3mm, F225000M2.

Physical properties

(Tested to ASTM F104 procedures)	<3mm	≥3mm	
Hardness, IRHD	65 to 80	65 to 85	(ASTM D1415)
Tensile strength (minimum), MPa	1.75	1.75	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	15 to 30	20 to 30	(ASTM F36B)
Recovery, minimum %	75	75	(ASTM F36B)
Fluid resistance, % volume change in:			
ASTM Oil No.1, 72h @ 100°C	-3 to +10	0 to +10	(ASTM F146)
IRM 903, 72h @ 100°C	0 to +25	+5 to +30	(ASTM F146)
ASTM Fuel A, 22h @ ambient	-5 to +10	0 to +15	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+23	+8	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1.2m for thicknesses 0.75mm, 1mm, 1.5mm, 2mm, 2.5mm, 3mm, 4mm, 5mm, 6mm, 6.4mm. Sheets 0.9m x 9m for thicknesses 0.75mm, 1.5mm, 2mm, 3mm, 5mm.

Cork-elastomer jointings

Nebar® White: Premium Neoprene Electrical



Description

Premium quality cork-elastomer jointing, based predominantly on polychloroprene. Proven over many years in heavy electrical plant. Previously designated Nebar® N6/25.

Recommended maximum system pressure is 0.5MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Top grade product for transformers and switchgear.
- Developed for prolonged contact with mineral oils.
- 105°C maximum operating temperature in liquids.
- Retains flexibility down to -30°C.

Specification

Complies with ASTM F104 line call out F225000M2.

Physical properties

(Tested to ATSM F104 procedures)

Hardness, IRHD	65 to 85	(ASTM D1415)
Tensile strength (minimum), MPa	1.75	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	20 to 30	(ASTM F36B)
Recovery, minimum %	80	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-5 to +10	(ASTM F146)
IRM 903, 72h @ 100°C	+10 to +30	(ASTM F146)
ASTM Fuel A, 22h @ ambient	0 to +15	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+10	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1.2m. Thicknesses 0.75mm, 1.5mm, 2mm, 3mm, 4mm, 5mm, 6mm, 6.4mm, 8mm, 9.5mm.

Nebar® Orange: Neoprene Electrical



Description

Economical, high quality cork-elastomer jointing based on a polychloroprene/nitrile/SBR blend. Previously designated Nebar® N7E.

Recommended maximum system pressure is 0.5MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Recommended for switchgear and transformers.
- 110°C maximum operating temperature in liquids.
- Retains flexibility down to -30°C.

Specifications

Complies with ASTM F104 line call out F225000M2.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	60 to 70	(ASTM D1415)
Tensile strength (minimum), MPa	1.45	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	20 to 35	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-5 to +10	(ASTM F146)
IRM 903, 72h @ 100°C	0 to +30	(ASTM F146)
ASTM Fuel A, 22h @ ambient	0 to +15	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+5 to +15	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1.2m. Thicknesses 1.5mm, 2mm, 2.5mm, 3mm, 5mm, 6mm, 9.5mm.

Cork-elastomer jointings

Nebar® Grey: Premium Nitrile Electrical

**Description**

Premium quality, medium hardness jointing based on nitrile rubber, that meets ABB specification for transformers and switchgear. Previously designated Nebar® N80.

Recommended maximum system pressure is 0.5MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Suitable for a wide range of duties.
- Used extensively in automotive, engineering and electrical industries.
- 110°C maximum operating temperature in liquids.
- Retains flexibility down to -25°C.

Specifications

Meets ABB specifications for transformers and switchgear. Complies with ASTM F104 line call out F225000M2.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	70 to 75	(ASTM D1415)
Tensile strength (minimum), MPa	1.75	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	20 to 30	(ASTM F36B)
Recovery, minimum %	80	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-2 to +10	(ASTM F146)
IRM 903, 72h @ 100°C	-2 to +15	(ASTM F146)
ASTM Fuel A, 22h @ ambient	-2 to +10	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+2.4	(ASTM F146)
Dow Corning 561 Transformer Fluid	-5	(Non-ASTM test)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 0.9m. Thicknesses 1.5mm, 3mm, 5mm, 6mm.

Nebar® Purple: Nitrile Electrical

**Description**

High quality, medium-to-hard grade of cork-elastomer jointing based on nitrile elastomer. Replacement material for Nebar® N67.

Recommended maximum system pressure is 0.5MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Robust grade for heavy electrical duties.
- More resistant to over-compression than normal cork-elastomer grades.
- Resists all commonly used transformer fluids.
- 110°C maximum recommended operating temperature in liquids; tolerates intermittent excursions to 120°C.
- Retains flexibility down to -20°C.

Specification

Complies with ASTM F104 line call out F225000M2.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	60 to 80	(ASTM D1415)
Tensile strength (minimum), MPa	1.75	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	15 to 25	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-5 to +15	(ASTM F146)
IRM 903, 72h @ 100°C	+5 to +20	(ASTM F146)
ASTM Fuel A, 22h @ ambient	+5 to +15	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+1 to +10	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 0.9m for thicknesses 1.5mm, 3mm, 4mm, 5mm, 6mm, 6.4mm. Sheets 1.27m x 1.014m for thicknesses 1.5mm, 5mm.

Cork-elastomer jointings

Nebar® Blue: Unleaded Services



Description

Premium quality nitrile based cork-elastomer jointing, especially recommended for use with unleaded fuels. Previously designated Nebar® PR.

Recommended maximum system pressure is 0.5MPa/5bar. May be used for higher pressures in consultation with our Technical Support Team.

Prime features

- Exceptional resistance to a wide range of fuels, oils and solvents.
- Suitable for many fluid sealing applications in the automotive, engineering and electrical industries.
- Originally developed for use with Askarel transformer fluids.
- 115°C maximum operating temperature in liquids.
- Retains flexibility down to -5°C.

Specification

Complies with ASTM F104 P2245A; and ASTM F104 line call out F226000M1.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	60 to 75	(ASTM D1415)
Tensile strength (minimum), MPa	1.45	(ASTM F152B)
Compressibility @ 2.8N/mm ² , %	25 to 40	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-5 to +10	(ASTM F146)
IRM 903, 72h @ 100°C	-5 to +15	(ASTM F146)
ASTM Fuel A, 22h @ ambient	-2 to +10	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+1	(ASTM F146)
Unleaded petrol, 8 months @ 18-22°C	+11	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1.0m for 2mm thickness. Sheets 1.2m x 1.2m for thicknesses 3mm, 8mm.

Nebar® Green: Sponge



Description

Soft cork-elastomer jointing of closed-cell construction based on polychloroprene elastomer. Previously designated Lioncelle® CS.

Recommended maximum system pressure is 0.2MPa/2bar.

Prime features

- For sealing at low bolt loads, and on uneven or delicate flanges.
- 100°C maximum operating temperature in liquids.
- Retains flexibility down to -30°C.

Specifications

Complies with ASTM F104 P2357A.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	30 to 50	(ASTM D1415)
Tensile strength (minimum), MPa	0.53	(ASTM F152B)
Compressibility @ 0.7N/mm ² , %	25 to 45	(ASTM F36F)
Recovery, minimum %	75	(ASTM F36F)
Fluid resistance, % volume change in:		
ASTM Oil No.1, 72h @ 100°C	-10 to +10	(ASTM F146)
IRM 903, 72h @ 100°C	+15 to +50	(ASTM F146)
ASTM Fuel A, 22h @ ambient	0 to +25	(ASTM F146)
BS 148 Transformer Oil, 14 days @ 90°C	+15	(ASTM F146)

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.2m x 1m. Thicknesses: 3mm, 5mm, 6.4mm.

Cork-elastomer jointings chemical suitability guide

Key: ● Suitable for use LP Not suitable at high pressure

NEBAR®:	YELLOW	BLACK	RED	BROWN	WHITE	PURPLE	ORANGE	GREY	BLUE	GREEN
AIR	●	●	●	●	●	●	●	●	●	LP
WATER	●	●	●	●	●	●	●	●	●	●
ALCOHOLS	●	●	●	●	●	●	●	●	●	●
FUEL & DIESEL OIL	●	●	●	●	●	●	●	●	●	●
LUBRICATING OIL – MINERAL	●	●	●	●	●	●	●	●	●	●
LUBRICATING OIL – SYNTHETIC	●	●	-	-	-	●	-	●	●	-
HYDRAULIC OIL – MINERAL	●	●	●	●	●	●	●	●	●	●
WATER/GLYCOL	●	●	●	●	●	●	●	●	●	●
WATER/OIL EMULSION	-	●	-	-	-	-	-	-	-	-
ASTM OIL NO.1	●	●	●	●	●	●	●	●	●	●
IRM 903	●	●	●	●	●	●	●	●	●	●
ASTM FUEL A	●	●	●	●	●	●	●	●	●	●
BS 148 TRANSFORMER OIL	●	●	●	●	●	●	●	●	●	●
UNLEADED FUEL	-	-	-	-	-	-	-	-	●	-

Note: None of the above Nebar® grades is suitable for use with potable water, dilute acids or alkalis, phosphate ester (aliphatic or aromatic), or foodstuffs.

Due to the complexity of making a recommendation for any given duty, this section on chemical suitability is intended only as a guide. The possible effect of elevated temperatures should be considered when determining the compatibility of these products with a chemical. If necessary, please contact our Technical Support Team for assistance.

General service information

Nebar® is the registered tradename for our range of cork-elastomer jointings. These products are intended for sealing flat flanges against fluid leakage within the 'modest' pressure and temperature ranges as recommended for each Nebar grade on pages 20 to 24 of this guide.

PTFE gaskets & jointings

Fluolion® Integra Blue



Description

General purpose PTFE-based sheet jointing that is specially stabilised and mechanically treated to improve multi-directional strength, combat creep and improve resilience for flange jointing duties.

Typical applications

Flanged joints on plant that handles aggressive fluid media, especially where hygiene is top priority – such as in the food and electronic industries. It is especially suited to applications with weak or lightly loaded flanges, as well as standard flange duties.

Prime features

- High compressibility for effective sealing on lightly loaded flanges.
- Outstanding resistance to a very wide range of chemical media.
- Inherently clean, non-toxic and non-tainting.
- Can be used at cryogenic temperatures.

Specifications

- Complies with requirements of FDA Regulations for food use.

Chemical properties

Resistant to moderate concentrations of acids, caustic alkalis, solvents, hydrocarbons, hydrogen peroxide, refrigerants and cryogenics. Will not support combustion.

Physical properties

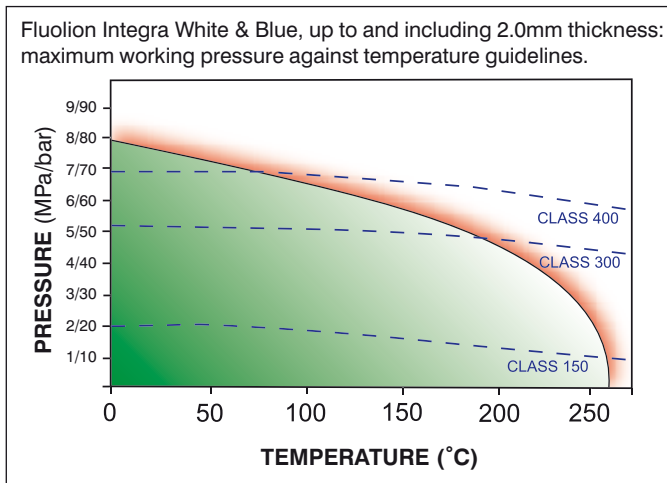
(Typical values for 1.5mm thick material)

Density, Mg/m ³	1.43	
Transverse tensile strength, MPa	10	(ASTM F152A)
Residual stress at 175°C, MPa	22	(BS 7531)
Compressibility, %	42	(BS 7531)
Recovery, %	43	(ASTM F36J)
Gas leakage, ml/min	0.03	(BS 7531)

Fluid immersion properties

IRM 903, % thickness increase, 5h @ 150°C	5.0	(BS 7531)
ASTM Fuel B, % thickness increase, 5h @ RT	6.0	(ASTM F146)
Water, % thickness increase, 5h @ 100°C	9.0	(BS 7531)

Service capability graph for Fluolion® Integra range



Service capability

For applications falling into the green zone, the product may normally be used without consultation. If the pressure/temperature combination is in the red zone then we must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.5m x 1.5m. Thicknesses: 0.75mm, 1.0mm, 1.5mm, 2.0mm. Please note that 3.0mm is also available but is not recommended (see page 48 for advice on gasket use).

PTFE gaskets & jointings

Fluolion® Integra White

**Description**

Specially stabilised PTFE sheet material, mechanically treated to improve multi-directional strength, combat creep and improve resilience for flange jointing duties.

Typical applications

Flanged joints on plant that handles extremely aggressive fluid media. Also where hygiene is top priority – such as in the pharmaceutical, food and electronic industries.

Prime features

- Outstanding resistance to a very wide range of chemical media.
- Inherently clean, non-toxic and non-tainting.
- Can be used at cryogenic temperatures.
- Displays compressibility and recovery characteristics close to those of many non-asbestos fibre jointings.

Specifications

- Complies with requirements of FDA Regulations for food use.
- Complies with USP 25, Class V classification of plastics for pharmaceutical service.

Chemical Properties

Resistant to strong acids (except hydrofluoric), steam, solvents, hydrocarbons, hydrogen peroxide, refrigerants and cryogenics. Will not support combustion.

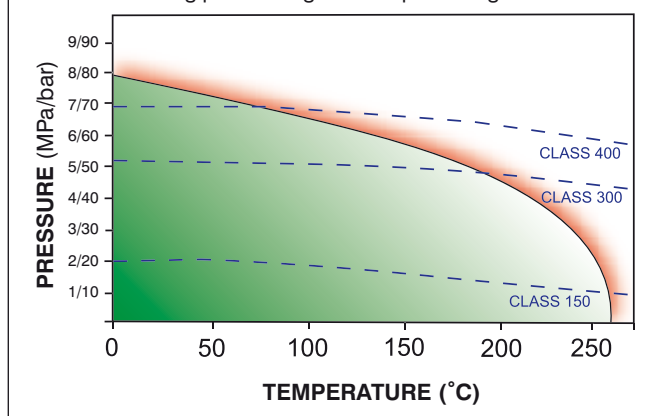
Physical properties

(Typical values for 1.5mm thick material)

Density, Mg/m ³	2.2	
Transverse tensile strength, MPa	15	(ASTM F152A)
Residual stress at 175°C, MPa	31	(DIN 52913)
Compressibility, %	4-10	(ASTM F36J)
Recovery, %	41	(ASTM F36J)
Gas leakage, ml/min	0.04	(BS 7531)

Service capability graph for Fluolion® Integra range

Fluolion Integra White & Blue, up to and including 2.0mm thickness: maximum working pressure against temperature guidelines.

**Service capability**

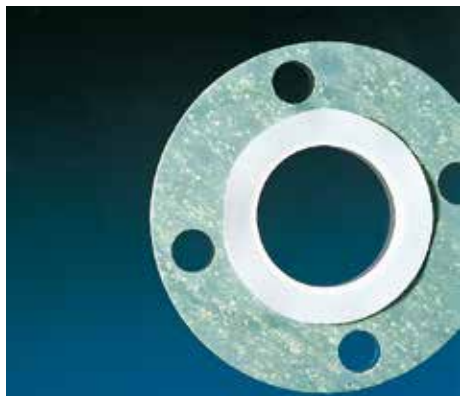
For applications falling into the green zone, the product may normally be used without consultation. If the pressure/temperature combination is in the red zone then we must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity. In sheets 1.5m x 1.5m. Thicknesses: 0.75mm, 1.0mm, 1.5mm, 2.0mm. Please note that 3.0mm is also available but is not recommended (see page 48 for advice on gasket use).

PTFE gaskets & jointings

Fluolion® Envelope Gaskets

**Description**

A resilient material encased in a thin cover of PTFE.

The resulting gasket combines the inertness of virgin PTFE with the mechanical properties of the insert material.

James Walker supplies three envelope designs: Fin Type; Machined Square Type; Folded Tape Type.

Typical application

Flanged joints handling highly aggressive fluid media that would swiftly destroy the integrity of other materials. Often used with soft insert material on glass-lined pipework systems. Also used in food processing, where cleanliness and non-contamination are essential.

Fin type

- Standard design: most economical envelope gasket.
- Suits majority of applications where highly abrasive media are NOT used, and turbulent flow will NOT create problems.
- Needs clearance between insert and envelope inside diameter to enable insert to be fitted.

Machined square type

- Provides continuity with pipeline bore for smooth flow.
- Recommended where flange sealing width is restricted or thick inserts are used.
- Supplied with serrated surface.

Folded tape type

- Has smooth surface finish – tape of PTFE is folded and joined by welding.
- Used for diameters over 300mm.
- Can be adapted to non-circular planforms.

Service capability

Maximum temperature	Typically +260°C for PTFE envelope, but also dependent on filler material.
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Materials

Cover: virgin Fluolion® PTFE.
 Inserts: compressed non-asbestos fibre, synthetic rubber-proofed woven cloth, and laminated combinations of these.

How supplied

Custom made to suit all standard flanges and non-standard shapes.

Fluolion® Sheet Gaskets

**Description**

Custom-cut gasket of plain (virgin), expanded or filled PTFE.

Typical application

- Expanded PTFE gaskets are used on flanges that have rough or damaged faces. Also on glass, porcelain and plastic flanges where low bolt loads are essential.
- Gaskets of filled-Fluolion are used for applications where the mechanical properties of PTFE need to be improved at the expense of chemical resistance and other inherent benefits.

Service capabilities

Maximum temperature	+260°C
Chemical suitability	See recommendations on page 36.

Materials

Fluolion® PTFE: plain PTFE. Fluolion® G15 & G25: contain 15% or 25% glass, by weight. Fluolion® GS: 25% glass plus wear-resistant additives. Fluolion® G15M: 15% glass and 5% molybdenum disulphide. Fluolion® B60: 60% bronze. Fluolion® GR: 25% carbon/graphite. Fluolion® BR65: 60% bronze and 5% graphite.

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.5m x 1.5m. Standard thicknesses: 1.0mm, 1.5mm, 2.0mm, 3.0mm.

PTFE gaskets & jointings

GORE® Universal Pipe Gasket (Style 800)**Description**

A gasket for all types of standard piping, manufactured by WL Gore & Associates, from 100% ePTFE with multi-directional strength.

Typical applications

Flange sealing in the chemical processing sector — especially where it is desirable to standardise on one gasket type for duties with many different piping materials. These gaskets are used with steel, glass-lined steel and FRP piping systems, wherever a non-metallic gasket is normally applied.

Specifications

- This product is suitable for industrial use only.

Prime features

- Dimensionally stable — resists creep, cold flow and blow-out.
- Seals efficiently at the low bolt loads required on fragile flanges.
- One gasket type can be used system-wide — protects against the use of a wrong product.
- Superior sealing reliability and long gasket life for lower total sealing costs.
- Chemically resistant to all media in the range pH 0-14, except molten alkali metals and elemental fluorine.

Service capabilities

Operating temperature (maximum)	+270°C (with short excursions to +315°C)
Operating temperature (minimum)	-268°C
Pressure range	Vacuum to 4MPa/40bar, depending on application and operating conditions.

How supplied

Precision gaskets to fit Class 150 and Class 300 flanges, from ½" to 24" nominal pipe sizes. Thicknesses: 1.5mm, 3.0mm, 6.0mm — with 1.5mm recommended for steel pipework applications.

GORE® GR Sheet Gasketing**Description**

Sheet material of ePTFE with high multi-directional strength, manufactured by WL Gore & Associates.

Typical applications

Flanges on plant handling aggressive chemicals or high purity media. Ideal for rough or damaged flange faces, where excellent results can be achieved with limited bolt loads.

Specifications

- High quality seal to TA Luft/VDI 2440.
- This product is suitable for industrial use only.

Prime features

- Not subject to ageing — can be stored indefinitely.
- Chemically resistant to all media in the range pH 0-14, except molten alkali metals and elemental fluorine.
- Soft and conformable material that compresses to form a tight seal.
- Dimensionally stable, with increased resistance to creep and cold flow.
- High tensile strength.

Service capability

Operating temperature (maximum)	+270°C (with short excursions to +315°C)
Operating temperature (minimum)	-268°C
Pressure range	Vacuum to 4MPa/40bar, depending on application and operating conditions.

How supplied

As precision cut gaskets to any shape, size and quantity. In sheets 1.5m x 1.5m maximum. Thicknesses: 1.6mm, 3.2mm. Other thicknesses available to order.

PTFE gaskets & jointings

GORE® Series 500 Gasket Tape



Description

WL Gore & Associate's 100% ePTFE with multi-directionally oriented fibril structure. It comes in tape form with an adhesive backing that enables gaskets to be formed quickly in place. This material is based on recently patented technology to deliver dramatically improved creep resistance.

Typical applications

Formed-in-place gaskets on large steel-flanged applications.

Specifications

- This product is suitable for industrial use only.

Prime features

- Easy-to-handle and install alternative to cut gaskets.
- Eliminates long lead times to prefabricate large, one-piece gaskets.
- Highly conformable — overcomes flange deviation.
- Provides at least 50% greater creep resistance than other ePTFE gasket tapes.
- Chemically resistant to all media in the range pH 0-14, *excluding molten or dissolved alkali metals and elemental fluorine, especially at higher temperatures.*

Service capabilities

Operating temperature (maximum):	+270°C (with short excursions to +315°C)
Operating temperature (minimum):	-268°C
Pressure range:	Vacuum to 4MPa/40bar, depending on application and operating conditions.

How supplied

Tape form, with adhesive backing. Widths: 10mm, 15mm, 20mm, 25mm, 30mm. Thicknesses: 3mm and 6mm. Supplied on spools containing 5m, 10m or 20m.

GORE® Series 600 Gasket Tape



Description

WL Gore & Associates' 100% virgin ePTFE in tape form with an adhesive backing that enables gaskets to be formed quickly in place.

Typical applications

Seals for large diameter glass-lined flanges on mixer vessels, columns, storage tanks and receiver tanks — especially where flanges have irregular surfaces.

Specifications

- This product is suitable for industrial use only.

Prime features

- Easy to install, and economical in use with minimal wastage.
- Overlays can compensate for imperfections in flange surface.
- Dimensionally stable — resists creep and cold flow.
- Soft and conformable material that compresses to form a tight seal.
- Chemically resistant to all media in the range pH 0-14, except molten alkali metals and elemental fluorine.

Service capability

Operating temperature (maximum)	+270°C (with short excursions to +315°C)
Operating temperature (minimum)	-268°C
Pressure range	Vacuum to 600kPa/6bar (consult our Technical Support Team if higher pressure duty is anticipated).

How supplied

Tape form with an adhesive backing. Widths: 40mm, 55mm, 60mm. Thicknesses: 6mm, 9mm — with 3mm available to order. On spools containing 2.5m, 5m, 10m or 15m, depending on width.

PTFE gaskets & jointings

GORE® Joint Sealant DF

**Description**

Made from 100% expanded PTFE by WL Gore & Associates, this form-in-place gasket tape has a self-adhesive backing for swift and simple installation.

When compressed, it forms a thin yet strong, durable gasket that is highly resistant to creep and cold flow.

Typical applications

Used predominantly for sealing large, complex or damaged flanges, where it reduces maintenance time and process disruption.

Specifications

- BAM tested: Suitable for applications in flange connections of copper, copper alloy or steel with gaseous oxygen at up to 4MPa/40bar and 60°C.
- This product is suitable for industrial use only.

Prime features

- Easy and economical to install — minimal material wastage.
- Exceptionally versatile — can be used on highly complex flange shapes.
- Ideal for large or damaged flange surfaces.
- Resistant to all common chemicals in the range pH 0-14, except molten alkali metals and elemental fluorine.
- Reliable, long-term sealing performance.

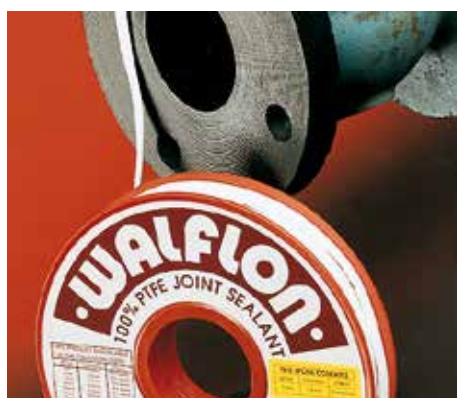
Service capabilities

Operating temperature (maximum)	+270°C (with short excursions to +315°C)
Operating temperature (minimum)	-268°C
Pressure range	Vacuum to 4MPa/40bar, depending on application and operating conditions.

How supplied

Tape form with self-adhesive backing. Widths: 5mm, 7mm, 10mm, 14mm, 17mm, 20mm, 25mm. On spools containing 5m to 50m, depending on width.

Walflon Joint Sealant

**Description**

Soft and pliable rectangular cord material of expanded PTFE, with a self-adhesive backing to aid installation.

Typical applications

This is an excellent maintenance expedient for flanged joints where temperatures and pressures are modest. It is ideal for emergency flange sealing when the correct gasket or joining material is unavailable.

Prime features

- Forms 'instant' gaskets very economically.
- Conforms readily to irregular surfaces.
- A ring of Walflon in a flange joint compresses to a high-density PTFE gasket when bolt load is applied.
- Can be used with a very wide range of fluid media.

How supplied

As seven cross-sections from 5mm x 3mm to 7mm x 20mm, in packs containing lengths of 5m to 30m, depending on width and thickness.

PTFE gaskets & jointings

Gylon® 3500



Description

Gylon® 3500 comprises PTFE with silica filler. It is manufactured by Garlock Sealing Technologies, and is fawn in colour. The unique Gylon® manufacturing process retains all the positive characteristics of PTFE, but minimises or eliminates the creep and flow problems associated with conventional PTFE products.

Typical applications

This multi-purpose gasket material is recommended for the chemical and petrochemical industries, as well as food processing applications.

Prime features

- Excellent chemical resistance.
- Improved performance over conventional PTFE.
- Resistance to cold flow and creep.
- Excellent bolt load retention.
- Outstanding dimensional stability under thermal stress.
- Resistance to wear and abrasion.

Specifications

- Conforms to FDA requirements.
- Conforms to American Bureau of Shipping (ABS) requirements.
- Conforms to US Department of Agriculture (USDA) requirements.
- ASTM F104 Line call out F451999A9B4E99K6M6.

Chemical properties

- Resistant to strong acids (except hydrofluoric), steam, solvents, hydrocarbons, chlorine, and cryogenics. Will not burn.

Biological properties

- Will not support bacterial growth.

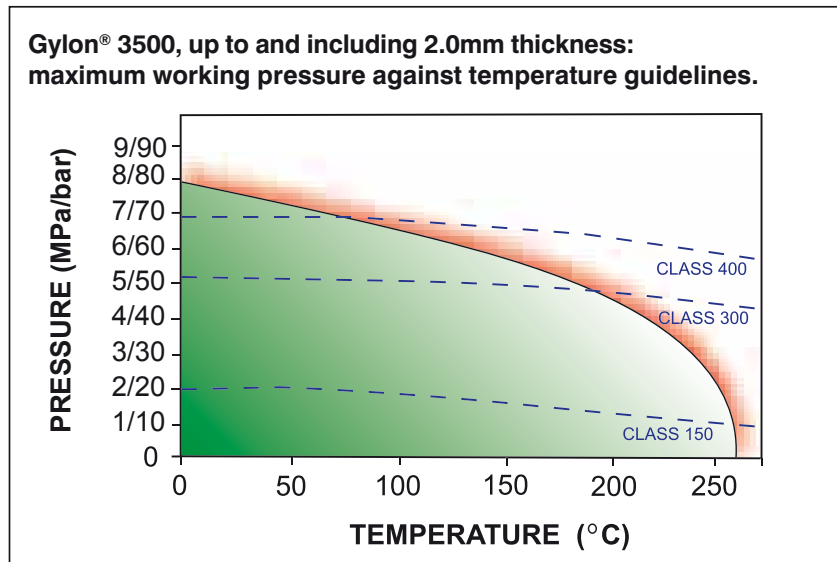
Physical properties

Density, Mg/m ³	2.10	(ASTM D792)
Transverse tensile strength, MPa	13.8	(ASTM F152)
Modulus at 100% elongation, MPa	11.0	(ASTM D1708)
Compressibility, %	7-12	(ASTM F36)
Recovery, %	40	(ASTM F36)
Gas permeability, ml/min	<0.015	(DIN 3535-4)

Operating limits

Temperature range (continuous operation)	-268°C to +260°C
Maximum working pressure	8.3MPa/83bar

Service capability graph



Service capability

For applications falling into the green zone, the product may normally be used without consultation. If the temperature/pressure combination is in the red zone, our Technical Support Team must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity, or in sheet form to maximum size 1.5m x 1.5m. Thicknesses: 0.8mm, 1.0mm, 1.6mm, 2.0mm. Please note that 3.2mm is also available, but is not recommended (see page 48 for advice on gasket use).

PTFE gaskets & jointings

Gylon® 3504

**Description**

Gylon® 3504 is a highly compressible grade of Gylon®, comprising PTFE with a filler of glass microspheres. It is manufactured by Garlock Sealing Technologies, and is blue in colour. The unique Gylon manufacturing process retains all the positive characteristics of PTFE, but minimises or eliminates the creep and flow problems associated with conventional PTFE products.

Typical applications

This highly-compressible modified-PTFE material is designed for applications where efficient flange sealing is required at low bolt loads. It is recommended for use with glass-lined, enamelled or plastic flanges in the chemical, pharmaceutical, food processing, and electronics sectors.

Prime features

- Resists a wide range of chemicals.
- Highly compressible with excellent bolt-load retention.
- Improved performance over conventional PTFE.
- Outstanding dimensional stability.
- Resists wear and abrasion.

Specifications

- Conforms to FDA requirements.
- Meets US Pharmacopeia (USP) requirements.
- Conforms to American Bureau of Shipping (ABS) requirements.
- TUV certified in accordance with TA-Luft VDI 2440.
- ASTM F104 Line call out F456999A9B7E99K3M6.

Chemical properties

- Resistant to moderate concentrations of acid, some caustics, solvents, hydrocarbons, hydrogen peroxide, refrigerants, and cryogenics. Will not burn.

Biological properties

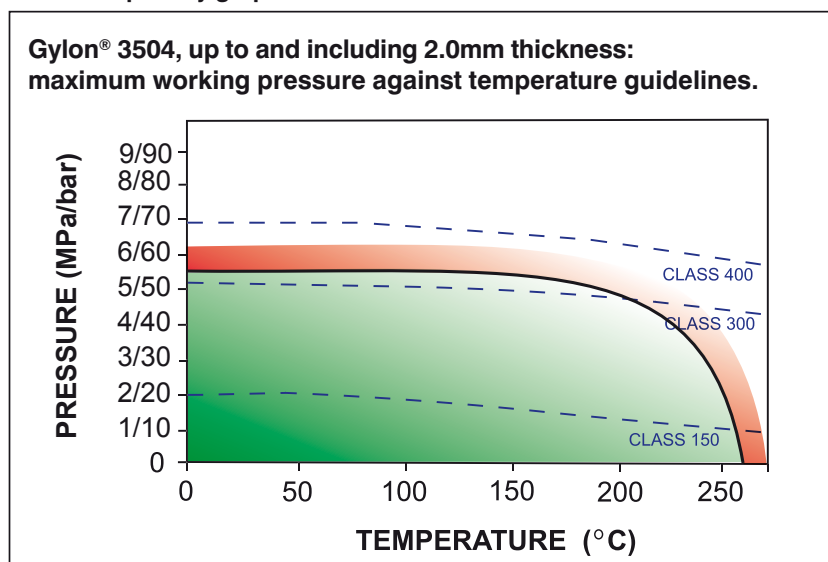
- Will not support bacterial growth.

Physical properties

Density, Mg/m ³	1.70	(ASTM D792)
Transverse tensile strength, MPa	13.8	(ASTM F152)
Modulus at 100% elongation, MPa	10.3	(ASTM D1708)
Compressibility, %	25-45	(ASTM F36)
Recovery, %	30	(ASTM F36)
Gas permeability, ml/min	<0.015	(DIN 3535-4)

Operating limits

Temperature range (continuous operation)	-268°C to +260°C
Maximum working pressure	5.5MPa/55bar

Service capability graph**Service capability**

For applications falling into the green zone, the product may normally be used without consultation. If the temperature/pressure combination is in the red zone, our Technical Support Team must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity, or in sheet form to maximum size 1.5m x 1.5m. Thicknesses: 0.8mm, 1.0mm, 1.6mm, 2.0mm. Please note that 3.2mm is also available, but not recommended (see page 48 for advice on gasket use).

PTFE gaskets & jointings

Gylon® 3510



Description

Gylon® 3510 comprises PTFE with barium sulphate filler, and is the most chemically resistant of our Gylon® grades. It is manufactured by Garlock Sealing Technologies, and is off-white in colour. The unique Gylon manufacturing process retains all the positive characteristics of PTFE, but minimises or eliminates the creep and flow problems associated with conventional PTFE products.

Typical applications

With its high resistance to chemical attack, this grade is recommended for flange duties with highly aggressive media in the chemical and petrochemical sectors. It is of particular value for use on electrolytic baths in plating processes.

Prime features

- Excellent chemical resistance.
- Improved performance over conventional PTFE.
- Resistant to cold flow and creep.
- Excellent bolt load retention.
- Outstanding dimensional stability under thermal stress.
- Resistance to wear and abrasion.

Specifications

- Conforms to FDA requirements.
- Conforms to American Bureau of Shipping (ABS) requirements.
- TUV certified in accordance with TA-Luft VDI 2440.
- ASTM F104 Line call out F451999A9B2E99K5M6.

Chemical properties

- Resistant to strong caustics, moderate acids, chlorine, gases, water, steam, cryogenics, hydrocarbons, and aluminium fluoride. Will not burn.

Biological properties

- Will not support bacterial growth.

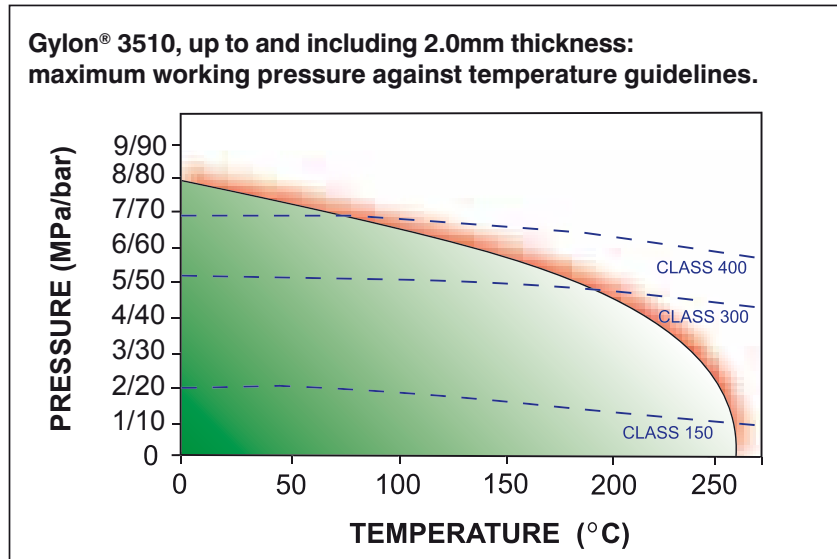
Physical properties

Density, Mg/m ³	2.80	(ASTM D792)
Transverse tensile strength, MPa	13.8	(ASTM F152)
Modulus at 100% elongation, MPa	9.6	(ASTM D1708)
Compressibility, %	4-10	(ASTM F36)
Recovery, %	40	(ASTM F36)
Gas permeability, ml/min	<0.015	(DIN 3535-4)

Operating limits

Temperature range (continuous operation)	-268°C to +260°C
Maximum working pressure	8.3MPa/83bar

Service capability graph



Service capability

For applications falling into the green zone, the product may normally be used without consultation. If the temperature/pressure combination is in the red zone, our Technical Support Team must be consulted before the product is used. Class lines refer to ASME B16.5.

How supplied

Precision cut gaskets to any shape, size and quantity, or in sheet form to maximum size 1.5m x 1.5m. Thicknesses: 0.8mm, 1.0mm, 1.6mm, 2.0mm. Please note that 3.2mm is also available, but is not recommended (see page 48 for advice on gasket use).

PTFE gaskets & jointings

Teadit® 24SH multi-directionally expanded PTFE sheet jointing**Description**

A white coloured jointing from Teadit International, comprising 100% pure, multi-directionally expanded PTFE.

Typical applications

Flange sealing duties across many industrial sectors, especially where limited bolting loads apply — eg, with plastic and glass flanges. Also where the malleability of expanded PTFE is needed to compensate for out-of-parallel and/or damaged sealing faces. Widely used for flanges on pump housings, compressors, hand-holes/manholes, air ducts, compensators, heat-exchangers, etc.

Specifications

- TA-Luft to VDI 2440.
- VDI 2200 (blow-out test)
- Conforms to FDA 21 CFR 177.1550.
- USP Class VI.
- BAM approved for applications with gaseous oxygen at operating conditions up to 3MPa/30bar and 200°C.
- Germanischer Lloyd Approval.

Prime features

- Multi-directional expanded PTFE of exceptional strength, with less creep at higher temperatures than other types of PTFE sheet.
- Inherently clean and non-toxic for duties where purity and hygiene are paramount.
- Dimensionally stable — narrow flange faces can be sealed without interrupting flow.
- Gaskets are quick and easy to install, and can be removed without leaving residue.
- Chemically resistant to most media in the range pH 0-14. Exceptions include molten alkali metals and elemental fluorine at high temperature and pressure.

Service capabilities

Operating temperature (maximum): +270°C (with short excursions to +315°C).

Operating temperature (minimum): -240°C.

Pressure range: Vacuum to 20MPa/200bar.

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets to a maximum size of 1.5m x 1.5m. Thicknesses: 0.5mm, 1mm, 1.5mm, 2mm, 3mm, 4mm, 5mm, 6mm.

Teadit® 24B mono-axially expanded PTFE tape**Description**

A white coloured gasket tape from Teadit International, made from mono-axially expanded virgin PTFE, and supplied with an adhesive backing strip.

Typical applications

As for Teadit® 24SH above.

Specifications

- TA-Luft to VDI 2400.
- Conforms to FDA 21 CFR 177.1550 (PTFE), and FDA 21 CFR 175.105 (adhesive).
- BAM approved for applications with gaseous oxygen at operating conditions up to 10MPa/100bar and 100°C.

Prime features

- Quick and simple installation, with adhesive backing strip.
- Reduced downtime: immediately available, with no gasket cutting or hole punching.
- Reduced stockholding: a few spools of different sizes cover most duties at a site.
- Reduced waste: a gasket on a spool with no off-cuts.
- Chemically resistant to most media in the range pH 0-14. Exceptions include molten alkali metals and elemental fluorine at high temperature and pressure.

Service capabilities

Operating temperature (maximum): +260°C (with short excursions to +310°C).

Operating temperature (minimum): -240°C.

Pressure range: Vacuum to 20MPa/200bar.

How supplied

Tape form with adhesive backing. On spools containing: 3mm x 1.5mm x 25m, 5mm x 2mm x 25m, 7mm x 2.5mm x 25m, 10mm x 3mm x 10m, 12mm x 4mm x 10m, 14mm x 5mm x 10m, 17mm x 6mm x 8m, 20mm x 7mm x 5m, 22mm x 5mm x 5m, 25mm x 5mm x 5m, 28mm x 5mm x 5m, 40mm x 5mm x 5m. Also 1mm round x 50m without adhesive backing.

PTFE gaskets & jointings

Teadit® 25BI multi-directionally expanded PTFE tape



Description

Multi-directionally expanded gasket tape, from Teadit International, of 100% pure PTFE with an adhesive backing strip. The manufacturing process gives it almost equal tensile strength in longitudinal and cross directions, for creep resistance. It is white in colour.

Typical applications

Flanges with irregularities on sealing surfaces, and stress sensitive joints. Enamelled and glass flanges, large flanges, heat exchangers, pressure vessels, suction filters and strainers, etc.

Specifications

- TA-Luft to VDI 2400.
- Conforms to FDA 21 CFR 177.1550 (PTFE), and FDA 21 CFR 175.105 (adhesive).

Prime features

- Quick and simple installation, with no gasket cutting or hole punching required.
- Easy to remove without leaving residue.
- Excellent malleability for overcoming minor damage to sealing surfaces.
- Chemically resistant to most media in the range pH 0-14. Exceptions include molten alkali metals and elemental fluorine at high temperature and pressure.

Service capabilities

Operating temperature (maximum): +260°C (with short excursions to +310°C).
Operating temperature (minimum): -240°C.
Pressure range: Vacuum to 20MPa/200bar.

How supplied

Spools of tape with adhesive backing. Thicknesses: 2mm, 3mm, 6mm, 9mm.
Range of widths from 10mm to 65mm, depending on thickness.

PTFE gaskets chemical suitability guide

The chemical resistance of virgin PTFE is almost universal. It is suitable for applications involving chemical media in the range pH 0-14, with the exception of molten alkali metals, fluorine gas, elemental fluorine and any materials that may generate these at the operating temperatures and pressures involved.

However, PTFE materials that contain fillers to enhance their mechanical properties may have a lower resistance to certain chemical media than virgin PTFE. Therefore, prior to the use of filled-PTFE products, please check chemical compatibility with James Walker's Technical Support Team.

Specification grade elastomers

We process and/or supply many Specification Grades of elastomer as sheet jointings and precision cut gaskets. In addition to those on this page, we have many other customer and industry specification materials that suit particular applications.

Natural Rubber (NR)

- BS 1154 Grades Z40, Z50, Z60, Z70, Z80.

Nitrile Rubber (NBR)

- BS 2751 Grades BA40, BA50, BA60, BA70, BA80, BA90.
We also supply top quality commercial rubber grades that, on request, can be released to BS 2751: JW Grade 350C to BA40; 351C to BA50; 352C to BA60; 353C to BA70; 354C to BA80.
- BS 6996 Grades BO60, BO80.
- DTD 5594A Grades 60, 70, 80, 90.
- DTD 5509 Grades A, B, C, D.

Chloroprene/Neoprene (CR)

- BS 2752 Grades C40, C50; C60, C70, C80.
We also supply top quality commercial rubber grades that, on request, can be released to BS 2752 — JW Grade 355C to C40; 356C to C50; 357C to C60; 358C to C70; 359C to C80.

Butyl (IIR)

- BS 3227 Grades B60, B70.

Ethylene-propylene terpolymer (EPDM)

- BS 6014 Grades EP60S, EP70S, EP80S.
- Elast-O-Pure® EP75 Black grade to FDA and USP for food and pharmaceutical processing.

Silicone (VMQ, MQ)

- BS F 152 Grades 50, 60, 70, 80.
- BS F 153 Grades 50, 60, 70, 80.
- Elast-O-Pure® SIL70 Translucent grade to FDA and USP for food and pharmaceutical processing.

Fluorosilicone (FMQ)

- BS F154 Grade 60 for defence and aerospace duties where resistance to fuels and hydraulic fluids (mineral and synthetic oils) is required.

Fluoroelastomer dipolymer (FKM)

- Elast-O-Pure® GF75 Black grade, based on Viton® GF-600S, to FDA and USP for food and pharmaceutical processing.
- DTD 5543B Grades 60, 70, 80, 90 (all in black and green).
- DTD 5612A Grades 50, 60, 70, 80, 90 (all in black and green).

Kalrez® Perfluoroelastomer (FFKM)

We are Authorised Distributor in the UK, Ireland and France for design, supply and technical support of sealing and fluid handling parts made from DuPont™ Kalrez®.

Various Kalrez® grades are recommended for critical or high purity sealing applications in different industries:

- Food and pharmaceutical processing: Kalrez® 6211 and 6230 to FDA and USP.
- Semiconductor fabrication.
- Oil, gas, chemical and petrochemical processing.
- Defence and aerospace.

Note: Specifications in red have been declared OBSOLESCE.



Commercial grade elastomers

263C — SBR/NR

Description

Good quality blend of styrene butadiene (SBR) and natural rubber (NR). It is black in colour with smooth finish as standard.

Typical applications

Gaskets for use with hot and cold water, ethylene glycol, dilute acids and alkalis. Temperature range is -30°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	65
Tensile strength, MPa min	3.0
Elongation at break, % min	250
Compression set, % max (22h @ 70°C)	30

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

261C — Tan Natural Rubber (NR)

Description

'Soft' grade of natural rubber (NR) with a high resistance to abrasion. It is tan in colour with a shot blast finish as standard.

Typical applications

Gaskets for applications involving water, dilute acids and alkalis, lower alcohols, and silicone greases and oils. Temperature range is -20°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	40
Tensile strength, MPa min	10
Elongation at break, % min	400

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1mm, 1.5mm, 2mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

259C — White Food-Quality SBR/NR

Description

White coloured blend of styrene butadiene (SBR) and natural rubber (NR), with a smooth finish as standard. It conforms to FDA 21 CFR 177.2600 for applications in the food and beverage industries.

Typical applications

Gaskets for food plant where temperature is between -20°C and +70°C. The material can also be used with dilute acids and alkalis, lower alcohols, and silicone greases and oils.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60
Tensile strength, MPa min	6.0
Elongation at break, % min	400
Compression set, % (24h @ 70°C)	45

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1.5mm, 2mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

332C — SBR/NR Insertion

Description

Good quality blend of styrene butadiene (SBR) and natural rubber (NR) sheet containing one or two layers of cotton or polyester scrim insertion, to give additional resistance to spread under compression.

Typical applications

Gaskets for use with hot and cold water, ethylene glycol, dilute acids and alkalis, and silicone greases and oils. Temperature range is -20°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	65
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How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 2mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

Commercial grade elastomers

264C — SBR/CR**Description**

Black coloured blend of styrene butadiene (SBR) and polychloroprene (neoprene) rubber (CR), with a smooth finish as standard.

Typical applications

Used for gaskets because of its good resistance to many types of oils and greases — mineral, silicone and animal-based — as well as aliphatic hydrocarbons. Good resistance to ozone, sunlight and atmospheric ageing. Temperature range is -20°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60
Tensile strength, MPa min	3.0
Elongation at break, % min	150
Compression set, % max (22h @ 70°C)	35

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1mm, 1.5mm, 2mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

283C — SBR/CR Insertion**Description**

Similar to 264C above, but contains one or two layers of cotton or polyester scrim insertion to give additional resistance to spread under compression.

Typical applications

As for 264C above. Temperature range is -20°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60
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How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

265C — Neoprene (CR) based Closed-Cell Sponge**Description**

A conformable, 'medium' density, closed-cell sponge of polychloroprene (neoprene) based rubber (CR), that is supplied with no skin on either side, as standard.

Typical applications

For low duty gasket service where good resistance is required to media such as oils, greases and aliphatic hydrocarbons. Temperature range is -40°C to +70°C constant.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, Shore 00	43-48
Density, Mg/m ³	0.170
Tensile strength, MPa min	>0.5
Elongation at break, % min	150
Load for 25% compression deflection, kPa	60
Load for 50% compression deflection, kPa	131

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.0m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm, 8mm, 10mm, 12mm. Other dimensions can be supplied.

269C — SBR/NBR**Description**

Black coloured blend of styrene butadiene (SBR) and nitrile rubber (NBR) with a smooth finish as standard.

Typical applications

Gasket service with all types of oils and greases — mineral, silicone, vegetable, animal and synthetic — as well as hydrocarbon fuels and water/glycol-based hydraulic fluids. Temperature range is -20°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	70
Tensile strength, MPa min	3.5
Elongation at break, % min	250
Compression set, % max (22h @ 70°C)	35

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

Commercial grade elastomers

260C — White Food-Quality SBR/NBR

Description

White coloured blend of styrene butadiene (SBR) and nitrile rubber (NBR), with a smooth finish as standard. It conforms to FDA 21 CFR 177.2600 for applications in the food and beverages industries.

Typical applications

Gaskets for food plant, where good resistance is needed to vegetable and animal oils and fats. Temperature range is -20°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60
Tensile strength, MPa min	6
Elongation at break, % min	300
Compression set, % max (24h @ 70°C)	30

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1.5mm, 2mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

337C — SBR/NBR Insertion

Description

Similar to 269C (see page 39), but with one or two layers of cotton or polyester scrim insertion to give additional resistance to spread under compression.

Typical applications

As for 269C. Temperature range is -20°C to +70°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	70
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How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

280C — Ethylene-Propylene (EPDM)

Description

Black coloured ethylene-propylene rubber (EPDM) with a cloth finish.

Typical applications

Gaskets for service with water, dilute acids, animal fats and vegetable oils. It also has excellent weathering properties. Temperature range is -15°C to +100°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	70 ±5
Tensile strength, MPa min	7
Elongation at break, % min	200
Compression set, % max (24h @ 70°C)	25

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.6m. Thicknesses: 1mm, 1.5mm, 2mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

327C — Red Silicone (Q)

Description

Red coloured silicone rubber (Q) with a smooth finish. It conforms to FDA 21 CFR 177.2600.

Typical applications

Rubber gaskets where a wide temperature range is beneficial: -60°C to +230°C constant, with excursions +250°C. It has good ozone resistance and very good electrical insulation properties.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60 ±5
Tensile strength, MPa min	5.5
Elongation at break, % min	250
Compression set, % max (24h @ 150°C)	30

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.2m. Thicknesses: 1mm, 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

Commercial grade elastomers

284C — White Food-Quality Silicone (Q)**Description**

White coloured silicone rubber (Q) with a smooth finish as standard. It conforms to FDA 21 CFR 177.2600 for applications in the food and beverages industries.

Typical applications

Gaskets for food plant where a wide temperature range is beneficial: -60°C to +230°C constant, with excursions to +250°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60 ±5
Tensile strength, MPa min	5.5
Elongation at break, % min	250
Compression set, % max (24h @ 150°C)	30

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.2m. Thicknesses: 1mm, 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

336C — Translucent Food-Quality Silicone (Q)**Description**

Translucent silicone rubber (Q) with a smooth finish as standard. It conforms to FDA 21 CFR 177.2600 for applications in the food and beverages industries.

Typical applications

Gaskets for food plant where a wide temperature range is beneficial: -60°C to +230°C constant, with excursions to +250°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60 ±5
Tensile strength, MPa min	5.5
Elongation at break, % min	250
Compression set, % max (24h @ 150°C)	30

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.2m. Thicknesses: 1mm, 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

338C — Butyl (IIR)**Description**

Isobutylene-isoprene (butyl) rubber (IIR), black in colour with a smooth finish as standard.

Typical applications

Duties where the extremely low permeability of butyl is required, together with good resistance to phosphate esters, dilute acids and alkalis. Temperature range is -40°C to +120°C.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	60
Tensile strength, MPa min	5
Elongation at break, % min	500

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.4m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

340C — Fluorocarbon (FKM) based on Viton® polymer**Description**

Fluorocarbon rubber (FKM) based on a genuine DuPont™ Viton® polymer, black in colour, with a smooth finish as standard.

Typical applications

Suitable for a wide range of gasket duties and fluid media. It has an exceptional temperature range for a rubber (-10°C to +250°C constant, with excursions to +315°C), plus good resistance to mineral oils, fuels, and non-polar solvents including high aromatic and chlorinated types.

Physical properties

(Unless otherwise stated, values are typical)

Hardness, IRHD	70 ±5
Tensile strength, MPa min	4
Elongation at break, % min	160
Compression set, % max (22h @ 175°C)	55

How supplied

Precision gaskets to any shape, size or quantity. Also in rolls or sheets, width: 1.2m. Thicknesses: 1mm, 1.5mm, 3mm, 5mm, 6mm. Other dimensions can be supplied.

Topog-E® Series 180 Moulded Rubber Gaskets



Description

Topog-E® moulded rubber gaskets are known as ‘the world’s most recognised and respected brand of boiler gaskets’. They are manufactured by the Topog-E Gasket Company of Oklahoma, USA, using its own proprietary compound. These gaskets are supplied throughout Europe by James Walker’s companies and official distributor network.

Typical applications

Gaskets for handholes and manholes on pressure vessels of all types, including: boilers, hot water vessels, steam cookers, refrigeration plant, compressed air tanks and water towers.

Prime features

- Cost-effective sealing device for inspection openings on many industrial pressure vessels and tanks.
- Conforms to the topography of mating surfaces.
- Withstands a boiler’s full, continuous and cycling operating pressures.
- Withstands continuous exposure to water treatment chemicals.
- Simple to install, and to remove without chiseling or buffing.

Capabilities and service life

- **Steam pressure vessels:** typical maximum operating pressure of 12bar and saturated steam temperatures of 193°C, for an average service life of one year.
- **Other applications** (eg, condensate, water, and air vessels): these gaskets are sometimes used at pressures above 14bar where temperatures are more moderate — eg, below 121°C.
- **Under less severe conditions** (eg, water applications at ambient temperatures), these gaskets can provide a very long service life.
- Please refer to our Technical Support Team before exceeding any of the above quoted pressure/temperature combinations.

Chemical compatibility

Excellent resistance to steam and hot and cold water. Good resistance to alcohols, ketones, phosphate esters, silicone oils/greases, dilute acids, bases, salts, glycols, ammonia, selected refrigerants, and animal and vegetable fats.

Water treatment chemicals used in accordance with a supplier’s guidelines should not have a significant effect on the service life of properly installed Topog-E Series 180 gaskets.

These gaskets should not be directly exposed to high concentrations of aromatic hydrocarbons, chlorinated solvents or petroleum-based oils, fuels, or lubricants.

How supplied

Moulded gaskets are available in 350 stock sizes and shapes. Custom shapes, sizes and sheet materials are available on request.

These gaskets are recommended for general boiler duties. For higher pressure/temperature combinations, please consider our Metaflex® spiral wound gaskets.

Other gasket products & devices

Gaskoid



Description

An economical cellulose-based material impregnated with plasticised gelatine. It is brown in colour with a smooth finish. This material has excellent resistance to fuels, oils and most organic solvents, and is ideal for use at low bolt loadings.

Typical applications

Used predominantly in the automotive industry as a gasket material for carburettors, fuel and oil pumps, gear casings and pipeline flanges.

Service capabilities

Operating pressure (maximum)	1MPa/10bar
Operating temperature range	-20°C to +120°C

Physical properties

(Unless otherwise stated, values are typical)

Residual stress, MPa	26.0	(BS 7531)
Tensile strength, MPa	12	(ASTM F152)
Compressibility @ 70kg/cm ² , %	20-40	(ASTM F36G)
Fluid ageing (22h @21°C):		
IRM 903, weight increase, % maximum	15	
Thickness increase, % maximum	5	
ASTM Fuel B, weight increase, % maximum	15	
Thickness increase, % maximum	5	

How supplied

Precision cut gaskets to any shape, size or quantity. Thicknesses: 0.15mm, 0.25mm, 0.4mm, 0.5mm, 0.8mm, 1mm, 1.2mm, 1.6mm, 2mm, 3.2mm. Rolls: 1m wide, any length.

Compact Gasket Cutter



Prime features

- Readily adjustable for diameters from 20mm (13/16") to 600mm (24").
- Long extension bar available for diameters up to 900mm (35").
- Dual metric/inch calibration.
- Cuts compressed fibre jointings up to 5mm thickness; cork-elastomer to 12mm.

How supplied

Boxed kit containing main body, extension bar, ten blades, and operating instructions. Cutting board, long extension bar, and straight edges are available as optional extras.

Description

Precision made hand tool for efficient on-site cutting of circular gaskets from compressed fibre jointings, rubber and cork-elastomer sheet.

Other gasket products & devices

RotaBolt® Tension Control Fasteners



Description

RotaBolt® fasteners are modified bolts and studs that allow specific tensions to be accurately applied. Correct tension is easily checked, using either a finger-feel device or visual indicator built into the fastener.

Typical applications

Extensively used for flange jointing duties in many industries including offshore, petrochemical, mining, defence, nuclear and power generation. They prove particularly valuable where the unreliability of a flange joint may have a cost, health and safety or environmental impact.

Prime features

- Every RotaBolt is factory-calibrated to ensure the achievement of design load is accurately monitored.
- The RotaBolt system is far more reliable than a torque wrench or hydraulic tensioner, where bolt loads at the end of tightening cycles are unknown and uncontrollable.
- With RotaBolts 1 and 2, tension is easy to finger-check, even when wearing protective gloves or diving equipment.
- RotaBolt® Vision is readily monitored at a distance and in many locations that are difficult to access.
- Suit a wide range of bolting systems in different industrial environments.
- Resist corrosion, elevated and cryogenic temperatures, shock and vibration.

Service settings

- Standard load settings 5t to 250t.
- Indicator for RotaBolt 1 One setting of $\pm 5\%$.
- Indicator for RotaBolt 2 Upper and lower settings as required.

How supplied

Standard range: M12 to M125 bolts, M18 to M125 studs.

Materials: Alloy steels up to 12.9 strength grade, stainless steels, cupro-nickel, nickel and titanium alloys.

Other sizes and materials available. Customer-supplied fasteners can be modified.

Flange Insulation Sets



Description

Each Flange Insulation Set comprises an electrically insulating flange gasket, plus insulating bolt sleeves and washers to prevent electrical conduction through bolts.

Typical applications

These sets are used widely in cathodic protection systems and to help eliminate galvanic corrosion, as well as reducing the risk of eddy current build-up. They prove of particular value on long distance pipelines for water, oil or gas.

Materials

Gaskets, standard: Neoprene-faced phenolic. Other materials: Reinforced phenolic with nitrile seals, high dielectric strength CNAF, glass reinforced epoxy with fluoroelastomer seals, or plastic coated soft iron.

Sleeves, standard: polyester or DuPont™ Mylar®. Other material: DuPont™ Nomex®.

Insulation washers, standard: reinforced phenolic. Other material: glass-reinforced epoxy.

Back-up washers: zinc-plated carbon steel or stainless steel.

How supplied

Four designs of set to cater for many different flange sizes, specifications and arrangements — including those with 'O' ring grooves or handling very high pressures.

Cut gaskets & services

Immediate supply



James Walker is dedicated to meeting industry's immediate demand for precision-cut gaskets from our full range of sheet jointings, as well as for spiral wound and other metallic types.

We hold thousands of different types of sealing products, ready for same day despatch throughout the world. Many of these stocked items are gaskets to suit flanges across all sectors of industry.

If we do not have your gaskets in stock, we can usually manufacture them economically within minutes.

For cut gaskets we use highly accurate CAD/CAM controlled water-jet cutters, ready programmed with every gasket design to industry and international standards. We hold large stocks of non-asbestos sheet jointings, PTFE sheet, cork-elastomer sheet, Supagraf® materials and elastomers, all in standard thicknesses, specifically for this purpose.

Custom-cut gaskets



Using water-jet technology enables us to make any shape, size and quantity of standard or non-standard cut gaskets to high-precision levels — and meet seemingly impossible deadlines. We work directly from customers' CAD files, sent via email or disk. In addition, we digitise profiles from drawings, templates or samples: no tooling is needed.

Our state-of-the-art water-jet cutters operate with all major CAD languages. Nesting pattern software, combined with video acquisition equipment to capture the complex shape of a previously cut sheet, ensure that the maximum number of gaskets is produced with minimum material wastage.

These systems are highly economical for prototype cutting as well as large batch runs.

For tougher materials, such as Supagraf® Tanged T10 Jointing with its central layer of stainless steel, we use an abrasive water-jet cutter. This easily slices intricate designs from **any** sheet material — including high-strength alloys and titanium — leaving a clean edge without heat distortion. Each hair thin water-jet is loaded with crushed garnet and operates at Mach 2 and 400MPa.

Joint Integrity Programme



James Walker's Joint Integrity Programme (JIP) is a service that monitors, maintains and refurbishes all bolted flange joints at oil, gas and chemical sites — onshore and offshore. It covers ducts and pipework, pressure vessels, heat exchangers, valves and other plant items that rely on bolted joints.

Our approach of **evaluate, design and apply** delivers long-term solutions rather than short-term fixes that need to be repeatedly applied at considerable cost. The aim is to:

- Maximise plant uptime.
- Keep expensive product loss to a minimum.
- Reduce leaks to improve health & safety and environmental performance.

JIP comprises a series of modules that can be tailored to a client's requirements, with all services integrated under a single project manager. The modules include:

- Tagging, data management and reporting.
- Leak detection and repair (LDAR).
- Heat exchanger and pressure vessel bolted joint programme.

James Walker in action

James Walker research & development



James Walker Technology Centre runs extensive research and development programmes that are targeted to deliver new materials and products that will meet tomorrow's fluid sealing requirements before they arise.

Problem solving is a challenge we enjoy. Our world-class materials research and product testing laboratories are staffed by teams of scientists and technologists who prove the design integrity and quality of every item we supply.

We supplement our in-house R&D facilities with those at leading universities, research establishments and other organisations that work at the forefront of materials science, tribology and sealing technology. Co-operation between such centres of excellence is invaluable as we strive to develop products to work across greater temperature ranges, at higher pressures and under more aggressive conditions.

James Walker is a founder member of the European Sealing Association and belongs to many other influential bodies.

James Walker service



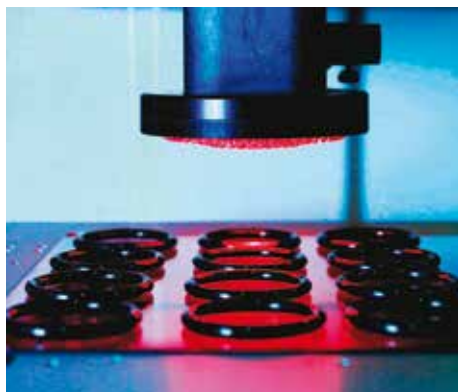
Our customers expect the very best, and we supply it in terms of efficient customer support, technical services, products, delivery and after sales service.

James Walker's high-technology customer support centre provides a personalised service to tens of thousands of customers worldwide, plus short response times for quotations and order processing.

With many thousands of different types of sealing products stocked for immediate despatch, backed by flexible production for non-stocked items, we can react very swiftly to industry's urgent demands for sealing products to bring a plant back on stream.

On-site advice worldwide is provided by large teams of local experts, backed by industry specialists, applications engineers and materials scientists. Between them they have the knowledge, practical skills and technical facilities to solve any relevant fluid sealing problem for our customers and offer *best-value* solutions.

James Walker quality



Our quality systems are third-party registered to ISO 9001 and AS/EN 9100. We are also regularly assessed and quality approved by a wide range of industry bodies including multinational corporations, utilities and government organisations.

We always use the best available raw materials for each product, and use advanced manufacturing techniques with strict quality control and traceability at every stage. Our manufacturing process culminates in an exacting inspection procedure for the finished product. Our stockholding and distribution facilities meet similar exacting standards.

Certificates of conformity to international or customer-specific standards can be supplied on request, with packaging and labelling available to individual specifications.

Material Safety Data Sheets (MSDS) are available on request for every product we supply.

James Walker's advice on gasket use

This information is for general guidance only

YES...

- Check that the gasket is compatible with the media at required operating temperature and pressure ranges.
- Use gasket material and bolt grades that suit the tensile loading requirements of the flange.
- Ensure the gasket is the correct size for the flange.
- Specify the thinnest gasket that will suit the flange finish and parallelism.
- If appropriate, use an anti-stick coated gasket where joints are frequently broken for operational reasons.
- Ensure the flange is clean, undamaged and without radial scores, free from grease and oil, and has the correct surface finish.
- Remove all traces of protective material before assembling the gasket.
- Ensure that a cut gasket is free from burrs or ridges at bolt holes and edges to avoid uneven stress loading.
- Lightly lubricate the flange bolts and check that the nut can run freely down the threads before use.
- Use RotaBolt® tension control fasteners on all important joints where unreliability may have a cost, health and safety or environmental impact.
- Tighten down the gasket evenly in several stages using an approved bolting sequence. This avoids flange distortion and gives an even stress distribution within the gasket.
- Use feeler gauges to check any predetermined level of gasket compression that is needed. This often applies to cork-elastomer gaskets.
- Non-metallic gaskets should be stored flat, at a moderate temperature (ie, +15°C to +20°C), in dry conditions, away from direct sunlight and heat, and remote from any electrical equipment that may produce ozone.

NO...

- **Never reuse an old gasket.**
(But it may be possible for James Walker to fit new soft faces to the undamaged cores of Metakamm® Kammprofile-types.)
- Do not use low quality gaskets or jointings. Any initial cost savings will soon be lost in plant downtime and production delays caused by joint failures.
- Never use sealing compounds or grease on joints. They reduce the friction between the gasket and its flanges, which can allow a gasket to stress-relax and creep, leading to premature failure.
- Avoid using impact adhesives or pressure sensitive tapes at temperatures exceeding 40°C. Above this temperature the tackifying resins may melt and act as a lubricant.
- Do not mate flange faces that have different surface finishes.
- Do not retighten bolts after use at elevated temperatures on flanges sealed with gaskets of compressed non-asbestos fibre.

Seating stress guide for gaskets

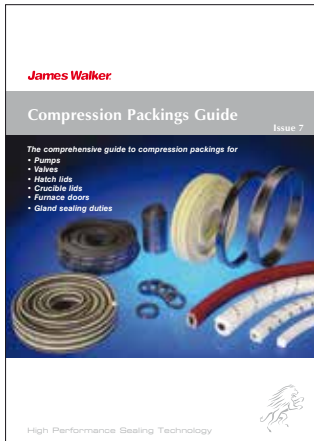
Gasket type	Minimum operational stress (N/mm ²)	Maximum initial stress (N/mm ²)
Compressed non-asbestos fibre (Chieftain®, Centurion®, Sentinel®, Inca)	15	50
Supagraf® Plain	10	100
Supagraf® Tanged T10	10	150
Supagraf® Laminated S10	10	60
Metaflex® Spiral Wound + SPG filler	30-40	Not applicable
Metakamm® Kammprofile-type	25	200
Metcom® Gasket	20	100
Nebar® Red cork-elastomer	6	12
Nebar® Green cork-elastomer	1.5	5
Nebar® Brown cork-elastomer	3	7
Fluolion® Integra Blue	13	50
Fluolion® Integra White	16	50
Gore® GR Sheet Gasketing	24	70

NOTES

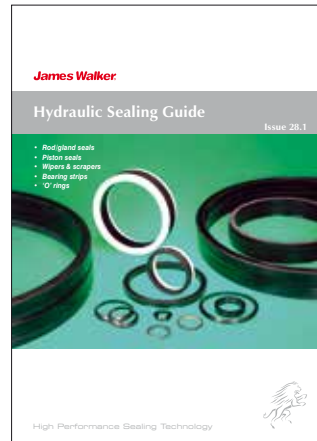
- 1) All values shown are for guidance only.
- 2) Levels of sealability/gas tightness will depend on system pressure and media involved, as well as operational stress.
- 3) Flange and bolt stiffness will affect the uniformity and level of stress applied, and hence the sealing capability.
- 4) Each gasket type will show a different level of gas tightness at the minimum operational stress value given. Also, maximum leak tightness will be different for each gasket type.

General information

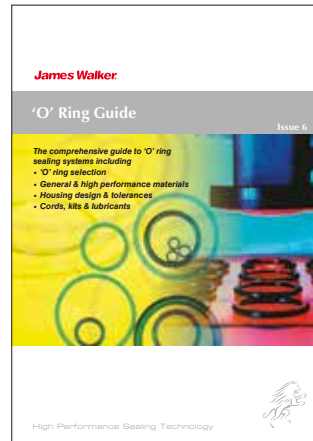
Please ask for these free guides to our other product ranges and services. These, and many more, can also be downloaded as pdf files from www.jameswalker.biz.



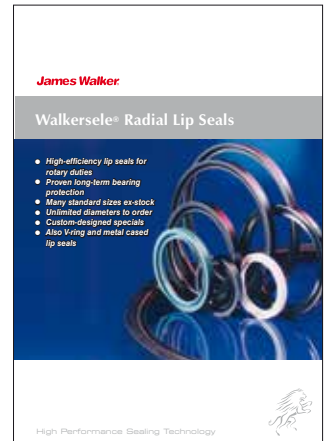
Compression packings



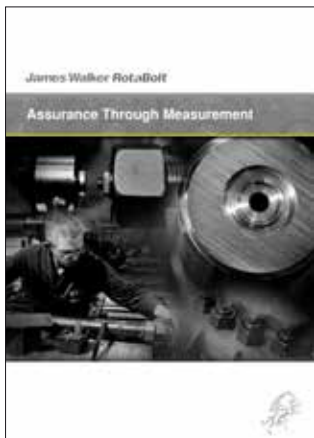
Hydraulic sealing products



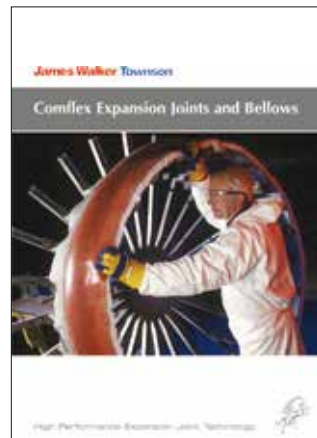
'O' rings



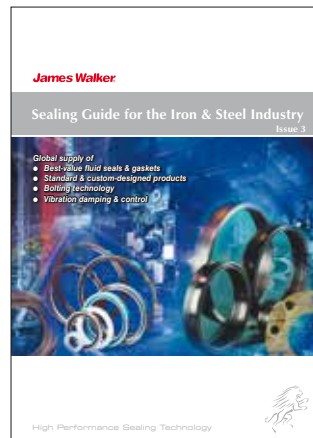
Walkersele® radial lip seals



RotaBolt® tension monitoring fasteners



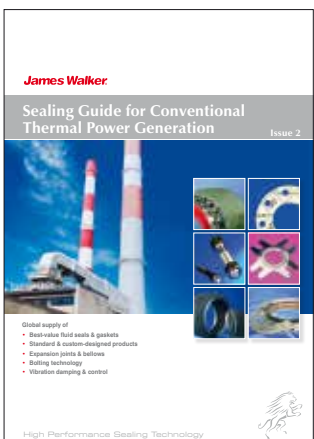
Expansion joints & bellows



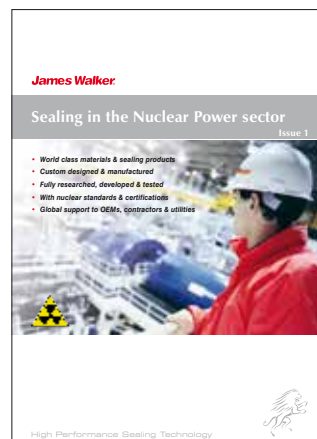
Iron & steel industry



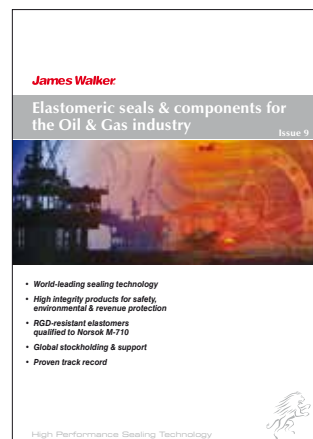
Marine sector



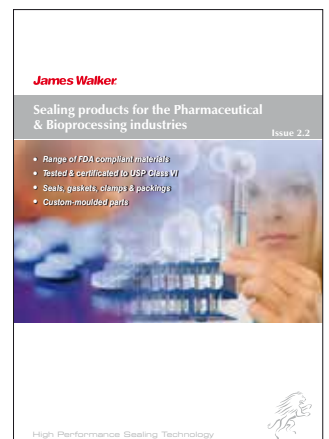
Conventional thermal power



Nuclear power



Oil & gas sector



Pharmaceutical

General information

Trademark acknowledgements

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Dowtherm®	Dow Chemical Company
Freon®	E I DuPont de Nemours & Company or its affiliates
GORE®	WL Gore & Associates
Gylon®	Garlock Sealing Technologies
Kalrez®	E I DuPont de Nemours & Company or its affiliates
KLEA®	ICI C&P
Mylar®	E I DuPont de Nemours & Company or its affiliates
Nomex®	E I DuPont de Nemours & Company or its affiliates
Teadit®	Teadit International
Topog-E®	Topog-E Gasket Company
Viton®	E I DuPont de Nemours & Company or its affiliates

Information

Health warning: If PTFE or fluoroelastomer (eg, FKM, FFKM, FEPM) products are heated to elevated temperatures, fumes will be produced which may give unpleasant effects, if inhaled. Whilst some fumes are emitted below 250°C from fluoroelastomers or below 300°C from PTFE, the effect at these temperatures is negligible. Care should be taken to avoid contaminating tobacco with particles of PTFE or fluoroelastomer, or with PTFE dispersion, which may remain on hands or clothing. Material Safety Data Sheets (MSDS) are available on request.

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To ensure you are working with the very latest product specifications, please consult the relevant section of the James Walker website: www.jameswalker.biz.

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