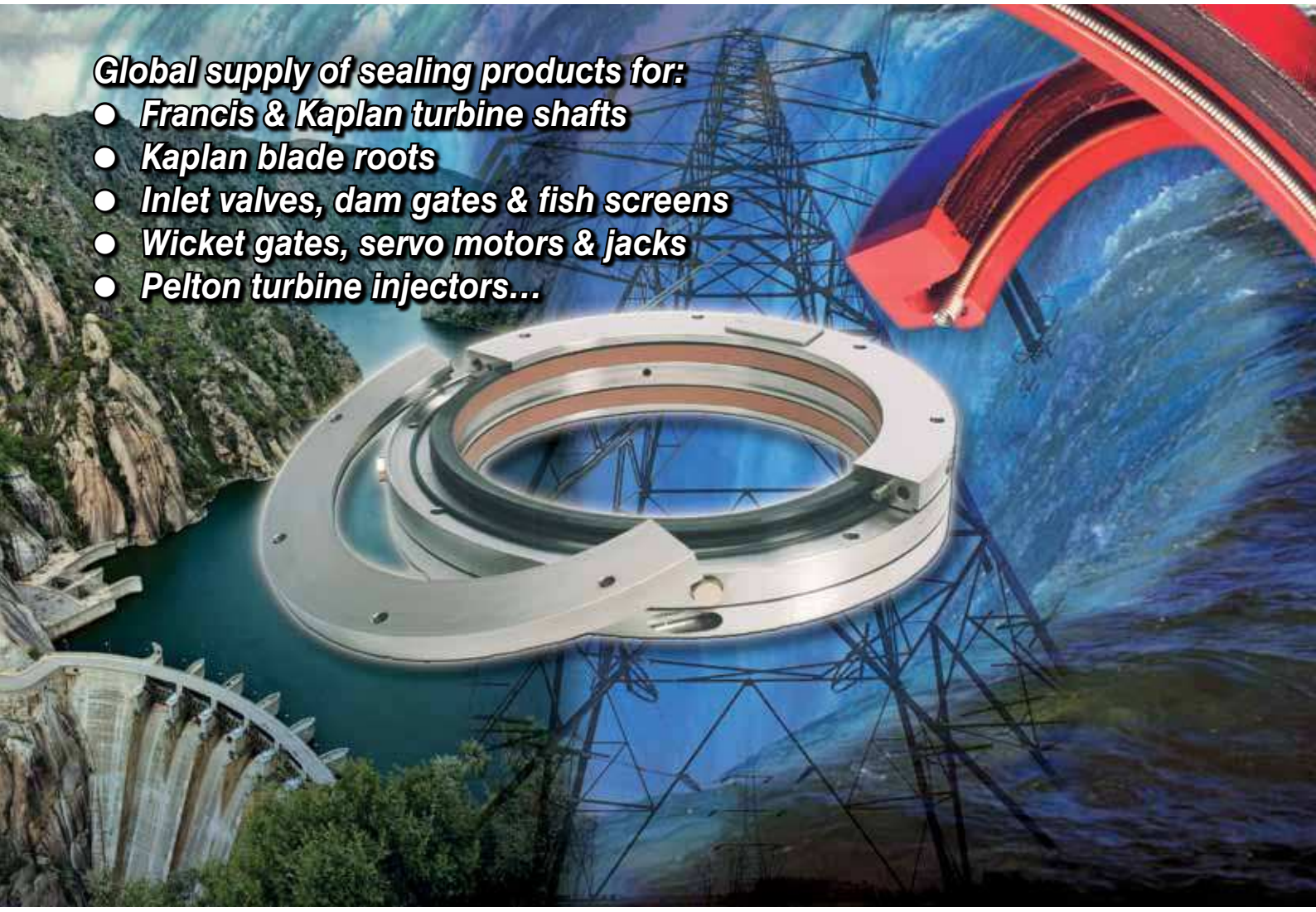
James Walker®

High Performance Sealing for the Hydropower industry



High Performance Sealing Technology

High performance sealing for hydropower

Introduction

James Walker's vast ranges of fluid sealing products and services are widely used in hydropower applications around the globe. We back these with top level technical expertise from dedicated specialists in our Power Generation Industry Support Team and highly efficient customer support operations.

The quality and longevity of our products are well appreciated by original equipment manufacturers and hydropower operators, who rely on their efficiency to improve cost effectiveness and operational performance by helping to reduce plant downtime.

We are constantly reviewing material performance and seeking to develop new compounds and sealing solutions that will address the operational problems faced by our clients and the industry sectors we serve. Across industries as diverse as aerospace, power generation and bioprocessing, James Walker technical ability and expertise has helped create what are now recognised as class-leading, best practice products and solutions.

Your global partner in sealing success

James Walker is a global manufacturer and distributor that supplies standard ranges and custom-designed sealing products to virtually every industrial sector. These activities help to keep plant and equipment running safely, efficiently and with improved environmental performance, year-in and year-out.

We have a worldwide family of companies with over 50 production, engineering, distribution and customer support sites spread across the Americas, Europe, Australasia, Asia Pacific and Africa.

At a local level, a close-knit network of James Walker companies and official distributors supplies our products and services to well over 100 countries. Our worldwide IT systems and logistics operations give customers the surety of supply they need.

Understanding our customers

We can't begin to solve our customers' problems if we don't understand their business, their operational constraints and manufacturing processes. By taking the time and trouble to understand our customers' situation we are able to be more targeted in our development of a solution – ensuring that the result of our work addresses the problem on every level.

A technical solution for example is little use if it is not economic or doesn't fit in with existing maintenance schedules. To this end James Walker believes in developing a tailored solution package rather than supplying a compromise from a list of standard, off-the-shelf products.

Leading with technology

By operating at the leading edge of technology, we ensure that our products and services match the ever-growing complexity of industrial plant — both for today and into the future. Fluid sealing is not a stand-alone technology: it is based on materials development, innovative design and skilled application.
It depends greatly on constant advances in elastomers, engineering plastics, metallurgy and manufacturing techniques, as well as chemistry, tribology and fastener technology.

Quality — our prime consideration

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 of every process.
This culture is reinforced by top-level technical support, logistics operations and a multitude of customised services. Our quality standards are third party registered to BS EN ISO 9001:2000. Industry bodies, as well as corporations, utilities and government organisations, regularly assess and approve our standards.

James Walker is a member of the Energy Industries Council

James Walker

HydroSele® S — innovative cartridge seal

Long life, low maintenance sealing for turbine shafts

HydroSele® S is the result of over 12 years of design, development and long-term field trials on operational Francis and Kaplan-type equipment working under a wide variety of conditions. This fully-split cartridge assembly has verified its ability to significantly improve a turbine's cost efficiency and operational performance.

Why install HydroSele® S?

- **Swift pay back on investment.** At two years, HydroSele should have paid for itself in terms of maintenance costs, turbine downtime and power absorption. At four years, total investment in cash and downtime could be just one-quarter of that for an equivalent mechanical seal.
- **Long and reliable service life.** Prototype HydroSeles are still running trouble-free after 12 years' operation. This reliability enables you to schedule maintenance with absolute confidence.
- **Simple to install and adjustment free.** HydroSele is one of the easiest arrangements to fit on a turbine shaft. Downtime is cut to a minimum and the seal is adjustment free once installed.
- **Economical refurbishment.** It takes just hours to refurbish HydroSele on site. Stand-by sealing units are no longer needed.
- **High efficiency sealing.** HydroSele's unique method of operation gives a very low and controlled level of water leakage. This greatly reduces the risk of flood damage to plant caused by uncontrolled leakage past sealing faces.

Operating capabilities

Shaft diameters: 250mm to 1000mm (9.84-39.37 in). *Please consult James Walker if shaft diameter exceeds 1000mm.*

Maximum pressure at gland: 1000Kpa (10bar gauge). *Please consult James Walker for pressures above 1000Kpa (10bar*)

Maximum surface speed: 20m/s (3940fpm). *Please consult James Walker when higher shaft speeds are involved.*

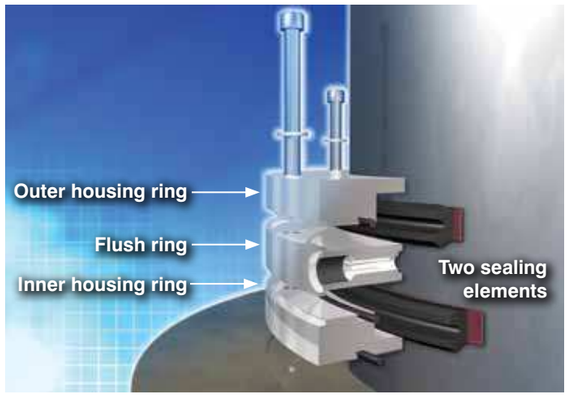
Maximum temperature: 50°C (122°F) at seal/flush interface.

Flush water pressure: 200Kpa (2bar) above system pressure.

How supplied

HydroSele S is custom manufactured from modular components to suit specific applications. Service can include installation of HydroSele plus on-site cartridge refurbishment.

HydroSele S is a fully split cartridge assembly, containing two sealing elements working back-to-back with flush water introduced between them.



High performance sealing for hydropower

Extended HydroSele® family

We are constantly developing our HydroSele® family to provide a total shaft-sealing service to OEMs and operators of water turbines.

Current family includes:

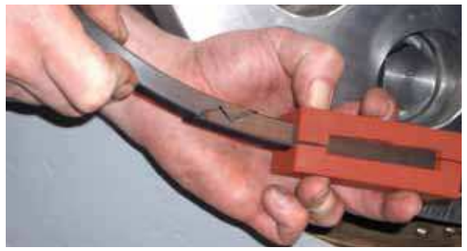
- **HydroSele® S** — the innovative rotary cartridge seal for turbine shafts.
- **HydroSele® MS** — S type plus maintenance seal.
- **HydroSele® RS** — S type with reversed inner element.
- **HydroSele® W** — cartridge containing a single Walkersele® radial lip seal.
- **HydroSele® WT** — cartridge with two Walkersele lip seals in tandem.
- **HydroSele® WB** — cartridge with two Walkerseles back-to-back.
- **HydroSele® Total Service** — ancillary equipment and services including FlushPak, Adapter, Condition Monitoring, and Shaft Sleeve.

Other variants and combinations of HydroSele can be custom-designed, including 'floating' versions to cater for higher levels of shaft eccentricity.

Specially commissioned test rigs at the James Walker Sealing Engineering and Materials Technology Centre allow testing of rotary seals under a wide variety of operational conditions

Solosele® KB Hydro — special design

High integrity sealing for Kaplan blade roots



This robust seal was developed specifically for the blade roots of Kaplan-type turbines. It operates with great success on turbine blades at hydropower schemes across the world — both as an OEM fit and as retrofit on older equipment — where it significantly reduces both turbine downtime and maintenance costs.

Why install Solosele® KB Hydro?

- **Very cost effective.** Solosele® KB Hydro out-performs and runs significantly longer than many multi-lip seals and other seal types installed on Kaplan blade roots.
- **High performance sealing.** No axial compression required. Solosele KB Hydro has excellent low and high-pressure sealing capabilities under fluctuating conditions (including negative pressure).
- **Keeps oil in and water out.** Two seals are installed back-to-back in a housing to prevent hydraulic fluid leaking to the water course, and prevent water ingress to the blade adjustment mechanism.
- **Adverse mechanical conditions.** Solosele KB Hydro will efficiently seal shafts that run eccentrically on worn bearings.
- **Suits OEM applications.** Supplied as endless (solid) type seals for simple and highly effective OEM fitment on new turbines.
- **Easy to retrofit.** Available as split-type seals for swift On-Site Joining using James Walker's special OSJ® technique that gives fully-moulded seal performance without removing the blades.

Recommended dimensions

10mm housing section up to 575mm shaft diameter; 12.5mm section to 700mm diameter; 16mm section to 900mm diameter; 19mm section to 1100mm diameter; 25mm section above 1100mm diameter. *(Please consult James Walker for maximum diameters and other section/diameter ratios).*

How supplied

Endless seals for OEM installation or split-type seals with OSJ (On-Site Joining) kits for retrofitting — in a range of sections to suit Kaplan-type blade root housings.

James Walker

Lofilm® — versatile multi-lip seal

For servo motors, valve trunnion housings and Pelton turbine injectors

Lofilm® operates reliably for very long periods with the minimum thickness of stable fluid film on the dynamic contact surfaces.

Why install Lofilm®?

- Low pressure sealing capability on servo-motor applications.
- Ideal for trunnion housings on butterfly valves.
- Special sealing systems combining Lofilm® and Solosele® G on Pelton turbine injectors prove far superior to multi-lip packings.

Operating capabilities

Maximum pressure — reciprocating: 42Mpa (to ISO 5597)
Temperature range: -20 to +120°C
Maximum surface speed — reciprocating: 0.5m/s.

How supplied

As endless or split-type rings, in metric and inch sizes. Radial sections from 4mm upwards. Endless rings to 2.25m OD.

Solosele® G — single-element seal

For servo-motors, wicket gates, fixed wheel gates, trunnion housings and Pelton turbine injectors

Robust, compact seal that saves space without compromising high integrity sealing.

Why install Solosele® G?

- For servo-motors where housing space is restricted.
- Modified version of Solosele® G is the modern replacement for 'O' and 'U' rings on wicket gates.
- Protects plastic and fabric bearings on fixed wheel gates.
- Ideal for trunnion housings on butterfly and spherical valves.
- Special sealing systems combining Lofilm® and Solosele® G on Pelton turbine injectors prove far superior to multi-lip packings.

Operating capabilities

Maximum pressure — reciprocating: 42Mpa (to ISO 5597)
Temperature range: -20°C to +120°C
Maximum surface speed — reciprocating: 0.5m/s.

How supplied

As endless rings, in metric or inch sizes: 3mm ID to 2.3m OD.

Walkersele® — radial lip seal

For fixed wheel gates, fish screen gearboxes and low head turbine shafts

Our vast family of Walkersele® radial lip seals is proven worldwide for long-term bearing protection throughout the power generation industry.

Why install Walkersele®?

- Walkersele® D6 retains lubricant and/or prevents water ingress on runner bearings of fixed wheel gates.
- Walkersele® D7 will minimize river pollution from fish screen gearboxes at heads up to 400Kpa.
- Swift to fit with our patented OSJ® (On-Site Joining) kit.

Operating capabilities

Maximum system pressures: 20Kpa for D6 design; 400Kpa for D7.
Maximum surface speed: Up to 30m/s for D6; 25m/s for D7.

How supplied

Metric and inch sizes, in over 10,000 size/material combinations.

Arasele – braided packing

For valves and pumps handling highly abrasive or aggressive chemical media.

Arasele can readily overcome the shaft and rod wear problems often experienced with inferior grades of aramid-based packing.

Why install Arasele?

- Soft and tough replacement for hard fibre aramid braided packings.
- Kinder to shafts than traditional yellow grades under adverse operating conditions.
- Can eliminate unnecessary wear.
- For valves and rotary or reciprocating pumps that handle highly abrasive slurries or aggressive chemical media.

Operating capabilities

Maximum valve pressure: 15Mpa
Maximum system pressure — rotary pumps: 2.5Mpa
Maximum shaft speed — rotary pumps: 20m/s
Maximum system pressure — reciprocating: 10Mpa
Maximum surface speed — reciprocating: 1.5m/s
Temperature range: -50°C to +285°C.

How supplied

All standard square sections to fit pump and valve glands, boxed in 8m lengths. Also supplied as mould-formed rings and sets.

High performance sealing for hydropower

Other recommended braided packings

For pumps and valves across the hydropower industry

Aluflon

- White, conformable braided packing for valves and rotary or reciprocating pumps that handle media with suspended solids.
- Low friction — low wear.
- Long life and low maintenance.
- Chemically compatible with media in pH range 0-14.

Duramid®

- Aramid-based braided packing for small diameter turbine shafts, penstock expansion joints, pumps and valves
- Long life and minimal shaft wear on small diameter turbine shafts.
- Extrusion resistance with large clearances for packed glands on penstock expansion joints.
- Resilient and responsive in long-term service with pumps and valves handling chemically aggressive and abrasive media.

Hornet

- High performance braided packing that absorbs the eccentric action of worn shafts and bearings.
- For valves and rotary or reciprocating pumps handling highly abrasive slurries or aggressive chemical media.
- Excellent extrusion resistance.
- Low shaft wear.

Ramiex

- Extremely durable braided packing with excellent extrusion resistance.
- Low friction — low wear.
- Used with great success on reciprocating pumps working at 30Mpa with water that contains highly abrasive particles.
- Also suitable for valves and rotary pumps.

How supplied

These braided packings are supplied in all standard square sections in length form. They are also available as split preformed rings and sets.

Nebar® — cork-elastomer jointings

Flange gaskets on transformers and switchgear

Six grades of our Nebar® cork-elastomer jointings are exceptionally well proven for long-term flange sealing duties with heavy electrical plant.

Nebar® cork-elastomer jointings are also the obvious choice for numerous flange duties with oils, fuels and water in the general machinery sector.

Nebar® Black — Hi-Performance Electrical

- For hydrogen coolers or where SF6 gas is present.
- 10^{10} ohm.cm resistivity at 100Vdc.
- Retains flexibility down to -15°.

Nebar® Red — High Pressure

- For high pressure applications in switchgear and transformers.
- High resistance to mineral oils.
- Withstands higher bolt loadings than other Nebar grades.
- Retains flexibility down to -35°C.

Nebar® White — Premium Neoprene Electrical

- Top grade product for transformers and switchgear.
- Long operational life in contact with mineral oils.
- Retains flexibility down to -35°C.

Nebar® Grey — Premium Nitrile Electrical

- Premium quality, medium hardness grade that meets ABB specifications for transformers and switchgear.
- Suitable for a wide range of electrical and engineering duties.
- Retains flexibility down to - 25°C.

Nebar® Orange — Neoprene Electrical

- Economical high-quality grade for switchgear and transformers.
- Retains flexibility down to - 30°C.

Nebar® Purple — Nitrile Electrical

- Recommended for transformer lids where mating faces are out of parallel.
- Resistant to vapour phase drying and all commonly used transformer fluids.
- Robust grade — more resistant to over-compression than normal cork-elastomer jointings.
- Retains flexibility down to -25°C.

How supplied

Cut gaskets to any shape, size or quantity. Also available in sheet form in many standard thicknesses.

James Walker

Elastomer mouldings and extrusions

Inlet valve seals, dam gate seals…

Our plants for the production of elastomeric components are amongst the most advanced in the world.

Custom-designed components for the hydropower sector include:

- Seals for butterfly and spherical inlet valves, with a wide selection to fit Boving types.
- Vertical lift sliding gate seals — as solid elastomer extrusions, fabric-reinforced elastomer, or elastomer with a bonded cladding of wear-resistant PTFE.

Flange gaskets and sheet jointings

General services, including oxygen and potable water

Our wide range of sheet jointings and gaskets includes:

- Non-asbestos fibre jointing grades for the majority of flange duties.
- Supagraf® expanded graphite jointings for high temperatures.
- Metaflex® spiral wound gaskets for flange installations where pressure, temperature, vibration or flow rates are beyond the capability of conventional jointing materials.
- James Walker Gylon 3510 (white) and 3504 (blue) modified PTFE jointings for duties where hygiene and chemical resistance are top priority.
- ePTFE gasket products by WL Gore & Associates.

How supplied

Precision gaskets to virtually any shape, size or quantity. Sheet jointings in roll form with sizes and thicknesses dependent on material grade.

Hydraulic sealing

For virtually every hydraulic application

We have a large family of rod/gland seals, piston seals, wipers and bearing strips that suits the heaviest jacks and cylinders, down to the most accurate control actuators and instruments.

How supplied

Standard and non-standard sizes to both inch and metric dimensions.

RotaBolt® — tension control fasteners

Assured tension across bolted joints

Our RotaBolt® tension control fasteners provide reliable bolted connections in applications where cost, health and safety or environmental consequences are of paramount importance on structural assemblies and flange joints.

How supplied

Standard range includes bolts of ½″ section and above and studs with a section of ¾″ or greater, in most materials. Customer-supplied fasteners can also be modified.

General information

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

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. 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.

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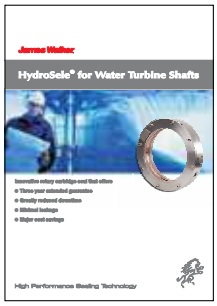
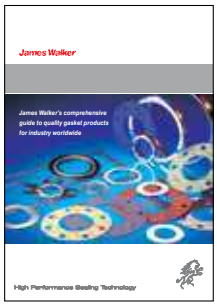


HydroSele®

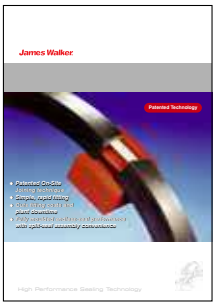
Solosele® KB Hydro

Compression packings



Gaskets & jointings

RotaBolt®



Walkersele® OSJ-2

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