James Walker®

Braided Packings Guide

The comprehensive guide to braided packings for

- ***Pumps***
- ***Valves***
- ***Hatch lids***
- ***Crucible lids***
- ***Furnace doors***
- ***Gland sealing duties***

High Performance Sealing Technology

James Walker

Introduction

James Walker's constant advances in materials and lubricants, product design and manufacturing techniques, bring you braided packings to match your modern fluid handling systems — and your older plant.

This guide covers packings that:

- **Offer world-beating fugitive emission control — often to below 50ppm.**
- **Provide *best value* fluid sealing for your specific plant duties.**
- **Range from state-of-the-art materials to traditional 'natural' yarns.**
- **Work in the most abrasive and chemically aggressive environments.**
- **Tolerate poor mechanical conditions with off-centre shafts or worn bearings.**
- **Meet requirements for potable water, food, pharmaceutical, or liquid/ gaseous oxygen duties.**
- **Reduce your stockholding levels, as one length-form packing can be used for many different valves, pumps and other fluid handling plant at a site.**

Industries across the world rely on our braided packings to help keep their valves, pumps and other equipment operating efficiently day-in and day-out — with energy saving benefits and the minimum of fugitive emissions.

Supagraf® Premier: our world-leading fugitive emission control braided packing.
See pages 6, 7 & 8 for valve stem sealing down to 50ppm.

Packed glands

The packed gland stands the test of time as:

- An exceptionally reliable fluid sealing device.
- Simple to install and maintain.
- Highly versatile.
- Remarkably cost effective in both downtime and materials — especially when compared to complex alternatives.

Contact us if you need a special-duty braided packing — we are expert at custom design and production.

With our fluid sealing and applications engineering expertise, backed by a wide range of raw materials and flexible production facilities, we can solve all of your relevant fluid sealing problems.

Valve sealing systems

High performance braided packings constitute part of our wide-ranging package of sealing-based products and services for valve OEMs, users and refurbishers.

Please ask for full information on our:

- 'O' rings.
- Metal ring joints and gaskets.
- Valve seats in engineering plastics.
- RotaBolt® tension control fasteners.

Duties at a glance

Throughout this guide we use icons to indicate different plant applications:

for valve stems

for centrifugal pumps and rotary equipment

for reciprocating pumps and rams

for static duties – tank and hatch lids, crucible lids and doors

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Contents

Four simple steps to find your *best value* packing

Step 1: Turn to ***Quick reference chart*** on pages 4 & 5. The left-hand column lists packings under six services:

- Rotary, Valve & Reciprocating duties
- Rotary & Valve duties
- Rotary duties only
- Valve & Reciprocating duties
- Valve duties only
- Static (Lids & Doors) duties only.

Step 2: Compare your plant specifications with the ***Service Capabilities, Media Guide*** and ***Industry Sectors*** of each packing product that is recommended for the types of duty you need.

Step 3: Check the detailed specifications of each 'short listed' product in the main body of this guide.

Step 4: Contact your local James Walker company or distributor ***(see back cover)*** for ***best value*** prices and delivery details.

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Quick reference chart

● Certified to TA Luft for VOC fugitive emission control in valves ● Other recommended VOC fugitive emission control products

SERVICE CAPABILITIES

Recommended service type	Product name	More details on page	Rotary		Valve	Reciprocating		Static (Lids Doors)	Temperatures		pH range
			Shaft speed (fpm)	Pressure (psi)	Pressure (psi)	Rod speed (fpm)	Pressure (psi)	Pressure (psi)	MIN (°F)	MAX (°F)	
Rotary/Valve/ Reciprocating	Aluflon	17	2362	290	1450	394	725	n/a	–58	+266	0-14
	Arasele	13	3937	363	2175	295	1450	n/a	–58	+545	0-13
	Duramid®	14	3937	363	2175	295	2175	n/a	–58	+482	2-13
	Fluograf®	12	4331	145	1160	197	1160	n/a	–148	+500	0-14
	Fluolion® Emulsion XA-P	17	3937	363	1450	197	1450	n/a	–58	+518	1-14
	Fluolion® Emulsion 2XA	19	2362	363	2175	394	1450	n/a	–58	+554	2-12
	Fluolion® Filament L	16	1969	363	2175	197	1450	n/a	–148	+482	0-14
	Fluolion SEQUEL®	13	3937	290	1450	394	1450	n/a	–148	+536	1-14
	Fluolion® Sturntite	24	1772	363	1450	197	1450	n/a	–40	+203	5-10
	Graphite Filament Packing	11	3937	363	2175	787	725	n/a	–58	+752	0-14
	Hornet	14	3937	290	3626	394	1450	n/a	–58	+500	2-13
	Liongraf	15	3445	290	1740	394	1160	n/a	–148	+500	0-14
	Ramiex	23	3445	290	3626	394	3626	n/a	–22	+248	4-11
	Rapido	25	1476	363	1450	197	1450	n/a	–40	+203	6-10
	Supeta XA	20	1969	145	1015	197	1015	n/a	–40	+662	4-10
Rotary/Valve	Aquagraf	15	3937	145	725	n/a	n/a	n/a	–58	+500	1-13
	Fortuna XA	20	3937	218	290	n/a	n/a	n/a	–40	+599	4-10
	Supagraf® Moulded Rings (steam)	10	C	C	3626	n/a	n/a	n/a	n/a	+1202	0-14
	Supagraf® RibbonPak (steam)	9	4922	363	3626	n/a	n/a	n/a	n/a	+1022	0-14
	Supagraf® RibbonPak SC (steam)	10	3937	363	3626	n/a	n/a	n/a	n/a	+1202	0-14
Rotary	Cottonpak Type E	23	1378	145	725	197	725	n/a	–40	+194	6-8
	Injectable Black	29	1181	116	n/a	n/a	n/a	n/a	+14	+302	4-10
	Injectable White	29	1969	232	n/a	n/a	n/a	n/a	–148	+482	0-14
	Injectable Yellow	29	1673	218	n/a	n/a	n/a	n/a	–58	+482	2-13
	Rover Medium Soft Cotton	25	1378	145	725	197	725	n/a	–40	+194	6-8
Valve/Reciprocating	Fluolion® Filament D	16	787	145	3626	98	725	n/a	–148	+482	0-14
	Glengarry	25	787	145	1450	197	1450	n/a	–40	+203	6-10
	Sextant	24	591	145	1450	197	1450	n/a	–40	+194	6-10
Valve	Fluocord	29	n/a	n/a	508	n/a	n/a	n/a	–238	+482	0-14
	Grafpak	11	n/a	n/a	2175	n/a	n/a	n/a	–58	+1022	0-14
	Incoval XA	19	n/a	n/a	2175	n/a	n/a	n/a	–40	+932	2-11
	Supagraf® Control ●	7	n/a	n/a	3626	n/a	n/a	n/a	–328	+662	1-14
	Supagraf® LF Rings ●	8	n/a	n/a	3626	n/a	n/a	n/a	–328	+662	0-14
	Supagraf® Premier ●	6	n/a	n/a	3626	n/a	n/a	n/a	–328	+842	1-14
	Supagraf® PremiPak ●	28	n/a	n/a	3626	n/a	n/a	n/a	–328	+842	1-14
	Supagraf® RibbonPak M (steam)	9	n/a	n/a	4351	n/a	n/a	n/a	n/a	+1202	0-14
	Supagraf® Tape	30	n/a	n/a	1015	n/a	n/a	n/a	–328	+932	0-14
	Valcor® XA	21	n/a	n/a	2175	n/a	n/a	n/a	–58	+932	2-13
	Valvemaster® Packing Sets	28	n/a	n/a	3626	n/a	n/a	n/a	–328	+1022	0-14
Static (Lids/Doors)	Armoured Supasca XA	21	197	14.5	n/a	n/a	n/a	72.5	+14	+1256	4-10
	Tankatite® 250	27	n/a	n/a	n/a	n/a	n/a	7.3	–22	+212	1-13
	Tankatite® 440	26	n/a	n/a	n/a	n/a	n/a	10.2	–58	+248	0-14
	Tankatite® 660	26	n/a	n/a	n/a	n/a	n/a	8.7	–58	+446	0-14
	Tankatite® 880 Super	27	n/a	n/a	n/a	n/a	n/a	29	–58	+248	0-14
	Torrlid 162B	22	n/a	n/a	n/a	n/a	n/a	Vacuum	C	C	C
	Torrlid 297	22	n/a	n/a	n/a	n/a	n/a	Vacuum	C	C	C
	Valcor® Hi-Temp	18	n/a	n/a	n/a	n/a	n/a	n/a	–58	+1832	0-10

Quick reference chart

Key: ✓ = suitable product ✗ = not suitable C = consult James Walker n/a = not applicable

MEDIA GUIDE									INDUSTRY SECTORS						
Steam	Gases	Process water	Potable water	Strong acids	Caustic alkalis	Oils	Solvents	Chemical	Food	Marine services	Metallurgical	Petroleum	Pulp & paper	Power generation	Water & sewage
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Graphite-based fugitive emission control

Supagraf® Premier

World-beating fugitive emission control

Description

Supagraf® Premier is one of our top-of-the-range fugitive emission control products for valves. It is a ***best available technique (BAT)*** product for reducing industry's fugitive emissions in line with the **European Union's IPPC Directive.**

This cost-effective braided packing is manufactured in exfoliated graphite, reinforced in a novel way to provide additional strength plus resistance to pressure and extrusion. It incorporates an advanced lubricant system that prevents the pick-up of graphite on the valve stem.

Typical applications

Harsh operating conditions where fugitive emissions from all types of valves need to be reduced to well below 100ppm.

Widely used in systems handling fluid media such as hydrocarbon liquid fuels and gases, lubricating oils and process chemicals.

Specifications

Supagraf Premier is third party tested and certified to:

- TA Luft Rev 07.2002 requirements, VDI 2440, for VOC emission control in valves. Sealing system met TA Luft High Grade requirement in tests for Ruhr Oel (Deutsche BP & Petróleos de Venezuela).
- EN ISO 15848.
- Shell specification SPE 77/312 Rev 06.2007: Class B rating with 6875psi helium in Class 2500 valve.
- Shell specification SPE 77/312 Class A, Rev 16.10.2002.
- API 607 Fire Safety, to an extended specification.

Prime features

- Third-party verified emission control performance.
- Came top of its class in independent tests run on behalf of CAPI Group (Akzo Nobel, Shell, Dow and DSM).
- Recommended for both rotary and rising-stem valves.
- Low friction action without graphite pick up.
- No special fitting techniques needed.

Chemical properties

Chemically inert within the range pH

Valve stem duties

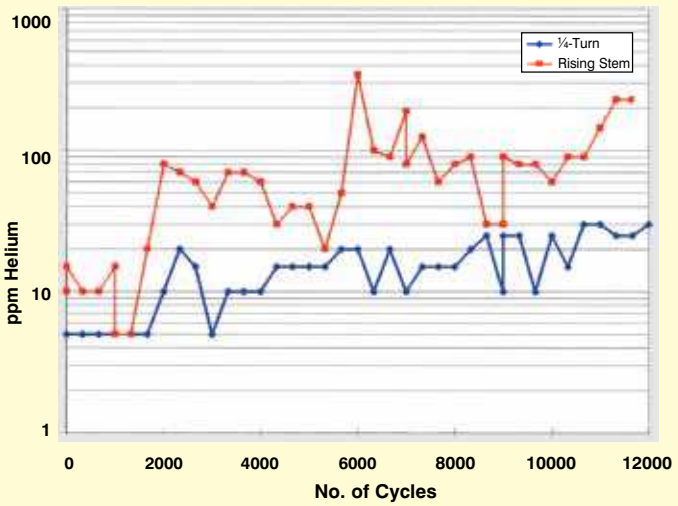
Maximum temperature	
Oxidising conditions	+842°F (+450°C)
Minimum temperature	–328°F (–200°C)
Max system pressure	3626psi (25MPa)

How supplied

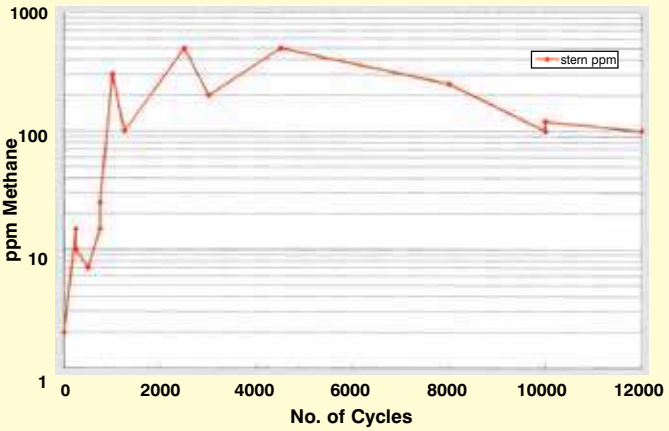
Split preformed rings and sets for ease of installation and optimal performance, or in boxes containing 26 ¼' (8m) for on-site maintenance economy.

Ex stock: all popular sections from ⅛" upwards to suit standard valves. Non-standard square or rectangular sections made to order. Full fitting instructions are included.

SEALABILITY TESTS: Leeds University Tests – 580psi Helium
(Valve Body Temperature Cycling between 572°F and 392°F)



LONGEVITY TESTS: Supagraf Premier
J.W. Endurance Test, - 580psi Methane



Supagraf® Control

Fugitive emission control for control valves to TA Luft requirements

Description
This innovative braided packing for control valves is proven to reduce VOC fugitive emissions to well below 50ppm for over 100,000 stem strokes. Its use represents a ***best available technique (BAT)*** in line with the ***European Union's IPPC Directive***.

Supagraf® Control's long-term, high integrity sealing capability, with very low stem friction for control accuracy, derive from its unique design and manufacture.

It is made of high purity exfoliated graphite, reinforced in a novel way with a non-metallic structure to provide additional strength and resistance to pressure and extrusion. An advanced lubricant system is incorporated to prevent the pick up of graphite on valve stems.

Typical applications
Control valves in systems that handle fluid media such as hydrocarbon liquid fuels and gases, lubricating oils and hazardous process chemicals.

It can be used as a long-term replacement for the PTFE V-type packings that are readily damaged by ingress of dirt and other foreign particles to the gland area.

Specifications
TA Luft/VDI 2440: Masoneilan control valves fitted with Supagraf Control are certified to TA Luft requirements at leak tightness with helium to $<10^{-4}$mbar.litre.s^{-1}.m^{-1}. The tests were undertaken with 1450psi at 68°F and 827psi at a fluid flow temperature of 797°F for 100,000 stem cycles, including four thermal cycles and two gland adjustments.

ISO 15848-1: Masoneilan control valves fitted with Supagraf Control are certified to ISO 15848-1 Class BH, CC3, at -20°F to +797°F. The valves showed helium leakage rates less than 10^{-4}mg.s^{-1}.m^{-1} for 100,000 stem cycles. This was achieved with pressure of 834psi at a fluid flow temperature of +797°F and 1500psi at -20°F to +100°F.

Prime features
- High integrity gland sealing for control valve stems: to well below 50ppm fugitive emission level.
- Long-term adjustment free operation: over 100,000 stem strokes possible with emission levels below 500ppm.
- Very low coefficient of friction for smooth and accurate valve action.
- Reduced friction requirement to save on power consumption and enable smaller actuators to be used.
- Certificated by TUV-Nord to TA Luft/ VDI 2440.

Summaries of additional tests
In addition to TA Luft and ISO 15848-1 certifications shown under *Specifications*, the following impressive test results have been achieved.

Thermal cycling: 10,800 valve operating cycles at +68°F and 725psi, followed by 16,700 operating cycles at 536°F and 725psi. Recorded leakage was $<2.2 \times 10^{-4}$ mbar.litre.s^{-1}. *(Third party test by major manufacturer of control valves.)*

Fugitive emission control: 10ppm to 15ppm maximum emission levels for five-ring set of Supagraf Control after 1100 stem strokes and five thermal cycles between ambient and +320°F. *(Test by James Walker Technology Center.)*

Long-term performance: Over 100,000 stem cycles with emission levels below 500ppm using 580psi methane, without gland adjustment. *(Test by James Walker Technology Center.)*

Copies of certificates and/or full details of tests can be supplied.

Chemical properties
Chemically inert within the range pH 1-14, *excluding* strong oxidising agents. Low volatiles content.

Service capabilities

Valve stem duties

Maximum temperature	+662°F (+350°C)
Minimum temperature	-328°F (–200°C)
Max system pressure	3626psi (25MPa)

How supplied
Split preformed rings and sets for ease of installation and optimal performance, or in boxes containing 26 ¼' (8m) for on-site maintenance economy.

Ex-stock: all popular sections from ⅛" upwards to suit standard valves. Non-standard square or rectangular sections made to order. Full fitting instructions are included.

Graphite-based fugitive emission control

Supagraf® LF Rings

Low friction rings for low-torque valve action plus fugitive emission control

Description
Supagraf® LF rings represent a major enhancement of the operational capabilities of graphite sealing rings used on valve stems.

The rings are precision molded from high purity expanded graphite foil to which a special low friction coating has been sinter bonded. The 200μin (5μm) thick coating is bonded to the expanded graphite before the molding process to ensure maximum service life.

Typical applications
- Valves where fugitive emission control to 50ppm or less is required.
- Valves that handle dry gases or other fluids, where friction on standard graphite seals is unacceptably high.
- Valves that suffer judder, hesitation or erratic action due to carbon pick-up or high-spot friction on the spindle.

Prime features
- Greatly reduce the torque needed for efficient valve operation.
- Save on power consumption and enables smaller actuators to be used.
- Lower the break-out friction for smoother valve operation.
- Retain exceptionally low-friction characteristics with fugitive emission control for up to 20,000 valve cycles.
- Subsequent manual adjustment extends performance to 60,000 cycles.
- Fire-safe capability enables rings to be used in plant subjected to fire rating tests.
- Can be supplied live-loaded.

Chemical compatibility
Chemically inert to most media in the range pH 0-14.

Service capabilities

Valve stem duties

Maximum temperature	+662°F (+350°C)
Minimum temperature	-328°F (–200°C)
Max service pressure	3626psi (25MPa)

How supplied
Precision moulded rings in endless form or with single split or as matched scarf-split halves. Sections 1/16" to 1 9/16" ; diameters 3/32" ID to over 43" ID.

Laboratory tests
Independent tests confirm our low-friction, low torque claims.

In comparative tests, sets of Supagraf LF Rings were compressed in a gland housing and the friction coefficients determined at two levels of compressive stress. The tests were repeated with sets of standard graphite rings.

In both cases, Supagraf LF displayed exactly half the friction coefficient of the standard graphite.

Supagraf LF Rings	***Friction coefficient***
@ 10MPa stress	0.11
@ 40MPa stress	0.07*
Standard graphite rings	
@ 10MPa stress	0.22
@ 40MPa stress	0.14*

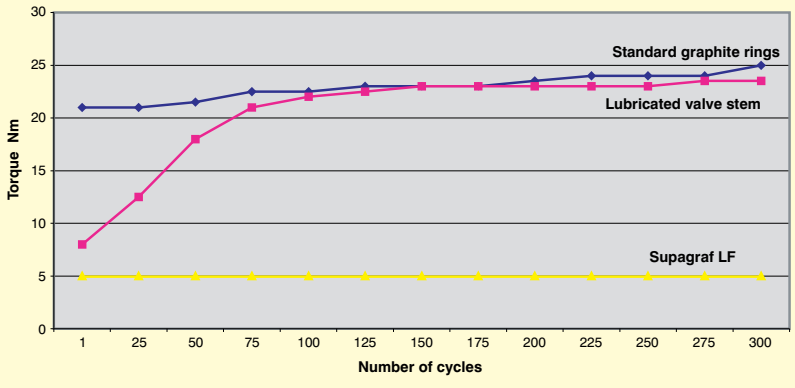
(*Surface characteristics improve on these graphite rings as the material compresses.)

Torque figures taken during extended valve cycling tests showed that valve stem torque remained constant at 5Nm for Supagraf LF Rings *(see graph)*.

For standard graphite rings, the torque rose from 21Nm to 25Nm during the first 300 operating cycles.

With a lubricated valve stem, the torque for standard graphite rings increase from 7Nm to 23Nm during the first 150 cycles as the lubricant was removed by valve action.

VALVE STEM TORQUE



Supagraf® RibbonPak M

Length-form graphite packing with reinforcement

Description
Plaited length-form packing of pure exfoliated graphite ribbons that are reinforced with fine Inconel® wires to provide additional strength plus resistance to pressure and extrusion.

Typical applications
Valves handling steam, condensate, fuel, oils, gases, chemicals, process water or effluent. This product is widely used in petrochemical plants, refineries, power stations and steel mills.

Prime features
- Exceptional temperature range.
- Excellent chemical resistance.
- Long service life with rotary or rising-stem valves.
- Low friction and high thermal conductivity.
- Easy to cut, shape and install.
- Replaces molded graphite foil rings and reduces stockholding.
- Extended shelf life – does not harden.

Chemical properties
Chemically inert within the range pH 0-14, *excluding* strong oxidising agents. Negligible volatile content. Low in extractable trace impurities such as chloride and sulphur.

Service capabilities

Valve stem duties

Maximum temperatures	
Steam	+1202°F (+650°C)
Oxidising conditions	+842°F (+450°C)
Non-oxidising	+1832°F (+1000°C)
Minimum temperature	–328°F(–200°C)
Max system pressure	4350psi (30MPa)

How supplied
Ex-stock: all popular square sections from ⅛" upwards to suit all standard valves. In boxes containing 26 ¼' (8m), or supplied as split preformed rings and sets. Full fitting instructions are included.

Supagraf® RibbonPak

High rotary speeds with aggressive media

Description
High purity exfoliated graphite ribbons, plaited into a flexible length-form packing for convenient on-site maintenance.

Typical applications
High speed rotary pumps handling water or slurry in pulp and paper processing. Also a general purpose valve stem packing for steam and chemical processing duties.

Prime features
- Excellent chemical resistance across very wide temperature range.
- Replaces molded graphite foil sealing rings.
- Flexible and compressible.
- Easy to install – no special tools needed.
- Reduces stockholding requirements.

Chemical properties
Chemically inert within the range pH 0-14, *excluding* strong oxidising agents. Negligible volatile content. Low in extractable trace impurities such as chloride and sulphur.

Service capabilities

Valve stem duties

Maximum temperatures	
Steam	+1022°F (+550°C)
Oxidising conditions	+842°F (+450°C)
Non-oxidising	+1562°F (+850°C)
Minimum temperature	-328°F (–200°C)
Max system pressure	3626psi (25MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	4922fpm (25m/s)
Max system pressure	363psi (2.5MPa)

How supplied
Ex-stock: all popular square sections from ⅛" upwards, in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Graphite-based

Supagraf® RibbonPak SC

Expanded graphite plus carbon fiber

Description
Superior quality packing of high purity expanded graphite ribbons reinforced with carbon fiber for additional strength plus resistance to pressure and extrusion.

Typical applications
Valves handling high temperature steam, condensate, fuel oils, chemicals, process water or effluent. High speed rotary pumps handling slurries, process water, or chemical solutions.

Prime features
- Length-form packing that reduces stockholding and operating costs at power stations, processing plants and many other industrial sites.
- Low friction; high thermal conductivity.
- Conforms to housing irregularities.
- Densifies under compression for high integrity sealing at high pressures.
- Replaces other graphite foil packings.
- Extended shelf life — does not harden.

Chemical properties
Chemically inert within the range pH 0-14, *excluding* strong oxidising agents. Negligible volatile content. Low in extractable trace impurities such as chloride and sulphur.

Service capabilities

Valve stem duties

Maximum temperatures	
Steam	+1202°F (+650°C)
Oxidising conditions	+842°F (+450°C)
Non-oxidising	+1562°F (+850°C)
Minimum temperature	-328°F (–200°C)
Max system pressure	3626psi (25MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	363psi (2.5MPa)

How supplied
In all popular sections from ⅛" to 1″, in boxes containing 26 ¼' (8m). Also as molded rings, split preformed rings and sets. Full fitting instructions are included.

Supagraf® Molded Rings

Graphite rings with excellent qualities

Description
High efficiency graphite sealing rings molded to precise density and size. Manufactured from expanded high purity graphite foil without binders, elastomers or fillers. Highest purity **Nuclear Grade** available. Also **Wire Reinforced Supagraf®** containing stainless steel wire orientated in all planes, for high loads; and **Passivated Supagraf®** with corrosion inhibitor to minimize galvanic action.

Typical applications
Valves and rotary equipment handling virtually any media. These rings are ideal for systems handling high-temperature steam, demineralized water, potable water, heat transfer media, petroleum products, inorganic and organic acids, alkalis, hot waxes and oils.

Specifications (plain Supagraf®)
- Material is WRAS approved for use with cold and hot potable water up to 185°F.

Prime features
- Outstanding sealing performance over long adjustment-free periods.
- Excellent chemical resistance.
- Very wide temperature range.
- Can seal liquid and gaseous oxygen up to 194°F (90°C). *Consult James Walker first*.

Chemical properties
Chemically inert within the range pH 0-14.
Standard Grade: extractable chlorine ion content (typical) 25ppm; sulphur <100ppm.
Nuclear Grade: chlorine ion <10ppm; sulphur <60ppm.
No loss of volatiles at high temperatures. Lower limiting temperatures apply when used with oxidising agents, eg nitric acid.

Physical properties

Carbon content (grade dependent), %	98 – 99.8
Density range, SG	1.1 – 1.8
Coefficient of linear expansion, ring of density, 1.1 SG,	$7x10^6$
Thermal conductivity, ring of density SG 1.4, W/mK; axial	400
radial	6
Coefficient of friction to steel	0.05

Service capabilities

Valve stem duties

Maximum temperatures	
Steam	+1202°F (+650°C)
Oxidising conditions	+932°F (+500°C)
Non-oxidising	+1832°F (+1000°C)
Minimum temperature	-328°F (–200°C)
Max system pressure	3626psi (25MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	*Consult James Walker*
Maximum shaft speed	*Consult James Walker*
Max system pressure	*Consult James Walker*

How supplied
Precision moulded rings in endless form, or with single split or matched scarf-split halves. Sections 1⁄16" to 1 9⁄16"; diameters 3⁄32" to over 43″.

Recommended densities: 1.5 SG for rotary duties; 1.6 SG for valve stems (with end rings of **Grafpak**, *see p11*), or mixture of ring densities for special applications (eg, **Valvemaster®**, *see p28)*. Full fitting instructions are included.

Grafpak

For high temperature/pressure steam

Description
Dense, high strength packing of cross-plaited premier quality graphite filament yarns. Treated with pure graphite before and after plaiting, and further treated with special corrosion inhibitors.

Typical applications
Control valves and main stop valves on high temperature/pressure steam circuits at power stations, chemical plants, industrial services, and on marine installations. Also suitable for duties with water, condensate, alkalis, acids, solvents and most chemicals.

Frequently used as end rings in conjunction with **Supagraf® Molded Rings** *(page 10)* and in **Valvemaster®** live-loaded control system *(page 28)*.

Prime features
- Suitable for wide range of aggressive media.
- Low friction for low torque operation.
- Tough and resistant to fretting and extrusion.

Chemical properties
Chemically inert within the range pH 0-14, *excluding* strong oxidising agents.

Service capabilities

Valve stem duties

Maximum temperatures	
Steam & oxidising conditions	+1022°F (+550°C)
Non-oxidising	*(significantly higher, refer to James Walker)*
Minimum temperature	-58°F (–50°C)
Max system pressure	2175psi (15MPa) typical *(refer to James Walker for higher pressures)*

How supplied
Ex-stock: all popular square sections from ⅛" cross-section upwards to suit all standard valves. In boxes containing 26 ¼' (8m), or supplied as split preformed rings and sets. Full fitting instructions are included.

Graphite Filament Packing

Highly versatile gland packing

Description
Cross-plaited packing of high strength graphite yarn, impregnated with PTFE dispersion and graphite powder to increase density and sealing efficiency.

Typical applications
Gland packing duties with a wide range of media across many industrial sectors. Its versatility with valves, rotary equipment and reciprocating pumps allows users to standardize on one range of packings for the majority of their general plant.

Prime features
- Excellent chemical and thermal resistance.
- Good thermal conductivity.
- Excellent lubricity.
- Dense and resilient for long operational life.

Chemical properties
Chemically inert within the range pH 0-14, *excluding* strong oxidising agents such as concentrated sulphuric and nitric acid, plus molten alkali metals, fluorine gas and fluorine compounds.

Service capabilities

Valve stem duties

Maximum temperature	+752°F (+400°C)
Minimum temperature	-58°F(–50°C)
Max system pressure	2175psi (15MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	787fpm (4m/s)
Max system pressure	725psi (5MPa)

How supplied
Ex-stock: all popular square sections from ⅛" cross-section upwards, in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Fluograf®

Outstanding pump & valve packing

Description
A highly versatile product that adds a new dimension to braided packing reliability and performance. Made totally from WL Gore & Associates' highly-developed GFO® yarn – combining the benefits of ePTFE, graphite and high temperature lubricants – this cross-plaited packing offers the ideal balance between density, resilience, strength and durability.

James Walker is the only UK manufacturer permitted to print ***100% GFO®*** on the product.

Typical applications
Pumps and valves handling aggressive chemical media in the petrochemical, pulp and paper, power generation and metallurgical sectors, as well as potable water, food products, and steam at up to 500°F.

Specifications
- WRAS approved for use with hot and cold potable water up to 185°F (85°C).

Prime features
- Extended service life – by up to 400% in harsh environments.
- Well proven with aggressive media.
- High thermal conductivity for cool running.
- Low coefficient of friction and minimal shaft wear.
- Very good start-up and emergency running characteristics.
- Non hardening.

Chemical properties
Compatible with media in the range pH 0-14, including steam, but *excluding* strong oxidising agents such as aqua regia, fuming nitric acid, oleum, and molten alkali metals.

Service capabilities

Valve stem duties

Maximum temperature	+500°F (+260°C)
Minimum temperature	-148°F (–100°C)
Max system pressure	1160psi (8MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	4331fpm (22m/s)
	(refer to James Walker for duties up to 5512fpm/28m/s)
Max system pressure	145psi (1MPa)

Reciprocating pumps & rams

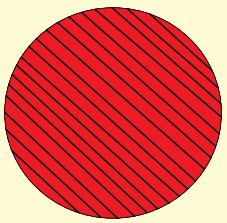
Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1160psi (8MPa)

(More severe duties can be sealed with specially designed arrangements)

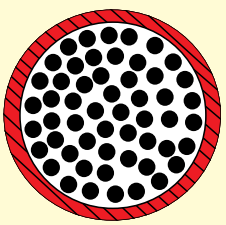
How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Selected sections available in 6 ½' (2m) maintenance packs. Also supplied as split preformed rings and sets. Full fitting instructions are included.

What is so special about GORE™ GFO®?
GFO® is a homogenous fiber, developed specifically for braided packings with heat transfer and lubricant components forming an integral part of the yarn. In contrast, most other packing yarns have these components added as a coating during packing manufacture. Such coatings may be washed out during the service life of the packing.

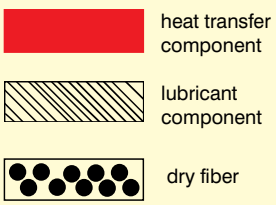
With its consistently high thermal conductivity, a GFO fiber packing ensures efficient sealing, particularly at high temperatures and speeds. Under arduous conditions where other materials can harden, dry out or even burn, a GFO fiber packing will continue to run trouble-free with controlled leakage.



homogenous fiber



coated fiber



Fluolion SEQUEL®

Pure white for food & pharmaceuticals

Description
An outstanding, non-contaminating packing, made from WL Gore & Associates' highly developed SEQUEL® yarn of ePTFE and an entrapped white solid lubricant with heat conductivity and lubricity features close to graphite. James Walker's design and manufacturing expertise converts the yarn to a cross-plaited packing offering optimum performance, density, resilience and durability.

Typical applications
Rotary and reciprocating plant in the food processing, pharmaceutical, speciality chemicals, and pulp and paper sectors. It is particularly recommended for sugar and chocolate processing, and fine paper production.

Specifications
- SEQUEL® yarn meets FDA requirements for food and pharmaceutical duties.

Prime features
- Clean, non-contaminating and graphite free.
- Long maintenance-free service life.
- Minimal shaft wear and leakage.
- Superior performance over other pure white packings.

Chemical properties
Compatible with media in the range pH 1-14, *excluding* strong oxidising agents and molten alkali metals.

Service capabilities

Valve stem duties

Maximum temperature	+536°F (+280°C)
Minimum temperature	-148°F (–100°C)
Max system pressure	1450psi (10MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	290psi (2MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	394fpm (2m/s)
Max system pressure	1450psi (10MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", with 26 ¼' (8m) per box. Sets of preformed rings are recommended for optimum performance, fitting ease and economy. Full fitting instructions included.

Arasele

Soft & tough replacement for yellow packings

Description
This top-performing clean white packing replaces the hard-fiber yellow products used for abrasion resistance. It effectively assists in overcoming the shaft/rod wear problems often experienced when inferior grades of aramid-based packing are used with abrasive slurries or aggressive chemicals.

Arasele is braided from fine yarns of tough synthetic aromatic polymer fiber. The yarns are texturised and impregnated with PTFE dispersion before braiding over a central core of white elastomer. A silicone-free, inert and colourless lubricant is incorporated to provide swift running in.

Typical applications
Rotary or reciprocating pumps and valves that handle highly abrasive slurries or aggressive chemical solutions, typically in the mineral, pulp and paper, wastewater and chemical industries. Ideal for water, aqueous solutions and media needing a clean white non-staining packing.

With its rubber core, Arasele can absorb eccentric movement of shafts or rams that run out-of-true, and swiftly recovers from thermal or pressure shocks and cycling.

Prime features
- Kinder to shafts than traditional yellow packing under adverse conditions.
- Can eliminate unnecessary shaft wear.
- Resists abrasion and chemical attack.
- Resists hydrolysis — ideal for use with steam, water or hot aqueous solutions.
- Reduces stockholding, as can be used on most pumps and valves on a site.

Chemical properties
Compatible with media in range pH 0-13, including steam, fuels, oils, solvents, acids and alkalis. *(Chemical resistance is better than for aramid-based products.)*

Service capabilities

Valve stem duties

Maximum temperature	+545°F (+285°C)
Minimum temperature	-58°F (–50°C)
Max system pressure	2175psi (15MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	295fpm (1.5m/s)
Max system pressure	1450psi (10MPa)

(Note: Traditional aramid-based packings are usually limited to +482°F (+250°C) maximum.)

How supplied
Ex-stock: all standard square sections to fit pump and valve glands, in boxes containing 26 ¼' (8m). Also supplied as mold-formed rings and sets. Full fitting instructions are included.

PTFE-based

Duramid®

Tough packing for harsh conditions

Description
A tough, high performance packing, cross-plaited from texturized aramid yarns. Each yarn is uniformly impregnated with PTFE dispersion and a silicone-based lubricant that resists chemical attack at high temperatures. Although Duramid® is based on aramid fiber rather than PTFE, its exceptional qualities justify inclusion in this section alongside its sister products, Fluograf® and Hornet.

Typical applications
Valves and pumps handling abrasive and aggressive media in pulp and paper mills, petrochemical plants, power stations, metallurgical plants, sewage works and china clay works. Also suitable for potable water and foodstuffs, medium pressure steam, and hardening fluids such as tar and bitumen.

Specifications
- WRAS approved for use with hot and cold potable water up to 185°F (85°C).

Prime features
- Suitable for very wide range of media.
- Excellent abrasion resistance.
- Long service life with minimal shaft wear.
- Resilient and responsive in operation.

Chemical properties
Compatible with media in the range pH 2-13, including water, oils, solvents, medium strength acids and alkalis.

Service capabilities

Valve stem duties

Maximum temperature	+482°F (+250°C)
Minimum temperature	-58°F (–50°C)
Max system pressure	2175psi (15MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
	(refer to James Walker for higher speed duties)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	295fpm (1.5m/s)
Max system pressure	2175psi (15MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Hornet

For slurries & abrasive media

Description
A high performance packing that absorbs the eccentric action of worn shafts and bearings. It has a central core of temperature resistant elastomer. The square sectioned packing is cross-plaited with tough aramid fibers at the corners to resist abrasion and wear. PTFE/graphite yarn at the centre of each side dissipates heat and presents a low friction face to the shaft.

Typical applications
Valves and pumps handling highly abrasive slurries in pulp and paper mills, sugar refineries, petrochemical plants, sewage works, metallurgical plants and china clay works. Also suitable for potable water, foodstuffs and steam.

Specifications
- WRAS approved for use with hot and cold potable water up to 185°F (85°C).

Prime features
- Excellent abrasion resistance.
- Superior compression and recovery characteristics with out-of-true shafts.
- Excellent extrusion resistance.
- Low shaft wear.

Chemical properties
Compatible with media in the range pH 2-13, including water, fuels, oils, solvents, waxes, and mild acids and alkalis.

Service capabilities

Valve stem duties

Maximum temperature	+500°F (+260°C)
Minimum temperature	-58°C (–50°C)
Max system pressure	3626psi (25MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	290psi (2MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	394fpm (2m/s)
Max system pressure	1450psi (10MPa)

How supplied
Ex-stock: all popular square sections from ¼" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Liongraf

Our universal, economical packing

Description
A highly reliable pump and valve packing of cross-plait construction, based on graphite and PTFE yarn that is thermally stabilized then lubricated with a silicone-free compound.

Typical applications
Widely regarded as an economical packing for universal application and the reduction of stockholding requirements. Well proven in the petrochemical, power generation, marine and metallurgical sectors, and by pump and valve manufacturers for OEM installation.

It is suitable for duties with steam, condensate, effluents, fuels and oils, acids, alkalis and chemical solutions.

Prime features
- Strong, durable and extrusion resistant.
- Reliable over a wide range of duties.
- Excellent chemical resistance.
- Low friction with high thermal conductivity.

Chemical properties
Compatible with media in the range pH 0-14, including corrosive fluids and solvents.

Service capabilities

Valve stem duties

Maximum temperature	+500°F (+260°C)
Minimum temperature	-148°F (–100°C)
Max system pressure	1740psi (12MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3445fpm (17.5m/s)
Max system pressure	290psi (2MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	394fpm (2m/s)
Max system pressure	1160psi (8MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1" in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Aquagraf

Potable water & chemical duties

Description
A highly developed gland packing for valves and rotary pumps on potable water systems. The yarn, which comprises a unique blend of expanded PTFE and graphite lubricant, is cross plaited around a silicone rubber core for good compressibility and recovery.

Typical applications
OEM and maintenance for valves and rotating plant in the water supply industry. It is also safe for intermittent contact with food products. Resistance to a wide range of media has extended its duties to chemical, petrochemical and general processing plant.

Specifications
- WRAS approved for use with cold and hot potable water up to 185°F (85°C).

Prime features
- Hard wearing with great resilience.
- Elastomeric core absorbs action of worn shafts and valve stems.
- Impressive low friction characteristics.
- Rapidly achieves stable conditions after pump start-up.

Chemical properties
Compatible with media in the range pH 1-13, *excluding* strong oxidising agents such as aqua regia, fuming nitric acid, oleum and molten alkali metals.

Service capabilities

Valve stem duties

Maximum temperature	+500°F (+260°C)
Minimum temperature	-58°F (–50°C)
Max system pressure	725psi (5MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	145psi (1MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Fluolion® Filament D

For oxygen & food applications

Description
Fluolion® Filament D is a cross-plaited packing made from tough, thermally stable PTFE fiber yarn. This yarn is impregnated with densified particles of PTFE to generate additional lubrication. The packing is then cleaned of all organic matter and volatile content.

Typical applications
The purity of Fluolion Filament D enables it to be used as a valve packing for oxygen services, as well as food and potable water applications. It is also suitable for slow rotary duties with pumps and plant handling chemicals.

Specifications
- PTFE yarns are manufactured in accordance with FDA guidelines.
- BAM approved for service with gaseous oxygen at up to 140°F (60°C) and 290psi (2MPa), and with liquid oxygen to 482°F (250°C) and 2175psi (15MPa).
- WRAS approved for use with cold and hot potable water up to 185°F (85°C).

Prime features
- Excellent chemical resistance.
- High purity for applications with oxygen, food and potable water.
- Clean and highly conformable for ease of fitting.

Chemical properties
Compatible with media in the range pH 0-14, including corrosive acids and alkalis.

Service capabilities

Valve stem duties

Maximum temperature	+482°F (+250°C)
Minimum temperature	-148°F (–100°C)
Max system pressure	3626psi (25MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	787fpm (4m/s)
Max system pressure	145psi (1MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	98fpm (0.5m/s)
Max system pressure	725psi (5MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Fluolion® Filament L

High chemical resistance

Description
Fluolion® Filament L is a cross-plaited packing made from tough, thermally stable PTFE fiber yarn. This yarn is impregnated with densified particles of PTFE to generate additional lubrication.

Typical applications
Used in pumps and valves where a high performance, chemically resistant braided packing is needed.

Specifications
- PTFE yarns are manufactured in accordance with FDA guidelines.

Prime features
- Excellent chemical resistance.
- High performance sealing in pump and valve applications.
- Long and efficient working life with minimum maintenance requirements.
- Clean and highly conformable for ease of fitting.

Chemical properties
Compatible with media in the range pH 0-14, including corrosive acids and alkalis.

Service capabilities

Valve stem duties

Maximum temperature	+482°F (+250°C)
Minimum temperature	-148°F (–100°C)
Max system pressure	2175psi (15MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	1969fpm (10m/s)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1450psi (10MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Fluolion® Emulsion XA-P

High performance chemical duties

Description
A universal packing comprising a unique synthetic yarn, densified with particles of PTFE and treated with an advanced silicone-free lubricant. The impregnated yarns are cross-plaited over an elastomeric core, which enables this packing to absorb the eccentric actions of worn shafts and bearings running in very harsh environments.

Typical applications
Pumps, valves and rotating plant that handle hot, abrasive and highly caustic fluid media. This packing is widely used in contact with hot slurries and effluents at pulp and paper mills, and alumina processing plants. It is also employed as a general purpose packing in the chemical industry.

Prime features
- Excellent chemical resistance, including strong acid and alkalis.
- Excellent abrasion resistance.
- Low friction and low wear on shaft sleeves.
- Non-contaminating lubricants.

Chemical properties
Compatible with media in the range pH 1-14.

Service capabilities

Valve stem duties

Maximum temperature	+518°F (+270°C)
Minimum temperature	-58°F (–50°C)
Max system pressure	1450psi (10MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1450psi (10MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Aluflon

For highly aggressive chemicals & slurries

Description
A white, conformable packing of cross-plait construction. Made from a highly developed yarn, comprising a fine reinforced glass insert with a spun cover of polyolefin fiber, all coated and impregnated with PTFE micro-particles and an inert pure petroleum lubricant.

Typical applications
Developed for pumps that handle caustic slurries in the alumina processing industry. Also recommended for duties throughout the sewage treatment and chemical sectors, on pumps and valves handling media across the widest pH range, including those containing suspended solids.

Prime features
- Outstanding chemical resistance, including strong acids and alkalis.
- Low friction and low wear on shaft sleeves.
- Long life with low maintenance.
- Easy to fit and remove.
- Free of graphite, silicone oils and abrasive fibres.

Chemical properties
Compatible with media in the range pH 0-14.

Service capabilities

Valve stem duties

Maximum temperature	+266°F (+130°C)
Minimum temperature	-58°F (–50°C)
Max system pressure	1450psi (10MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	2362fpm (12m/s)
Max system pressure	290psi (2MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	394fpm (2m/s)
Max system pressure	725psi (5MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Live-loaded systems can be custom-manufactured. Full fitting instructions are included.

Non-hazardous silica fibre

Valcor® Hi-Temp

Non-hazardous fibre construction for >1800°F

Descriptions
This innovative product is braided as a gland packing for high efficiency static and slow rotatry sealing applications at up to 1832°F (1000°C) constant. It also fulfils other high temperature duties in different forms of construction.

Valcor® Hi-Temp is manufactured from an exceptionally stable fiber material that is soft, non-irritating, non-hazardous, and is not limited by World Health Organisation (WHO) or European Union (EU) restrictions.

The heat-resistant fibers are produced using advanced chemical fiber technology, then spun into a flexible yarn in the UK with a low percentage of glass fiber and Inconel® wire reinforcement. Our products are braided or woven from this specially developed and superior yarn.

The yarn contains no organic agents or processing additives. It therefore retains its physical and chemical properties at very high temperatures and does not decompose into hazardous substances as happens with many normal ceramics.

Typical applications
Braided packings of Valcor Hi-Temp are used for very high temperature static sealing applications or slow rotary duties. It replaces ceramic yarn packing and radiation seals on BOS plant, and ceramic packings and vessel lid seals on secondary steelmaking plant.

Other examples include door seals for annealing furnaces at steelworks, kiln packings, protective surfaces on pottery kiln cars, and stem gland sealing on valves handling very high temperature gases.

Valcor Hi-Temp is also supplied in various other constructions for high temperature duties across industry, including:
- Braided insulation sleeves
- Webbing tapes
- Ladder tapes
- Twisted ropes
- Lagging ropes
- Blankets and paper
- Woven cloth.

Prime features
- Braided packing will seal efficiently at 1832°F (1000°C), with excursions to 2012°F (1100°C).
- Competitively priced, non-hazardous alternative to normal ceramic fiber based braided packings.
- Far better value for money than other non-hazardous high temperature materials such as those made of pure silica fiber.

Health & Safety considerations
Average diameter of the mineral fiber used in Valcor Hi-Temp is 354µin (9µm), which is considered **non-hazardous to health**.

No protection for breathing, eye, hand or body is required by the WHO or EU for the material's normal handling, storage or use. For further details, please refer to our Material Safety Data Sheet (MSDS) on Valcor Hi-Temp, which is available on request.

*Note: Normal ceramic fibers, as often used in the manufacture of very high temperature braided packings, are around 118µin (3µm) in diameter. These much finer fibers are now considered **hazardous to health**, with WHO and EU restrictions applied to the products that contain them.*

Chemical properties
Valcor Hi-Temp is compatible with fluid media in the range pH 0-10, *excluding* hydrofluoric acid and hydrogen fluoride. It has excellent resistance to water, organic chemicals and other acids.

Service capabilities

Static duties - furnace doors

Max temperature (constant)	+1832°F (+1000°C)
Max temperature (intermittent)	+2012°F(+1100°C)
Minimum temperature	-58°F (-50°C)

Valve stem duties

Max temperature (constant)	+1832°F (+1000°C)
Max temperature (intermittent)	+2012°F(+1100°C)
Minimum temperature	-58°F (-50°C)

How supplied
As densely formed braided packings (square, round or rectangular) from 3⁄16" to 4" sections, in any length. Full fitting instructions are included.

All other constructions of Valcor Hi-Temp are manufactured to order.

All products in our XA range have been specifically developed by James Walker as economical replacements for traditional asbestos-based braided packings.

Fluolion® Emulsion 2XA

Cost effective multi-service on land & sea

Description

A high performance packing, cross plaited in a specially developed yarn that is spun from a blend of glass and three other fibers, and impregnated with PTFE dispersion. The result is a strong and flexible product offering low surface friction and high thermal conductivity.

Typical applications

Multi-service on pumps and valves in the marine, petrochemical, power generation, and pulp and paper industries. It is recommended for duties involving solvents, oils and petroleum products, process water and effluents, low pressure steam, and dilute acids.

Prime features

- Multi-service and highly cost effective.
- Extended working life.
- Heat, wear and chemical resistant.
- Clean, flexible and easy to fit.

Chemical properties

Compatible with media in the range pH 2-12, *excluding* highly corrosive solutions.

Service capabilities

Valve stem duties

Maximum temperature	+554°F (+290°C)
Minimum temperature	-58°F (–50°C)
Max system pressure	2175psi (15MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	2362fpm (12m/s)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	394fpm (2m/s)
Max system pressure	1450psi (10MPa)

How supplied

Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Incoval XA

Wire-reinforced high-temperature packing

Description

A resilient valve packing, comprising a core of glass fibers bonded with a high temperature polymer and treated with graphite and an organic corrosion inhibitor. The core is over-braided with a jacket of Inconel® reinforced glass yarn, treated with high purity graphite binder and a corrosion inhibitor to give a smooth low-friction surface.

Typical applications

Valves in heavy industry where high temperatures and pressures are involved. It is recommended for duties with oils and petroleum products, air, water, gases and non-corrosive chemicals. Limited to low pressure/temperature steam services.

Prime features

- General purpose, high temperature valve packing.
- Inconel® reinforced for heavy duties.
- Dense and resilient construction.

Chemical properties

Compatible with media in the range pH 2-11, *excluding* corrosive chemicals.

Service capabilities

Valve stem duties

Maximum temperature	+932°F (+500°C) *(not steam)*
Minimum temperature	-40°F (–40°C)
Max system pressure	2175psi (15MPa)

How supplied

Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

XA range

Fortuna XA

High speeds & high temperatures

Description
A dense and flexible packing that is plaited from a special spun yarn blended from four synthetic fibers, coated with graphite. The yarn is impregnated under controlled condition of heat, pressure and vacuum, with a high viscosity petroleum-based lubricant then coated with high purity flake graphite before plaiting.

Typical applications
High speed rotary pumps on boiler feed systems in the power generation, marine and petrochemical industries. Also other pump and valve duties involving high temperatures and extreme conditions with steam, process water and oils.

Prime features
- Dense, flexible and responsive packing.
- Well proven in the power generation industry.
- Graphited yarns for low friction, good thermal conductivity and reduced fretting.

Chemical properties
Compatible with media in the range pH 4-10, including oil, gases and a variety of chemicals.

Service capabilities

Valve stem duties

Maximum temperature	+599°F (+315°C)
Minimum temperature	-40°F (–40°C)
Max system pressure	290psi (2MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3937fpm (20m/s)
Max system pressure	218psi (1.5MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Supeta XA

Economical & versatile

Description
Dense, resilient packing, plaited from high quality texturised glass yarns. Each fiber of the yarn is coated with a special graphite lubricant to reduce fretting when compressed. The graphited glass yarns are further lubricated with a heat-resistant petroleum-based compound, then finally coated with high purity flake graphite prior to braiding. **Supeta XA Twist** is available for small radial section glands.

Typical applications
General service duties on pumps or valves handling media such as steam, process water, waste water, oils and gases. Widely used in the chemical, petroleum, marine, power generation and sewage treatment sectors.

Prime features
- Economical general purpose packing.
- Highly versatile – reduces stock inventories.
- Temperatures to 622°F (350°C), including steam.
- Unique graphite-based lubricant system.

Chemical properties
Compatible with media in the range pH 4-10.

Service capabilities

Valve stem duties

Maximum temperature	622°F (+350°C)
Minimum temperature	-40°F (–40°C)
Max system pressure	1015psi (7MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	1969fpm (10m/s)
Max system pressure	145psi (1MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1015psi (7MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. **Supeta XA Twist** for small radial section glands: 1⁄16" and ⅛" diameter sections on spools containing 1.1lb (500g). Full fitting instructions are included.

Valcor® XA

General valve service at high temperatures

Description
This is a jacketed construction braided packing. It comprises a dense polymer-bonded core of graphite and carbon fiber, covered with a tough outer braid of Inconel® wire-reinforced graphite yarn, which is then coated with a graphite surface lubricant.

The polymer binder for the core contains an active corrosion inhibitor, plus features to minimise volume loss due to volatiles.

Typical applications
Valves controlling hot gaseous media, steam, condensate, process water, mild acids and alkalis, non-corrosive chemical solutions, oils and many solvents.

This product is widely used in the chemical, petroleum, marine, power generation, and pulp and paper industries.

Prime features
- Economical general purpose valve stem packing.
- Operates at very high temperatures with gases and steam.
- Jacketed construction with compliant core.

Chemical properties
Compatible with media in the range pH 2-13, *excluding* corrosive solutions.

Service capabilities

Valve stem duties

Maximum temperature	+932°F (+500°C)
Minimum temperature	-58°F (–50°C)
Max system pressure	2175psi (15MPa)
	(depending on temperature and mechanical conditions)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Armoured Supasca XA

Very high temperature static duties

Description
This high-temperature packing comprises a core of glass yarns, coated with graphite and protected by a tough sleeve of braided copper wire.

Typical applications
Extensively used as a furnace door and kiln packing, and in exhaust expansion glands. It can also be used for very slow rotating duties when liberally coated with our **Copper Anti-Seize Compound** *(page 32)*.

Prime features
- Tough and flexible packing for arduous duties.
- Recommended as a furnace door and kiln packing.
- Suitable for exhaust expansion glands.
- Can be used with super-heated steam.
- Operates on static sealing duties at up to 1256°F (680°C).

Chemical properties
Resists super-heated steam, hot air and hot gases in the range pH 4-10.

Service capabilities

Static duties - furnace doors

Maximum temperature	+1256°F (+680°C)
Minimum temperature	+14°F (-10°C)
Max system pressures	
Static	72.5psi (500kPa)
Rotary	14.5psi (100kPa)

How supplied
All popular round or square cross sections from ⅛" to 2", in lengths to order. Also supplied as split preformed rings and sets. Full fitting instructions are included.

XA range

TorrLid 162B

Vacuum seal for aluminum crucible lids

Description
This specialised product features a resilient, hollow-centred core of ethylene-propylene elastomer, over-braided with a jacket of filament glass yarns. The exterior surface is coated with a layer of red-colored silicone rubber.

Prime features
- Developed specifically as a vacuum seal for aluminum crucible lids.
- Readily withstands the temperatures and compressive forces involved.
- Tough silicone rubber coating provides abrasion resistance.
- Withstands repeated opening/closing cycles.

Typical applications
This exceptionally well-proven product is used worldwide as a vacuum lid seal for crucibles containing molten aluminum. It has also proved a great success on new plant using AP35 technology.

Service capabilities

Static duties — crucible lids

Maximum temperature
Suitable for holding a vacuum over molten aluminum in crucibles.
Consult James Walker

Pressure range: From partial vacuum up to 131psi (0.9MPa)

How supplied
Manufactured to order to meet customers' specific requirements. Full fitting instructions are included.

TorrLid 297

Higher temperature crucible lid seal

Description
This highly specialised product features a resilient, hollow-centred elastomeric core, that resists higher temperatures than the ethylene-propylene used in TorrLid 162B. The core is over-braided with a jacket of filament glass yarns, and the exterior surface is then coated with a layer of grey-colored silicone rubber.

Prime features
- Developed as a higher temperature vacuum seal for the lids of crucibles as used in specific smelting plants.
- Readily withstands the temperatures and compressive forces involved.
- Tough silicone rubber coating provides abrasion resistance.
- Withstands repeated opening/closing cycles.

Typical applications
This well-proven product is used as a vacuum lid seal for crucibles containing molten aluminum. It is particularly popular with smelting plants in the southern hemisphere.

Service capabilities

Static duties — crucible lids

Maximum temperature
Suitable for holding a vacuum over molten aluminum in crucibles.
Consult James Walker

Pressure range: From partial vacuum up to 131psi (0.9MPa)

How supplied
Manufactured to order to meet customers' specific requirements. Full fitting instructions are included.

Ramiex

Our strongest natural fibre packing

Description
Versatile, high-performance packing, cross-plaited from top-quality bleached ramie fiber yarns that are impregnated with an advanced PTFE dispersion lubricant. The result is a consistent packing of uniform density and compressibility.

Ramie, a tropical nettle plant, produces a fiber of extreme durability, rot resistance and significantly greater strength than flax, cotton or hemp.

Typical applications
Used with great success in the mining and quarrying industries on reciprocating pumps working at 4350psi (30MPa) with water containing highly abrasive particles. Also used for water-based hydraulic systems, pulp and paper processing with cellulose slurry, brine circulation, cooling water systems, and with fluids that crystallise or contain suspended solids.

Prime features
- Excellent extrusion resistance.
- Excellent abrasive resistance.
- Excellent rot resistance.
- Low friction and low wear.
- Kind to shafts and sleeves.

Chemical properties
Compatible with media in the range pH 4-11.

Service capabilities

Valve stem duties

Maximum temperature	+248°F (+120°C)
Minimum temperature	-22°F (–30°C)
Max system pressure	3626psi (25MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	3445fpm (17.5m/s)
Max system pressure	290psi (2MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	394fpm (2m/s)
Max system pressure	3626psi (25MPa)

(can be extended to 10,153psi / 70MPa with special support rings on some applications)

How supplied
Ex-stock: all popular square sections ⅛" to 1", in boxes containing 26 ¼' (8m). Also supplied as split preformed rings and sets. Full fitting instructions are included.

Cottonpak Type E

White, graphite-free cotton packing

Description
Superior quality packing, plaited from fine cotton yarns of soft texture. Each yarn is uniformly impregnated under heat and pressure with a tallow lubricant prior to plaiting.

Typical applications
Rotary pumps, and reciprocating plant with soft metal rams, handling cold water.

Prime features
- Clean, white and graphite-free.
- Good flexibility.
- High lubricity in aqueous environments.
- Kind to shafts and sleeves.
- Easy to handle, cut and fit.

Chemical properties
Compatible with media in the range pH 6-8.

Service capabilities

Valve stem duties

Maximum temperature	+194°F (+90°C)
Minimum temperature	–40°F (–40°C)
Max system pressure	725psi (5MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	1378fpm (7m/s)
Max system pressure	145psi (1MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	725psi (5MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1", in boxes containing 26 ¼' (8m). Larger cross-sections manufactured to order. Also supplied as split preformed rings and sets. Full fitting instructions are included.

Flax, cotton & ramie

Fluolion® Sturntite

Premier packing for marine duties

Description
Dense, robust packing, plaited from the finest quality flax yarns, impregnated with Fluolion® PTFE and petroleum-based grease. Flax yarns are selected for strength, durability, rot resistance and lubricant retention properties.

Typical applications
Very well proven product on marine duties – widely used on stern glands and rudder posts of all sizes, bilge pumps and valves, etc. Non-marine applications include pumps and valves handling waste water or sewage.

Prime features
- Designed for marine duties.
- Long life with low leakage.
- Reduced shaft wear.
- Flexible for easy fitting.

Chemical properties
Compatible with media in the range pH 5-10.

Service capabilities

Valve stem duties

Maximum temperature	+203°F (+95°C)
Minimum temperature	- 40°F (–40°C)
Max system pressure	1450psi (10MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	1772fpm (9m/s)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1450psi (10MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to ⅞" (plus 1 3⁄16") in boxes containing 26 ¼' (8m); and 1" to 2" (apart from 1 3⁄16") in boxes containing 29½' (9m). Other cross-sections manufactured to order. Also supplied as split preformed rings and sets. Full fitting instructions are included.

Sextant

Economical packing for marine duties

Description
Firm, yet flexible and compressible packing, plaited from good quality flax yarns impregnated with blended tallow lubricant then coated with mica. Flax yarns are selected for strength, durability, rot resistance and lubricant retention properties.

Typical applications
Economical and reliable grade frequently used for marine stern glands and rudder posts. Also popular for general service in hydraulic rams, valves, reciprocating pumps and accumulators, particularly in aqueous environments.

Prime features
- White graphite-free construction.
- Flexible and easy to fit.
- Lubricates and protects surfaces in aqueous duties.

Chemical properties
Compatible with media in the range pH 6-10.

Service capabilities

Valve stem duties

Maximum temperature	+194°F (+90°C)
Minimum temperature	-40°F (–40°C)
Max system pressure	1450psi (10MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	591fpm (3m/s)
Max system pressure	145psi (1MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1450psi (10MPa)

How supplied
Ex-stock: all popular square sections from ⅛" to 1¼", in boxes containing 26¼' (8m). Larger cross-sections manufactured to order. Also supplied as split preformed rings and sets. Full fitting instructions are included.

Rapido

Stern glands & waste water systems

Description
Dense, flexible packing plaited from good quality flax yarns, impregnated with petroleum jelly and coated with flake graphite.

Typical applications
Smaller marine stern glands and bilge pumps. Also land-based waste water and sewage pumps.

Chemical properties
Compatible with media in range pH 6-10.

Service capabilities

Valve stem duties

Maximum temperature	+203°F (+95°C)
Minimum temperature	-40°F (–40°C)
Max system pressure	1450psi (10MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	1476fpm (7.5m/s)
Max system pressure	363psi (2.5MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1450psi (10MPa)

How supplied
Square sections from ⅛" to 1", with 26 ¼' (8m) per box; also split preformed rings and sets. Larger sections made to order. Full fitting instructions included.

Rover Medium Soft Cotton

'Natural' choice for water & oil media

Description
Superior quality packing plaited from fine, soft cotton yarns, impregnated under heat and pressure with petroleum-based grease and graphite prior to plaiting.

Typical applications
Marine and land-based pumps and valves handling cold water or oil.

Chemical properties
Compatible with media in range pH 6-8.

Service capabilities

Valve stem duties

Maximum temperature	+194°F (+90°C)
Minimum temperature	-40°F (–40°C)
Max system pressure	725psi (5MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	1378fpm (7m/s)
Max system pressure	145psi (1MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	725psi (5MPa)

How supplied
Square sections from ⅛" to 1", with 26 ¼' (8m) per box; also split preformed rings and sets. Larger sections made to order. Full fitting instructions included.

Glengarry

General use in aqueous environments

Description
Our top performing flax-based packing. Each yarn is uniformly impregnated with tenacious tallow then coated in graphite. Tallow minimizes friction on aqueous duties and helps protect metal surfaces.

Typical applications
General service in hydraulic rams, valves, pumps and accumulators, particularly in aqueous environments.

Chemical properties
Compatible with media in range pH 6-10.

Service capabilities

Valve stem duties

Maximum temperature	+203°F (+95°C)
Minimum temperature	-40°F (–40°C)
Max system pressure	1450psi (10MPa)

Centrifugal pumps & rotary equipment

Operating temperatures	As valve stem
Maximum shaft speed	787fpm (4m/s)
Max system pressure	145psi (1MPa)

Reciprocating pumps & rams

Operating temperatures	As valve stem
Maximum rod speed	197fpm (1m/s)
Max system pressure	1450psi (10MPa)

How supplied
Square sections from ⅛" to 1¼", with 26 ¼' (8m) per box; also split preformed rings and sets. Larger sections made to order. Full fitting instructions included.

Tankatite® range

Tankatite® represents state-of-the-art packing design and manufacture. This comprehensive range of tank lid packings has been constantly developed to meet increasingly stringent international regulations that cover the maritime transport of chemical and potentially hazardous cargoes. Extensions to the range cover the requirements of road and rail transport, and static or mobile tank containers.

Tankatite® 440

For all types of vessel

Description
A resilient elastomeric core, spirally wrapped with PTFE tape and surrounded with successive braided jackets of inert polypropylene yarn. Specially reinforced corners are incorporated to build the section to the required packing size. The braided structure is spirally wrapped with further layers of PTFE tape to provide an impermeable barrier to liquids and gases, then finally enclosed in a robust, abrasion resistant braid of PTFE yarns.

Typical applications
Sealing of tank lids, main hatches, inspection and cleaning covers on tankers carrying all known bulk liquid cargoes in all International Maritime Organisation (IMO) classes.

Specifications
- Meets US Coast Guard requirements for lid sealing of hazardous cargoes.
- Pressure tight beyond Lloyd's and DNV test criteria.

Prime features
- Gas-tight environmental seal.
- Protects cargo from sea water ingress.
- Withstands repeated opening/closing cycles.
- Unaffected by steam and other tank cleaning systems.
- Suitable for smooth recesses in stainless steel lids as well as those with rougher surface finishes.

Chemical properties
Inert to media in range pH 0-14, including all known bulk liquid cargoes in all IMO classes.

Service capabilities

Static duties - tank lids

Maximum temperature	+248°F (+120°C)
Minimum temperature	-58°F (-50°C)
Maximum tank pressure	10.2psi (70kPa)

How supplied
Any square or rectangular section of ½″ upwards is made to order; also endless rings to fit specific tank lid recesses. Full fitting instructions are included.

Tankatite® 660

For heated cargoes

Description
A heat resistant grade of Tankatite®. Similar in construction to Tankatite® 440, but with braided jackets of high quality glass fiber yarns instead of polypropylene.

Typical applications
Seals for tank lids that cover heated cargoes, such a molten bitumen, which need to be transported at elevated temperatures to prevent solidification in the tank.

Prime features
- Gas-tight environmental seal for heated cargoes.
- Protects cargo from sea water ingress.
- Withstands repeated opening/closing cycles.
- Unaffected by steam and other tank cleaning systems.

Chemical properties
Inert to media in range pH 0-14, including all known bulk liquid cargoes in all IMO classes.

Service capabilities

Static duties - tank lids

Maximum temperature	+446°F (+230°C)
Minimum temperature	-58°F (-50°C)
Maximum tank pressure	8.7psi (60kPa)

How supplied
Any square or rectangular section of ½″ upwards is made to order; also endless rings to fit specific tank lid recesses. Full fitting instructions are included.

Tankatite® 250

For road & rail tankers

Description
A modified form of Tankatite® 440, specifically developed for production at smaller and rectangular cross sections.

Typical applications
Seals to fit the smaller tank lid recesses of road and rail tankers.

Prime features
- Easy to cut and fit in small section lid recesses.
- Tough, resilient and long-life product.
- Withstands repeated opening/closing cycles.
- Controls emission levels from tanks.
- Protects tank contents from contamination.
- Withstands arduous cleaning systems.

Chemical properties
Inert to all chemical media in range pH 1-13 at normal operating temperatures, *excluding* fluorine gas.

Service capabilities

Static duties - tank lids

Maximum temperature	+212°F (+100°C)
Minimum temperature	-22°F (-30°C)
Maximum pressure	7.3psi (50kPa)

How supplied
As length form packing or endless rings, in sections to fit popular lid recess dimensions. Full fitting instructions are included.

Tankatite® 880 Super

For static & mobile tank containers

Description
A clean, length form packing manufactured from an inert reinforced polypropylene yarn, impregnated with PTFE and an inert resin to provide a non-stick surface. It contains a resilient core for improved performance.

Typical applications
Seals for lids and fittings on tank containers for road, rail or static use, that contain chemicals, petroleum products or foodstuffs. Seals for lids and fittings on dedicated tanks that handle aggressive cargoes under an inert gas blanket. It can replace molded rubber sealing components and low cost packings.

Prime features
- Excellent value for money.
- Equivalent performance to molded rubber seals.
- Easy to cut and fit in small section lid recesses.
- Excellent sealing capability on repeated opening/closing cycles.
- Controls emission levels from tanks.
- Protects tank contents from external contamination.
- Withstands arduous cleaning systems.

Chemical properties
Inert to media in range pH 0-14, and totally compatible with a full range of cargoes, including chemicals, petroleum products and foodstuffs.

Service capabilities

Static duties - tank lids

Maximum temperature	+248°F (+120°C)
Minimum temperature	-58°F (-50°C)
Maximum tank pressure	29psi (200kPa)

How supplied
As coil form packing and endless rings, in sections to fit popular lid recess dimensions. Full fitting instructions are included.

Customized braided packings

Valvemaster® Packing Sets

Live-loaded for longer life

Description
A live-loaded system for high integrity sealing of valves and slow rotary equipment operating in arduous conditions. Comprises **Supagraf® Molded Rings** *(page 10)* of differing graphite construction located along the valve stem – to give even distribution of radial stress on the gland – with lubrication/anti-extrusion rings of tough **Grafpak** packing *(page 11)* at each end.

Disc-spring stacks operate on the gland follower to provide live-loading action for self adjustment over long maintenance-free periods.

Typical applications
Inaccessible valves controlling hazardous media, especially valves subject to thermal/pressure cycling and vibration. Industries include chemical and hydrocarbon processing, oil/gas production, power generation, sewage treatment and nuclear.

Prime features
- Self adjusts to minimize routine maintenance.
- Even radial stress gives 25 per cent higher sealing efficiency.
- Live-loading helps compensate for thermal cycling, pressure variations in media, and vibration.
- Suitable for wide range of media.
- Low breakout friction for smooth valve operation.

Chemical properties
Suitable for steam, water, condensate, oils, hot waxes, solvents, organic and inorganic acids, alkalis and most other chemicals within the pH 0-14 range. Temperature limits apply to strong oxidising agents.

Service capabilities

Valve stem duties

Maximum temperatures (packings)	
Steam & oxidising media	+1022°F (+550°C)
Minimum temperature	-328°F (–200°C)
Pressure range	High vacuum to 3626psi (25MPa)
Temperature ranges (springs)	
Stainless steel	-238°F (–150°C) to +482°F (+250°C)
Inconel®	-328°F (–200°C) to +1022°F (+550°C)

How supplied
Each Valvemaster® set is custom-designed and manufactured to match precisely the physical dimensions and operating conditions of a specific valve. Full fitting instructions are included.

Supagraf® PremiPak

Superior combination packing sets

Description
Supagraf® PremiPak is a superior combination packing set for valves. It is based on two of our class-leading graphite products that conform to Shell material specifications MESC SPE 85/203 and 85/204.

We also design and supply other high performance combination packing sets for valves, to meet end users' defined standards and specifications with regard to materials, construction, and the level of fugitive emission control required.

Construction
***End rings*: Supagraf® Premier** *(page 6)* braided graphite filament packing for high strength and extrusion resistance, with excellent sealability and third-party certification to TA Luft emission control requirements. These rings conform to MESC SPE 85/204.

***Intermediate rings*: Supagraf® Molded Rings** *(page 10)* of high purity graphite foil, that offer low friction and excellent heat transfer characteristics, plus high efficiency sealing. These rings conform to MESC SPE 85/203.

Typical applications
Stop valves and control valves performing arduous duties with media such as hydrocarbon liquid fuel and gases.

Most applications require VOC fugitive emission control to 100ppm or better, with a maximum working temperature capability of up to +842°F (+450°C).

Prime features
- Reduced valve stem shudder/hesitation.
- Low break-out friction.
- Long working life with minimal maintenance.

Chemical properties

Valve stem duties

Maximum temperature	+842°F (+450°C)
Minimum temperature	-328°F (–200°C)
Max system pressure	3626psi (25MPa)

How supplied
Precision molded rings in endless form or with single split to meet customers' requirements. Sections: ⅛" to 1⁹⁄₁₆". Diameters: ³⁄₁₆" to 19 ¹¹⁄₁₆" ID. Full fitting instructions are included. Other designs of combination set supplied to order.

Injectable Black, White & Yellow

To cover the majority of pumped media

Descriptions
Each grade of our injectable packings comprises a homogeneous blend of fibers/fillers, lubricant particles and lubricating grease. These products are pressure injected through a valve directly into the gland housing, where two rings of conventional packing are sited at either end to retain the compound. The gland follower is adjusted to compress the materials and form a seal.

Injectable Black: graphite fiber and high-temperature non-melting grease.

Injectable White: PTFE fibers and solids, plus high temperature lubricating grease.

Injectable Yellow: blend of Kevlar® fibers with PTFE solids and a pure lubricant.

Typical applications
Centrifugal pumps and rotary mixers that handle cooling water, aqueous solutions, oils or solvents, particularly in the pulp and paper, metallurgical or mineral processing sectors. Injectables are often used because they readily conform to worn shafts or irregular housings.

Prime features
- Can be controlled for low leakage.
- No strip-down needed for repacking.
- Effective in less than perfect mechanical conditions.
- No flush required.
- Extended life can be achieved.

Chemical properties
Between them, these three products provide a wide range of compatibility with media including water, oil, acids, alkalis and solvents.

Injectable Black	pH range 4-10
Injectable White	pH range 0-14
Injectable Yellow	pH range 2-13

End rings
End rings of conventional packing should be selected in the normal way to meet temperature, pressure and surface speed parameters of the application.

Service capabilities

Injectable Black

Centrifugal pumps & rotary equipment

Maximum temperature	+302°F (+150°C)
Minimum temperature	-14°F (-10°C)
Maximum shaft speed	1181fpm (6m/s)
System pressure range	Vacuum to 116psi (0.8MPa)

Injectable White

Centrifugal pumps & rotary equipment

Maximum temperature	+482°F (+250°C)
Minimum temperature	-148°F (-100°C)
Maximum shaft speed	1969fpm (10m/s)
System pressure range	Vacuum to 232psi (1.6MPa)

Injectable Yellow

Centrifugal pumps & rotary equipment

Maximum temperature	+482°F (+250°C)
Minimum temperature	-58°F (-50°C)
Maximum shaft speed	1673fpm (8.5m/s)
System pressure range	Vacuum to 218psi (1.5MPa)

How supplied
Ex-stock: 4.4lb tubs, complete with fitting instructions. Injector guns also available.

Fluocord

For rapid valve repacking

Description
Resilient cord-type packing comprising a core of unsintered PTFE, spirally wrapped with a covering of PTFE tape. This construction allows the product readily to conform to any housing annulus whilst at the same time resisting extrusion.

Typical applications
A highly efficient maintenance expedient for swift repacking of valves where temperatures and pressures are modest. Ideal for emergency application when the usual grade of packing is unavailable. Often used for longer-term duties on non-critical services. Can also be used to form emergency flange gaskets.

Prime features
- Very versatile maintenance product that reduces stockholding levels.
- Swift valve repacking — wrap several turns around a stem and tighten the gland follower.
- Each size readily deforms to fit a range of housings.
- Reduces risk of valve stem corrosion.

Chemical properties
Compatible with media in range pH 0-14, *excluding* molten alkali metals, fluorine and some fluorine compounds at elevated temperatures.

Service capabilities

Valve stem duties

Maximum temperature	+482°F (+250°C)
Minimum temperature	-238°F (–150°C)
Max system pressure	508psi (3.5MPa)

How supplied
Ex-stock: spools containing 3⁄32" diameter cord x 78 3⁄4' length; 5⁄32" x 26 1⁄4'; 7⁄32" x 13'; or 9⁄32" x 6½'.

Complementary products & services

Supagraf® Tape

Maintenance expedient for valves

Description
Supagraf® exfoliated graphite in an easy-to-use textured tape form. Can be supplied with self-adhesive backing.

Typical applications
This maintenance expedient is wound around a valve stem — then compressed into the stuffing box. It is suitable for valves handling high temperature steam, potable water, demineralized water, petroleum products, heat transfer media, organic and inorganic acids, and alkalis. Self-adhesive version can be used as an emergency gasket replacement.

Specifications
- Material is WRAS approved for use with cold and hot potable water up to 185°F (85°C).

Chemical properties
See **Supagraf® Moulded Rings** (p10).

Service capabilities

Valve stem duties

Maximum temperature	+932°F (+500°C)
Minimum temperature	-328°F (–200°C)
Max system pressure	1015psi (7MPa)

How supplied
In cassettes for protection and ease of use. 0.02" thick tape: 0.4" x 32 ¾', 0.6" x 32 ¾', 0.8" x 49', 1" x 49'.

Pre-formed packing rings

Precision molded to fit each gland

Description
Precision molded rings of our length-form braided packings, custom-made to an exact fit for a specific gland.

Typical applications
Widely used by valve and pump manufacturers for convenience and surety of installation during equipment assembly. They are also recommended for on-site maintenance and/or refurbishment when operating conditions are severe in terms of pressure and/or chemical attack.

Prime features
- Ease of installation.
- Minimum initial adjustment needed.
- Precise fit in gland for high integrity sealing.
- Accurately controlled packing density for duties at higher than normal pressures.

Service capabilities
The pressure rating of standard length form packings can often be significantly increased by special molding techniques during the manufacture of rings. *Please discuss your specific applications with our Technical Support Team.*

How supplied
Sets of rings are custom-molded to order and supplied with either butt or scarf cut joins as required. ***Special sets*** can be designed and manufactured to combine the advantages of two or more packing products, and/or supplied with extrusion resistant end rings and spacers.

Packing Ring Cutter

Easy-to-use hand tool for scarf joints

Description
A robust and accurate cutting jig that simplifies the production of perfectly matching 45° scarf joints on packings.

Prime features
- Removes guesswork in cutting scarf joints for reliable sealing of valves and pumps.
- Simple to use for on-site maintenance and workshop-based refurbishment.
- Made from strong aluminum-alloy extrusions.
- Contains two precision scales: one for packing section, the other for inside diameter of ring.
- Supplied with knife to cut the toughest synthetic yarn packings. *Note: please follow local safety instructions for hazard-free use; also wear cut-resistant gloves.*

Service capabilities
Suitable for metric size packing sections of 3mm to 20mm, and ring inside diameters of 10mm to 140mm. Just match the section of the packing to the ring inside diameter required, then simply cut the exact ring length required with perfect scarf joints.

How supplied
Ex-stock: boxed and labelled, with full instructions included.

Packing Extractors

Trouble free removal of old packings

Description
Highly effective and widely used extraction tools, with a long flexible shank to gain access to glands in difficult positions. The corkscrew tips are designed to embed firmly in all types of length-form packing, including badly worn and hardened products. A T-handle provides good grip for both screw action and the efficient removal of packing.

Service capabilities
- Size 1: 3⁄16" and 1⁄4" packings.
- Size 2: 5⁄16" and 3⁄8" packings.
- Size 3: 7⁄16", 1⁄2" and 5⁄8" packings.
- Size 4: 13⁄16" packings and larger.

How supplied
Fixed-tip extractors: individual sizes, or as full set of Sizes 1 – 4.
Replaceable-tip extractors: individual sizes, or as full set of Sizes 1 – 4.
Replacement tips: supplied individually.

Molyon Grease

Excellent adhesion properties

Description
A product of soft consistency, comprising a blend of non-melting petroleum greases (bentone type) and fine particles of pure high quality molybdenum disulfide.

Typical applications
Lubrication of braided packing and seals prior to installation for duties with non-corrosive media or environments. Also used as a general lubricant.

Prime features
- Good adhesion and spread on metal surfaces.
- Film of lubricating molybdenum disulfide remains on surface even when grease carrier has gone.

Chemical properties
Compatible with most engineering materials, *excluding* items made from natural, butyl or ethylene-propylene rubber.

Service capabilities
Maximum temperature +302°F (+150°C)
Minimum temperature -4°F (–20°C)

How supplied
Ex-stock: packs of 10 x 175g (6oz) tubes or 1kg (2.2lb) tubs.
Other quantities supplied on request.

Silicone Grease

For food & potable water plant

Description
A translucent gel that combines the properties of silicone fluid with a degree of structure to provide a stiff consistency.

Typical applications
A versatile grease for lubricating packings and seals prior to installation, as well as valves and taps used in the food processing and potable water industries. Can be used as an anti-seize compound, and also gives a degree of protection against dust, moisture, chemicals and corrosion.

Specifications
- Produced from FDA-compliant materials.
- WRAS listed for use with cold and hot potable water up to 185°F (85°C).

Prime features
- Excellent lubricating performance across wide temperature range.
- Very low order of toxicity.
- Wide chemical resistance.
- Safe to use with most rubbers and plastics.

Chemical properties
Compatible with most engineering materials, including rubbers and plastics, but *excluding* items made from silicone or fluorosilicone compounds. Low halogen content: <20ppm chloride.

Service capabilities/properties

Maximum temperature	+392°F (+200°C)
Minimum temperature	-58°F (–50°C)
Flash point	>+572°F (>+300°C)
Penetration test (ASTM D217)	
Unworked	250-280
Worked	250-285
Radiation resistance	
Onset of gellation (approx)	10Mrad [10^5Gy]

How supplied
Ex-stock: packs of 10 x 175g (6oz) tubes or 1kg (2.2lb) tubs. Other quantities supplied on request.

Complementary products & services

Graphite Grease

Lubricant & anti-seize compound

Description
Thick paste of non-melting petroleum greases (bentone type) blended with a high quality lubricating grade of natural fine graphite particles.

Typical applications
Lubrication of braided packing and seals prior to installation for duties with non-corrosive media or environments. Also used as a general lubricant and anti-seize compound.

Prime features
- Contains 50 per cent graphite by weight.
- Good tack/adhesion on metal surfaces.
- Spreads with reasonable ease.
- No solvent content.

Service capabilities
Maximum temperature +302°F (+150°C)
Minimum temperature -4°F (–20°C)

How supplied
Ex-stock: packs of 10 x 200g (7oz) tubes or 1kg (2.2lb) tubs.
Other quantities supplied on request.

Copper Anti-Seize Compound

General purpose lubricant paste

Description
High purity anti-seize lubricant in paste form. Comprises copper and graphite particles in a high melting point petroleum carrier. Contains no added lead.

Typical applications
Prevention of seizing, galling, thread damage and high friction problems on bolts, studs, valve stems, pipe fittings, press fits, etc.

Prime features
- Can be used at up to 1832°F/1000°C.
- Easy to apply by brush.
- Good adhesion.
- Excess can be wiped free.

Chemical properties
Sample analysis of elemental impurities shows: chlorine <100ppm, zinc <100ppm, sulfur <50ppm, fluorine <15ppm, lead <5ppm; cadmium, mercury and tin <2ppm each.

Service capabilities/properties
Maximum temperature +1832°F (+1000°C)
Flash point (carrier) +464°F (+240°C)
Drop point (carrier) Infusible
Oil separation (carrier)
@ 302°F (150°C) Nil
Penetration test (ASTM D217)
Worked @ 77°F (25°C) (carrier) 265-295

How supplied
Ex-stock: packs of 10 x 200g (7oz) tubes or 500g (1.1lb) tubs.
Other quantities supplied on request.

Nickel Anti-Seize Compound

For high temperatures & corrosive environments

Description
Very high purity anti-seize lubricant in paste form. Compounded from graphite and nickel in a high melting point petroleum carrier.

Typical applications
Used instead of **Copper Anti-Seize Compound** *(see above)* where a copper-based product is unsuitable due to temperature limitations, fluid incompatibility or corrosive environment (eg, at sea). Suitable for nuclear industry duties where purity of content is a major consideration.

Prime features
- Can be used at up to 2552°F (1400°C).
- Low level of impurities.
- Resists corrosion.
- Good adhesion.

Chemical properties
Sample analysis of elemental impurities shows: chlorine <15ppm, fluorine <15ppm, zinc <15ppm, sulfur <10ppm, lead <10ppm; tin and copper <5ppm each; cadmium and mercury <2ppm each.

Service capabilities/properties
Maximum temperature +2552°F (+1400°C)
Flash point (carrier) +464°F (+240°C)
Drop point (carrier) Infusible
Oil separation (carrier)
@ 302°F (150°C) Nil
Penetration test (ASTM D217)
Worked @ 77°F (25°C) (carrier) 265-295

How supplied
Ex-stock: packs of 10 x 200g (7oz) tubes or 500g (1.1lb) tubs.
Other quantities supplied on request.

Custom-designed & non-standard products

We are expert in the custom-design and manufacture of braided packings and other braided products to solve specific problems for industry.

When you want products that are outside our standard size range — just ask. We make lengths or rings to order on our automated braiding and plaiting machines. With flexible manufacturing and stocks of raw materials, we can efficiently meet your urgent demands.

And, when your working parameters fall beyond the scope of our standard products, our in-house development team will work to create new or modified packings to meet your requirements.

Non-standard products
The vast majority of items listed in this guide are held in stock. The following is a small selection of products we have developed to meet unusual demands and now manufacture to order.

Soot blower packing rings (LRCM056): Based on knitted copper wire and graphite yarns, these tough, dense packings will combat wear and resist the action of excessive lance movement.

Graphite-free Hornet (LRCM085): Similar to our Hornet packing *(page 14)*, but cross-plaited with aramid fibres at the corners and PTFE yarns at each side. For use with abrasive media where graphite materials cannot be tolerated.

Braided glass yarns (LRCM190): Various types of special braided packing made from braided glass yarns. Round, square and rectangular sections are available in different densities. Yarns can also be braided over rubber cores.

Grafpak with wire (LRCM275): Wire-reinforced version of our graphite-based Grafpak packing *(page 11)* for high temperature/pressure applications.

Aramid with PTFE (LRCM370): Specially developed valve stem packing made from PTFE yarns containing an aramid core.

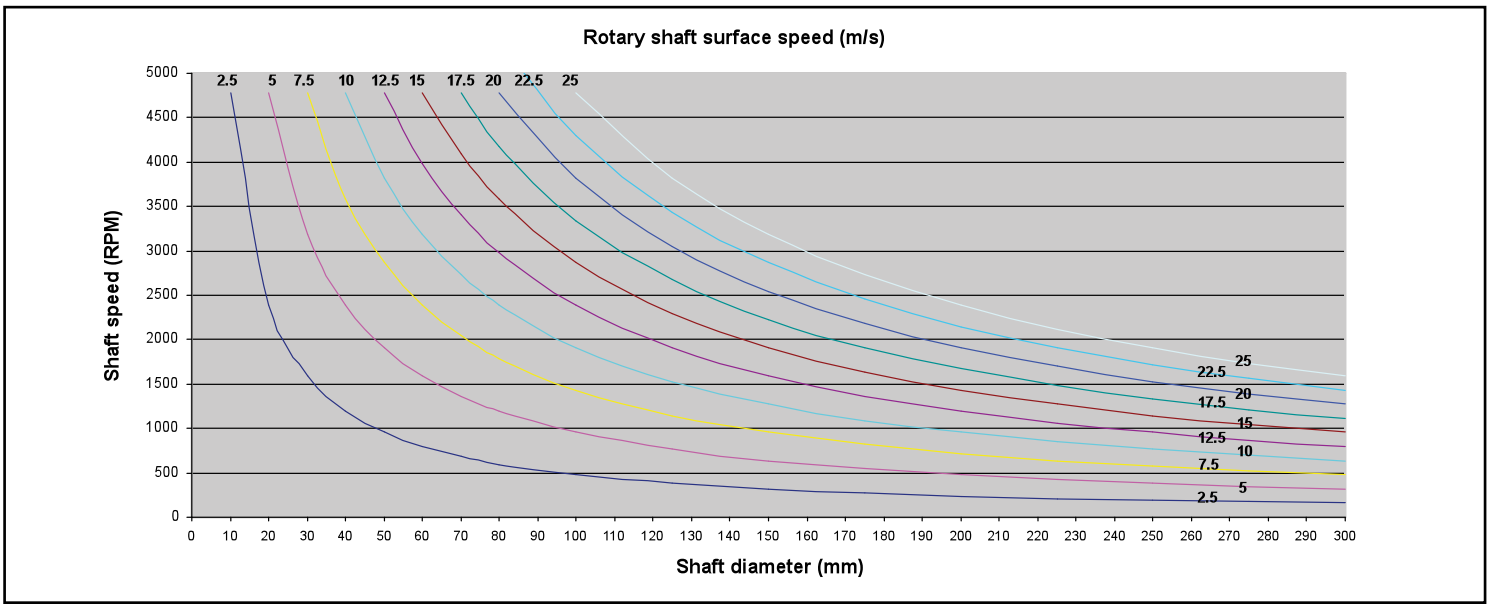
Higher temperature Armoured Supasca XA: Special version of our **Armoured Supasca XA** *(page 21)* with stainless steel wire braided over a silica-based core. For duties at 1832°F (1000°C) and above.

Silicone-coated braided glass sleeving: Protects cables and pipes from excessive heat or impact by hot particles.

Other related products for industry:
- Glass webbing tape and ladder tape.
- Cloths.
- Rope/pipe lagging.
- Twisted cord.
- Sewing twine.
- Gauge glasses and seals.
- Packing sleeves with eyelets.

Shaft surface speeds

This graph presents a range of metric rotary shaft surface speeds for given shaft diameters and RPM. It is for guidance only.



James Walker

James Walker in action

Immediate supply

We will supply you with braided packing products, when and where you need them.

Our automated warehouse holds ten million sealing products ready for same day despatch. These include vast stocks of braided packings in all popular sizes and grades used by industry.

A close-knit network of James Walker companies and official distributors covers over 100 countries. This is supported by a web-based system and a highly developed logistics operation to give you surety of supply for JIT regimes and your normal maintenance schedules.

Research & development

Teams of scientists and development engineers at the James Walker Technology Center work at the leading edge of fluid sealing knowledge. They deliver the new materials, products and manufacturing techniques that improve the sealing of today's plant and meet tomorrow's sealing demands.

They also work on joint venture research projects with other organisations in the European Sealing Association – of which we are a founder member – and sponsor high-level research in partnership with world leading users of sealing technology.

In addition to our in-house test laboratories that verify the viability of our materials and seal designs, we regularly commission independent test houses across the world for third-party certification of our products to international and industry standards.

James Walker customer support

We aim to supply you with the very best:

- Customer service
- Technical support
- Fluid sealing products
- Delivery
- After sales service.

Our high technology Customer Support Center leads the fluid sealing industry with its service to tens of thousands of customers worldwide.

On-site technical advice comes from our local teams backed by highly experienced applications engineers and James Walker Technology Center. Together they have the knowledge and facilities to solve any fluid sealing problem for our customers.

User training is another important service we provide. Our specialists regularly host sessions to instruct plant engineers and designers in the selection and installation of sealing products.

James Walker quality

We select the best raw materials for each product and use advanced manufacturing techniques with strict quality control and traceability at every stage. This culminates in an exacting inspection procedure for the finished product. Stockholding and distribution meet similar exacting standards.

Our quality systems are third-party registered to BS EN ISO 9001:2008. We are also regularly assessed and quality approved by a wide range of industry bodies and individual customers, including multinational corporations, utilities and government organisations.

Alphabetical index

Trademark acknowledgements

James Walker acknowledges the following trademarks as mentioned in this guide. All other names bearing the ® symbol are registered trademarks of James Walker.

Trademark	Company
GFO®	WL Gore & Associates
GORE™	WL Gore & Associates
Inconel®	Special Metals Corporation
Kevlar®	DuPont
SEQUEL®	WL Gore & Associates

General information

Health warning: *If PTFE or fluoroelastomer (eg, FKM, FFKM, TFE/P) products are heated to elevated temperatures, fumes will be produced which may give unpleasant effects, if inhaled. Whilst some fumes are emitted below 482°F (250°C) from fluoroelastomers or below 572°F (300°C) from PTFE, the effect at these temperatures is negligible. Care should be taken to avoid contaminating tobacco with particles of PTFE or fluoroelastomer, or with PTFE dispersion, which may remain on hands or clothing. Material Safety Data Sheets (MSDS) are available on request.*

Information in this publication and otherwise supplied to users is based on our general experience and is given in good faith, but because of factors which are outside our knowledge and control and affect the use of products, no warranty is given or is to be implied with respect to such information. Unless governed by type approval or contract, specifications are subject to change without notice. Statements of operating limits quoted in this publication are not an indication that these values can be applied simultaneously.

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

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