

James Walker®

Sealing Guide for the Iron & Steel Industry

Issue 2

Global supply of

- **Best-value fluid seals & gaskets**
- **Standard & custom-designed products**
- **Bolting technology**
- **Vibration damping & control**



High Performance Sealing Technology

Sealing guide for the iron & steel industry

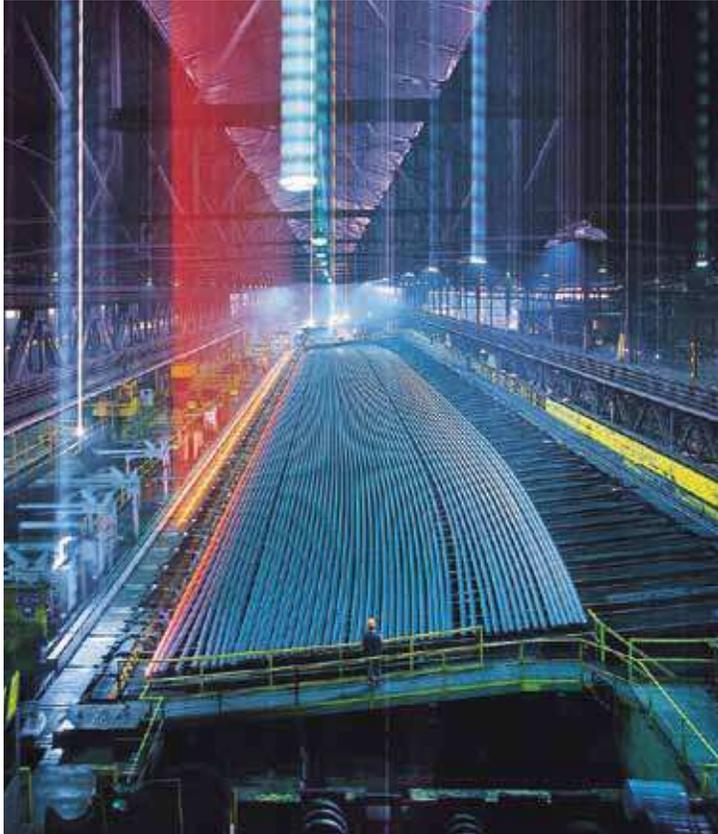


Photo courtesy of Siemens VAI

World's longest rails — Siemens VAI hot rolling mill, Danawitz, Austria

Introduction

James Walker is a dynamic global manufacturer and distributor that supplies a vast range of specialized products to the iron and steel sector on a global basis.

From raw materials handling systems and iron and steelmaking processes, through casting plant and rolling mills, to giant forging and extrusion presses — we have a long-proven track record as a leader in fluid sealing and associated technologies.

Our world-leading expertise and capability are led by design and materials technology, plus the willingness to solve sealing problems for equipment manufacturers, plant operators and maintenance contractors.

To achieve this, we embrace the complete industrial cycle from research, development and manufacture, to product application and plant maintenance.

This publication follows the process route through iron and steelmaking, and itemizes the James Walker products and services applicable to different plant. Our range is being constantly developed to meet customer demand, so please contact your local James Walker company — as shown on rear cover — if your need falls outside the products and services described.

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Meeting global demands

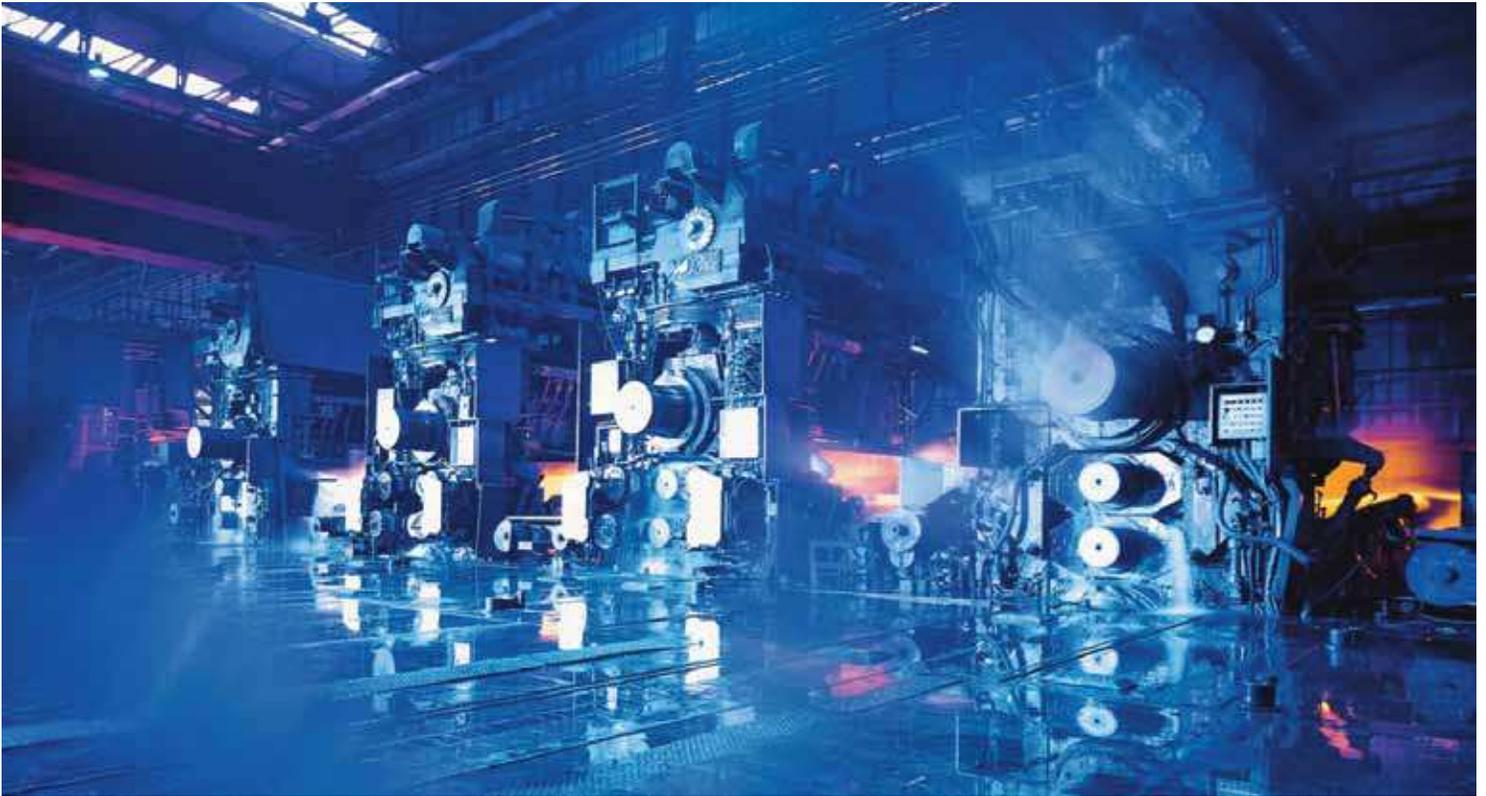


Photo courtesy of Siemens VAI

Siemens VAI hot strip mill, Linz, Austria

Global services

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 the Americas, Europe, Australasia, Asia Pacific and Africa.

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

Partnering contracts

E-commerce and logistics feature strongly in our long-term partnering contracts with major multi-national steel corporations. Their engineers are able to specify, select and order sealing items on-line from site, anywhere in the world, in the sure knowledge that their requirements will be swiftly and efficiently met.

These contracts are managed by dedicated managers with specialized teams of experts whose sole responsibility is to service the needs of that customer's sites across different countries and continents. In many cases we hold stocks of customer-specific products local to their sites for immediate delivery.

Our service, however, is not limited to the supply of items to meet planned maintenance and unscheduled shutdowns.

Our metallurgical industry specialists work in close harmony with customers' engineers and scientists to solve their complex fluid sealing problems and generate best-value solutions. This leads to the development of new products that meet ever-increasing production demands, changing health and safety regimes and new environment legislation.

Quality led by technology



Elastomer production at James Walker's Cockermouth, UK plant



Critical inspection of elastomeric moldings with state-of-the-art optical measuring system

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 customized services.

Our quality standards are third party registered to ISO 9001:2008. Industry bodies, as well as corporations, utilities and government organizations, regularly assess and approve our standards.

Leading with technology

By operating at the leading edge of technology, we insure 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.

We make best use of these capabilities to help industry improve its safety, environmental systems and revenue protection. Many of our products efficiently control fugitive emissions of volatile organic compounds to TA-Luft and other standards.

We also provide specialized knowledge and products to companies that must meet the latest environmental legislation, such as the European Union's wide-ranging Integrated Pollution Prevention and Control (IPPC) directive 96/61/EC.

Scientists and engineers at the James Walker Technology Center work constantly on in-house and customer-specific research and development projects — often in conjunction with other sites of excellence — to convert innovative materials and ideas into sealing production reality.

These are just a few examples of our R&D successes:

- **Walkersele® OSJ-2** — OSJ® is our patented technique for On-Site Joining of a seal around a shaft without stripping down the housing or shaft. This saves plant operators days of maintenance time and plant shutdown, without loss of sealing integrity or operational life.
- **Walkersele® Ultraglide** — A reformulated hydrogenated nitrile (HNBR) material, with optimized properties, that greatly extends the working life of rotary seals running for long periods under hot and abrasive conditions. On the intermediate stand of a hot rolling mill, Walkersele® Ultraglide has given six times the maintenance-free life of a traditional nitrile NBR seal.
- **RotaBolt®** — The world's first safety bolt to give a clear indication of tension loss across a bolted joint. It uniquely improves safety regimes and makes significant savings in maintenance costs.

Raw materials handling & preparation

Sealing products that improve plant performance at the raw materials end of the iron and steelmaking process

Harbor cranes

Gearbox bearing seals on machine house winding drums

- Walkersele® lip seal M1/D6 OSJ-2 and Ultraglide OSJ-2.
- Bolt-on fully split cartridge seals for worn shafts.

Bolted joints on grab jaws, gearboxes, drive mechanism, mechanical & structural components

- RotaBolt® tension control fasteners.

Burden handling plant

Stacker reclaimers

Hydraulic cylinders

- Split-type Lofilm® seals in Elast-O-Lion® hydrogenated nitrile HNBR.
- Comflex® protector bellows.

Slewing bearings

- Large diameter Walkersele® OSJ-2 radial lip seals.
- RotaBolt® tension control fasteners.

Winding gear

- Walkersele® OSJ-2 radial lip seals.
- Bolt-on rotary cartridge seals for worn shafts.

Bucket wheels

- RotaBolt® tension control fasteners for retention bolting.

Conveyors

Conveyor drive gearboxes

- Walkersele® radial lip seals M1/D6, M6/D6, Ultraglide D6, and OSJ-2.
- Bolt-on rotary cartridge seals for worn shafts.

Ball mills

Hydraulic cylinders

- Full family of hydraulic sealing products.

Trunnion bearings

- Large diameter Walkersele® OSJ-2 radial lip seals.
- Bolt-on rotary cartridge seals for worn shafts.



EMO dry bulk terminal, Rotterdam, Holland

Walkersele® OSJ-2



Bolt-on rotary cartridge seals



RotaBolt® tension control fasteners



Hydraulic sealing products



Comflex® protector bellows



Primary processes

Sealing products that are well proven for process plant operating in very hot and abrasive conditions

Coking plant

Battery ovens

- Battery door seals — Valcor® Hi-Temp braided packing.
- Battery charger lid bellows — Comflex® bellows.

Coke discharge pusher rams

- Hydraulic seals in high-temperature resistant FKM.
- Comflex® protector bellows.

Pumps and valves

- Braided packings — to suit both pumps and valves for reduced maintenance stockholding.
- Mechanical seals.
- James Walker's mechanical seal refurbishment service.

Gas extraction plant pipework

- Comflex® metallic expansion joints.
- Gaskets — Metaflex® spiral wound, Metakamm® Kammprofile-type, Supagraf® Furnasele and Metex.
- Cut gaskets from any sheet jointing material.

Conveyor drives

- Walkersele® Ultraglide radial lip seals.

Vibrating hoppers

- RotaBolt® tension control fasteners to prevent loosening.

Sinter plant & pelletizing plant

Furnaces and pipework

- Supagraf® Furnasele, Metex, Metaflex® spiral wound and Metakamm® Kammprofile-type gaskets.
- Cut gaskets from any sheet jointing material.
- Comflex® expansion joints.

Conveyor drives

- Walkersele® radial lip seals.

Rotary kilns

- Walkersele® OSJ-2 radial lip seals.

Pumps and valves

- Braided packings — to suit both pumps and valves for reduced maintenance stockholding.
- Mechanical seals and James Walker's refurbishment service.



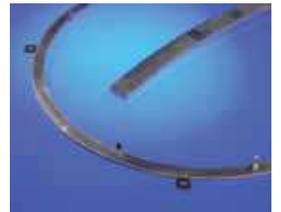
Hydraulic and pneumatic cylinders

- Hydraulic seals — Lofilm®, Shallex®, Lionsele® G, plus hydraulic wipers and bearing strips.
- Pneumatic seals — Lionsele® P, and rubber/polyurethane U-rings, plus bearing strips.

Vibrating hoppers

- RotaBolt® tension control fasteners to prevent loosening.

Supagraf® Furnasele and Metex gaskets



Metaflex® and Metakamm® gaskets



Comflex® Metallic Bellows



Hydraulic and pneumatic seals



We recommend these products for aggressive environments including blast furnaces, raw coal ironmaking processes, DR plant and DRC rotary kilns

Bustle mains — stove duct connectors

- Gaskets — Supagraf® Furnasele and Metex solid stainless steel/graphite combination gaskets.

Tuyere stocks — downleg to elbow joints and access doors

- Gaskets — Metaflex® spiral wound, Metakamm® Kammprofile-types and corrugated double-jacketed gaskets with graphite facings.

Slag taphole drills & clay guns

- Hydraulic seals.

Gas lines

- Metal jacketed gaskets.

Skip hoist gearbox

- Walkersele® radial lip seals.

Bell-less top system — bi-furcated chutes, valve seats, flanges and planetary gearboxes

- Copper jacketed gaskets.
- Silicone T seals.
- Arasele braided packing.
- Super Twilstele® XA-G gaskets.
- Rectangular section valve seats in silicone (VMQ) or Elast-O-Lion® hydrogenated nitrile (HNBR) elastomers.

Stave connections

- Metaflex® spiral wound gaskets.
- High-temperature resistant 'O' rings.

Blast furnace flow gates

- Walkersele® OSJ-2 rotary split cartridge sealing units.

Gas valves

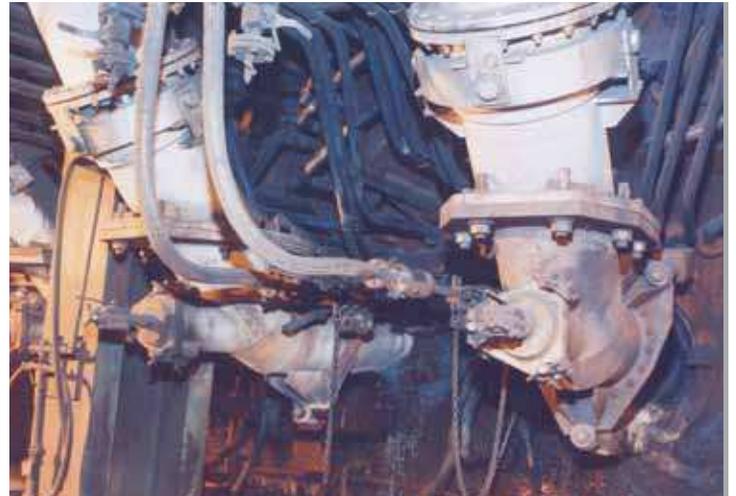
- Supagraf® Premier and Supagraf® Control braided packings.

Torpedo transporters

- Tow-arm cushion/shock absorber — Tico® Loadtech Buffers.
- Tilting mechanism gearbox — Walkersele® radial lip seals.

Pumps — in general

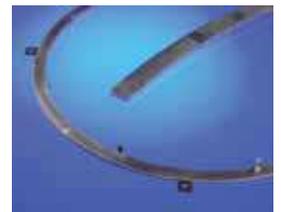
- Arasele braided packing, and many other grades.
- Mechanical seals and James Walker's refurbishment service.



High temperature pipework systems

- Comflex® metal bellows.
- Supagraf® Furnasele and other high temperature gaskets.
- Valcor® Hi-Temp braided packing.

Supagraf® Furnasele and Metex gaskets



Metaflex® and Metakamm® gaskets



Supagraf® Premier braided packing



Split Cartridge unit



Steelmaking

Our seals and associated products that work efficiently for long periods in high temperature abrasive environments are vital to every steelmaking process

Basic oxygen converters

Gear drive tilting mechanism

- Walkersele® radial lip seals.

Torque arm gearbox

- Motion cushioning — snubber rubbers.

Extraction hood

- Hood seals — Valcor® Hi-Temp braided packing.

Oxygen lance and oxygen delivery system

- 'O' rings of silicone (VMQ) or fluoroelastomer (FKM).

Converter trunnion bearings

- Large diameter Walkersele® OSJ-2 radial lip seals.

Charging manipulator — hydraulic cylinders

- Lofilm® hydraulic seals — in materials resistant to fire-retardant hydraulic fluid.
- Complex® protector bellows.

Ladle tilter

- RotaBolt® tension control fasteners.

Extraction ducts and flanges

- Complex® HT/XA — very large, high temperature expansion joints.
- Supagraf® Furnasele, and other high temperature gaskets.

Electric arc furnaces

Extraction ducts and flanges

- Complex® HT/XA high temperature expansion joints.
- Supagraf® Furnasele, and other high temperature flange gaskets.

Electrode regulator — hydraulic cylinders

- Lofilm® and other hydraulic seals.
- Complex® protector bellows.

Overhead gantry cranes

- Walkersele® Ultraglide OSJ-2 radial lip seals.
- Crane couplings — RotaBolt® tension control fasteners.
- Crane rail strip.



Walkersele® Ultraglide OSJ-2



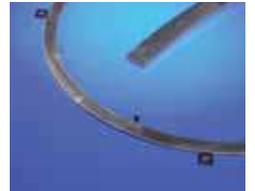
RotaBolt® tension control fasteners



Lofilm® multi-lip hydraulic seal



Supagraf® Furnasele gasket



Complex® HT/XA expansion joints



Valcor® Hi-Temp braided packing



Secondary steelmaking

These products are proven on ladle treatment stations, ladle furnaces, vacuum degassing systems, and vacuum circulating processes

Secondary steelmaking plant

Main flanges

- James Walker's special design of wedge-shaped rubber/metal flange gaskets.

RH degasser top flanges

- James Walker's special design of wedge-shaped rubber/metal flange gaskets.

Allow chute flanges

- James Walker's special design of wedge-shaped rubber/metal flange gaskets.

Hot take-off flanges

- Supagraf® Furnasele, and other designs of Supagraf® graphite/steel laminated gaskets.

RH degasser — top hydraulic jacks

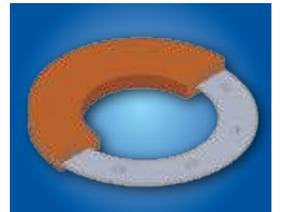
- Lionsele® G hydraulic seals in Elast-O-Lion® hydrogenated nitrile (HNBR).
- L-shaped wipers.
- 'O' rings in Elast-O-Lion® hydrogenated nitrile (HNBR) and other high-temperature resistant elastomers.
- Complex® protector bellows.

Vacuum plant

- Incoval XA high-temperature braided packing.
- Manhole covers — cut gaskets of Sentinel® sheet jointing.



Wedge-shaped rubber/metal flange gaskets



Supagraf® Furnasele gasket



Lionsele® G hydraulic seal



Incoval XA braided packing



Sentinel® cut gaskets



Continuous casting

Our family of hydraulic sealing products, together with rotary seals, gaskets and fasteners, help keep continuous casters working efficiently

Continuous casters — slab, thin slab, bloom, billet & beam blank

Water cooling connections

- 'O' rings in silicone (VMQ).

Roller bearings

- Walkersele® radial lip seals in fluoroelastomer (FKM).
- Metallic laminar sealing rings — labyrinth seals.
- Spring-energised PTFE U-rings.
- Metallic piston rings.

Roll positioning, adjusting and straightening cylinders

- Straightening cylinders — Solosele® and Lionsele® S hydraulic seals in FR44/80 or FR66/KC300 fluorocarbon (FKM) materials.
- Shallex® hydraulic seals.
- Lionsele® LF hydraulic seals with bronze carrier rings/housings.
- U-rings in hydrolysis-resistant and amine-resistant polyurethane (AU/EU).
- PTFE-loaded lip seals.
- Heavy duty wipers.
- Comflex® protector bellows.

Top zone rollers

- Walkersele® Ultraglide D7 radial lip seals.

Electromagnetic stirrer on bloom caster

- Supagraf® Tanged T10 gaskets.

Length measuring device wheel

- Supagraf® Tanged T10 gaskets.

Concast slew bearings

- Walkersele® OSJ-2 radial lip seals.

Concast foundation blocks

- RotaBolt® tension control fasteners.

Steam exhaust fan

- Holding bolts — RotaBolt® tension control fasteners.

Slab straightener gearbox

- Holding bolts — RotaBolt® tension control fasteners.
- Walkersele® radial lip seals and OSJ-2.

Crane coupling bolts

- RotaBolt® tension control fasteners.



Cooling water pumps and valves

- Braided packings — to suit both pumps and valves for reduced maintenance stockholding.
- Mechanical seals for pumps.
- James Walker's mechanical seal refurbishment service.

Spray cooling chamber roller bearings.

- Walkersele® M8/D6 and M8/D7 radial lip seals.



Family of hydraulic sealing products



Supagraf® Tanged T10 gaskets



Walkersele® Ultraglide OSJ-2 radial lip seal



RotaBolt® tension control fastener

Hot rolling

We developed Walkersele® Ultraglide radial lip seals specifically for hot rolling mills. Together with hydraulic sealing products, they lead our activities in this most demanding environment

Steckel, hot-strip, compact, plate, section/bar & reversing mills

Work roll chocks

- Walkersele® Ultraglide D6 and M1/D6 radial lip seals.
- Lantern rings.

Chock covers

- Nebar® cork-elastomer gaskets.

Back-up chocks

- Walkersele® radial lip seals.

Automatic gauge control (AGC) units

- Lionsele® P composite double-acting hydraulic piston seal.
- Walkersele® M1/D7 Shallowback lip seal — acting as a wiper.
- Solosele® G hydraulic seals in NM59/80 and GHN/FC materials — for static hydraulic duties.
- Solosele® G-AE hydraulic seals on vertical rolling cages AGC.
- Composite seals with NBR or FKM energizer and element of high-performance Fluolion® Xtreme PTFE.
- Comflex® protector bellows.

Screw down drives

- Comflex® protector bellows.

Roller tables

- Gearboxes and approach table rollers that are driven — Walkersele® M1/D6, M6/D6 and Ultraglide D6 radial lip seals, and OSJ-2.

Roll balance cylinders and roll bend cylinders

- Hydraulic seals — Shallex®, Solosele® and dish rings that are compatible with non-flammable phosphate-ester fluids.
- Comflex® protector bellows.

Hydraulic manipulators

- Hydraulic seals — Lofilm® HD and Shallex®.
- Comflex® protector bellows.

Downcoilers/tension reels

- Drive gearboxes — Walkersele® radial lip seals and OSJ-2.
- Positioning cylinders — Shallex® and Twinset hydraulic seals.

Dynamic shaped rolls

- External lip Walkersele® Ultraglide radial lip seals.



Plate mill guides, breast roll bearing bolts, Holset coupling bolts, flying shear holding-down bolts, and bar mill vertical shaft drive couplings.

- RotaBolt® tension control fasteners.

Water descalers

- Metaflex® spiral wound gaskets.
- 'O' rings of high performance elastomers.
- Mechanical seals and James Walker's refurbishment service.

Rotary pumps

- Arasele, and other abrasion-resistant braided packings.
- Mechanical seals and James Walker's refurbishment service.



Walkersele® Ultraglide radial lip seals



Family of hydraulic sealing products



Comflex® protector bellows

Cold rolling, plus tube & pipe mills

A prime task of sealing products used in cold rolling processes is to prevent products being spoiled by fluid leakage. James Walker is a world leader in this field

Cold rolling mills

Work roll chocks

- Walkersele® M1/D6 radial lip seals.

Chock covers

- Nebar® cork-elastomer gaskets.

Back-up chocks

- Walkersele® radial lip seals.

Automatic gauge control (AGC) units

- Lionsele® P composite double-acting hydraulic piston seal.
- Walkersele® M1/D7 Shallowback lip seal — acting as a wiper.
- Solosele® G hydraulic seals in NM59/80 and GHN/FC materials — for static hydraulic duties.
- Solosele® G-AE hydraulic seals on vertical rolling cages AGC.
- Composite seals with NBR or FKM energizer and element of high-performance Fluolion® Xtreme PTFE.
- Comflex® protector bellows.

Screw down drives

- Comflex® protector bellows.

Roller tables

- Gearboxes and approach table rollers that are driven — Walkersele® M1/D6, M6/D6 and Ultraglide D6 radial lip seals, and OSJ-2.

Roll balance cylinders and roll bend cylinders

- Hydraulic seals — Shallex®, Solosele® or dish rings.
- Comflex® protector bellows.

Hydraulic manipulators

- Hydraulic seals — Lofilm® HD and Shallex®.
- Comflex® protector bellows.

Downcoilers/tension reels

- Drive gearboxes — Walkersele® radial lip seals and OSJ-2.
- Positioning cylinders — Shallex® and Twinset hydraulic seals.

Dynamic shaped rolls

- External lip Walkersele® Ultraglide radial lip seals.

Coupling and hold-down bolts

- RotaBolt® tension control fasteners.

Electrical grade sheet mill wipers

- Speciality grade felt wipers.



Tube & pipe mills

Uncoilers

- Walkersele® radial lip seals.
- Hydraulic seals.

Forming presses

- Heavy duty hydraulic seals — Lofilm® HD.

Tube testers

- Polyurethane (EU/AU) dual-hardness tube test seals rated at least 11,600psi (800bar).
- Rubber/fabric composite tube test seals.

Lofilm® HD heavy duty hydraulic seal



Polyurethane tube test seals



RotaBolt® tension control fasteners



Pickling, coating & shearing

Pickling lines need acid-resistant sealing products — such as mechanical seals, braided packings and chemically compatible gaskets

Pickling lines

Pumps and valves

- Mechanical seals.
- Braided packings — acid resistant grades to suit both pumps and valves for reduced maintenance stockholding.
- Acid resistant gaskets — stabilized PTFE, Metaflex® spiral wound and Metakamm® Kammprofile.
- Flange protectors.
- James Walker's mechanical seal refurbishment service.



Hot dip galvanizing, color coating, & tinning lines

Rollers

- Walkersele® radial lip seals.

Pumps and valves

- Mechanical seals.
- Braided packings — to suit both pumps and valves for reduced maintenance stockholding.
- James Walker's mechanical seal refurbishment service.

Sink rolls

- Sink roll seals — specially designed mechanical seals.
- James Walker's mechanical seal refurbishment service.

Shearing lines & slitting lines

Flying shear

- Hydraulic sealing products.
- Holding down bolts — RotaBolt® tension control fasteners.

Cold strip slitting machine

- Slitting rubbers — large rectangular section rubber rings.



Stabilized PTFE gasket



Metaflex® spiral wound gaskets



Braided packings for pumps and valves



Flange protectors



Mechanical seal refurbishment service

Forging & extrusion

We have a long history of sealing and buffering the world's largest presses. New designs and materials keep us ahead of the field — with traditional products still available for older equipment

Forging & extrusion presses

Press installations

- Tico® pit installations — for the reduction, damping and isolation of noise and vibration.

Main ram

- Heavy duty hydraulic seals — Lofilm® HD and Lion® Expanding with Self-aligning Gland Rings.

Approach and drawback rams

- Hydraulic seals — Lion® Expanding, Lofilm®, and Shallex®.

Manipulator rams and positioning cylinders

- Hydraulic seals — Lofilm®, Shallex®, and Lionsele® G.

Forging hammers

- Tico® pit installations — for the reduction, damping and isolation of noise and vibration.
- Anvil mats — Tico® Hi-Duty RF/PA pads.

Massey hammers

- Tico® pit installations — for the reduction, damping and isolation of noise and vibration.
- Spigot joints — Tico® Hi-Duty PF/PA pads.
- Anvil pads — Tico® Hi-Duty RF/PA pads.

Beche hammers

- Counter-blow buffers — Tico® Loadtech.

High-speed reciprocating pumps

- Lion® Expanding and Shallex® packing sets in special materials.

Alternative rod pumps

- Ramiex braided packing with PTFE intermediate washers.

General applications on press installations

- Comflex® protector bellows.
- Mechanical seals.
- James Walker's mechanical seal refurbishment service.



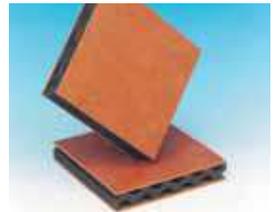
Heavy duty hydraulic seals



Tico® pit installation



Tico® Hi-Duty pads



Ramiex braided packing

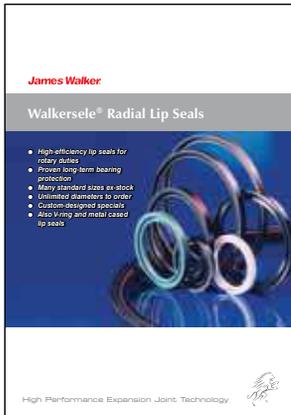


Comflex® protector bellows

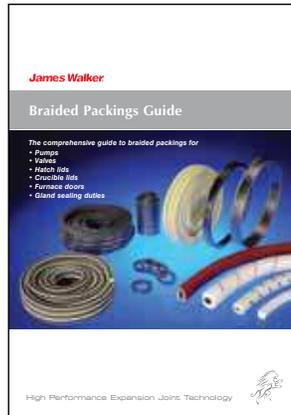


Technical guides

These free guides give detailed technical information on the products and services covered in this publication. Please ask your local James Walker company for copies — see contact details on back cover. Many of these guides can also be downloaded in pdf form from our website www.jameswalker.biz.



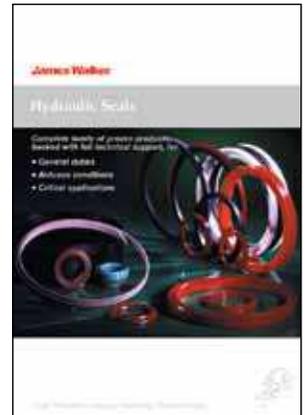
Walkersele® Radial Lip Seals



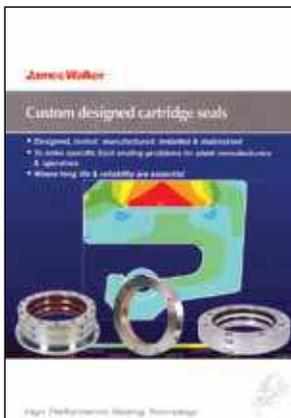
Braided packings



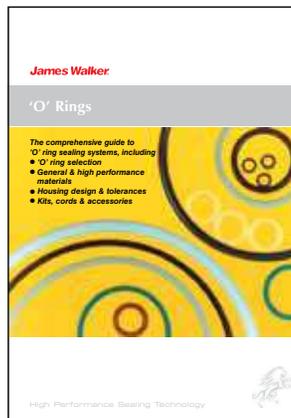
Gaskets & jointings



Hydraulic seals



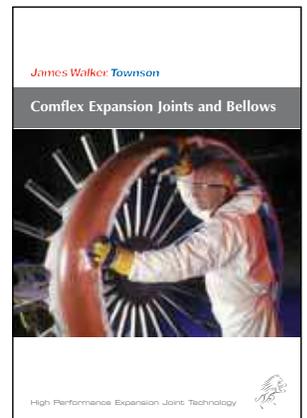
Custom-designed cartridge seals



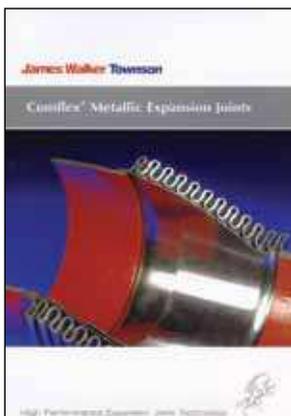
'O' rings



RotaBolt® tension control



Complex® expansion joints & bellows



Complex® metallic bellows & expansion joints



Tube test seals

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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 480°F (250°C) from fluoroelastomers or below 570°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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