

James Walker®

Improving valve sealing performance & emissions control

Issue 2



High Performance Sealing Technology



Respected reputation

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Over a century of experience

James Walker has been in the business of fluid sealing and control since the company's founding over 125 years ago. From our earliest products and throughout our history the company has developed sealing solutions and components in parallel with advances in valve technology. As a result we have amassed specialised knowledge of applications across a very broad range of industries.

Driving advances in performance

From marine transport and aerospace to nuclear energy, renewables, oil and gas, our experience drives innovations in materials and sealing technology that help facilitate production and performance advances. Across a broad range of applications James Walker products and materials offer class-leading capabilities and are considered a performance benchmark in many industry sectors.

A respected reputation built on a history of innovation and proven performance

Global presence — local support

Bespoke solutions

Bespoke doesn't necessarily mean expensive. At James Walker our aim is to create the most cost-effective solution and we focus carefully on optimising the lifetime cost of ownership for our customers.

We carry a global reputation for solving sealing problems. Backed by testing and manufacturing to world-class standards James Walker brings practical expertise and leading edge technology to the custom-design of optimum solutions that match our customers' exact operational requirements.

Our focus is
on providing
cost-effective
operational solutions

Worldwide distribution

Our role as a global supplier demands an international manufacturing base plus highly efficient sales and distribution operations. We have a worldwide family of companies with over 50 production, engineering, distribution and customer support sites spread across Europe, Australasia, Asia Pacific, Africa and the Americas.

At the local level, a close-knit network of James Walker companies and official distributors works in close partnership with customers in well over 100 countries.



Cost-effective solutions

Driving development

Our position as a technology leader, in combination with the vast experience of our applications engineering and materials science teams, helps us to identify and supply the most appropriate and competitive solution for each individual customer's requirement.

We run a structured development programme for each of the industrial markets served by our business. Working in partnership with customers we identify the current and future needs to be addressed to improve key performance parameters such as cost effectiveness, longevity, safety and environmental care.



Delivering quality

Quality design, quality manufacture and quality service are paramount throughout our worldwide operations. We start with the best raw materials and use advanced manufacturing techniques with strict quality control.

This culture is reinforced by top-level technical, sales and logistics support to ensure a total quality service to every customer.

API
Norsok M-710
Shell
Total
BS EN ISO 9001
BS EN 9100
BAE Systems
Ministry of Defence
FDA
USP Class VI

...working to the
highest standards
and audited by
industry's most
exacting businesses

Proving performance

Working in close co-operation with customers, industry bodies and academic institutions, our facilities provide some of the most advanced test regimes outside of actual operational application. This gives our customers the confidence that James Walker products have been fully tested to meet the required application conditions.

With our broad range of engineering resources and expertise we design and build custom test-rigs for many of the projects we undertake. In addition, and central to our research and development programmes, the James Walker Technology Centre houses the core of our world-class test facilities.

Testing capabilities

- Environmental chambers capable of replicating conditions from -70°C to +130°C
- Rapid gas decompression rigs – amongst the most advanced in the world
- Steam skid for testing seal longevity under harsh Sterilisation in Place (SIP) steam cycle cleaning
- Multiple rotary and reciprocating test rigs with a variety of shaft sizes and speeds from gentle oscillation to in excess of 6,000 revolutions per minute
- Chemical type-approval testing which allows customers the opportunity for third party-witnessed testing of elastomers and polymers in their anticipated chemical environment

With in-house materials compounding we also hold complete control over batch production – essential during critical testing and materials assessment.



Depth of experience

Broad experience

James Walker is involved in designing solutions and manufacturing products for virtually every industrial sector.

Our products are found wherever there is a critical application, whether that is on the sea bed, at the very core of a process or ensuring safety under extreme circumstances.

Our applications and materials engineering teams have developed in-depth knowledge of the industries we serve – a knowledge that forms the basis of our engineered solutions and sets us apart from the competition.

Our customers trust James Walker products and solutions to keep their business working, their workforces safe and the environment protected.



In addition to third-party assessment for international quality standards, many parts of our global operations are also regularly assessed and quality approved by a wide range of industry bodies and individual clients including multinational corporations, utilities and government organisations.



James Walker
products are found in
critical applications
at the forefront of
key global industries
ensuring that
processes run safely
and smoothly, day
after day after day



Extreme environments

Our capabilities in high performance materials science are relied upon worldwide by customers who need top quality materials that are validated and proven to operate:



- At extremes of pressure
- In chemically aggressive and physically abrasive environments
- Under rapid gas decompression (RGD) conditions
- To the highest safety and performance specifications laid down by international industry bodies
- At extremes of temperature
- Where failure could have significant health & safety, environmental or financial risk
- In food, pharmaceutical and bioprocessing applications where contamination prevention is critical to the process

Fugitive emissions

Products & services

We have an extensive range of world-class products and services which meet or exceed the required international standards in reducing volatile organic compound (VOC) fugitive emissions from valves, pipelines, processing plant and pressure vessels. Many of these products meet TA-Luft requirements and demonstrate Best Available Technique (BAT) under the European Union's Integrated Pollution Prevention and Control (IPPC) directive.

As a world leader in sealing and jointing technology, we have an in-depth understanding of the latest technologies and products and can confirm whether the systems you have, or are planning to install, meet your emissions containment targets.

James Walker is an active member of the European Sealing Association and we have made a significant contribution to the Association's 'Sealing Technology Best Available Technique (BAT) Guidance Notes'.

This document, which is available as a free download from the ESA website, gives the industry consensus guidance on Best Available Techniques for sealing; bolted flange connections, rotodynamic equipment, reciprocating shafts and valves.

Developing “Best Available Technology” to protect your business and the environment



Saving energy & reducing costs

In helping to ensure effective and efficient emissions control, James Walker products can also significantly reduce energy consumption and costs.

We have the products, expertise and integrated solutions to save you time and money when planning and implementing your emission control plans.

James Walker products can cut equipment leaks dramatically and achieve efficiencies through reduced power consumption, better use of energy, improved water usage and better plant performance.

In essence, the James Walker mission is to prevent pollution of the environment through a range of products and services that are environmentally friendly and which generate major benefits for your business.

Operators have to ensure that their IPPC directive responsibilities are met, and substantial penalties apply for non-compliance.

James Walker's experience and knowledge, allied to our range of leading edge products and services, makes us the ideal partner to help you comply with the IPPC and other environmental directives.

Reducing fugitive
emissions also
improves plant
performance and
reduces costs

Fugitive emissions

Regular monitoring and inspection coupled with correct seal specification is the key to successful fugitive emissions control

Equipment leaks from valve glands are considered to account for approximately 50-60% of the fugitive emissions on petrochemical sites. Furthermore, the major proportion of fugitive emissions comes from only a small fraction of these sources.

For example, less than 5% of valves in gas / vapour service can account for more than 90% of the fugitive emissions in a refinery.

Class-leading solutions

James Walker is deeply committed to environmental excellence. Many of the products and services we supply worldwide are expressly developed to help industry meet ever more stringent environmental targets by:

- Reducing fugitive emissions
- Helping companies meet the European Union IPPC and other international emissions directives
- Improving the energy efficiency of plant and equipment
- Attenuating noise and vibration



Certified products

A number of James Walker products have been tested and certified as meeting the stringent TA-Luft requirements. The German TA-Luft is a comprehensive air pollution control regulation that sets maximum permissible limits for the emission of dust, vapours or gases when processing, conveying or transferring dusty, liquid or gaseous materials, taking into account the specific risk potential.

Proven techniques

Even using the best certified products doesn't guarantee the reduction or elimination of hazardous fugitive emissions. To be successful in this task requires the correct procedures, fitting and maintenance techniques.

- Product specification
- Regular monitoring and inspection

Eliminating risk is all about using certified product and proven techniques

TA-Luft certified products include:

- Supagraf® Premier and Supagraf® Control compression packings
- Metaflex® spiral wound gaskets
- Metakamm® Kammprofile gaskets

- Bolting regimes
- Joint / flange protection

These are just a few of the key areas in which James Walker can provide proven expertise and valuable advice when you are seeking to comply with fugitive emissions regulations.

Elastomer products

Materials technology

We supply sealing products in a vast range of general and high-specification grades of elastomer including ranges of low-temperature and rapid gas decompression (RGD) resistant materials.

Our comprehensive range of available materials includes:

- Ethylene-propylene (EPM/EPDM)
- Chloroprene / Neoprene (CR)
- Nitrile (NBR)
- Polyurethane (AU/EU)
- Silicone (VMQ)
- Fluoroelastomer (FKM)
- Hydrogenated Nitrile (HNBR)
- Perfluoroelastomer (FFKM)

Within each material category we have numerous different compounds each specially formulated for specific applications or operational conditions including:

- Extremes of pressure
- Chemically aggressive environments
- Extremes of temperature
- Under rapid gas decompression conditions
- Abrasive environments

Product availability

James Walker sealing products are supplied in a variety of standard and specialist grades of elastomer and other materials. If the products you want are not available off-the-shelf, we can design, manufacture and supply them creating new product moulds where necessary.

With our flexible production schedules, we are confident of meeting the most urgent requests from our customers anywhere in the world. Our range of elastomeric sealing products for valve applications includes:

- 'O' rings
- 'T' seals
- 'D' seals
- Dome seals
- Diaphragms

In addition to our standard product configurations, custom mouldings can be designed and manufactured to individual client specifications.

...over 300
compound formulae,
advanced in-house
batch production and
total traceability

Quality & traceability

Our Materials Technology Centre houses one of Europe's most advanced facilities for elastomer batch production, materials development and product testing.

We hold over 300 compound formulae providing full batch traceability, production flexibility and the highest levels of quality control.

Our products and materials are extensively in-house validated, and are tested, approved and specified by end users and equipment manufacturers around the world.

Case study

James Walker 'O' rings in RGD (rapid gas decompression) resistant FR25/90 fluoroelastomer are specified in valves for the undersea pipeline that will feed Southern Europe with Algerian natural gas.

The Medgaz project's 24-inch pipeline runs for 210km beneath the Mediterranean in a maximum sea depth of 2160m, which means that RGD resistance is a prime consideration for any seals in the system.

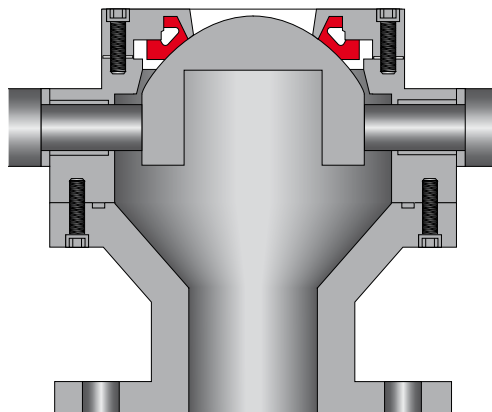
Certification of FR25/90 to Total GS VV 142 03/01 by French test house Cetim confirmed the material's suitability.

Inflatable dome seals

Simple in design and low in maintenance, valves using a domed shut-off are used in a wide range of industries for controlling the flow of bulk materials including abrasive, hazardous or toxic materials.

James Walker inflatable dome seals are available in a broad range of materials to suit every application and include silicone (VMQ), fluorocarbon (FKM), nitrile (NBR), hydrogenated nitrile (HNBR), chloroprene (CR) and ethylene-propylene-diene (EPDM).

Materials to FDA and other specifications are also available.



Elastomer products

A range of industry approved products ...

Aflas® FEPM

AF69/90: compounded for rapid gas decompression (RGD) resistance.

Elast-O-Lion® HNBR

Elast-O-Lion®101: Norsok M-710 for RGD resistance and sour gas (H₂S) ageing.
Total spec: GS PVV 142
Shell spec: DODEP 02.01 B 03.02

Elast-O-Lion® 985: compounded for RGD resistance and extreme low temperature duties, down to -55°C.

Fluoroelastomers FPM/FKM

FR58/90: Norsok M-710 for RGD resistance and sour gas (H₂S) ageing.
Total spec: GS PVV 142
Shell spec: DODEP 02.01 B 03.02

FR25/90: Norsok M-710 for RGD resistance and sour gas (H₂S) ageing.
Total spec: GS PVV 142
Shell spec: DODEP 02.01 B 03.02
Cold temperature compatible.

Kalrez® FFKM

The ultimate performance material when considering heat and chemical resistance.

Elast-O-Pure® (EPDM)

Developed to USP Class VI for the pharmaceutical and bioprocessing sectors.

FR68/90

This fluorocarbon-based material is the first in our New Generation of oil and gas elastomers. With new polymer architecture, it offers best in class resistance to sour gas, amines and steam for an FKM elastomer with this outstanding level of RGD resistance. It has a perfect '0000' Norsok RGD rating up to at least 10.0mm cross section at 100°C and also at 5.33mm section at an elevated temperature of 150°C.

Norsok M-710 qualification

Problems with RGD are most commonly experienced in the oil and gas industry but can occur in any application where there is a rapid drop in gas pressure.

Rapid Gas Decompression (RGD) can destroy standard elastomeric seals in oil and gas applications downhole, at the wellhead and upstream.

Global operators and equipment manufacturers in the oil and gas sector therefore rely on the enhanced capabilities of James Walker's RGD resistant materials for extreme operating conditions.

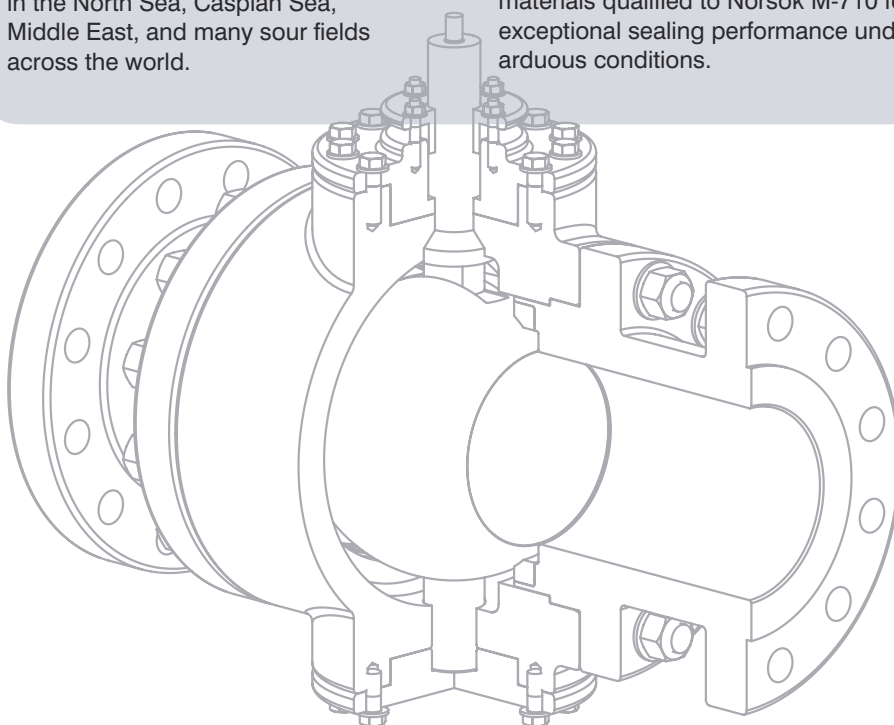
Operators such as Shell and Total have validated James Walker materials against their own specification in addition to globally recognised industry approvals. Norsok M-710 is one of the toughest RGD testing regimes. It combines rapid gas decompression tests and an evaluation of sour gas (H₂S) ageing, enabling life predictions to be made for application conditions.

This is of immense value to operators in the North Sea, Caspian Sea, Middle East, and many sour fields across the world.



Under Norsok test conditions a theoretical service life of 817 years at 80°C has been predicted for James Walker's FR58/90 in sour gas service, before its tensile strength is halved.

We are able to offer a range of products in both hydrogenated nitrile (HNBR) and fluoropolymer (FKM) materials qualified to Norsok M-710 for exceptional sealing performance under arduous conditions.



Compression packings

Leading solutions

James Walker manufactures many different grades of compression packing for valve stem duties providing a broad range of operational benefits:

- World-beating fugitive emission control — often to below 50ppm
- Best value fluid sealing for your specific plant duties
- State-of-the-art materials to traditional 'natural' yarns
- Work in the most abrasive and chemically aggressive environments
- Tolerate poor mechanical conditions
- Meet requirements for potable water, food, pharmaceutical or liquid/gaseous oxygen duties
- Reduce your stockholding levels, as one packing can often be used for many different valves and other fluid handling plant at a site

Expertise & experience

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

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

Whatever your requirement our expertise and over 125 years of experience in compression packing materials can be brought to bear on providing a customised solution.

James Walker compression packings can be supplied in length form or as pre-formed split and endless rings. Combination and live-loaded ring sets are available in a number of materials to suit specific applications.

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

World-leading
fugitive emission
control products
with proven
performance

Supagraf® Premier — A world-leading history of success in beating fugitive emission control specifications.

Emission levels < 500ppm when subjected to over 12,000 valve operating cycles with methane at 4MPa / 40bar.

Top of its class in comparative tests run by the Materials Technology Centre of Akzo Nobel. Leakage rates between six and 100 times less than competitors' brands — lasted 12 times longer than the next best valve packing.

Twice certified to TA-Luft requirements in independent tests:

< 10^{-4} mbar.l/(s.m) at system temperatures below 250°C

< 10^{-2} mbar.l/(s.m) above 250°C

Third-party verified for emission control by CETIM to Shell SPE 77-312 Class A specification.



Compression packings

A range of industry approved products ...

Supagraf® Control

TA Luft / VDI 2440
ISO 15848-1
IPPC Best Available Technique (BAT)

Supagraf® Moulded Rings

WRAS approved for hot and cold potable water

Supagraf® Premipak

Conforms to Shell MESC SPE 85/203 and 85/204 material specifications

Fluolion® Filament D

Meets FDA requirements, and is approved by BAM and WRAS

Supagraf® Premier

TA Luft / VDI 2440
API 622
Shell SPE 77-312 Rev 06.2007
Class B rating
Shell SPE 77-312 Rev 06.10.2002
Class A rating
API 607 Fire Safety to extended specification
IPPC Best Available Technique (BAT)

Applications

Product name	Food	Marine services	Metallurgical	Petroleum	Pulp & paper	Power generation	Water & sewage
Arasele	✗	✓	✓	✓	✓	✓	✓
Duramid®	✓	✓	✓	✓	✓	✓	✓
Fluograp®	✓	✓	✓	✓	✓	✓	✓
Fluolion® Emulsion XA-P	✗	✓	✓	✓	✓	✓	✓
Fluolion® Filament L	✓	✓	✗	✓	✓	✓	✓
Hornet	✓	✓	✓	✓	✓	✓	✓
Liongraf	✓	✓	✓	✓	✓	✓	✓
Ramiex	✗	✓	✓	✓	✓	✓	✓
Supagraf® Moulded Rings (steam)	✓	✗	✓	✓	✓	✓	✓
Fluolion® Filament D	✓	✓	✗	✓	✓	✓	✓
Grafpak	✗	✓	✓	✓	✓	✓	✗
Supagraf® Control	✗	✓	✓	✓	✗	✓	✗
Supagraf® LF Rings	✗	✓	✓	✓	✓	✓	✗
Supagraf® Premier	✗	✓	✓	✓	✗	✓	✗
Supagraf® PremiPak	✗	✓	✓	✓	✗	✓	✗
Supagraf® RibbonPak M (steam)	✗	✓	✓	✓	✓	✓	✗
Supagraf® Tape	✓	✓	✓	✓	✓	✓	✓

More than 125 years of experience
in the manufacture and application
of compression packings

Supagraf® RibbonPak M tested to 30MPa for use in 'super critical' power stations.

Latest tests rate Supagraf® RibbonPak M for use to 650°C or 30MPa/300bar with no impairment to valve stem movement. We also have independent proof from Australian power stations of successful operation at 540°C with simultaneous 23MPa/230bar pressure. Under these conditions the product still offered long-term efficiency to match the steam valve conditions.



Gaskets

Non-metallic cut gaskets

Compressed fibre

Most fluid media from ASME Class 150 to Class 600 ratings.

- Chieftain® – carbon fibre / NBR
- Centurion® – glass / aramid / NBR
- Sentinel® – aramid / NBR
- Inca – glass / aramid / NBR

Expanded graphite

James Walker Supagraf® combines excellent chemical resistance with an exceptionally wide temperature range for sealing integrity over extended periods. Supagraf grades include:

- Standard 98% pure
- Ultra-pure / nuclear grade
- Tanged
- Laminated

PTFE

Outstanding chemical resistance for duties where hygiene and non-contamination are essential.

- Fluolion®
- GORE™
- Teadit®
- Gylon®

Elastomer

James Walker offers a broad range of commercial and specification grade elastomer jointing materials including:

- Natural rubber (NR)
- Nitrile rubber (NBR)
- Ethylenepropylenediene (EPDM)
- Silicone (VMQ)
- Fluoroelastomer (FKM)
- Perfluoroelastomer (FFKM)

Semi-metallic

Spiral-wound

The Metaflex® range of spiral-wound gaskets is widely used on high pressure joints including Metaflex type C and C/IR in valve bonnet and steam trap applications.

These are generally used for higher temperatures and pressures. A variety of metals are available for the winding strip as well as for the support rings.

- System pressures: high vacuum to over 35MPa/350bar
- Temperatures: cryogenic to 1000°C
- Material combinations for all operating conditions

Kammprofile

The James Walker Metakamm® gasket type is generally a solid metal ring having a serrated tooth form profile on each side.

A covering layer of graphite or PTFE is applied, which becomes compressed into the serrated surface when the gasket is loaded.

- Safer and easier to handle than spiral-wound
- Operate at up to 1000°C or 25MPa/250bar

Fire Test certification to API 607 – ISO 10497

James Walker offers two semi-metallic multi-purpose gaskets certified as Fire Safe to ANSI/API Standard 607 and ISO 10497-5:2004, for critical CPI / HPI applications.

CorruSafe FS

- Stainless steel corrugated ring
- PTFE inner envelope
- Graphite outer seal
- Maximum pressure 5MPa/50bar

Metaflex® SG/IR Fire Safe

- Spiral-wound construction
- Stainless steel inner support ring
- PTFE inner seal and winding strip
- Graphite outer seal
- Carbon steel outer ring
- Maximum pressure 35MPa/350bar

Sizes from ½" to 48" to all relevant gasket standards and flange designations.

Continuous operating temperatures of up to 260°C.



Metallic ring joints

Manufactured to the highest standards including API 6A, Moorside® ring type metallic gaskets are used for high temperature or pressure applications in the oil, gas and process industries.

Only the best forged metals are used in manufacturing Moorside® ring joint gaskets — no welded rings. All rings undergo a stringent machining process to ensure that close tolerances and smooth contact surfaces are rigidly maintained.

Standard materials

- Soft iron
- Low carbon steel
- Alloy steels
- Stainless steels

Specialist materials

- High nickel alloys (eg, Incoloy®)
- Super alloy steels (eg, Inconel®)

Quality is guaranteed by a strict series of tests and process quality control plus a final inspection to assure total compliance with customer specifications.

Traceability of material and constant monitoring of manufacture are essential for effective quality control. All Moorside® ring joint gaskets carry a **Material Reference Number**, which directly relates to the batch of material from which it was manufactured.

- API 6A, ASME B16.20, and custom ring joints
- Manufacture in the UK by API licensee
- R type (oval and octagonal) solid sections
- RX and BX for pressures over 70MPa/700bar
- Wide ranges of materials

Elastomer coated ring joints for pressure testing operations

Elastomer coated ring joints are used for pressure testing purposes, minimising the risk of damaging the sealing faces. Once the test is completed a metal ring joint, available in R (oval and octagonal), RX and BX configurations dependant upon application, can then be fitted for final service.

Metaflex® spiral wound or Metakamm® kammprofile gaskets can also be used for pressure testing; located between the flange faces inboard of the ring joint groove. Again, this configuration minimises the risk of groove damage during pressure testing ahead of final assembly.



R type oval joint with elastomer coating.



The lips of the elastomer seal on the BX ring joint are pressure energised (the ring is made taller than standard to give a stand-off) and thus a lower bolt load than normal can be used to achieve a seal for a hydro-test.

Valve seating

Material choice

Elastomers

Wide range of elastomer compounds available to match specific application criteria.

Devlon® V-API

Robust alternative to PTFE and Nylon grades suitable for use at higher pressures.

Nylon

Full range of Nylon grades available for standard valve applications.

PTFE

Chemically compatible with the majority of media.

Glass reinforced PTFE

Offers good chemical resistance of virgin PTFE with extended life.

UHMW polyethylene

Ultra-high molecular weight polyethylene, ideal for use in low-level radiation applications, also offers excellent resistance to abrasive media.

PCTFE

For extreme low temperature applications.

PEEK™

For high temperature and pressure service, suitable for nuclear applications.

Metals

Machined or spun metal seat inserts are ideal for applications involving hydraulic shock, high temperature or abrasive media. Vast range of specialised metals and coatings available to suit individual applications.

Thermoplastic seats

Increasingly stringent restrictions on valve operating conditions over the years have meant the use of several thermoplastic materials to cover the required operating range for valve seat inserts.

However 'thermoplastic materials' can cover such a broad range of specifications that there is often a certain amount of confusion and ambiguity as to the exact material used and its associated capabilities.

Working closely with a major valve manufacturer, James Walker Devol developed and introduced Devlon® V-API grade as a superior valve seat material, which is now widely specified by valve manufacturers and also approved for use by major oil and gas producers such as Shell and BP.

Devlon® V-API

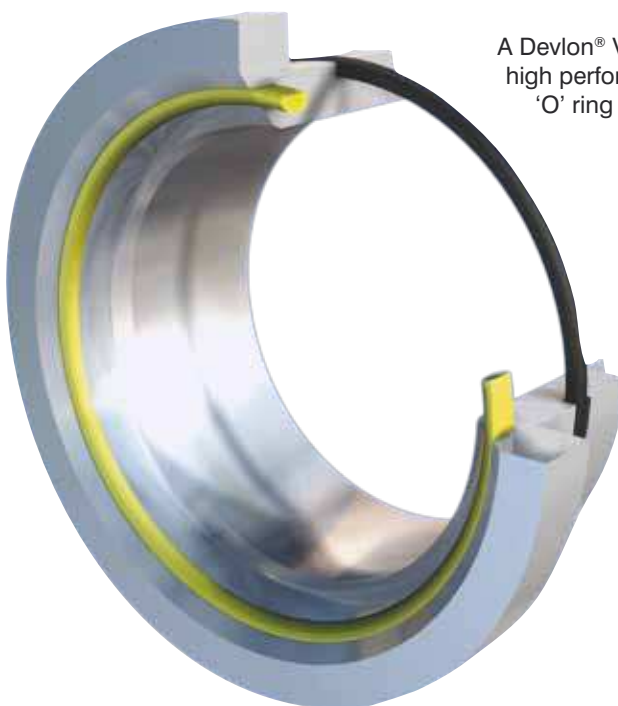
Devlon V-API is part of the polyamide family but incorporates additives which allow it to perform at higher pressures and temperatures than other grades of Nylon.

Devlon® V-API benefits

Devlon® V-API can be specified as a direct replacement for Nylon as a valve seat material in the knowledge that it exceeds all temperature and pressure limitations of Nylon 6, Nylon 6/6, Nylon 6/12 and Nylon 12.

Devlon V-API offers a range of operational benefits:

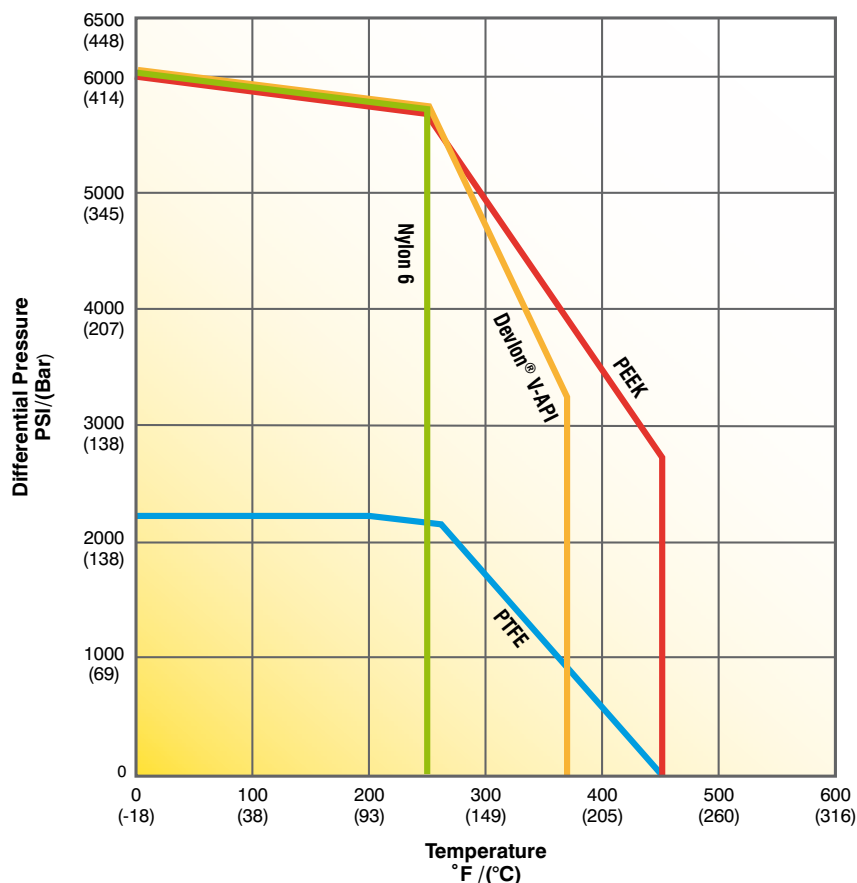
- Shell approval (MESC 77/130) for use in high pressure valves conforming to API 6D
- Approval to Total GS EP PVV 142 rev4
- Proven in operation at temperatures as low as -196°C and up to +200°C, subject to valve and seat design
- Can withstand a pressure of 41MPa/414bar (6,000 psi) at +176°C
- Available in dimensions of 1" (25.4mm) to 88" (2,250mm)
- OEM specified
- Cost effective



A Devlon® V-API valve seat and high performance elastomer 'O' ring sealing arrangement.

Valve seating

Pressure / temperature performance comparison



Devlon® V-API offers better performance than Nylon or PTFE and is significantly more cost-effective than PEEK

Metallic seats

When leak-tight performance is required under severe service conditions such as high temperature or pressure or with corrosive or abrasive media, then metallic seats can be precision machined to customer specification from a wide range of specialist metals to suit the individual application.

James Walker is highly experienced in the precision machining of difficult-to-work exotic alloys, as well as all standard grade materials. Materials machined regularly and usually held in stock include;

- Stainless steel
- Duplex
- Super duplex
- Hastelloy®
- Inconel®
- Monel®
- Titanium
- Bronze



PTFE Chevron® & KVSP®

PTFE Chevron® Packing Sets

Chevron® (known as Shallex® in some regions) is our universal multi-lip packing that is highly regarded for its long working life and ability to operate under adverse conditions. When used in split form it can provide major downtime savings.

PTFE is the standard material used in automatic control valves because of its broad chemical compatibility, excellent thermal stability and reduced torque requirements on valve activation.

PTFE Chevrans form a multi-part packing set commonly made up of a centre sealing ring with top and bottom (male and female) adapters.

Service capabilities

- Max operating temperature: +260°C
- Min operating temperature: 0°C
- Max system pressure: 42MPa/420bar
- Chemically inert and suitable for most media in the pH 0-14 range

Chevron sets can be supplied as live-loaded kits. The spring loading helps;

- Improve performance
- Compensate for stem wear, pressure and temperature changes

Kalrez® Valve Stem Packing (KVSP®)

KVSP® is the Kalrez® Valve Stem Packing system from DuPont Performance Elastomers.

It comprises alternate V-rings of Kalrez® perfluoroelastomer (FFKM), and rings of DuPont Teflon® or DuPont VespeI® to form a three or five-part packing set.

The KVSP system is widely used to minimise fugitive emissions, particularly in control valves. A five-part set can typically reduce valve stem leakage to less than 10ppm at oil, gas, petrochemical and chemical processing plants.

Standalone packing sets and calibrated live-loaded kits, together with full technical support, are supplied by James Walker as an Authorised Distributor of Kalrez® parts in the UK.



KVSP® capabilities

Chemical properties

All KVSP components display outstanding chemical resistance being inert to media in the range pH 0-14.

Service capabilities

- KVSP systems are rated for actual continuous temperature service from -40 to +288°C. Live loading is necessary to seal to -40°C
- Max system pressure: 17MPa/170bar

Case Study

Application

1" level-control valve fitted on a reactor vessel operating at 30°C and 4.5MPa/45bar with a mixture of pentane and butane plus trace solvents, water and acid.

Problem

Ten years of continual problems with valve stem sealing. Graphite-based stem packing offered little success, failing soon after installation. Ceramic-coated stems were eventually fitted due to stem damage. On average the valve caused a reactor shut-down at least once a year at a cost of over £60,000 a time.

Requirement

Packing system offering effective long-term fluid sealing and accuracy of control for the valve.

Solution

James Walker refurbished the valve, fitting KVSP® seals lubricated with DuPont Krytox®, reinstalled and monitored the unit. After two and a half years' continuous service the KVSP® set is still operating perfectly.

Benefits

Immediate operational saving in excess of £60,000 per year plus improved productivity and safety.

Spring energised PTFE lip seals

High performance

High-performance spring energised PTFE lip seals from James Walker have been developed to meet the demands of extreme applications, which are beyond the limits of elastomers and packings.

Capable of handling adverse service conditions these seals are used where chemical compatibility, extremes of pressure and temperature, and ultra low friction are required.

Material properties

The molecular structure of PTFE provides a seal material that is not only chemically resistant but that is almost totally resistant to the effects of rapid gas decompression (RGD).

In addition, the almost identical static and dynamic friction coefficient of PTFE means that the 'stick-slip' effect is eliminated, even at low temperatures, which is ideal for smooth valve operation.

Product benefits

- Virtually universal compatibility with all fluids and gases
- Suitable for operational temperatures from -250 °C to +250 °C
- Does not absorb water
- Unlimited weather resistance
- Doesn't age in atmosphere or light
- Excellent 'low-stick' properties
- Long service life
- RGD resistant

Spring action

On installation the spring element is under compression and forces the sealing lip against the counterface to create a leak-free seal. Any set or wear in the seal material, or eccentricity in the surface against which the seal is made, is compensated for by the spring energising action.

The spring elements of these seals are available in a variety of materials to provide the required performance and chemical resistance to suit differing applications and environments.

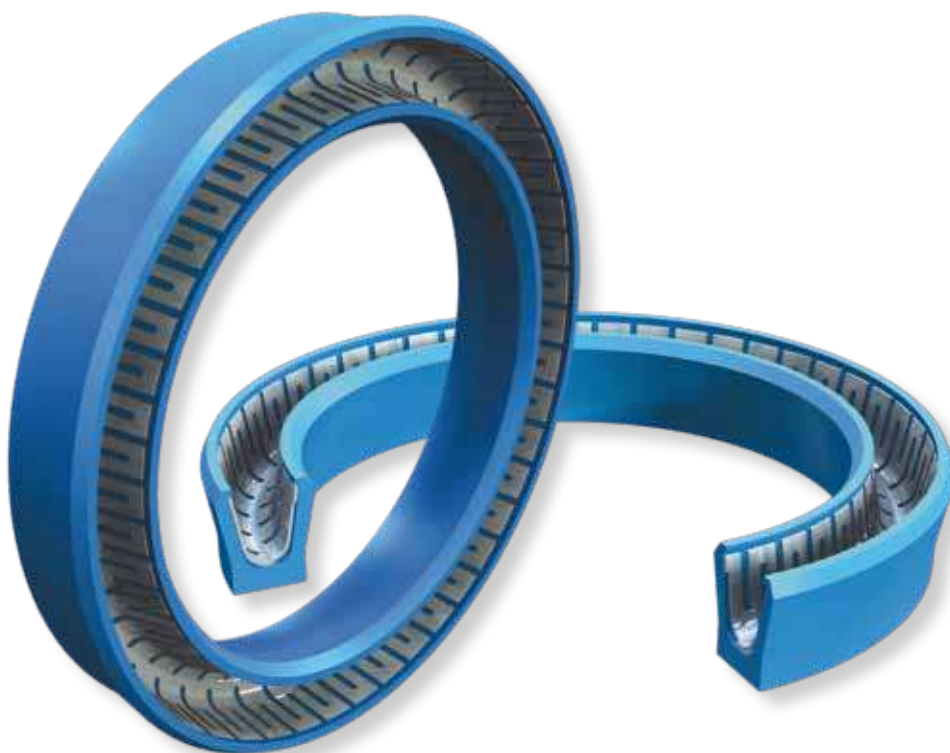
Materials available include:

- Stainless steel
- Hasteloy®
- Inconel®

Critical applications

Due to its unique properties the spring energised PTFE lip seal is the ideal solution for a great variety of applications:

- Extreme temperatures
- Aggressive environments
- Food and pharmaceutical
- Offshore
- Chemical processing
- Refrigeration
- Energy
- Aviation
- Defence



Metallic bellows

Comflex® metallic bellows

A metallic bellows seal is usually used in place of conventional packing where conditions are too harsh for other alternatives or the elimination of leakage is critical; for example, in nuclear applications.

This sealing option eliminates fugitive emissions of toxic, lethal, or regulated fluids/gases, minimises maintenance, reduces life cycle costs, and optimises productivity in process plants including steam, cryogenic, and vacuum systems.

With this sealing option there are no sliding or rotating seals through which process fluid can pass. The bellows simply expand or compress with the stroke movement of the valve, any required movement is taken up by the convolutions in the bellows.

Total Cost of Ownership

Designed to last many thousands of cycles, Comflex® bellows offer a long-term sealing alternative with none of the continual maintenance demands associated with other methods of valve stem sealing.

Although requiring a higher initial outlay compared with alternative stem sealing products, Comflex metallic bellows can provide the lowest Total Cost of Ownership (TCO) of any sealing system.

The Comflex® metallic bellows, shown here in a globe valve application, eliminates loss or contamination of the process media.



...provides the lowest cost of ownership
for valve stem sealing

Best Available Techniques

Metallic bellows can be used with virtually any media, guarantee zero media loss and have a long life expectancy.

Bellows seals are considered a 'Best Available Technique' (BAT) for the control of fugitive emissions and also prevent the process media from contamination by harmful or corrosive external conditions.

Typical life expectancy:

- Gate valve bellows 3,000 cycles
- Globe valve bellows 10,000 cycles

Comflex® metallic bellows from James Walker are high specification products, formed from assured quality tube and available in a variety of materials including:

- Stainless steel
- Inconel®
- Hastelloy®
- Monel®

Specialised metal components

Precision machining

James Walker supplies proprietary components and standard items to exacting specifications on a global basis, including:

- Valve bonnets
- Valve seats
- Valve seat carriers
- Valve balls
- Metal to metal seals

Major operators and OEMs in the oil and gas sector have relied on our renowned engineering expertise and skilled workmanship for over 40 years in the production of API metal ring joint gaskets.

- Established market leader in the manufacture of ring joints, metal seals and bespoke metal components for OEM and end-user clients
- Providing services on a 24/7 basis, 365 days a year, to meet customers' most urgent demands worldwide

...expertise in
thinwall machining
and exotic alloys

Quality Assured

- API spec 6A PSL4 licence No. 6A-0038
- API spec Q1
- API accreditation in accordance with Standard 17D
- Full materials traceability
- Materials sourced from trusted supply chain, fully certified with permanent records held
- All machining undertaken is fully controlled in-house
- NDT, coatings and heat treatment conducted by approved and certified subcontractors



Materials

We are highly experienced at the machining of difficult-to-work exotic alloys, as well as all standard grade materials. The following is an inventory of metals that we machine regularly — many of these we hold in stock.

- Stainless A182 F316
- Duplex A182 F51
- Super duplex A182 F53
- Super duplex A182 F55
- Stainless Nitronic® 50 XM19
- Inconel® 825
- Inconel® 625
- Hastelloy® C 276
- Monel® K 500
- Titanium

Coatings & treatments

Where required for reasons such as wear resistance, chemically or physically aggressive media or friction reduction, components can be finished with a wide range of coatings and surface treatments, including:

- Xylan® fluoropolymer
- Zinc phosphate
- Molybdenum disulphide
- Silver
- Gold
- Zinc
- Nitriding
- Vacuum annealing
- Stress relieving



Tension control bolting

Leak free environments

RotaBolt® tension control fasteners assure joint integrity wherever bolted joints are subject to pressure containment, vibration loosening, fatigue and structural slippage.

Pressure containment

RotaBolts are providing joint integrity on pressure vessels, reactors, heat exchangers and high integrity pipeline flanges. Our technology is helping to make leak-free environments a reality.

Fatigue

Bolted joints that are subject to cyclical loading are vulnerable to fatigue failure. Failure occurs when bolts are tightened with insufficient bolt tension — the cyclic load exceeds the fatigue strength of the bolt, resulting in a fatigue crack.

In process engineering and power generation RotaBolt fasteners are leading the way in regimes that are 'fit and forget'.

Leading technology

Tension control is essential in achieving 100% reliability. Our unique RotaBolt fasteners not only achieve the correct tension at installation, they maintain this throughout the life of the bolted joint.

RotaBolt tension control fasteners are individually 100% load test calibrated and every bolt's extension measurement is individually certified.

Joint integrity

A broad range of benefits can be derived from maintaining reliable bolted joint integrity.

- Reduced maintenance costs
- Better design efficiencies
- Reduced installation costs
- Improved safety
- Reduced build costs
- Enhanced design performance
- Lowest cost of ownership
- Greener environmental regimes
- Extended equipment life



Case Study

Application

Non-return valve carrying steam at 300°C in a nuclear power plant. The valve is pressurised during start-up of the plant to 16MPa/160bar but after three days the pressure reduces to a continuous 6.4MPa/64bar.

Problem

The valve suffered from heavy flange rotation due to pressure on start-up and had been leaking for a period of seven years.

Solution

RotaBolt® tension control fasteners were installed to ensure correct joint tension and optimum seating and loading of the gaskets. As a result of this solution the valve was completely leak free on start-up and it has remained leak free ever since (more than three years and counting).

The rotating cap of the RotaBolt® provides a simple, foolproof check of correct bolt tension.

Tension control bolting

Original RotaBolt®

Standard bolts from M12 to M135 can be converted to incorporate the unique RotaBolt® indicator featuring air gap technology.

Increased tension accuracy means that bolt quantity, diameter or strength grade can be reduced.

There is less machining, fewer holes drilled and fewer bolts to be tightened.

In on-site installations it is the quickest system to achieve assured design tension, reducing installation times by a factor of six.

It reduces all aspects of bolted joint maintenance, delivering quick and easy in-service monitoring and eliminating operational 'first aid'.

No operator skill is required.

It empowers you to set bolt load and guarantee bolt tension throughout all your plant and machinery.

RotaBolt® 2

RotaBolt® 2 provides an even greater range of tension control on installation tightening and in-service checking by offering two tension settings in a single sensor.

It features a dual load indicator cap — the outer cap for high tension setting and the inner cap for low tension. This gives you the choice of an operational tension range, either for overload or maintenance control.

RotaBolt 2 has proven performance in offshore, petrochemical and nuclear applications.

RotaBolt® Vision

The world's first safety bolt to give a clear, visual indication of loss of tension across the bolted joint.

The Vision operates on the same internal air gap technology as the original RotaBolt® but has a specially developed, visual indicator which appears as an unbroken yellow line across the head of the bolt.

As soon as any tension is lost across the bolt, the indicator instantly rotates by 90 degrees to show a distinct right angle break in the yellow line.

This is clearly visible up to 25 metres away and is ideally suited for bolted joints in locations such as sea-bed valves where remote inspection by camera can be used.

Critical Factors

Bolted joint integrity relies on three critical factors:

- Joint design
- Bolt quality
- Tension control

The first two of these factors are controlled and measured.

The majority of bolted joints however are tightened in an uncontrolled manner and the bolt tension achieved at the end of the tightening cycle is unknown.

Traditional tightening methods, such as torque and hydraulic tensioning, measure the effort applied and not the tension achieved across the bolted joint.

The operator may well be highly trained and the installation procedures followed to the letter, but failure can still occur if all three reliability factors are not properly measured.

90 – 95% of all bolted joint failures are attributed to insufficient bolt tension on installation.

It is tension control that is critical to the reliability and safety of bolted joints.



Services

International contracts

Major players in a broad range of industries including the metallurgical, power generation, chemical and petrochemical processing sectors, rely on product supply and technical support provided by James Walker.

The long-term contracts we forge with these multinational corporations cover the requirements of their plants across many continents; our IT systems and logistics operations providing the secure, integrated supply chain required by such organisations.

The aim of a service contract is to help you keep your plants running safely and efficiently, and to offer you significant cost savings based on:

- Sealing products and associated components supplied at highly competitive market prices
- Value added services including technical advice, problem solving, Total Cost of Ownership (TCO) programme
- Stock standardisation and rationalisation — especially where your plants use many different products for identical duties
- Efficient order processing, logistics, stockholding and IT support for e-supply — to help you meet JIT requirements and reduce plant downtime

Improving safety
and productivity
whilst reducing
Total Cost
of Ownership

Valve & Flange Management

The Valve & Flange Management Programme approach — Evaluate, Design and Apply — is aimed at delivering long-term solutions where the cost benefits speak for themselves, as opposed to short-term fixes that need to be applied again and again, at considerable cost.

Evaluation

- Historic data collection
- Pressure/temp media data
- Flange, bolt & gasket details
- Bolted joint evaluation

Design

- Product combination & selection
- Determination of optimal sealing parameters
- Recommendations if housing / metalwork modifications needed
- Accurately establish required seating loads

Benefits

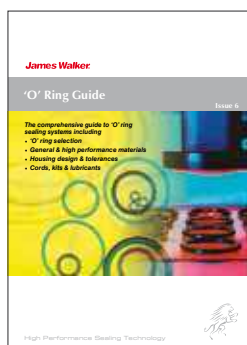
- Reduced downtime
- Assured reliability
- Reduction of lost product
- Leak & emission containment
- Elimination of repetitive maintenance costs

Delivering
long-term solutions
with significant
cost benefits

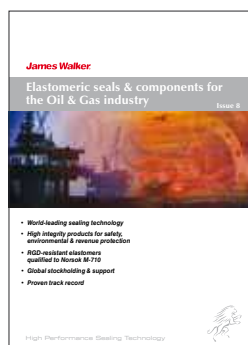


Technical guides & data sheets

These guides give detailed technical information on the products and services supplied by James Walker for valve applications across a broad range of industries. Please ask for your copies, or visit our website www.jameswalker.biz where many of them can be downloaded in pdf form.



'O' Rings



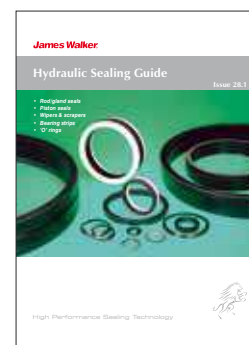
Elastomeric Seals



Dome Seals



Compression Packing



Hydraulic Seals



Gaskets & Jointings



Gasket Technology



Gasket Guide



Specialised Metals



Metallic Bellows



Devlon® V-API



RotaBolt®



IPPC



Global Contracts



Flange Management

Trademark acknowledgements

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

Aflas®	Asahi Glass	Kalrez®	DuPont Performance Elastomers	Teadit®	Teadit International
Gylon®	Garlock Sealing Technologies	KVSP®	DuPont Performance Elastomers	Teflon®	DuPont Performance Elastomers
GORE™	WL Gore & Associates	Monel®	Haynes International	VespeI®	DuPont Performance Elastomers
Hastelloy®	Haynes International	Nitronic®	Armco Inc	Viton®	DuPont Performance Elastomers
Incoloy®	Special Metals Corporation	PEEK™	Victrex plc.	Xylan®	Whitford Corp
Inconel®	Special Metals Corporation	Stellite®	Deloro Stellite Inc		

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General information

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

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.