

James Walker®

Gaskets & Jointings

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



High Performance Sealing Technology



Gaskets & Jointings

Setting the seal on gasket technology

Our commitment to the highly specialised field of fluid seal technology was forged in the 1880s when Scottish engineer Mr James Walker introduced new seals that proved vital to the success of the latest high-pressure marine steam engines.

Since those early days we have constantly developed and supplied gaskets, seals and packings to match the ever-growing complexity and low maintenance demands of modern plant and future requirements

Today's technology

Fluid seal technology today is a blend of materials science, fluid mechanics and practical engineering. Our work at the frontiers of these disciplines gives us the clearest understanding of flange sealing techniques and the role that gaskets must play, for example:

- If joint faces are absolutely flat and aligned true
 - If a flange does 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 connection.

The problem for end users is to select the correct gaskets to ensure the integrity and safe operation of their fluid handling equipment.

Tomorrow's service today

In the following pages we give details of the vast range of James Walker's jointings and gaskets – including brands such as Nebar® cork-elastomer products, Metaflex® Spiral Wound Gaskets and Moorside® Ring Joints.

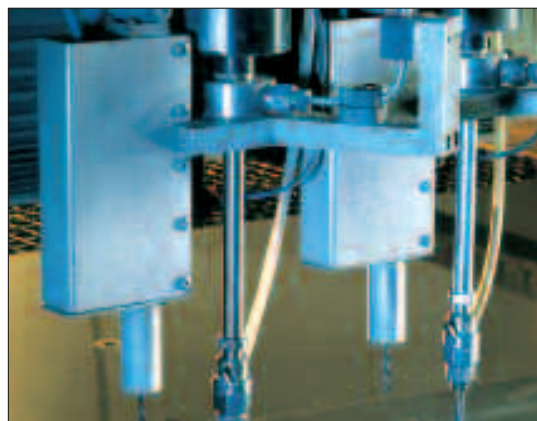
Our teams of local representatives, experienced applications engineers and materials scientists will help you select gaskets to match your exact operational specifications. If off-the-shelf gaskets won't solve your flange sealing problem, they can custom-design products that will.

Our high-tech customer service centres are set up to provide the fastest and most reliable service to customers worldwide, and our automated distribution centre holds over ten million sealing products for immediate despatch.

Where necessary, we will maintain consignment stocks at your sites for instant call-off, or hold customer-specific products in local warehouses.

With this top-level service, backed by world class manufacturing facilities and quality assurance regimes, you can be certain our gaskets and jointings will fit the bill.

To find out how James Walker will overcome your fluid sealing problems, contact your local customer support centre (see back cover) or the general numbers at the bottom of each page.



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Specification grade elastomers

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Butyl IIR
Ethylene Propylene EPDM (Terpolymer)
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Fluorosilicone FMQ
Fluoroelastomer FKM (Dipolymer)
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Non-asbestos sheet jointings

Chieftain®



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.

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

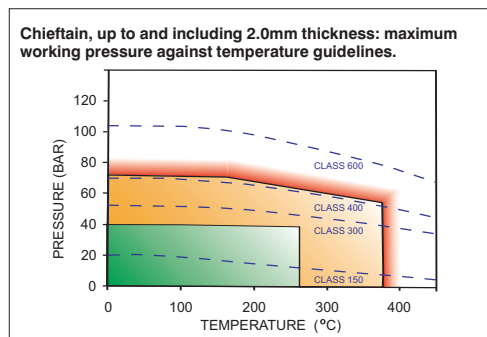
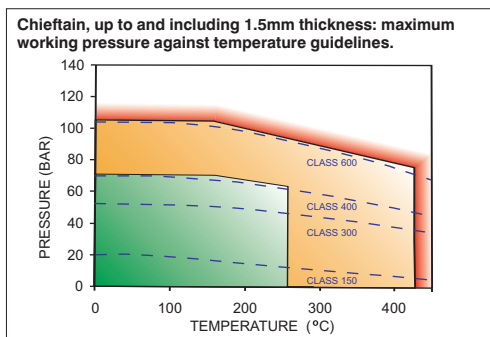
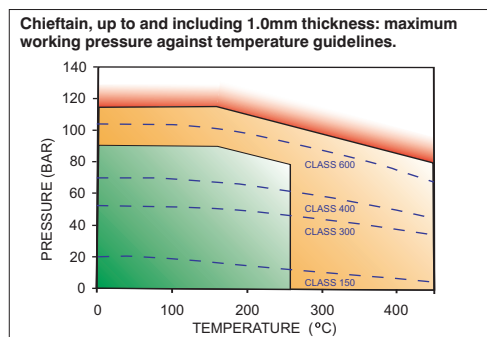
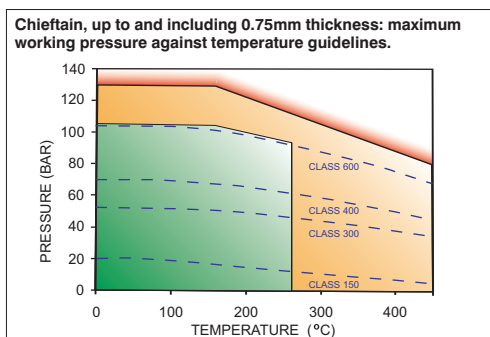
(Typical values for 1.5mm thick material)

Density, Mg/m³	1.6	
Transverse tensile strength, MPa	9.0	(ASTM F152)
Residual stress, MPa	28.0	(BS 7531)
Compressibility, %	9.0	(BS 7531)
Recovery, %	60.0	(ASTM F36J)
Flexibility after accelerated ageing	Pass	(BS F125)
Gas permeability, ml/min	<1.0	(BS 7531)
Leachable chloride ion content, ppm	<100	

Fluid immersion properties

IRM 903, % thickness increase, 5h @ 150°C	6.0	(BS 7531)
Water, % thickness increase, 5h @ 100°C	5.0	(BS 7531)
ASTM Fuel B, % thickness increase, 5h @ RT	8.0	(ASTM F146)
Sodium hydroxide, (50% conc.)		
% thickness increase, 10h @ 100°C	13.0	

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 services 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 43 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.
- Recommended for most fluid media.
- Non-pigmented.

Specification

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 F152)
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

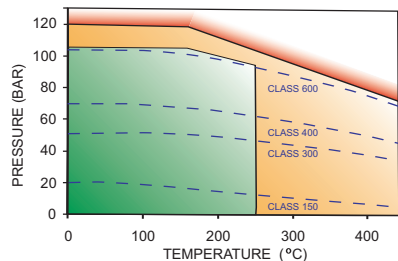
Centurion® is a high performance sheet jointing, based on glass and aramid fibres with a nitrile rubber (NBR) binder. An anti-stick finish to both surfaces is supplied as standard.

Fluid immersion properties

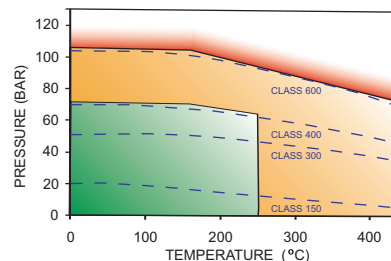
IRM 903, % thickness increase, 5h @ 150°C	5.0	(BS 7531)
ASTM Fuel B, % thickness increase, 5h @ RT	7.0	(ASTM F146)
Water, % thickness increase, 5h @ 100°C	5.0	(BS 7531)

Service capability graphs

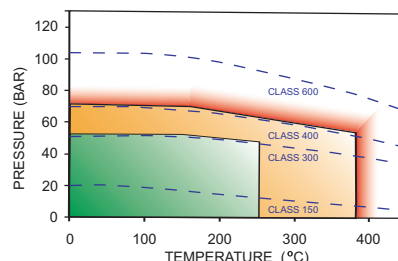
Centurion, up to and including 0.75mm thickness: maximum working pressure against temperature guidelines.



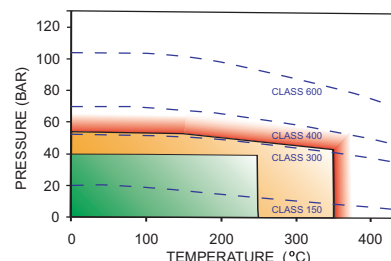
Centurion, up to and including 1.0mm thickness: maximum working pressure against temperature guidelines.



Centurion, up to and including 1.5mm thickness: maximum working pressure against temperature guidelines.



Centurion, up to and including 2.0mm thickness: maximum working pressure against temperature guidelines.



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 services 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 43 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.
- WRAS approved for use with cold and hot potable water up to 85°C.

Physical properties

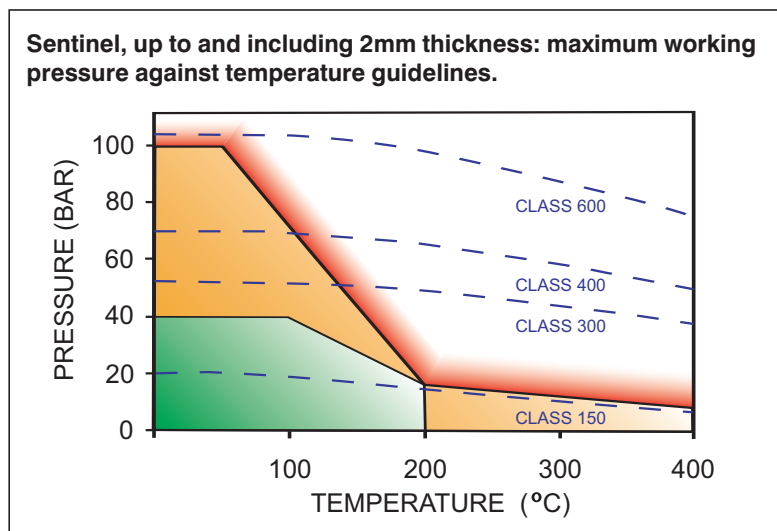
(Typical values for 1.5mm thick material)

Density, Mg/m³	1.6	
Transverse tensile strength, MPa	8.0	(ASTM F152)
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 services 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 43 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.
- WRAS approved for use with cold and hot potable water up to 85°C.

Physical properties

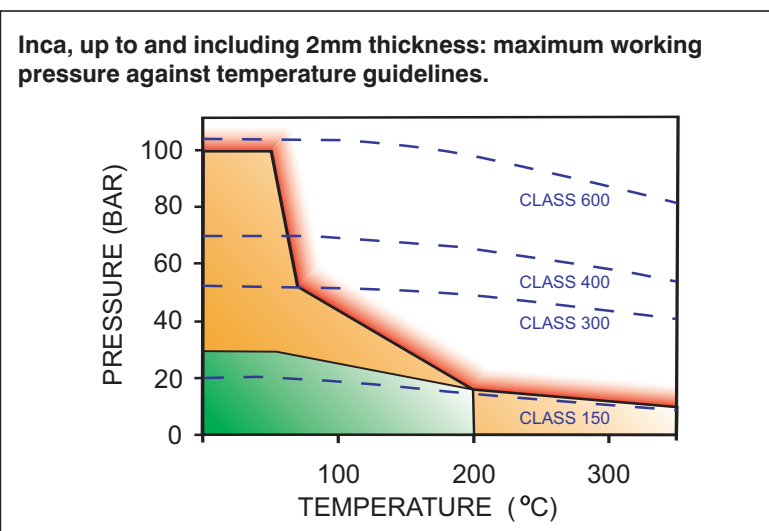
(Typical values for 1.5mm thick material)

Density, Mg/m ³	1.85	
Transverse tensile strength, MPa	7.0	(ASTM F152)
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 services 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 43 for advice on gasket use).

Non-asbestos sheet 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 pharmaceutical, food and electronic industries. It is especially suited to applications with weak or lightly loaded flanges, as well as standard flange duties.

Prime features

- Highly recommended for duties with caustic alkalis and strong acids, at elevated temperatures and moderate concentrations.
- 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.
- WRAS approved for use with cold and hot potable water up to 85°C.

Physical properties

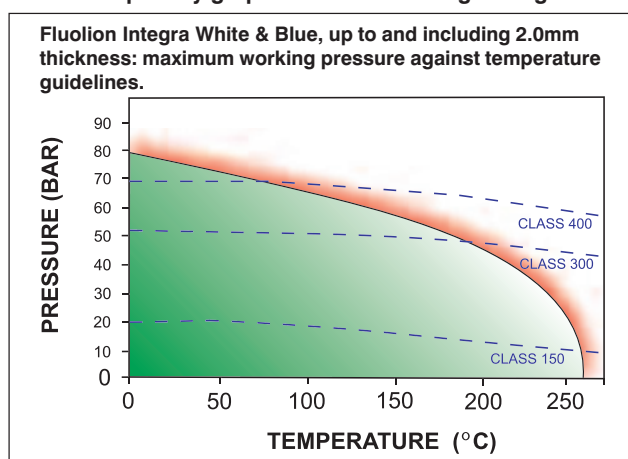
(Typical values for 1.5mm thick material)

Density, Mg/m³	1.43	
Transverse tensile strength, MPa	10	(ASTM F152)
Residual stress at 175°C, MPa	22	(BS 7531)
Compressibility, %	38	(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. In the amber zone we recommend that our technical services 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 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 43 for advice on gasket use).

Non-asbestos sheet 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. It was previously designated Fluolion® Integra.

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

- Highly recommended for duties with strong acids and oxidising agents at elevated temperatures and all concentrations.
- 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

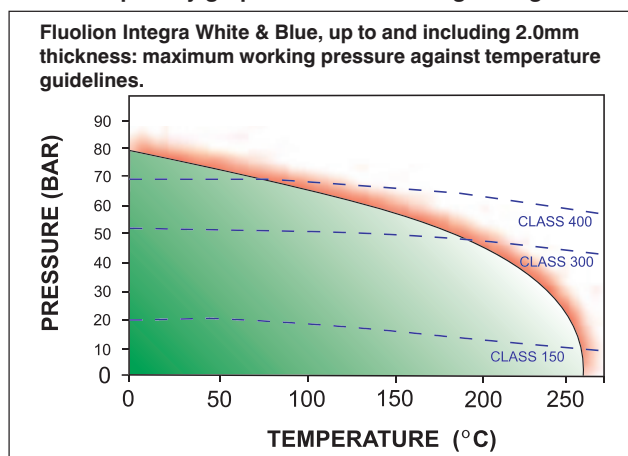
- Complies with requirements of FDA Regulations for food use, and USP 25, Class V, classification of plastics for pharmaceutical service.
- WRAS approved for use with cold and hot potable water up to 85°C.

Physical properties

(Typical values for 1.5mm thick material)

Density, Mg/m ³	2.2	
Transverse tensile strength, MPa	15	(ASTM F152)
Residual stress at 175°C, MPa	31	(DIN 52913)
Compressibility, %	10	(ASTM F36J)
Recovery, %	41	(ASTM F36J)
Gas leakage, ml/min	0.04	(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. In the amber zone we recommend that our technical services 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 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 43 for advice on gasket use).

Non-asbestos sheet jointings chemical suitability guide

¹ Suitable product.

Where chemical compatibility is not indicated, or a chemical is not listed, please consult our technical services team for a recommendation to be made.

NON-ASBESTOS SHEET JOINTINGS	CHIEFTAIN®	CENTURION®	SENTINEL®	INCA	FLUOLION® INTEGRA BLUE	FLUOLION® INTEGRA WHITE
STEAM	1	1	1	1	1	1
STEAM CONDENSATE	1	1	1	1	1	1
WATER	1	1	1	1	1	1
AIR	1	1	1	1	1	1
ACETIC ACID	1	1	50%	50%	1	1
ACETONE	1	1	1	1	1	1
ACETYLENE	1	1	1	1	1	1
ADIPIC ACID	1	1	1	1	1	1
ALUMINIUM CHLORIDE	1	1	NO	1	1	1
AMMONIA (ANHYDROUS, DRY)	1	1	1	1	1	1
AMMONIA (WET)	1	1	NO	1	1	1
AMMONIUM CHLORIDE	1	1	NO	1	1	1
AMMONIUM HYDROXIDE	1	1	10%	1	1	1
ANILINE	1	1	1	1	1	1
BENZENE	1	1	1	1	1	1
BITUMEN & HEAVY BOTTOMS	1	1	1	1	1	1
BLACK LIQUOR	1	1	NO	1	30°C	NO
BLEACH SOLUTIONS	1	1	NO	NO	1	1
BOILER FEED WATER	1	1	1	1	1	1
BRINE	1	1	1	1	1	1
BROMINE	NO	NO	NO	NO	1	1
BUNKER FUEL	1	1	1	1	1	1
BUTANE	1	1	1	1	1	1
CALCIUM CHLORIDE	1	1	1	1	1	1
CALCIUM HYDROXIDE	1	1	1	1	1	NO
CALCIUM HYPOCHLORITE	1	1	NO	NO	1	1
CARBON DIOXIDE	1	1	1	1	1	1
CARBON DISULPHIDE	NO	NO	NO	NO	1	1
CARBON TETRACHLORIDE	1	1	NO	NO	1	1
CHLORINE (DRY)	1	1	1	1	1	1
CHLORINE (WET)	1	NO	NO	NO	1	1
CHROMIC ACID	NO	NO	NO	NO	NO	1
CREOSOTE	1	1	1	1	1	1
DIESEL OIL	1	1	1	1	1	1
DIETHYL ETHER	1	1	1	1	1	1
DOWTHERM®	1	1	NO	NO	1	1
ETHANE	1	1	1	1	1	1
ETHANOLAMINES	1	1	1	1	1	1
ETHER	1	1	1	1	1	1
ETHYL ALCOHOL (Ethanol)	1	1	1	1	1	1
ETHYLAMINE	1	1	1	1	1	1
ETHYLENE	1	1	1	1	1	1
ETHYLENE GLYCOL	1	1	NO	1	1	1
ETHYLENE OXIDE	1	1	NO	NO	1	1
FERRIC CHLORIDE (WET)	NO	NO	NO	NO	1	1
FLUORINE	NO	NO	NO	NO	NO	NO
FORMALDEHYDE	1	1	1	1	1	1
FORMIC ACID	1	1	50%	10%	1	1
GASOLINE	1	1	1	1	1	1
GREEN LIQUOR	1	1	NO	NO	30°C	NO
HEAVY OILS	1	1	1	1	1	1
HYDROBROMIC ACID	NO	NO	NO	NO	NO	1
HYDROCHLORIC ACID	NO	NO	NO	NO	NO	1
HYDROFLUORIC ACID	NO	NO	NO	NO	NO	NO
HYDROGEN CHLORIDE GAS (DRY)	1	1	NO	NO	1	1
HYDROGEN PEROXIDE (<30%)	1	1	1	1	1	1
HYDROGEN SULPHIDE	1	1	NO	1	1	1
ISOPROPYL ALCOHOL	1	1	1	1	1	1
KEROSENE	1	1	1	1	1	1
LINSEED OIL	1	1	1	1	1	1
LIQUID PETROLEUM GAS	1	1	1	1	1	1

NON-ASBESTOS SHEET JOINTINGS	CHIEFTAIN®	CENTURION®	SENTINEL®	INCA	FLUOLION® INTEGRA BLUE	FLUOLION® INTEGRA WHITE
LYE	1	1	NO	1	30°C	NO
METHANE	1	1	1	1	1	1
METHYL ALCOHOL (Methanol)	1	1	1	1	1	1
METHYL CHLORIDE	1	1	1	1	1	1
METHYL ETHYL KETONE	1	1	1	1	1	1
METHYL TERTIARY BUTYL ETHER	1	1	1	1	1	1
METHYLATED SPIRITS	1	1	1	1	1	1
METHYLENE CHLORIDE	1	NO	NO	NO	1	1
MINERAL OILS	1	1	1	1	1	1
NAPHTHA	1	1	1	1	1	1
NATURAL GAS	1	1	1	1	1	1
NITRIC ACID	NO	NO	NO	NO	NO	1
NITROGEN	1	1	1	1	1	1
OCTANE	1	1	1	1	1	1
OLEUM	NO	NO	NO	NO	NO	1
OXALIC ACID	1	1	NO	50%	1	1
OXYGEN	NO	NO	NO	NO	NO	NO
PERCHLOROETHYLENE	1	1	1	1	1	1
PHENOLS	1	1	NO	NO	1	1
PHOSPHORIC ACID (50%)	1	1	NO	10%	1	1
POTASSIUM DICHROMATE (10%)	1	1	1	1	1	1
POTASSIUM HYDROXIDE (50%)	70°C	70°C	NO	NO	100°C	NO
PROPANE	1	1	1	1	1	1
PYRIDINE	1	1	NO	NO	1	1
RAPE SEED OIL	1	1	1	1	1	1
REFRIGERANT R12 (eg Freon® 12)	1	1	1	1	1	1
R22 (eg Freon® 22)	1	1	NO	NO	1	1
R134a (eg KLEA® 134a)	1	1	1	1	1	1
R404a (eg KLEA® 404a)	1	1	1	1	1	1
R407 series (eg KLEA® 407 series)	1	1	1	1	1	1
SEA WATER	1	1	1	1	1	1
SODA ASH	1	1	1	1	1	1
SODIUM CARBONATE	1	1	1	1	1	1
SODIUM DICHROMATE (10%)	1	1	1	1	1	1
SODIUM HYDROXIDE (50%)	70°C	70°C	NO	NO	100°C	NO
SODIUM HYPOCHLORITE	NO	1	NO	NO	1	1
STARCH	1	1	1	1	1	1
STYRENE	1	1	1	1	1	1
SULPHUR DIOXIDE (DRY)	1	1	NO	NO	1	1
SULPHUR DIOXIDE (WET)	NO	NO	NO	NO	1	1
SULPHUR TRIOXIDE	NO	NO	NO	NO	1	1
SULPHURIC ACID	NO	NO	NO	NO	NO	1
TANNIC ACID	1	1	1	NO	1	1
TITANIUM DIOXIDE	1	1	1	1	1	1
TITANIUM TETRACHLORIDE	1	1	NO	NO	1	1
TOLUENE (TOLUOL)	1	1	1	1	1	1
TRANSFORMER OIL	1	NO	NO	NO	1	1
TRICHLOROETHANE	1	1	NO	NO	1	NO
TRICHLOROETHYLENE	1	1	1	1	1	1
TURPENTINE	1	1	1	1	1	1
UREA	1	1	1	1	1	1
VINYL ACETATE	1	1	1	1	1	1
VINYL CHLORIDE	1	1	1	1	1	1
WHITE LIQUOR	1	1	NO	NO	30°C	NO
WHITE SPIRIT	1	1	1	1	1	1
XYLENE	1	1	1	1	1	1

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 services team for assistance.

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Supagraf® expanded graphite jointings

This information applies to all Supagraf® materials, as covered on pages 11, 12, 13 & 14.

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.

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.
- Fire safe.
- 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.
- Potable water duties and repeated use with foodstuffs.
- Very easy to cut – but large gaskets may need support during carriage and fitting.

Specification

WRAS approved for use with cold and hot potable water up to 85°C.

Physical properties

(Typical values for 1.5mm thick sheet)

Density, Mg/m³	1.0	
Compressibility, %	49	(ASTM F36A)
Recovery, %	16	(ASTM F36A)
Leachable chloride ion content, ppm	<50	

Service capabilities

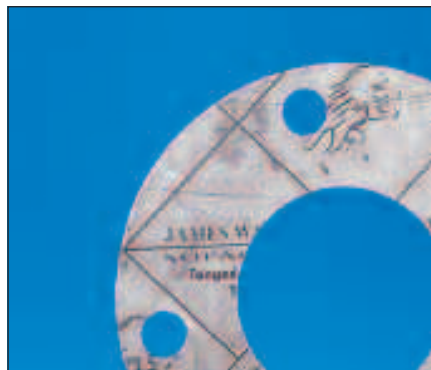
Maximum temperature (oxidising media)	400°C
Maximum temperature (*inert/reducing media)	2500°C
Minimum temperature	-200°C
(* Ensure that temperatures above 400°C on atmosphere side of flange do not cause gasket to oxidise inwards from outside edge.)	

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.

Specification

BAM approved for use with liquid and gaseous oxygen in flange connections of copper, copper alloys or steel at operating conditions up to 130bar and 200°C.

Physical properties

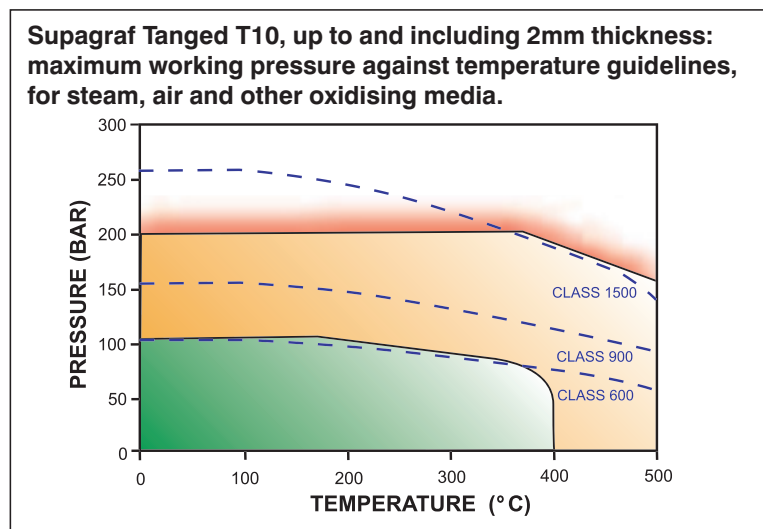
(Typical values for 1.5mm thick sheet)

Density (graphite), Mg/m ³	1.0	
Compressibility, %	35	(ASTM F36A)
Recovery, %	17	(ASTM F36A)
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 services 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.

Specification

S10 grade is BAM approved for use with liquid and gaseous oxygen in flange connections of copper, copper alloys or steel at operating conditions up to 130bar and 200°C.

Physical properties

(Typical values for 2.0mm thick sheet.)

Density (graphite) Mg/m ³	1.0	
Compressibility, %	41	(ASTM F36A)
Recovery, %	22	(ASTM F36A)
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



Physical properties

(Typical values for 1.5mm thick sheet)

Density (graphite), Mg/m ³	0.7	
Compressibility, %	45	(ASTM F36A)
Recovery, %	17	(ASTM F36A)

Service capabilities

Maximum temperature (oxidising media)	400°C
Maximum temperature (*inert/reducing media)	1000°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.

This material has all the attributes of Supagraf® Laminated S10, as described above, with the following important exceptions:

Description

Contains layer/s of nickel foil instead of stainless steel.

Prime features

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

Supagraf® products chemical suitability guide

¹ Suitable product.

Where chemical compatibility is not indicated, or a chemical is not listed, please consult our technical services team for a recommendation to be made.

SUPAGRAF® PRODUCTS	SUPAGRAF® PLAIN & HIGH PURITY	SUPAGRAF® TANGED T10	SUPAGRAF® LAMINATED N7	SUPAGRAF® LAMINATED S10
STEAM	1	1	1	1
STEAM CONDENSATE	1	1	1	1
WATER	1	1	1	1
AIR	1	1	1	1
ACETIC ACID	1	NO	1	NO
ACETONE	1	1	1	1
ACETYLENE	1	1	1	1
ADIPIC ACID	1	1	NO	1
ALUMINIUM CHLORIDE	1	1	NO	1
AMMONIA (ANHYDROUS, DRY)	1	1	1	1
AMMONIA (WET)	1	1	1	1
AMMONIUM CHLORIDE	1	1	1	1
AMMONIUM HYDROXIDE	1	NO	NO	NO
ANILINE	1	1	1	1
BENZENE	1	1	1	1
BITUMEN & HEAVY BOTTOMS	1	1	1	1
BLACK LIQUOR	1	1	NO	1
BLEACH SOLUTIONS	NO	NO	NO	NO
BOILER FEED WATER	1	1	1	1
BRINE	1	NO	NO	NO
BROMINE	NO	NO	NO	NO
BUNKER FUEL	1	1	1	1
BUTANE	1	1	1	1
CALCIUM CHLORIDE	1	1	1	1
CALCIUM HYDROXIDE	1	1	1	1
CALCIUM HYPOCHLORITE	30%	30%	30%	30%
CARBON DIOXIDE	1	1	1	1
CARBON DISULPHIDE	1	1	NO	1
CARBON TETRACHLORIDE	1	1	1	1
CHLORINE (DRY)	20°C	20°C	20°C	20°C
CHLORINE (WET)	NO	NO	NO	NO
CHROMIC ACID	NO	NO	NO	NO
CREOSOTE	1	1	1	1
DIESEL OIL	1	1	1	1
DIETHYL ETHER	1	1	1	1
DOWTHERM®	1	1	1	1
ETHANE	1	1	1	1
ETHANOLAMINES	1	1	1	1
ETHER	1	1	1	1
ETHYL ALCOHOL (Ethanol)	1	1	1	1
ETHYLAMINE	1	1	1	1
ETHYLENE	1	1	1	1
ETHYLENE GLYCOL	1	1	1	1
ETHYLENE OXIDE	1	1	1	1
FERRIC CHLORIDE (WET)	1	1	NO	1
FLUORINE	NO	NO	NO	NO
FORMALDEHYDE	1	1	1	1
FORMIC ACID	1	1	1	1
GASOLINE	1	1	1	1
GREEN LIQUOR	NO	NO	NO	NO
HEAVY OILS	1	1	1	1
HYDROBROMIC ACID	37%	NO	NO	NO
HYDROCHLORIC ACID	1	NO	NO	NO
HYDROFLUORIC ACID	1	NO	NO	NO
HYDROGEN CHLORIDE GAS (DRY)	1	1	1	1
HYDROGEN PEROXIDE (<30%)	1	1	1	1
HYDROGEN SULPHIDE	1	1	1	1
ISOPROPYL ALCOHOL	1	1	1	1
KEROSENE	1	1	1	1
LINSEED OIL	1	1	1	1

SUPAGRAF® PRODUCTS	SUPAGRAF® PLAIN & HIGH PURITY	SUPAGRAF® TANGED T10	SUPAGRAF® LAMINATED N7	SUPAGRAF® LAMINATED S10
LIQUID PETROLEUM GAS	1	1	1	1
LYE	1	1	1	1
METHANE	1	1	1	1
METHYL ALCOHOL (Methanol)	1	1	1	1
METHYL CHLORIDE	1	1	1	1
METHYL ETHYL KETONE	1	1	1	1
METHYL TERTIARY BUTYL ETHER	1	1	1	1
METHYLATED SPIRITS	1	1	1	1
METHYLENE CHLORIDE	1	1	1	1
MINERAL OILS	1	1	1	1
NAPHTHA	1	1	1	1
NATURAL GAS	1	1	1	1
NITRIC ACID (50%)	40°C	NO	NO	NO
NITROGEN	1	1	1	1
OCTANE	1	1	1	1
OLEUM	NO	NO	NO	NO
OXALIC ACID	1	1	1	1
OXYGEN	NO	1	NO	1
PERCHLOROETHYLENE	1	1	1	1
PHENOLS	1	1	1	1
PHOSPHORIC ACID (85%)	1	60°C	20°C	60°C
POTASSIUM DICHROMATE (10%)	1	1	1	1
POTASSIUM HYDROXIDE (50%)	1	1	1	1
PROPANE	1	1	1	1
PYRIDINE	1	1	1	1
RAPE SEED OIL	1	1	1	1
REFRIGERANT R12 (eg Freon® 12)	1	1	1	1
R22 (eg Freon® 22)	1	1	1	1
R134a (eg KLEA® 134a)	1	1	1	1
R404a (eg KLEA® 404a)	1	1	1	1
R407 series (eg KLEA® 407 series)	1	1	1	1
SEA WATER	1	20°C	20°C	20°C
SODA ASH	1	1	1	1
SODIUM CARBONATE	1	1	1	1
SODIUM DICHROMATE (10%)	1	1	1	1
SODIUM HYDROXIDE (50%)	1	1	1	1
SODIUM HYPOCHLORITE (25%)	1	NO	20°C	NO
STARCH	1	1	1	1
STYRENE	1	1	1	1
SULPHUR DIOXIDE (DRY)	1	1	1	1
SULPHUR DIOXIDE (WET)	1	1	1	1
SULPHUR TRIOXIDE	NO	NO	NO	NO
SULPHURIC ACID	70%	70%	50%	70%
TANNIC ACID	1	1	1	1
TITANIUM DIOXIDE	1	1	1	1
TITANIUM TETRACHLORIDE	1	1	1	1
TOLUENE (TOLUOL)	1	1	1	1
TRANSFORMER OIL	1	1	1	1
TRICHLOROETHANE	1	1	1	1
TRICHLOROETHYLENE	1	1	1	1
TURPENTINE	1	1	1	1
UREA	1	1	1	1
VINYL ACETATE	1	1	1	1
VINYL CHLORIDE	1	1	1	1
WHITE LIQUOR	NO	NO	NO	NO
WHITE SPIRIT	1	1	1	1
XYLENE	1	1	1	1

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 services team for assistance.

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Spiral wound & grooved metal gaskets

Metaflex® Spiral Wound Gaskets



Description

James Walker Metaflex® gaskets are designed to 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 surfaces are presented with a spiral of alternate metal/filler layers.

Typical applications

Pipelines and pressure vessels on steam, petrochemical, nuclear, marine and hydraulic plant; and 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 operating conditions.
- Quick to install and remove.
- Operating temperatures from cryogenic up to 1000°C.
- System pressures from high vacuum to over 350bar.
- Support rings, inside and/or outside of spiral, make gasket suitable for high line pressure on flat or raised-flange faces.

Specification

Products are manufactured in accordance with all relevant gasket standards to suit flange designations: ASME B16.5, BS 1560 (note:- 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 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 also available.	

Operating pressure

Metaflex gaskets seal up to 350bar, although higher pressures can be considered.

Metal winding strips

Standard materials: stainless steels 304L and 316L. Other materials include: 310, 320 and 321; Monel 400 and K500; nickel 200; titanium; Inconel 600, 625 and X750; Incoloy 800 and 825; Hastelloy HB2 and C276.

Support rings

Standard material: carbon steel. Other materials include: stainless steel 304L, 316L, 320 and 321; titanium; Monel 400 and K500; nickel 200; Fluolion® PTFE (inner rings only); Duplex UNS 31803.

Standard sizes (mm)

Nominal thickness	Compressed thickness	Minimum diameter	Maximum diameter
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

Largest non-standard gaskets manufactured to date are 5070mm diameter.

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 & grooved metal gaskets

Metakamm Kammprofile Gaskets



Description

These grooved metal, Kammprofile-type gaskets comprise a metal core with concentric grooves on either side, and usually 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; also heat exchangers.

Prime features

- Accommodate a vast range of operating conditions.
- Line temperatures and pressures up to 1000°C or 250bar.
- Undamaged cores can often be fitted with new soft faces to reduce maintenance costs.
- *Metakamm Easi-Fit (EF type) gaskets come with two or four locating lugs to aid fitting.
- **Metakamm Multifit gasket fits Class 150 to 2500 flanges.

Specification

Products are manufactured in accordance with all relevant gasket standards to suit flange designations: ASME B16.5, BS 1560 (note:- 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 also available.	

Operating pressure

Standard gaskets: 250bar max.

Serrated metal cores

Available in stainless steels 304, 304L, 316, 316L, 316Ti, 321 and 347; Monel 400 and K500; nickel 200; Inconel 600, 625 and X750; Incoloy 800 and 825; titanium; Hastelloy HB2 and C276; copper.

Sizes

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

How supplied

As six designs to suit different flange faces. Almost any combination of component materials is available. Special profiles include oval, rectangular and heat exchanger shapes with pass bars.

*Metakamm Easi-fit (EF type)

To facilitate easier fitting and reduce material and machining costs, larger Metakamm gaskets can be supplied as types EF with either two or four locating lugs. The lugs aid fitting as a minimum number of flange bolts need to be removed to allow easy and accurate gasket positioning.

**Metakamm Multifit

A variation of a Metakamm gasket with four self-locating lugs designed to minimise the number of gaskets required to fit all flange Classes from 150 to 2500. Sizes: ½ inch to 24-inch NB, and equivalent DIN sizes up to 600mm NB.

Metallic & semi-metallic gaskets

Moorside® Ring Joint Gaskets



Description

Precision manufactured metal ring joint gaskets predominantly used in high-pressure oilfield applications and for processing industry duties.

Specification

Available to API 6A (oilfield use) and ASME B16.20 (general use) standards to fit ASME, BS and DIN flanges. James Walker Moorflex is licensed by American Petroleum Institute to apply API monogram to gaskets in accordance with API 6A PSL4.

Prime features

- 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 above 700bar.

Materials

Standard: soft iron, low carbon steel, alloy steels F5 and 410; stainless steels 304, 304L, 316, 316L, 321 and 347.

Non-standard: high nickel alloys, super alloy steels, and other stainless grades.

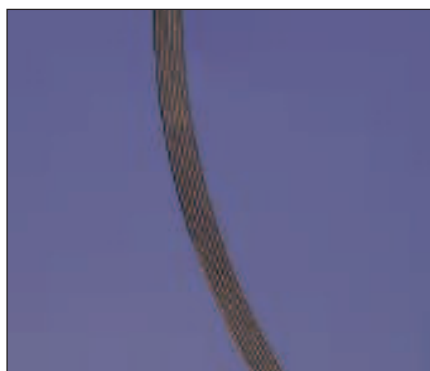
Ancillary equipment

- PTFE inner rings – for sitting in the cavity between flange bore and ring joint to reduce turbulence and flange erosion.
- Neoprene sponge flange guard protectors – for fitting externally to ring joint gasket to minimise ingress of moisture and dirt.
- Rubber coated ring joint gaskets – soft iron metal ring joint gaskets encapsulated in nitrile rubber for testing wellhead assemblies and valves. Rings can be reused and do not damage flange grooves.

How supplied

All sizes and materials to the standards listed, and to customer specification.

Machined Metal Gaskets



Description

Solid metal gaskets that are precision machined to a variety of complex profiles for special industrial and defence duties.

Typical applications

- Ultra-high vacuum equipment.
- Refrigeration plant.
- Hydraulic systems.
- Oxygen lines.

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 energised by bolting or internal pressure.
- Double cone section – for large diameter, high pressure duties.
- Weld ring gaskets – for critical applications where leak-proof joint is essential. Back-up gasket may be desirable.
- Ring joint orifice/blanking gaskets.

Materials

Include: soft carbon steel, stainless and alloy steels, Duplex, Monel, Inconel, Incoloy, nickel. Also S316L Urea Grade stainless for highly corrosive environments.

How supplied

Manufactured to international standards and customer specifications. Often supplied to proprietary designs where confidentially agreements are in force.

Metallic & semi-metallic gaskets

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. Jacket may be corrugated.

Typical applications

- Heat exchangers.
- Boilers and flues.
- Autoclaves and other pressure vessels.
- Gas mains.
- Pumps, valve bonnets.

Materials

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

How supplied

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

Copandas Gaskets



Description

Standard Copandas gasket comprises compressed fibre insert encased with metal sheet on its flange surfaces and inner edges: outer edges may also be encased.

Prime features

Often manufactured to suit unusual requirements.

Typical applications

- Cylinder heads – many veteran motor vehicles rely on Copandas gaskets to keep them running!
- Other duties involving high temperature and dry heat.
- Heat exchangers, and similar duties involving steam, hot water, hydrocarbons, or weak acid or alkali solutions.

Materials

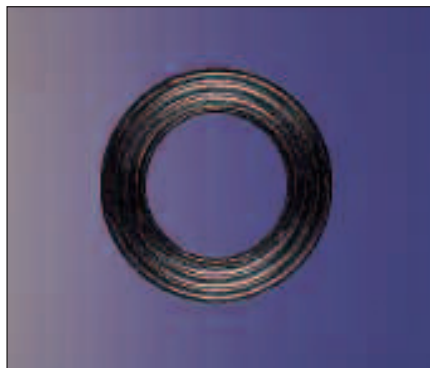
Fillers – usually non-asbestos Millboard, Chieftain® or Centurion®.
Cladding – copper.

How supplied

In materials to suit the application, and to any reasonable shape, size and quantity.

Metallic & semi-metallic gaskets

Corrugated Metal Gaskets



Description

Thin sheet metal gaskets with pressed corrugations – usually concentric around the bore.

Prime features

- Surface configuration enables the gasket to adapt to irregular flanges without undue compressive load.
- Provide efficient seal under varying conditions of temperature and pressure.

Materials

Usually formed from 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.

Metcom® Gaskets



Description

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.

Prime features

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

Physical properties

Standard metal cores SS304, 316L (others available)	
Supagraf® sealing material thickness	0.35mm to 0.5mm
Nominal overall thickness	1.5mm
Compressed thickness	0.5mm

Service capabilities

Maximum temperature (oxidising media)	500°C
Maximum temperature (non-oxidising)	550°C
Maximum temperature (steam)	650°C
Pressure range (depending on temperature)	Vacuum to 400bar

Optional sealing material

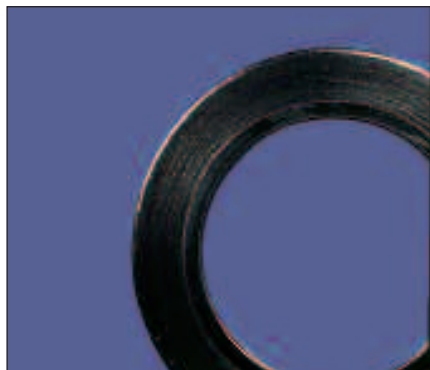
PTFE is available for aggressive chemical conditions. Restricted service capabilities apply – please contact our technical services team for assistance.

How supplied

Multiflange configuration: 0.5 inch to 12 inch Class 150–2500.
Individual flange configuration: 0.5 inch to 24 inch Class 150–2500.
Other sizes on application.

Metallic & semi-metallic gaskets

Supagraf® Eyeletted Gaskets



Description

Gaskets of Supagraf® Tanged T10, Supagraf® Laminated N7 and S10 supplied with metal eyelets (usually stainless steel) that shroud the inside or outside diameter.

Prime features of metal eyelets

- Reinforce the gasket surfaces.
- Erosion of graphite material is prevented at high fluid velocity – and subsequent contamination of media – when fitted to gasket inner surface.
- Reduce danger of overcompression at high seating stresses.
- Improve ease of gasket handling.

Physical properties & service capabilities

Generally as quoted for the Supagraf® grade to be used.

How supplied

Custom made to order.

Metagraf & Metex Gaskets

Description

Metagraf has a corrugated metal core, normally stainless steel, with Supagraf® expanded graphite facings. Available as **Metagraf PL** with a wide chemical compatibility for standard pipeline duties, and **Metagraf HX** for sealing heat exchangers. **Metex** is a robust gasket comprising a flat metal core (eg, 3mm thick stainless or carbon steel) with Supagraf® expanded graphite facings. It is typically used for large diameter gaskets, as well as heat exchanger duties where seating space is limited.

Temperature limits

Oxidising atmosphere
Steam

–200°C to +400°C
+650°C maximum

How supplied

Metagraf PL: To suit ASME Class 150 and 300 flanges, as well as DIN flanges. Metagraf HX and Metex: custom made to order..

Other devices

Flange Insulation Sets



Description

Flange insulation sets comprise an electrically insulating flange gasket, plus insulating bolt sleeves and washers to prevent conduction through bolts. They are used in cathodic protection systems and to eliminate galvanic corrosion

Typical applications

Long distance pipelines for water, oil or gas that operate at temperatures up to 120°C.

Materials

Gaskets: Neoprene-faced phenolic.
Washers: reinforced phenolic or plated mild steel.
Sleeves: polyester or DuPont Mylar®.

How supplied

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

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-0.025mm 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 services team for a recommendation to be made.

METAL COMPONENTS	STAINLESS STEEL 304L, 321, 347	STAINLESS STEEL 316, 316L	NICKEL 200	MONEL 400	INCONEL 625
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

METAL COMPONENTS	STAINLESS STEEL 304L, 321, 347	STAINLESS STEEL 316, 316L	NICKEL 200	MONEL 400	INCONEL 625
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

Filler & facing materials

Expanded graphite: See details for Supagraft[®] plain on page 14.

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 services team for assistance.

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

- 1 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.
- 1 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.

Prime features

- High compressibility at low bolt loadings.
- 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

Tested to BS 2F 66 and conforms to BS F 66. Complies with Rover GC2403.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	60 to 75	(ASTM D1415)
Tensile strength, MPa minimum	1.72	(ASTM F152)
Compressibility @ 2.8N/mm², %	20 to 30	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume swell 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	+1.0	(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: High Pressure



Description

A high quality blend of cork and polychloroprene that withstands high pressures and high bolt loads, particularly in the electrical industry. Previously designated Nebar® HP.

Prime features

- Developed for high pressure applications in switchgear and transformers.
- High resistance to mineral oils.
- Withstands higher bolt loadings than other Nebar grades.
- 110°C maximum operating temperature in liquids.
- Retains flexibility down to -35°C.

Specifications

Complies with DTD 900/4911 (DTD specs declared obsolescent); AFS 721; and ASTM F104 line call out F224000M2.

Physical properties

(Tested to ASTM F104 procedures)

Hardness, IRHD	70 to 85	(ASTM D1415)
Tensile strength, MPa min	2.35	(ASTM F152)
Compressibility @ 2.8N/mm², %	10 to 30	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume swells 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	

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.

Prime features

- Specifically for hydrogen coolers or where SF₆ gas is present.
- 1010ohm.cm electrical resistance 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, MPa min	2.45	(ASTM F152)
Compressibility @ 2.8N/mm², %	15 to 25	(ASTM F36B)
Recovery, minimum %	85	(ASTM F36B)
Fluid resistance, % volume swell in:		
ASTM Oil No.1, 72h @ 100°C	-2.7	(ASTM F146)
IRM 903, 72h @ 100°C	+10.7	(ASTM F146)
ASTM Fuel A, 22h @ ambient	+1.0	(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.

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, MPa min	1.75	1.75	(ASTM F152)
Compressibility @ 2.8N/mm², %	15 to 25	20 to 30	(ASTM F36B)
Recovery, minimum %	75	75	(ASTM F36B)
Fluid resistance, % volume swells 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	+23.1	+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.

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 -35°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, MPa min	1.75	(ASTM F152)
Compressibility @ 2.8N/mm², %	20 to 30	(ASTM F36B)
Recovery, minimum %	80	(ASTM F36B)
Fluid resistance, % volume swells in:		
ASTM Oil No.1, 72h @ 100°C	-5 to +10	(ASTM F146)
IRM 903, 72h @ 100°C	+5 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.

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	65 to 80	(ASTM D1415)
Tensile strength, MPa min	1.45	(ASTM F152)
Compressibility @ 2.8N/mm², %	20 to 35	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume swells 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® Purple: Nitrile Electrical

**Description**

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

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 -25°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, MPa min	1.75	(ASTM F152)
Compressibility @ 2.8N/mm ² , %	15 to 25	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume swells 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 0.9m for thicknesses 1.5mm, 3mm, 4mm, 5mm, 6mm, 6.4mm. Sheets 1.27m x 1.014m for thicknesses 1.5mm, 5mm.

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.

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, MPa min	1.75	(ASTM F152)
Compressibility @ 2.8N/mm ² , %	20 to 30	(ASTM F36B)
Recovery, minimum %	80	(ASTM F36B)
Fluid resistance, % volume swells 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	(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.

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.

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 70	(ASTM D1415)
Tensile strength, MPa min	1.45	(ASTM F152)
Compressibility @ 2.8N/mm ² , %	25 to 40	(ASTM F36B)
Recovery, minimum %	75	(ASTM F36B)
Fluid resistance, % volume swells 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	+0.8	(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.

Prime features

- For sealing at low bolt loads, and on uneven or delicate flanges.
- Exceptional oil resistance.
- Suitable for low-medium fluid pressures.

- 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	35 to 50	(ASTM D1415)
Tensile strength, MPa min	0.53	(ASTM F152)
Compressibility @ 0.7N/mm ² , %	25 to 45	(ASTM F36F)
Recovery, minimum %	75	(ASTM F36F)
Fluid resistance, % volume swells 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

Cork-elastomer jointings
chemical suitability guide

Key: 1 Suitable for use LP Not suitable at high pressure

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

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 services team for assistance.

PTFE gaskets

General description

Fluolion® is the James Walker trade name for its ranges of special PTFE grades. Virgin Fluolion and a number of filled materials are processed in house by the company.

Prime features

- Outstanding chemical resistance
- Non-corrosive, non-wetting, non-contaminating and odourless.
- Tolerates temperatures between –200°C and +260°C.
- Excellent electrical and thermal insulator in virgin form.

For general gasket duties, PTFE's impressive list of properties is often marred by creep characteristics that cause loss of sealing stress with time. James Walker minimises these negative properties by using fillers, biaxial orientation and other devices that enable the manifold advantages of Fluolion gaskets to outweigh the possible disadvantages.

PTFE gaskets

Fluolion® Integra Blue & White



Description

These two specially-stabilised PTFE jointing materials are mechanically treated to improve multi-directional strength, combat creep and improve resilience for flange jointing duties.

They are recommended for flanged joints on plant that handle chemically aggressive fluid media, and where hygiene is top priority – such as in the potable water, pharmaceutical, food and electronic industries.

For further details of Fluolion® Integra blue and Fluolion® Integra white, please see entry under *Non-Asbestos Sheet Jointings* on page 9, and chemical suitability on page 10.

Walflon Joint Sealant



Description

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

Typical application

Maintenance expedient for flanged joints where temperatures and pressures are modest. Ideal for emergency flange sealing when correct gasket or jointing material is unavailable.

Prime features

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

Specification

Complies with ASTM F104 P2357A.

How supplied

As seven cross-sections from 1.5mm x 3mm to 7mm x 20mm, in packs containing lengths of 5m to 30m.

PTFE gaskets

Fluolion® Envelope Gaskets

**Description**

A resilient fibre material encased in a thin cover of PTFE.

The resulting gasket combines the inertness of virgin PTFE with the mechanical properties of the compressed fibre sheet.

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 (which is usually lower than insert material)
Minimum temperature	–80°C
Maximum pressure	Typically 64bar

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

- Gaskets for food, pharmaceutical and potable water applications are made from suitably approved Fluolion PTFE.
- 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 below.

Materials

Fluolion PTFE: pure 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 & 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

Gore-Tex® TriGuard™ Gaskets

**Description**

Highly conformable gasket for fragile flanges, manufactured by WL Gore & Associates from 100% virgin ePTFE with high multi-directional strength.

Typical application

Weak, fragile or low bolt load flanges, such as those of plastic or glass-lined steel, on systems that handle contaminated media, highly permeable fluids, chlorine or monomers.

Specifications

Physiologically harmless in prolonged installation at temperatures up to +260°C according to VDI/VDE guidelines 2480. Complies to FDA 21 CFR 177.1550 (PTFE) requirements for food.

Prime features

- Dimensionally stable and creep resistant.
- Seals efficiently on damaged or misaligned flanges.
- Seals at low bolt loads.
- High resistance to blow-out.

Service capabilities

Maximum operating temperature, recommended
(Consult our technical services team if duties fall between +230°C and +270°C)

+230°C

Minimum operating temperature
Pressure range

–240°C

Vacuum to 40bar

How supplied

Precision cut gaskets to DIN and ANSI sizes up to 300mm or 12-inch. Thicknesses: 1.5mm, 3.0mm and 6.0mm as appropriate.

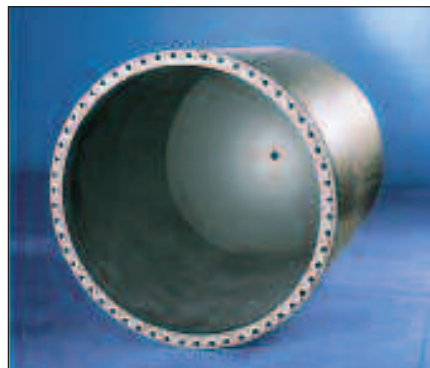
Chemical Suitability

The chemical resistance of virgin Fluolion® PTFE is almost universal. It is suitable for sealing duties with all chemical media – with the exception of molten alkali metals, fluorine gas and any materials that may generate these at the operating temperatures and pressures involved.

However, Fluolion PTFE materials that contain fillers to enhance their mechanical performance may have a lower resistance to certain chemical media than virgin PTFE. Therefore, prior to the use of these filled products, please check chemical compatibility with our technical services team.

PTFE Gaskets

Gore-Tex® DF Joint Sealant

**Description**

100% virgin ePTFE in length form with self-adhesive strip. Manufactured by WL Gore & Associates using a unique process to give an expanded fibre structure with excellent mechanical properties.

Specifications

- BAM approved for use with liquid and gaseous oxygen in flange connections of copper, copper alloys or steel in flat or tongue and groove finishes at operating conditions up to 130bar and 200°C.
- DVGW certified for sealing gas supplies at pressures up to 16bar and in the temperature range -10°C to +50°C.
- Physiologically harmless in prolonged installation at temperatures up to +260°C according to VDI/VDE guidelines 2480. Complies to FDA 21 CFR 177.1550 (PTFE) requirements for food.

Prime features

- Easy to install in length form with no waste.
- Universal installation.
- Long lasting and highly reliable.
- Unlimited shelf life.

Service capabilities

Maximum temperature	+270°C (short excursions to +315°C)
Minimum temperature	-240°C
Maximum pressure	250bar, depending on operating conditions and application.

How supplied

Length form (with self-adhesive strip): 1mm wide x 1mm thick, 3mm x 1.5mm, 5mm x 2mm, 7mm x 2.5mm, 10mm x 3.0mm, 14mm x 5.0mm, 17mm x 6.0mm, 20mm x 7.0mm, 25mm x 9.0mm. On spools containing 5m, 10m, 25m or 50m, according to width.

Gore-Tex® Series 600 Gasket Tape

**Description**

WL Gore & Associates' 100% virgin ePTFE in tape form with an adhesive backing. Material in this range is physically wider than Gore-Tex® 300 Gasket Tape and has the same multi-directionally orientated fibrous structure.

Typical application

Seals for glass-lined flanges on equipment such as mixer vessels, columns, storage tanks and receiver tanks – especially where flanges have irregular surfaces.

Specifications

Physiologically harmless in prolonged installation at temperatures up to +260°C according to VDI/VDE guidelines 2480. Complies to FDA 21 CFR 177.1550 (PTFE) for contact with food.

Prime features

- Easy to install, economical in use.
- Highly conformable material that compresses to form a tight seal.
- Overlays can compensate for imperfections in flange surfaces.
- Dimensionally stable – resists creep and cold flow.

Service capabilities

Maximum operating temperature	+220°C
Minimum operating temperature	-240°C
Pressure range	Full vacuum to 6bar (consult our technical services team if higher pressure duty is anticipated)

How supplied

Tape form, with self-adhesive backing. Widths: 40mm, 55mm, 65mm; in thicknesses: 3mm, 6mm and 9mm. Supplied on spools containing 2.5m or 5m of 3mm thick product; or 5m, 10m, or 20m of 6mm or 9mm thickness.

PTFE gaskets

Gore-Tex® Series 300 Gasket Tape



Description

WL Gore & Associates' 100% virgin ePTFE in tape form with an adhesive backing. It has a multi-directionally orientated fibrous structure.

Typical application

Metallic flanges on shell and tube heat exchangers, air coolers, pressure vessels and columns.

Specifications

Physiologically harmless in prolonged installation at temperatures up to +260°C according to VDI/VDE guidelines 2480. Complies to A 21 CFR 177.1550 (PTFE) for contact with food.

Prime features

- Easy-to-install alternative to cut gaskets.
- Highly conformable material that compresses to form a tight seal.
- Dimensionally stable – resists creep and cold flow.
- Minimises inventory costs
- Chlorine content <10ppm.

Service capabilities

Maximum operating temperature +250°C

Minimum operating temperature -240°C

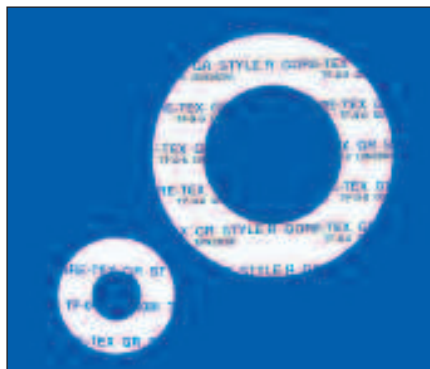
Pressure range

Full vacuum to 40bar

How supplied

Tape form, with self-adhesive backing. Widths: 10mm, 15mm, 20mm, 25mm; in thicknesses: 2mm, 3mm and 6mm. Width 30mm in thicknesses 3mm and 6mm. On spools containing 5m, 10m or 20m, according to width.

Gore-Tex GR® Style R



Description

Expanded PTFE sheet material with high multi-directional strength, manufactured by WL Gore & Associates using its patented process.

Typical application

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

Physiologically harmless in prolonged installation at temperatures up to +260°C according to VDI/VDE guidelines 2480. Complies to FDA 21 CFR 177.1550 (PTFE) requirements for food.

Prime features

- Not subject to ageing – can be stored indefinitely.
- Resists all media in the range pH 0-14 except molten alkali metals and elemental fluorine.

Service capability

Maximum temperature +270°C (short excursions to +315°C)

Minimum temperature -240°C

Pressure range Vacuum to 210bar, depending on application

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.

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
- Def Standard 22-006 (NES 2006) Grades OZ40, OZ50, OZ60, OZ70, OZ80 (all in black). (Declared OBSOLESCE.)

Nitrile Rubber NBR

- BS 2751 Grades BA40, BA50, BA60, BA70, BA80, BA90
- BS 6996 Grades BO60, BO80
- * DTD 5594A Grades 60, 70, 80, 90.
- * DTD 5509 Grades A, B, C, D
- Def Standard 22-005 (NES 2005) Grades BA(H)60, BA(H)70, BA(H)80. (Declared OBSOLESCE.)

Chloroprene CR (Neoprene)

- BS 2752 Grades C40, C50, C60, C70, C80
- ABR 4-0106 Issue 3 Grades 45, 55, 65, 75.

Butyl IIR

- BS 3227 Grades B60, B70.

Ethylene Propylene EPDM (Terpolymer)

- BS 6014 Grades EP60S, EP70S, EP80S.

Silicone VMQ, PVMQ, MQ, PMQ

- * DTD 5531 Grades 50, 60, 70, 80
- * DTD 5582 (as amended) Grades 50, 60, 70, 80
- * DTD 818 Classes L2, L3, L4, L5, N2, N3, N4, N5.

Fluorosilicone FMQ

This material resists mineral and synthetic oils.

- * DTD 5583A Grade 60 is available for defence and aerospace duties where resistance to fuels and hydraulic fluid is needed. Maximum size is 300mm square. (Because of the restricted applications for this specific material, it is not included in the General Elastomers Chemical Suitability Guide.)

Fluoroelastomer FKM (Dipolymer)

- * DTD 5543B Grades 60, 70, 80, 90 (all in black or green colour)
- * DTD 5612A Grades 50, 60, 70, 80, 90 (all in black or green colour)
- Viton® polymers are supplied when specified.

Kalrez® Perfluoroelastomer FFKM

We are UK Authorised Distributor for the design, supply and technical support of sealing and fluid handling parts made from DuPont Performance Elastomers' Kalrez®.

This high performance elastomeric material combines the resilience and sealing ability of rubber with almost universal chemical resistance and temperature capabilities up to 316°C.

Various grades of Kalrez® are recommended for critical and/or high purity sealing applications in industry sectors as diverse as:

- Pharmaceuticals and food processing
- Semiconductor fabrication
- Oil, gas, chemical and petrochemical processing
- Defence and aerospace.



* All DTD specifications have been declared OBSOLESCE.

Commercial grade elastomers

Commercial Natural Rubber 263C

Description

Good quality commercial grade of natural rubber; black in colour with smooth finish.

Typical applications

Services with hot and cold water, ethylene glycol, dilute acids and alkalis – within temperature range –30°C to +80°C.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	70 ±5
Density, Mg/m³	1.5 ±0.2
Tensile strength, MPa min	2.5
Elongation at break, % min	150
Compression set, % (max, 24h @ 70°C)	35

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial Tan Shotblast Natural Rubber 261C

Description

A soft rubber that has high resistance to abrasion. It is tan in colour, with a smooth finish.

Typical applications

Used as a gasketing material for a variety of applications involving water, dilute acids and alkalis, lower alcohols, and silicone greases and oils. Temperature range is –30°C to +70°C.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	40 ±5
Density, Mg/m³	1.0 ±0.2
Tensile strength, MPa min	5
Elongation at break, % min	450
Compression set, % (max, 24h @ 70°C)	30

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 3mm, 5mm, 6mm, 10mm, 12mm. Note: 6mm, 10mm and 12mm are bulk supplied only in 5m rolls.

Commercial White Food-Quality Natural Rubber 259C

Description

A white coloured natural rubber, with a smooth finish, that is compounded especially to meet the needs of the food and beverages industries. Conforms to FDA 21 CFR 177.2600.

Typical applications

Flange gaskets on food processing plant and equipment where the operating temperature is between –30°C and +80°C. The material is also suitable for use with dilute acids and alkalis, lower alcohols, and silicone greases and oils.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	55 to 65
Density, Mg/m³	1.5 ±0.2
Tensile strength, MPa min	5
Elongation at break, % min	350
Compression set, % (max, 24h @ 70°C)	35

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1.5mm, 3mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial Natural Rubber 332C

Description

Good quality commercial grade of natural rubber sheet containing a layer of polyester fibre reinforcement to give additional strength and resistance to spread under compression. Thicknesses of 3mm and greater have two plies of reinforcement.

Typical applications

Flange gaskets for use with hot and cold water, ethylene glycol, dilute acids and alkalis, and silicone greases and oils, within temperature range –30°C to +80°C.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	65 ±5
Density, Mg/m³	1.5 ±0.2
Tensile strength, MPa	3
Elongation at break, %	150
Compression set, % (24h @ 70°C)	35

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1.5mm, 2mm, 3mm, 5mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial grade elastomers

Commercial Neoprene 264C

Description

Black coloured polychloroprene (neoprene) rubber with a smooth finish.

Typical applications

Widely used for flange gaskets because of its good resistance to many types of oils and greases – mineral-based, silicone-based and animal-based – as well as aliphatic hydrocarbons. It also has good resistance to ozone, sunlight and atmospheric ageing. Operating temperature range is -20°C to $+100^{\circ}\text{C}$.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	55 to 70
Density, Mg/m^3	1.4 ± 0.2
Tensile strength, MPa	5
Elongation at break, %	200
Compression set, % (24h @ 70°C)	

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1.5mm, 2mm, 3mm, 5mm, 6mm, 10mm, 12mm, 16mm, 19mm, 25mm. Note: Thicknesses of 6mm and greater are bulk supplied only in 5m rolls.

Commercial Neoprene Insertion 283C

Description

Similar to 264C above, but contains a layer of polyester scrim reinforcement to give additional strength and resistance to spread under compression. Thicknesses of 3mm and greater have two plies of reinforcement.

Typical applications

As for 264C above

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial Neoprene 339C

Description

A soft commercial neoprene, similar to 264C above but with an IRHD of 50.

Typical applications

As for 264C above, but recommended for applications where a lower bolt loading is required.

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.3m x 1m. Rolls: 20m x 1.3m, 10m x 1.3m, 5m x 1.3m. Thicknesses: 1.5mm, 2mm, 3mm, 5mm, 6mm, 8mm.

Commercial Nitrile 269C

Description

Medium hardness grade of rubber based on an acrylonitrile-butadiene copolymer. It is black in colour with a smooth finish.

Typical applications

Service with all types of oils – mineral, silicone, vegetable, animal and synthetic – as well as many hydrocarbon fuels and water/glycol-based hydraulic fluids. Temperature range: -20°C to $+110^{\circ}\text{C}$.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	55 to 70
Density, Mg/m^3	1.45 ± 0.2
Tensile strength, MPa	5
Elongation at break, %	250
Compression set, % (24h @ 70°C)	30

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial grade elastomers

Commercial White Food-Quality Nitrile 260C

Description

White-coloured acrylonitrile-butadiene rubber, with a smooth finish, developed especially for the food and beverage industries. Conforms to FDA 21 CFR 177.2600.

Typical applications

Flange gaskets on food processing plant and equipment, where good resistance is needed to vegetable and animal oils and fats. It has a higher working temperature range (ie, -20°C to +110°C) than its natural rubber counterpart, 259C.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	60 ±5
Density, Mg/m³	1.5 ±0.2
Tensile strength, MPa	5
Elongation at break, %	300
Compression set, % (24h @ 70°C)	35

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial Nitrile Insertion 337C

Description

Similar to 269C above, but with polyester scrim insertion to give additional strength and resist spread under load.

Typical applications

As for 269C (Page 35).

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	55 to 65
Density, Mg/m³	1.5 ±0.2
Tensile strength, MPa min	3
Elongation at break, % min	300
Compression set, % (24h @ 70°C)	35

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.3m x 1m. Rolls: 20m x 1.3m, 10m x 1.3m, 5m x 1.3m. Thicknesses: 1.5mm, 2mm, 3mm, 4mm, 5mm, 6mm, 8mm.

Commercial Ethylene Propylene 280C

Description

Black-coloured ethylene propylene rubber with a fine fabric finish. This material is WRAS approved for service with cold potable water.

Typical applications

Widely used for gaskets in the water industry, this material also has good resistance to dilute acids, and animal and vegetable oils. It possesses excellent weathering properties and operates within the temperature range -40°C to +130°C.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	60 to 75
Density, Mg/m³	1.1 ±0.2
Tensile strength, MPa	5
Elongation at break, %	300
Compression set, % (24h @ 100°C)	40

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 3mm, 5mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial Red Silicone 328C

Description

Red coloured silicone rubber with a fine fabric finish.

Typical applications

Elastomeric gaskets that need the wide temperature range that silicone can provide: -55°C to +175°C for continuous use, with excursions to +200°C. This material also has good resistance to ozone and has very good electrical insulation properties.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	65 ±5
Density, Mg/m³	1.25 ±0.2
Tensile strength, MPa	8
Elongation at break, %	300
Compression set, % (22h @ 150°C)	25

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m. Rolls: 10m x 1m, 5m x 1m. Thicknesses: 1.5mm, 3mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial grade elastomers

Commercial White Silicone 308C**Description**

White-coloured silicone rubber with smooth finish.

Typical applications

As for 328C above, but limited to +155°C for continuous use.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	60 ±5
Density, Mg/m³	1.25 ±0.2
Tensile strength, MPa min	5
Elongation at break, % min	200
Compression set, % (24h @ 150°C)	30

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1m, 5m x 1m. Thicknesses: 1.5mm, 3mm, 6mm. Note: 6mm is bulk supplied only in 5m rolls.

Commercial Silicone 336C (Food-Quality)**Description**

Translucent silicone rubber, with a smooth finish. Confirms to FDA 21 CFR 177 2600.

Typical applications

Food processing plant and equipment, and where this rubber's very wide temperature range of -60°C to +200°C is beneficial.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	60 ±5
Density, Mg/m³	1.20 ±0.2
Tensile strength, MPa min	5
Elongation at break, % min	200
Compression set, % (22h @ 150°C)	35

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m. Rolls: 10m x 1.2m, 5m x 1.2m. Thicknesses: 1mm, 1.5mm, 2mm, 3mm, 4mm, 5mm, 6mm, 8mm, 10mm.

Commercial Butyl 338C**Description**

Isobutylene-isoprene elastomer, black in colour with a smooth finish.

Typical applications

Duties where the extremely low permeability of butyl is required, together with its good resistance to phosphate esters, dilute acids and alkalis. Temperature range: -30°C to +100°C.

Physical Properties

(Tested to BS/ISO procedures)

Hardness, IRHD	60 ±5
Density, Mg/m³	1.3
Tensile strength, MPa min	4.5
Elongation at break, % min	350
Compression set, % (24h @ 70°C)	35

How Supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.3m x 1m. Rolls: 20m x 1.3m, 10m x 1.3m, 5m x 1.3m. Thicknesses: 1.5mm, 3mm, 4mm, 5mm, 6mm, 8mm.

Commercial Fluorocarbon 340C**Description**

Good commercial grade fluorocarbon elastomer, black in colour with a smooth finish. Viton® grade available.

Typical applications

Suitable for a wide range of gasket duties and fluid media. It has an exceptional temperature range for a rubber (-20°C to +200°C for continuous operation, with excursions to +230°C) plus good resistance to mineral oils, fuels and non-polar solvents including high aromatic and chlorinated types.

Physical properties

(Tested to BS/ISO procedures)

Hardness, IRHD	75 ±5
Tensile strength, MPa min	8.5
Elongation at break, % min	200
Compression set, % (24h @ 150°C)	40

How supplied

Precision cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1m, 1.2m x 1.2m. Rolls: 10m x 1m, 5m x 1m. Thicknesses: 1.5mm, 3mm, 5mm, 6mm. Note: 5mm and 6mm are bulk supplied only in 5m rolls.

General elastomers chemical suitability guide

Notation:

A = Suitable product

B = Fair: some volume swell/chemical attack

C = Static use only

D = Unsuitable: do NOT use

H Suitability can depend on the grade selected

Note on temperature: All media considered to be at 20°C unless otherwise stated.

Where chemical compatibility is not indicated, or a chemical is not listed, please consult our technical services team for a recommendation to be made.

GENERAL ELASTOMER	NATURAL RUBBER (NR)	NEOPRENE RUBBER (CR)	NITRILE RUBBER (NBR)	ETHYLENE-PROPYLENE RUBBER (EPM, EPDM)	SILICONE RUBBER (VMQ)	FLUOROCARBON RUBBER (FKM)	BUTYL (IIR)	KALREZ® (FFKM)
STEAM (<120°C)	D	D	D	A	D	D	C	A
WATER	A	B	A	A	A	A	A	A
WATER (POTABLE)	H	H	H	H	H	H	H	H
AIR	A	A	A	A	A	A	A	A
ACETIC ACID (10%)	D	C	D	A	A	D	A	A
ACETONE	B	C	D	A	D	D	A	A
ACETYLENE	D	C	A	D	C	A	D	A
ADIPIC ACID	A	A	A	A	-	-	A	A
ALUMINIUM CHLORIDE	A	A	A	A	C	A	A	A
AMMONIA (ANHYDROUS, DRY)	D	A	C	A	C	D	A	A
AMMONIUM CHLORIDE	A	A	A	A	C	A	A	A
AMMONIUM HYDROXIDE (10%)	B	B	B	A	B	B	A	A
ANILINE	D	D	D	B	D	C	B	A
BENZENE	D	D	D	D	D	C	D	A
BLEACH SOLUTIONS	D	D	D	A	C	A	A	A
BRINE	D	D	D	D	D	A	D	A
BROMINE (ANHYDROUS)	-	D	D	D	D	A	D	A
BUNKER FUEL	D	D	A	D	C	A	D	A
BUTANE	D	B	A	D	D	A	D	A
BUTYL ALCOHOL (50°C)	A	A	A	C	C	A	C	A
CALCIUM CHLORIDE	A	A	A	A	A	A	A	A
CALCIUM HYDROXIDE	B	A	B	A	B	A	A	A
CALCIUM HYPOCHLORITE (15%)	C	D	D	A	C	A	A	A
CARBON DIOXIDE	B	C	A	C	C	C	C	A
CARBON DISULPHIDE	D	D	D	D	D	A	D	A
CARBON TETRACHLORIDE	D	D	D	D	D	A	D	A
CHLORINE (DRY)	D	D	D	D	D	B	D	A
CHLORINE (WET)	D	D	D	D	D	B	D	B
CHROMIC ACID (40%)	D	D	D	C	D	A	D	A
CREOSOTE	D	D	B	D	D	A	D	A
DIESEL OIL	D	C	A	D	D	A	D	A
DIETHYL ETHER	D	D	D	D	D	D	D	A
ETHANE	D	C	A	D	D	A	D	A
ETHANOLAMINES (less than 5%)	B	D	D	B	B	D	B	H
ETHER	D	D	D	D	D	D	D	A
ETHYL ALCOHOL (Ethanol)	B	A	A	A	A	A	A	A
ETHYLENE	-	-	A	B	-	D	-	A
ETHYLENE GLYCOL	B	A	A	A	A	D	A	A
ETHYLENE OXIDE	D	D	D	D	D	D	D	A
FERRIC CHLORIDE (WET)	A	C	A	A	C	A	A	A
FOODSTUFFS	H	H	H	H	H	H	H	H
FORMALDEHYDE (40%)	B	D	D	A	C	D	B	A
FORMIC ACID	C	B	D	A	C	D	D	A
GLYCERINE	A	A	A	A	A	A	A	A
GREEN LIQUOR (SULPHATE)	B	C	C	A	A	A	A	A
HEAVY OILS	-	-	-	-	-	A	-	A
HYDROBROMIC ACID (37%)	A	D	D	A	D	A	A	A
HYDROCHLORIC ACID (37%)	D	D	C	C	D	A	C	A
HYDROFLUORIC ACID (48%)	C	A	D	B	D	A	B	A
HYDROGEN PEROXIDE (<30%)	D	B	B	A	A	A	D	A
HYDROGEN SULPHIDE (DRY, 5%)	A	A	A	A	D	D	A	A
ISOBUTYL ALCOHOL	B	A	C	C	A	A	A	A
ISOPROPYL ALCOHOL	B	A	C	A	A	A	A	A
KEROSENE (70°C)	D	D	A	D	D	A	D	A
LIQUID PETROLEUM GAS	D	C	A	D	D	A	D	A

GENERAL ELASTOMER	NATURAL RUBBER (NR)	NEOPRENE RUBBER (CR)	NITRILE RUBBER (NBR)	ETHYLENE-PROPYLENE RUBBER (EPM, EPDM)	SILICONE RUBBER (VMQ)	FLUOROCARBON RUBBER (FKM)	BUTYL (IIR)	KALREZ® (FFKM)
LYE	B	C	C	A	C	C	A	A
MAGNESIUM CHLORIDE	A	A	A	A	A	A	A	A
METHANE	D	C	A	D	D	C	D	A
METHYL ALCOHOL (Methanol)	A	A	A	A	A	D	A	A
METHYL CHLORIDE	D	D	D	D	D	C	D	A
METHYLETHYL KETONE	D	D	D	A	D	D	A	A
METHYLENE CHLORIDE	D	D	D	D	D	C	D	A
MINERAL OILS	D	D	A	D	B	A	D	A
NAPHTHA	D	D	B	D	D	A	D	A
NATURAL GAS	D	B	A	D	B	A	D	A
NITRIC ACID (10%)	B	B	D	A	B	A	A	A
NITROGEN	A	A	A	A	A	A	A	A
OCTANE	D	D	B	D	D	A	D	A
OLEUM	D	D	D	D	D	C	D	A
OXALIC ACID (25%, 70°C)	B	C	C	B	C	A	A	A
OXYGEN (DEGREASED SEALS)	B	A	C	A	A	A	A	A
PERCHLOROETHYLENE	D	D	D	D	D	A	D	A
PHENOLS	A	C	D	B	A	A	A	A
PHOSPHORIC ACID (50%)	C	C	D	A	C	A	A	A
POTASSIUM DICHROMATE (10%)	B	A	A	A	A	A	A	A
POTASSIUM HYDROXIDE (50%)	B	C	B	A	C	D	A	A
POTASSIUM NITRATE	A	A	A	A	A	A	A	A
PROPANE	D	C	A	C	D	A	D	A
PYRIDINE	D	D	D	D	D	D	C	A
REFRIGERANTS (UNCONTAMINATED)								
R12 (eg Freon® 12)	D	A	A	C	D	C	C	B
R13 (eg Freon® 13)	A	A	A	A	D	C	A	B
R22 (eg Freon® 22)	B	A	D	A	D	D	A	A
R134a (eg KLEA® 134a)	A	A	A	A	B	D	A	C
SEA WATER	A	B	A	A	A	A	A	A
SOAP SOLUTION	B	B	A	A	A	A	A	A
SODA ASH	A	A	A	A	A	A	A	A
SODIUM CARBONATE	A	A	A	A	A	A	A	A
SODIUM DICHROMATE (10%)	-	-	-	A	-	-	-	A
SODIUM HYDROXIDE (50%)	C	B	C	B	B	D	B	A
SODIUM HYPOCHLORITE (20%)	C	D	C	B	C	C	C	A
STYRENE	D	D	D	D	D	D	D	A
SULPHUR DIOXIDE (DRY)	B	D	D	A	C	A	B	A
SULPHUR DIOXIDE (WET)	-	-	D	A	C	A	A	A
SULPHUR TRIOXIDE	B	D	D	C	C	A	C	A
SULPHURIC ACID (10%)	B	B	C	A	D	B	A	A
TANNIC ACID	A	C	A	A	C	A	A	A
TITANIUM TETRACHLORIDE	D	D	B	D	D	C	D	B
TOLUENE (TOLUOL)	D	D	D	D	D	A	D	A
TRANSFORMER OIL	D	C	A	D	B	A	D	A
TRICHLOROETHANE	D	D	D	D	D	B	D	A
TRICHLOROETHYLENE	D	D	D	D	D	A	D	A
TURPENTINE	D	D	A	D	D	A	D	A
UREA SOLUTION (30%)	-	A	A	A	-	A	A	A
VINYL CHLORIDE	D	D	D	C	-	A	D	A
WHITE SPIRIT	D	D	B	D	D	A	D	A
XYLENE	D	D	D	D	D	A	D	A

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 services team for assistance.

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Other gasket products & devices

Gaskoid



Description

Economical cellulose-based material impregnated with plasticised gelatine. It is brown in colour with a smooth finish.

Typical application

Predominantly used in the automotive industry as a gasket material for carburettors, fuel and oil pumps, gear casings and pipeline flanges. It has excellent resistance to fuels, oils and most organic solvents, and is ideal for use at low bolt loadings.

Specifications

Meets the requirements of most European and US motor manufacturers, plus USA Federal and Military specifications.

Service capabilities

Maximum operating pressure	10bar
Operating temperature range	-20°C to +120°C

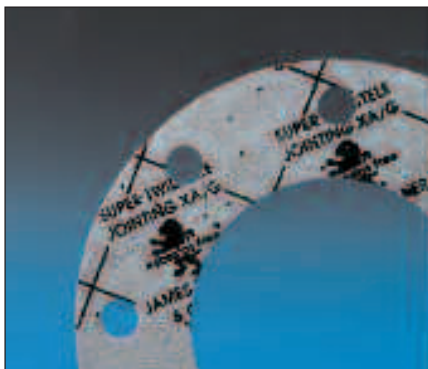
Physical Properties

Residual stress, MPa	26.0	(BS 7531)
Tensile strength, MPa min	12	(ASTM F152)
Compressibility @ 70kg/cm ² , %	20 - 40	(ASTM F36G)
Fluid ageing (22h @ 21°C):		(ASTM F146)
IRM 903, weight increase, % max	15	
thickness increase, % max	5	
ASTM Fuel B, weight increase, % max	15	
thickness increase, % max	5	

How supplied

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

Super Twilstele® XA/G



Description

A glass-fibre based material, reinforced with stainless steel wire and proofed with synthetic rubber. It has a grey surface.

Typical application

High temperature dry heat duties where operating pressure is low: exhausts of gas turbine and large diesel engines, open-ended fume extraction systems, refractory services. This very tough and flexible material can be cut with hand tools.

Service capability

Maximum operating temperature	+650°C
Maximum operating pressure	Not rated

How supplied

Cut gaskets to any shape, size or quantity. In sheets: 1.2m x 1.2m. Thicknesses in multiples of 1.3mm.

Computer gasket cutter

Compact Gasket Cutter



Description

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

Prime features

- Readily adjustable for diameters from 20mm ($\frac{13}{16}$ inch) up to 600mm (24-inch).
- Longer extension bar available for diameters up to 900mm (35-inch).
- Dual metric/imperial calibration.
- Cuts compressed fibre jointings up to 5mm thickness.
- Cuts rubber and cork-elastomer sheets up to 12mm thickness.

How supplied

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

Rotabolt® Tension Control Fastener



Description

A modified bolt or stud that allows a specific tension to be accurately applied. Correct tension is easily checked using a finger-feel device that is built into each fastener.

Typical application

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

Prime features

- Each RotaBolt® is calibrated to ensure the achievement of design load is accurately monitored.
- RotaBolt system is far more reliable than torque wrench or hydraulic tensioner where bolt loads at end of tightening cycles are unknown and uncontrollable.
- Easy to check fastener tension, even when wearing protective gloves or diving equipment.
- Suits a wide range of bolting and environmental conditions.
- Resists corrosion, elevated and cryogenic temperatures, shock and vibration.

Service setting

- Standard load settings: 5t to 350t
- Indicator for RotaBolt 1: One setting of $\pm 5\%$
- Indicator for RotaBolt 2: Upper/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.

Cut gaskets & services

Immediate Supply



James Walker is dedicated to meeting industry's immediate demands for precision-cut gaskets from sheet jointing materials, as well as for spiral wound and metallic types.

Our automated distribution centres hold ten million sealing products ready for same day dispatch throughout the world. A vast number of these stock 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 this we use highly accurate CAD/CAM controlled water-jet cutters, ready programmed with every gasket design to national and international standards. We hold large stocks of non-asbestos sheet jointings, rubber and Supagraf® products in all standard thicknesses, specifically for this purpose.

Custom-Cut Gaskets



Using the same technology enables us to make any shape, size and quantity of non-standard cut gaskets to high precision standards – and meet seemingly impossible deadlines.

We work directly from customers' CAD/CAM files, sent on disk, CD or e-mail. In addition, we can digitise profiles from drawings, samples or templates – 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 shape of a sheet, ensure the maximum number of gaskets is produced with minimum wastage.

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

For metallic materials, such as Supagraf® Tanged Jointing T10, we use an abrasive water-jet cutter. This slices intricate designs from the toughest materials – including alloy steels and titanium – leaving a perfectly clean edge without heat distortion. Each hair thin water-jet is loaded with crushed garnet and operates at Mach 2 and 4000bar.

Installation & Refurbishment



The vital role of the flange gasket is often overlooked. Our on-site service is based on the vast technical expertise of James Walker companies in the selection, manufacture and supply of the optimum gasket product for your application.

Experienced site teams, such as those from James Walker Engineering Services, will remove existing gaskets, re-dress the flange faces, supply and install new gaskets, and ensure bolted connections are correctly loaded. We can also carry out VOC emission testing.

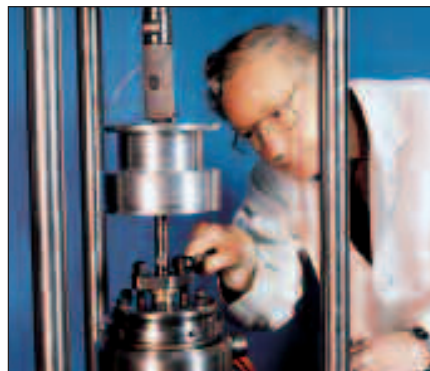
Where necessary, we will refurbish or re-engineer items of plant at dedicated workshops to facilitate optimum flange sealing.

These services include the following James Walker products:

- Jointings and cut gaskets.
- Metallic gaskets.
- Metaflex® spiral wound gaskets and Moorside® API ring joints.
- RotaBolt® tightening control.

James Walker in action

James Walker Research & Development



Our extensive research and development programmes are targeted to deliver new materials and products that 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 dedicated scientists and technologists who prove the design integrity and quality of every item we supply.

We supplement our in-house research facilities with those at the BHR Group, Cranfield, National Centre for Tribology and the laboratories of our raw material suppliers. 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.

Independent laboratories across the world are also contracted to undertake third-party testing of our products to specific national and industry standards.

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

James Walker Service



Our customers deserve the very best, and we supply it in terms of efficient customer

service, technical advice, products, delivery and after sales service.

James Walker's high-technology customer support centres lead the fluid sealing industry with their personalised service to tens of thousands of customers worldwide, plus the swiftest response times for quotations and order processing. With over ten-million items stocked for immediate despatch we can react very swiftly to industry's urgent demands for sealing products – typically to bring a process or production plant back on stream.

On-site advice is provided by a large team of James Walker's local representatives, backed by highly experienced applications engineers and materials scientists. Together, they possess the specialised knowledge, practical experience and technical facilities to solve any relevant fluid sealing problem for our customers.

Customer training is another important service. James Walker is constantly hosting sessions to help industry convert to new non-asbestos sealing products. Full training is given to designers and plant engineers in the selection and installation of all types of sealing products. This service is backed by free training videos on the new fitting techniques needed for non-asbestos products.

James Walker Quality



Quality design, quality manufacture and quality service are paramount throughout our worldwide operation. No effort is spared to achieve the highest possible standards.

We start with the best raw materials and use advanced production techniques with strict quality control at every stage, culminating in an exacting inspection procedure of the finished product.

Our quality systems are third party registered to BS EN ISO 9001. We are also regularly assessed and quality-approved by a wide range of industry bodies and individual customers – including multinational companies, utilities and government organisations.

James Walker's advice on gasket use

The following information is provided for general guidance only.

YES . . .

- Ensure that gasket is compatible with the media at required operating temperature and pressure ranges, and is of the correct dimensions for the flange being sealed.
- Use gasket material and bolt grades that suit the tensile loading requirements of the flange.
- Specify the thinnest gasket that will suit the flange finish and parallelism.
- When appropriate, use an anti-stick coated gasket where joints are frequently replaced for operational reasons.
- Ensure the flange is clean, undamaged and without radial scores, free from oil and grease, and has the correct surface finish.
- Remove all traces of protective material before assembling the gasket.
- Ensure a cut gasket is free from burrs or ridges at bolt holes and edges to avoid uneven stress loading.
- Lubricate bolts and ensure that nuts can run freely down the threads before use.
- Use RotaBolts® 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 will avoid flange distortion and give even stress-distribution throughout the gasket.
- Use feeler gauges to check any predetermined degree of compression that is needed. This often applies to cork-elastomer gaskets.
- Non-metallic gaskets should always 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 electrical equipment that may produce ozone.

NO . . .

- Never re-use an old gasket.
- Do not use low quality gaskets or jointings. Any initial cost saving will soon be lost in plant downtime and production delays caused by joint failures.
- Do not use sealing compounds or grease on joints. They reduce the friction between gasket and flange which can allow a gasket to stress-relax and creep, leading to premature failure.
- Avoid using impact adhesive 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 gasket selection

Material	Minimum operational stress (N/mm ²)	Maximum initial stress (N/mm ²)
Compressed non-asbestos fibre	15	50
Fluolion® Integra Blue	13	50
Fluolion® Integra White	16	50
Supagraf® Plain	5	100
Supagraf® Tanged T10	6	150
Supagraf® Laminated S10	5	60
Metaflex® Spiral Wound + XA filler	35-45	*
Metaflex® Spiral Wound + SPG filler	30-40	*
Metakamm: Kammprofile Gaskets	25	200
Metcom® Gaskets	20	100
Nebar® Red cork-elastomer	1	10
Nebar® Brown cork-elastomer	1	6
Gore-Tex GR® Style R	24	70

* Not applicable

NOTES:

1. All values shown are for guidance only.
2. The levels of sealability/gas tightness will depend upon the system pressure and media involved as well as actual operational stress.
3. Flange and bolt stiffness will affect the uniformity and level of stress applied, and hence 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.

TRADEMARK ACKNOWLEDGEMENTS

James Walker acknowledges the following trademarks as mentioned in this document:

TRADE MARK	COMPANY
Dowtherm®	Dow Chemical Company Ltd
Freon®	EI DuPont de Nemours & Company
Gore-Tex®	WL Gore & Associates (UK) Ltd
Gore-Tex® GR	WL Gore & Associates (UK) Ltd
Kalrez®	DuPont Performance Elastomers
KLEA®	ICI C&P Ltd
Mylar®	EI DuPont de Nemours & Company
TriGuard™	WL Gore & Associates (UK) Ltd
Viton®	DuPont Performance Elastomers

HEALTH WARNING: If PTFE products are heated to elevated temperatures, fumes will be produced which may give unpleasant effects, if inhaled. Whilst some fumes are emitted below 300°C (572°F), the effect at these temperatures is negligible. Care should be taken to avoid contaminating tobacco with PTFE particles or dispersion which may remain on hands or clothing. Health & Safety data sheets are available on request.

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