

Engineering the
Next Generation of
High-Performance Seals

Creating Uncommon Partnerships

Through a uniquely collaborative process, System Seals works closely with each customer to develop next-generation products that are changing the role of fluid seals from standard stock parts to an opportunity for greater performance.

Through advanced technology in materials and design, customers work directly with the industry's leading engineers and manufacturing specialists. Together, they find new ways to increase equipment reliability, reduce downtime and solve problems. Whether it's OEM products or maintenance-and-repair, System Seals delivers a level of expertise and service that consistently exceeds expectations.





It's Time We Had the Engineer-to-Engineer Talk.

Customers new to System Seals are surprised when they work directly with engineers who know their industry and their specific equipment.

By analyzing the entire application, specialists explore new ways to advance performance and reliability with every order. In many cases, System Seals' utilizes advanced analytical tools, such as finite element analysis, to identify hidden problems and develop breakthrough advancements. New designs are then tested in System Seals' state-of-the-art facility, while customers remain engaged in the development process, every step of the way.

It's this unique approach that has enabled System Seals and its customers to collaborate on designs that have changed performance standards throughout several major industries, such as steel, mining, wind, forging, injection molding and oil & gas. Don't just place an order. Talk to an engineer and discover a better approach.

Original Equipment Manufacturers

System Seals works with some of the most respected brands on the planet, creating sealing systems that add considerable value to OEM products. The company frequently develops OEM seals that outlast the manufacturer's warranty by several years.

When original equipment manufacturers approach System Seals, they work in collaboration with in-house engineers, who walk each case through a comprehensive design process that exacts specific needs. Through proven scientific methods and precision engineering, System Seals works with each customer to produce OEM products that are considerably more reliable than any off-the-shelf solution.

And with an increasing sense of urgency, System Seals now provides proposals and finished OEM products more quickly than other companies take to return a phone call. This expedited service comes with a team of specialists assigned to each customer. The team includes application engineers, researchers, customer service representatives and an inside logistics expert, who tracks new products from proposal to delivery.

This shared process ensures that every OEM product is the best in the world and delivered as quickly and efficiency as possible – anywhere in the world.

Advanced Research & Development

At the core of System Seals' success in design and innovation lies an elaborate research and development department. There, engineers use the latest technology to develop new designs, refine materials and innovate in ways that extend seal life and add considerable value to the products our customers build and maintain.

The process involves some of the most advanced analytical tools in the industry, such as Differential Scanning Calorimetry (DSC) and Dynamic Mechanical Analysis (DMA). This equipment helps researchers address specific material concerns such as fluid compatibility, temperature and pressure capability and unusual operating conditions.

Following initial product development, System Seals sends samples to its testing facility to refine designs and provide important data to customers. The process was established to dramatically reduce design time, expedite development and get it right the first time.

OEM Industry Specialists

System Seals' expertise runs deeper than technical design. For each major industry, the company provides a specialist who understands the precise details of key equipment within their segment. This allows the company to make continuous improvements over time, pinpoint unique challenges and work more closely with customers in their own environment.

MAJOR INDUSTRIES INCLUDE:

- Oil & Gas
- Mining
- Steel and Aluminum Processing
- Forging and Extrusion
- Injection Molding
- Mobile Hydraulics
- Pulp and Paper
- Hydraulic Cylinder Repair & Maintenance
- Industrial Compressors
- Valves, Pumps and Instruments
- Wind Energy

Interruptions. Are. Bad.

For. Pro. Duc. Tiv. Ity.

Maintenance & Repair

Too often, equipment operators settle for routine leaks and the expensive habit of relying on inferior stock seals. System Seals works closely with maintenance-and-repair customers to solve problems, find new and better ways to stop leaks, reduce downtime and significantly increase reliability.

In many cases, System Seals has custom designed maintenance-and-repair seals that have saved customers millions of dollars in lost productivity. In heavy duty applications, such as forging and steel mills, the company has dramatically extended time between scheduled maintenance by improved designs specific to their equipment.

Speed is critical. That's why System Seals manufactures and delivers customized products more quickly than any other seal producer. And our highly experienced engineers and industry specialists work directly with equipment operators to ensure their products are performing at their best. This includes installation help, technical support, failure analysis and troubleshooting long after delivery.

24/7 Emergency Response Service

Downtime can cost millions of dollars in lost productivity. That's why System Seals maintains a 24-hour emergency response service, which fills orders and expedites delivery faster than any other supplier in the industry. Nights, weekends, holidays – when seals fail, it's really your profit margin that's leaking. For many customers, System Seals has produced and delivered replacement products within 24 hours, just when they needed it most.

For emergency response call:
USA 216 220 1800

Don't just buy a replacement seal,
Upgrade your productivity with products and services that are specific to your unique equipment.





Raising the Bar for Forging and Extrusion Equipment

No additional adjustments.
No more shims. No more leaks.
Period.

For an industry that relies heavily on decades-old equipment, System Seals has redesigned the stock elastomer V-packing used for forging equipment and developed an advanced sealing solution with more than twice the normal lifespan.

System Seals' proprietary Elite system integrates one or more polyurethane seals in conjunction with the tradition elastomer-and-cloth seals that run up to 2 meters in diameter. The combination maximizes the sealing abilities of elastomer, while increasing the abrasion resistance from the polyurethane. The Elite set eliminates the need for seal adjustments, shimming and dealing with leaks.

Because each press differs greatly, System Seals custom designs blended-material V-packing for every ram. Our specialists closely analyze previously worn seals to identify weaknesses, and then they examine the design, condition and intricacies of the ram itself to recreate an entirely new V-packing.

Custom-designed products from System Seals are often produced and delivered considerably more quickly than off-the-shelf replacements. And because lost productivity can run into the millions, System Seals can help with the installation and any technical support long after the sale.

System Seals expertise in forging includes:

- Main Ram Cylinder
- Return Cylinder
- Knockout Cylinder
- Ejector Cylinder
- Sliding Table Cylinder
- Table Lock Cylinder
- Ram Wiper/Excluder Seals
- Gland Guide Element
- Piston Guide Element
- Valve Seals
- Plunger Pump Seals
- Piston Bore Seals
- Vacuum Seals
- Isothermal Press Seals
- O-Ring upgrade Seals
- Manipulator Seals
- Flange Seals

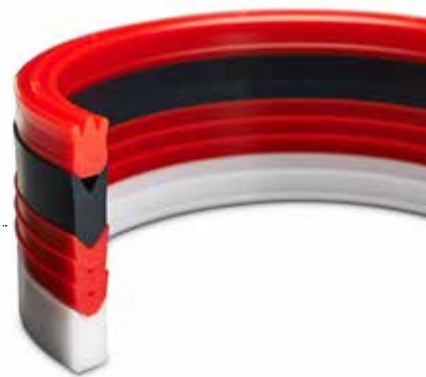
Leaders in Innovation & Reliability

The Elite Set Press Pack

A breakthrough in forging technology

System Seals has engineered a new generation of V-packing that includes one or more polyurethane seals, used in combination with traditional elastomer seals. Researchers have discovered that polyurethane resists the scored surfaces of older rams, while allowing the elastomer to remain intact and the entire system to perform more effectively and substantially longer.

Tested in System Seals' Research and Development facility, the elastomer and polyurethane worked most effectively when used together, along with a female adapter made from polyamides. Today, each Elite set is custom designed for each ram, following an extensive analysis by System Seals engineers who have a complete understanding for a variety of issues such as surface finish, groove details, tolerances and clearances.



The 148 Elite Heavy-Duty V-packing Set

Capital Project Consulting

System Seals provides a comprehensive consulting service at no charge to forging operations during capital projects and equipment rebuilds. These projects are ideal opportunities to review V-packing configurations and gain a better understanding for how they work inside specific equipment.

During these engagements, System Seals will even create engineering drawings for the piston and gland. We analyze operating conditions specific to each press, including speed, pressures and fluid compatibility. Seal failure analysis is also available to pinpoint areas for improvement.

Comprehensive consulting service at no charge.

We help forging operations during capital projects and equipment rebuilds.

A STUDY IN RELIABILITY

New Seal Technology Improves Last-Century Forging Presses

For decades the forging industry had relied exclusively on the standard molded rubber seals stacked in sets known as V-packing. But most of these seals are easily susceptible to shredding by the scarred and damaged forging rams that date as far back as the 1930s. For some companies, replacing the seals has become a monthly event. It's expensive and time consuming, and downtime costs as much as \$1 million in lost productivity.

These timeworn rams narrow at their core, creating an hourglass shape that renders conventional rubber seals deficient. The irregular shape allows oil to weep and increases the threat of extrusion. Making matters worse, the bronze bushings are typically long worn low, increasing dependence on the seals to perform under even greater pressure.

Knowing this, System Seals set out to advance the technology and provide the forging industry with the next generation of V-packing that would long outlive the industry standby, and allow these historic presses to forge on more reliably.

Engineers recognized that rubber did, in fact, provide an effective seal – when they remained intact. But they needed greater abrasion resistance against the rough rams and a more compliant lip that maintained contact, especially at the narrowing of the hourglass.

System Seals engineered a new V-packing system that includes at least one polyurethane seal, used in combination with rubber seals. Researchers discovered that polyurethane resists the scored surfaces of the ram, while allowing the rubber to remain intact and perform substantially longer.

Tested in System Seals' research facility, the rubber and polyurethane worked best together, along with a header ring made from polyamides. System Seals dubbed the new combination the Elite set, and it remains the only system of its kind on the market today.

Because every press differs greatly, System Seals custom designs V-packing for each individual ram, and the new approach is outlasting traditional all-rubber seals by more than 100 percent. For large presses on a monthly replacement schedule, that's about \$6 million per year in newfound productivity.









Researchers discovered that polyurethane resists the scored surfaces of the ram, while allowing the rubber to remain intact and perform substantially longer.

The Elite System Line

System Seals offers both standard elastomer-and-cloth V-Packing and a proprietary Elite system, which integrates one or more polyurethane seals in conjunction with tradition seals, based on the condition of each ram. The Elite system maximizes the sealing abilities of elastomer, while increasing the abrasion resistance of polyurethane.

The 148 Series Press-Pak Heavy-Duty V-Packing is available in a variety of configurations. Each set includes a reinforcing female adapter, an energizing male adapter and one to four heavy duty intermediate seal rings, depending on need. These sets are designed for dynamic applications and composed of elastomer, reinforced with fabric intermediate rings with high preload. The multiple sealing lip arrangements provide long leak-free service life. They can be supplied endless or split for ease of installation.

The 148 Elite Series is an enhanced version of the 148 Series. It utilizes abrasion-resistant polyurethane seal rings, along with a robust, extrusion-resistant Polyamides female adaptor ring. The Elite Series is a preferred choice for older legacy presses due to its abrasion and extrusion resistance. This is available in standard and custom sizes up to 2100 millimeters in diameter.

CONFIGURATION	SERIES TYPE	APPLICATIONS	DESCRIPTION
 <p>148 Elite Standard</p>	ELITE	Main Ram, Return, Table Lock cylinders	<i>This packing suited to scored rods and rams, increased extrusion protection.</i>
 <p>148 Elite A</p>	ELITE	Main Ram, Return, Cylinders	<i>This packing is suited when high performance is a must, long life, zero leakage, close tolerance stack height.</i>
 <p>148 Elite B</p>	ELITE	Main Ram, Return, Cylinders	<i>This packing is suited when high performance is a must, long life, zero leakage, shorter heights.</i>
 <p>148 Standard Series</p>	STANDARD	Main Ram, Return, General Purpose Cylinders	<i>This packing is suited to general applications.</i>
 <p>148 Standard A</p>	STANDARD	Main Ram, Return cylinder, cylinder	<i>This packing is suited to scored and damaged rams, increased extrusion protection, close tolerance stack height.</i>
 <p>148 Standard B</p>	STANDARD	Main Ram, Piston Bore, Return, Sliding Table, Cylinders	<i>This packing suited when shorter stack heights are required.</i>
 <p>140 Standard Series</p>	STANDARD	General Purpose Cylinders	<i>This packing suited to standard duty applications.</i>
 <p>140 Elite A</p>	ELITE	Main Ram, Return, Ejector, General Purpose Cylinder	<i>This packing is suited to standard duty applications, long life, zero leakage, close tolerance stack height.</i>

FORGING SEALS

product listing

	PAGE	APPLICATION	MATERIAL	TEMPERATURE	PRESSURE	SPEED
101 Rod U-Cup Seal	16	Rod Seal	MP03	-5 to +240° F -20 to +115° C	≤6,000 psi ≤400 bar	1.6 ft/sec. 0.5 m/sec.
117 Double-Lipped Rod U-Cup Seal	18	Rod Seal	MP03	-5 to +240° F -20 to +115° C	≤6,000 psi ≤400 bar	1.6 ft/sec. 0.5 m/sec.
139 Rod U-Cup Seal with Integrated Backup Ring	20	Rod Seal	MP30	-5 to +240° F -20 to +115° C	≤10,000 psi ≤690 bar	1.6 ft/sec. 0.5 m/sec.
140 Elite V-Packing	22	Rod Seal	MN142	-22 to +212° F -30 to +100° C	≤6,000 psi ≤400 bar	1.6 ft/sec. 0.5 m/sec.
148 Press-Pak Elite Heavy-Duty V-Packing	24	Rod Seal	MN142	-22 to +212° F -30 to +100° C	≤6,000 psi ≤400 bar	1.6 ft/sec. 0.5 m/sec.
156 Symmetrical Rod U-Cup Seal with Full-Face Backup Ring	26	Rod Seal	MP30	-5 to +240° F -20 to +115° C	≤20,000 psi ≤1,380 bar	1.6 ft/sec. 0.5 m/sec.
188 Heavy-Duty Rod Seal with Integrated Backup Ring	28	Rod Seal	MT24	-22 to +212° F -30 to +100° C	≤20,000 psi ≤1,380 bar	16.5 ft/sec. 5 m/sec.
190 Heavy-Duty Rod Seal	30	Rod Seal	MT23	-22 to +212° F -30 to +100° C	≤6,000 psi ≤400 bar	16.5 ft/sec. 5 m/sec.
254 Heavy-Duty, Four-Piece Piston Seal	32	Piston Seal	MT24	-22 to +212° F -30 to +100° C	≤7,250 psi ≤500 bar	5 ft/sec. 1.5 m/sec.
280 Heavy-Duty Piston Seal	34	Piston Seal	MT23	-22 to +212° F -30 to +100° C	≤6,000 psi ≤400 bar	16.5 ft/sec. 5 m/sec.

	PAGE	APPLICATION	MATERIAL	TEMPERATURE	PRESSURE	SPEED
288 Heavy-Duty Piston Seal with Integrated Backup Ring	36	Piston Seal	MT24	-22 to +212° F -30 to +100° C	≤6,000 psi ≤400 bar	16.5 ft/sec. 5 m/sec.
302 Snap-In Single Lip Wiper	38	Wiper	MP03	-5 to +240° F -20 to +115° C	N/A	6.5 ft/sec. 2 m/sec.
311 Double-Acting Snap-In Wiper	40	Wiper	MP03	-5 to +240° F -20 to +115° C	N/A	6.5 ft/sec. 2 m/sec.
314 Heavy-Duty, Double-Acting Wiper	42	Wiper	MT23	-22 to +212° F -30 to +100° C	N/A	16.5 ft/sec. 5 m/sec.
315 Heavy-Duty, Double-Acting Wiper	44	Wiper	MT23	-22 to +212° F -30 to +100° C	N/A	16.5 ft/sec. 5 m/sec.
318 Heavy-Duty, Double-Acting Wiper	46	Wiper	MT23	-22 to +212° F -30 to +100° C	N/A	16.5 ft/sec. 5 m/sec.
324 Heavy-Duty "Rambo" Snap-In Wiper	48	Wiper	MP03	-5 to +240° F -20 to +115° C	N/A	6.5 ft/sec. 2 m/sec.
845 / 890 (rod) High-Strength Composite Guide Band	50	Guide Band	MTC1	-40 to +248° F -40 to +120° C	N/A	3.3 ft/sec. 1 m/sec.
845 / 890 (piston) High-Strength Composite Guide Band	52	Guide Band	MTC1	-40 to +248° F -40 to +120° C	N/A	3.3 ft/sec. 1 m/sec.

Features:

- Asymmetrical design for optimal sealing performance
- Premium wear resistance
- Highly extrusion resistant
- Easy to install



MATERIAL

The 101 Series rod seal features high-grade polyurethane. Standard materials are MP03 machined H-PU, available up to 2100 millimeters in diameter, and MP50 injection-molded TPU. To suit a variety of applications, the series is also available in NBR, H-NBR, EPDM and high temperature-resistant FPM.

Material	Code
Polyurethane H-PU	MP03
Polyurethane TPU	MP50

OPERATING PARAMETERS

Temperature	MP03		MP50	
	°C	°F	°C	°F
hydraulic oil	-20...+115	-5...+240	-30... +110	-20...+230
water oil emulsions (HFA)	+5...+55	+40...+130	+5... +50	+40... +120
water-glycol fluids (HFC)	-20...+55	-5...+130	-30...+40	-20...+100
polyol esters (HFD)	-	-	-	-
water	+5...+55	+40...+130	+5...+50	+40...+120
speed	0.5 m/s (1.6 ft/sec)			
pressure	400 bar (6,000psi)			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 101 Series U-cup seal is one of System Seals' most popular designs used in standard-duty applications. Its asymmetrical design ensures that the seal lip forces are optimized for every cross section and diameter. When used within a sealing system, the 101 is a key component of System Seals' Zero Leak Technology. Manufactured in a variety of materials and sizes from 6mm up to 2100 millimeters in standard or custom diameters.

PRODUCT BENEFITS

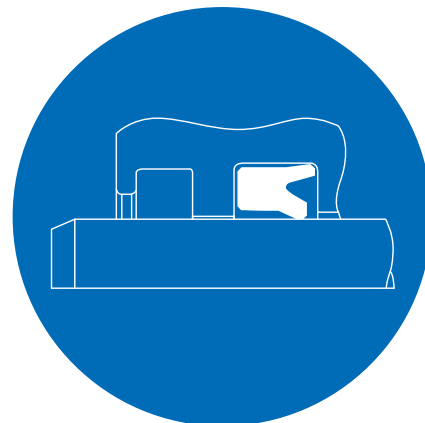
- High pressure capability and wide temperature range
- Excellent fluid compatibility including water-based fluids (H-PU)
- Exceptional abrasion resistance
- Highly extrusion resistant
- Available in diameters up to 2100 millimeters

APPLICATIONS

The 101 Series U-Cup is one of the most versatile seals typically used as a primary seal in moderate to high-pressure applications. In applications requiring Zero-Leak Technology, it is often used as a secondary seal with the 124 Series buffer seal.

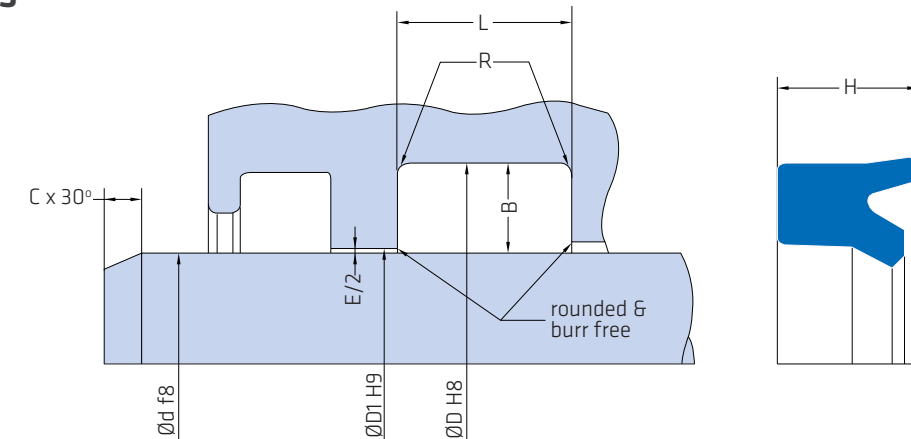
Typical applications include:

- Mobile Hydraulics
- Hydraulic Cylinder Rebuild
- Agricultural Hydraulics
- Construction Equipment
- Hydraulic Presses
- Injection Molding Machines



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	B	L ^{+0.20}	H	ØD	ØD1	R	C
Series 1	4.00 mm	6.30	5.70	d + 8.00	d + E	0.40	2.50
Series 2	4.00 mm	9.00	8.10	d + 8.00	d + E	0.40	2.50
Series 3	4.00 mm	11.00	9.90	d + 8.00	d + E	0.40	2.50
Series 4	5.00 mm	8.00	7.20	d + 10.00	d + E	0.40	4.00
Series 5	5.00 mm	11.00	9.90	d + 10.00	d + E	0.40	4.00
Series 6	7.50 mm	12.50	11.30	d + 15.00	d + E	0.40	5.00
Series 7	10.00 mm	16.00	14.40	d + 20.00	d + E	0.40	6.50
Series 8	15.00 mm	19.00	17.10	d + 30.00	d + E	0.40	7.50

INCH SERIES

	B	L ^{+0.008}	H	ØD	R	C
Series 1	0.250 in	0.413	0.375	d + 0.500	0.016	0.195
Series 2	0.375 in	0.619	0.563	d + 0.750	0.016	0.195
Series 3	0.500 in	0.825	0.750	d + 1.000	0.016	0.250
Series 4	0.563 in	0.928	0.844	d + 1.125	0.016	0.295
Series 5	0.625 in	1.031	0.938	d + 1.250	0.016	0.295
Series 6	0.750 in	1.238	1.125	d + 1.500	0.016	0.400
Series 7	1.000 in	1.650	1.500	d + 2.000	0.016	0.500

Note: The extrusion gap "E" is suitable for pressure up to 400bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Pressure	E
≤100 bar	0.50
≤250 bar	0.35
≤400 bar	0.25

Pressure	E
≤1,450 psi	0.020
≤3,625 psi	0.015
≤6,000 psi	0.010

Features:

Premium wear resistance

Secondary lip adds to seal performance and acts as a contamination barrier

Easy to install



MATERIAL

The 117 Series rod seal standard materials are MP03 machined H-PU, available up to 2100 millimeters in diameter, and MP50 injection-molded TPU. To suit a variety of applications the series is also available in NBR, H-NBR, EPDM and high temperature-resistant FPM.

Material	Code
Polyurethane H-PU (Shown in photo)	MP03
Polyurethane TPU	MP50

OPERATING PARAMETERS

Temperature	MP03		MP50	
	°C	°F	°C	°F
hydraulic oil	-20...+115	-5...+240	-30...+110	-20...+230
water oil emulsions (HFA)	+5...+55	+40...+130	+5...+50	+40...+120
water-glycol fluids (HFC)	-20...+55	-5...+130	-30...+40	-20...+100
polyol esters (HFD)	-	-	-	-
water	+5...+55	+40...+130	+5...+50	+40...+120
speed	0.5 m/s (1.6 ft/sec)			
pressure	≤400 bar (6,000psi)			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 117 Series U-cup seal is a high-performance, double-lipped seal for use as a primary seal, typically in moderate to high-pressure applications. Its asymmetrical design ensures that the seal lip forces are optimized for every cross section and diameter. Manufactured in a variety of materials and sizes from 6mm up to 2100 meters in standard or custom diameters.

PRODUCT BENEFITS

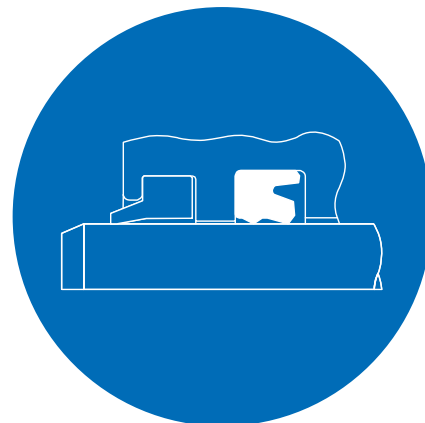
- High pressure capability and wide temperature range
- Excellent fluid compatibility including water-based fluids (H-PU)
- Exceptional abrasion resistance
- Highly extrusion resistant
- Available in diameters up to 2100 meters

APPLICATIONS

The 117 Series U-cup seal is typically used as a primary seal in moderate to high-pressure applications.

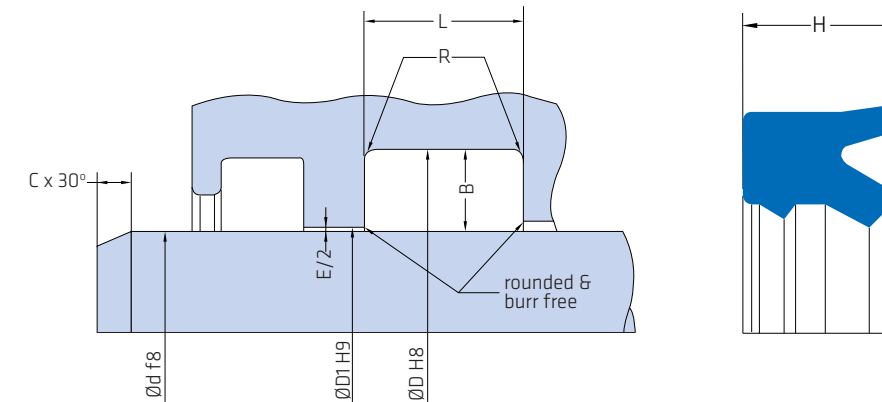
Typical applications include:

- Mining
- Agricultural Hydraulics
- Construction Equipment
- Presses
- Injection Molding Machines



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	B	L +0.20	H	ØD	ØD1	R	C
Series 1	4.00 mm	6.30	5.70	d + 8.00	d + E	0.40	2.50
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Series 7	10.00 mm	16.00	14.40	d + 20.00	d + E	0.40	6.00
Series 8	15.00 mm	19.00	17.00	d + 30.00	d + E	0.40	7.50

INCH SERIES

	B	L +0.008	H	ØD	ØD1	R	C
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Series 4	0.563 in	0.928	0.844	d + 1.125	d + E	0.016	0.295
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Sides of groove	≤3 µm	≤16 µm	125 RMS



Pressure	E
≤100 bar	0.50
≤250 bar	0.35
≤400 bar	0.25

Extrusion Gaps

Pressure	E
≤1,450 psi	0.020
≤3,625 psi	0.015
≤6,000 psi	0.010

Extrusion Gaps

Features:

- Premium wear resistance
- Optimized lip forces for every cross section and diameter
- Integrated backup ring prevents extrusion
- Easy to install



MATERIAL

The 139 Series rod seal features high-grade polyurethane. Standard materials are MP30 machined H-PU, available up to 2100 millimeters in diameter, an MN32 injection-molded TPU. To suit a variety of applications the series is also available in NBR, H-NBR, EPDM and high temperature-resistant FPM. The backup ring materials include POM, Polyamides and PEEK.

Material	Code
Polyurethane H-PU / POM (Shown in photo)	MP30
Hydrogenerated NBR, PTFE/Bz	MN32

OPERATING PARAMETERS

Temperature	MP30	
	°C	°F
hydraulic oil	-20...+115	-5...+240
water oil emulsions (HFA)	+5...+55	+40...+130
water-glycol fluids (HFC)	-20...+55	-5...+130
polyol esters (HFD)	-	-
water	+5...+55	+40...+130
speed	0.5 m/s (1.6 ft/sec)	
pressure	≤1,380 bar (20,000psi)	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 139 Series U-Cup seal is a high-performance, U-Cup seal for use in high-clearance applications, typically in moderate to high-pressure environments. Its asymmetrical design ensures that the seal lip forces are optimized for every cross section and diameter. The integrated backup ring supports the seal and ensures maximum extrusion resistance in a larger than normal clearance application. Manufactured in a variety of materials and sizes from 6mm to 2100 millimeters in diameter in standard or custom sizes.

PRODUCT BENEFITS

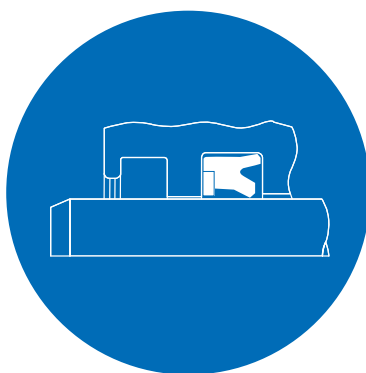
- Designed specifically for large clearance applications
- High pressure capability and wide temperature range
- Excellent fluid compatibility including water-based fluids (H-PU)
- Exceptional abrasion resistance
- Highly extrusion resistant

APPLICATIONS

The 139 Series U-Cup seal is typically used in high-clearance applications as a primary seal and functions well in moderate to high pressures.

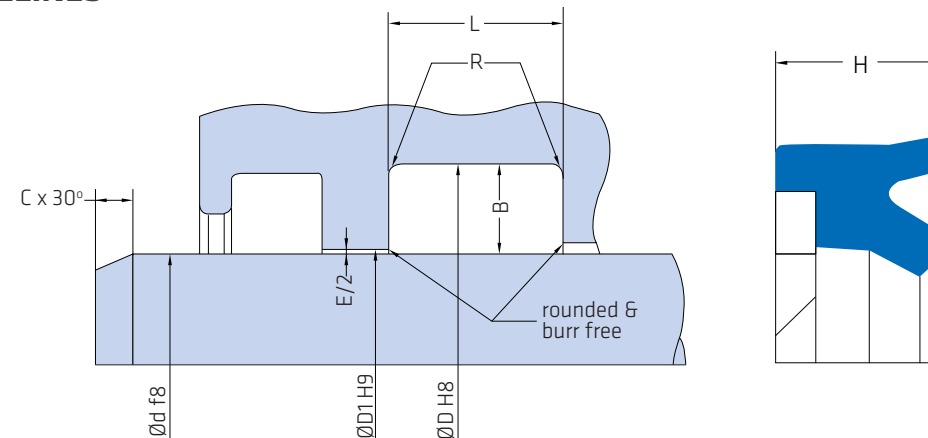
Typical applications include:

- Forging and Extrusion Presses
- Stamping Presses
- Mining
- Agriculture
- Construction Equipment
- Injection Molding Machines



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	B	L ^{+0.20}	H	ØD	ØD1	R	C
Series 1	4.00 mm	9.00	8.10	d + 8.00	d + E	.40	2.50
Series 2	5.00 mm	11.00	9.90	d + 10.00	d + E	.40	4.00
Series 3	7.50 mm	12.50	11.30	d + 15.00	d + E	.40	5.00
Series 4	10.00 mm	16.00	14.80	d + 20.00	d + E	.40	6.50
Series 5	15.00 mm	20.00	18.80	d + 30.00	d + E	.40	7.50
Series 6	20.00 mm	26.50	25.30	d + 40.00	d + E	.40	10.00

INCH SERIES

	B	L ^{+0.008}	H	ØD	ØD1	R	C
Series 1	0.250 in	0.413	0.375	d + 0.500	d + E	0.016	0.195
Series 2	0.375 in	0.619	0.563	d + 0.750	d + E	0.016	0.195
Series 3	0.500 in	0.825	0.750	d + 1.000	d + E	0.016	0.250
Series 4	0.563 in	0.928	0.750	d + 1.000	d + E	0.016	0.295
Series 5	0.625 in	1.031	0.938	d + 1.250	d + E	0.016	0.295
Series 6	0.750 in	1.238	1.125	d + 1.500	d + E	0.016	0.400
Series 7	1.000 in	1.650	1.500	d + 2.000	d + E	0.016	0.500

Note: The extrusion gap "E" is suitable for pressure up to 400bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Pressure (bar)	E
≤100 bar	1.00
≤250 bar	0.85
≤400 bar	0.70

Pressure (psi)	E
≤1,450 psi	0.040
≤3,625 psi	0.035
≤6,000 psi	0.030

Features:

Variable assembly options, from one to six intermediate seal rings

Female adapter supports the seal set and prevents extrusion

Available in molded elastomer and fabric construction, as well as machined materials, such as polyurethane, nitrile and fluoroelastomer.

Available in split or endless for easy installation



MATERIAL

Molded designs: Common construction consists of nitrile and fabric and fluoroelastomer and fabric for higher temperatures.

Machined designs: Available in abrasion-resistant polyurethane, nitrile, HNBR, EPDM and fluoroelastomer.

Material	Code
NBR/Cotton, Polyamides, H-PUR	MN142
NBR/fabric	MN50
NBR and PTFE Bz	MN19
NBR and Polyamides	MN13
HNBR and PTFE/Bz	MN32

OPERATING PARAMETERS

Temperature	MN142	
	°C	°F
hydraulic oil	-30...+100	-22...+212
water oil emulsions (HFA)	+5...+60	+41...+140
water-glycol fluids (HFC)	-30...+60	-22...+140
water	+5...+100	+41...+212
speed	0.5 m/s (1.6 ft/sec)	
pressure	400 bar (6,000psi)	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 140 Series V-Packing is available in a variety of configurations including standard and elite. Each set includes a reinforcing female adapter, an energizing male adapter and one to six chevron intermediate seal rings, depending on need. These sets are designed for dynamic applications and composed of elastomer, reinforced with fabric V-Rings with high preload. The multiple sealing lip arrangements provide long leak-free service life. They can be supplied endless or split for ease of installation.

PRODUCT BENEFITS

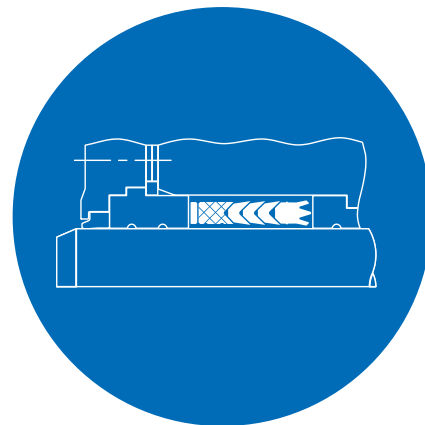
- Robust multi-lip design for maximum seal life
- Easily configured for retrofit applications
- Preferred design for rams with worn surfaces over conventional seal
- Proven design with long history of success

APPLICATIONS

The 140 Series V-Packing is a popular choice in heavy duty applications requiring maximum service life and leak-free performance.

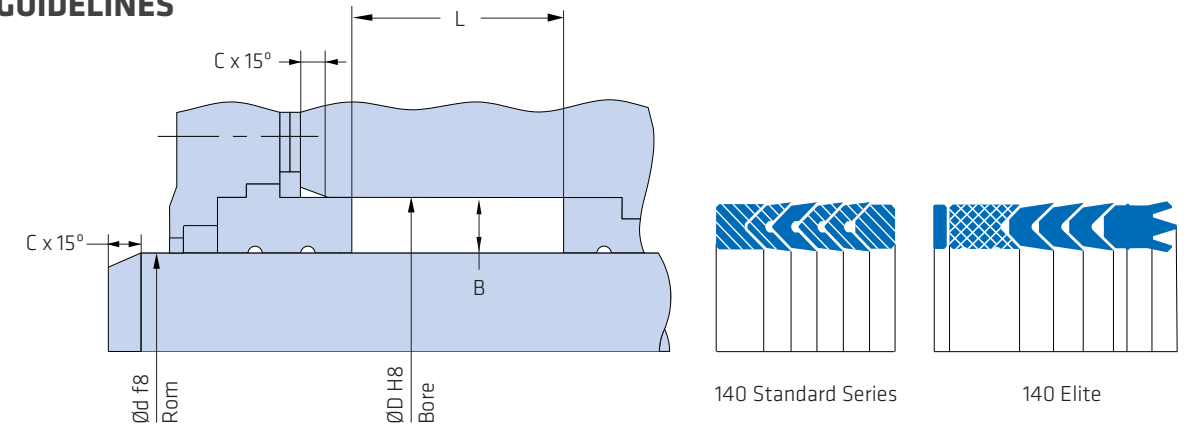
Typical applications include:

- Heavy Duty Forging Presses
- Stamping Presses
- Injection Molding Machines
- Extrusion presses
- Board Presses
- Legacy Equipment



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	d	B	L
Series 1	8-50 mm	5.00-8.00	20.00-125.00
Series 2	55-150 mm	6.00-12.50	25.00-150.00
Series 3	155-200 mm	7.50-15.00	40.00-200.00
Series 4	210-400 mm	10.00-20.00	50.00-300.00
Series 5	410-650 mm	12.50-25.00	80.00-325.00
Series 6	670-900 mm	15.00-25.00	100.00-350.00
Series 7	915-2000 mm	19.05-31.75	125.00-350.00

INCH SERIES

	d	B	L
Series 1	.312-2.000 in	.196-.312	.785-5.000
Series 2	2.615-6.000 in	.236-.500	1.000-6.000
Series 3	6.063-7.875 in	.295-.590	1.500-7.875
Series 4	8.250-15.750 in	.393-.785	2.000-11.812
Series 5	16.125-25.500 in	.500-1.000	3.000-12.750
Series 6	26.375-35.500 in	.590-1.000	4.000-13.750
Series 7	36.000-80.000 in	.750-1.250	5.000-13.750

Note: The extrusion gap "E" is suitable for pressure up to 400bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. Custom sizes are available and we can match fit to serve almost any application. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

Variable assembly options, from one to four intermediate seal rings

Female adapter supports the seal set and prevents extrusion

Female adapter is available in polyamides for the Elite Set

Available in molded elastomer and fabric construction, as well as machined materials, such as polyurethane, polyamides and nitrile.

Available in split or endless configurations for easy installation



MATERIAL

Molded designs: Common construction consists of nitrile and fabric and fluoroelastomer and fabric for higher temperatures.

Machined designs: Available in abrasion-resistant polyurethane, polyamides and nitrile

Material	Code
NBR/Cotton, Polyamides, H-PUR (Shown in photo)	MN142
NBR/Fabric	MN50
HNBR/Fabric	MN39

OPERATING PARAMETERS

Temperature	MN142	
	°C	°F
hydraulic oil	-30...+100	-22...+212
water oil emulsions (HFA)	+5...+60	+41...+140
water-glycol fluids (HFC)	-30...+60	-22...+140
water	+5...+100	+41...+212
speed	0.5 m/s (1.6 ft/sec)	
pressure	400 bar (6,000psi)	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 148 Series Press-Pak Heavy-Duty V-Packing comes in a variety of configurations, each with a reinforcing female adapter, an energizing male adapter and 1-4 heavy duty intermediate seals. The sets are composed of elastomer and reinforced with fabric with high preload. Offered endless or split. The 148 Elite Series includes abrasion-resistant polyurethane seal rings, along with a robust, extrusion-resistant Polyamides female adaptor ring.

PRODUCT BENEFITS

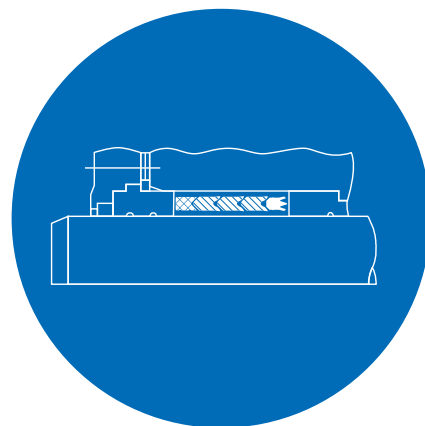
- Heavy-Duty robust multi-lip design for maximum seal life
- Easily configured for retrofit applications
- Preferred design for rams with worn surfaces over conventional seal
- The Elite Male Adaptor is energized for greater sealing performance

APPLICATIONS

The 148 Series V-Packing is a popular choice in heavy-duty press applications requiring maximum service life and leak-free performance. The 148 Elite set is the preferred choice for older legacy presses due to its abrasion and extrusion resistance.

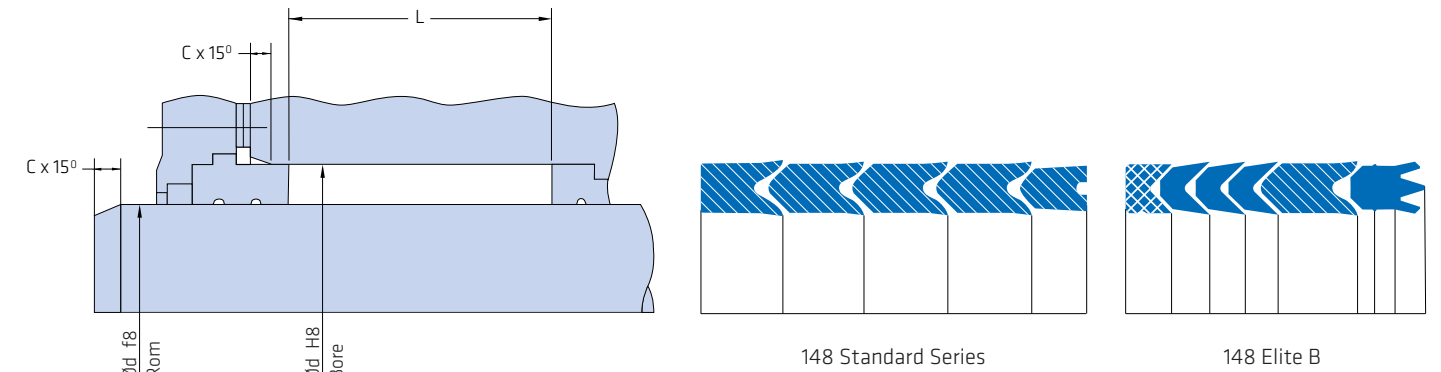
Typical applications include:

- Heavy-Duty Forging Presses
- Stamping Presses
- Extrusion Presses
- Board Presses
- Legacy Equipment



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	d	B	L
Series 1	200-2300 mm	19.05	80-350
Series 2	200-2300 mm	22.20	80-350
Series 3	400-2300 mm	25.00	100-350
Series 4	500-2300 mm	27.00	115-350
Series 5	600-2300 mm	28.50	115-350
Series 6	700-2300 mm	30.00	120-350
Series 7	800-2300 mm	31.75	120-350

INCH SERIES

	d	B	L
Series 1	7.875-90.500 in	0.750	3.000-13.750
Series 2	7.875-90.500 in	0.875	3.000-13.750
Series 3	15.750-90.500 in	1.000	4.000-13.750
Series 4	19.500-90.500 in	1.063	4.500-13.750
Series 5	23.500-90.500 in	1.125	4.500-13.750
Series 6	27.500-90.500 in	1.181	4.750-13.750
Series 7	31.500-90.500 in	1.250	4.750-13.750

Note: The extrusion gap "E" is suitable for pressure up to 400bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. Custom sizes are available and we can match fit to serve almost any application. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.4 µm	≤3 µm	6 - 12 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	64 RMS

Features:

- Symmetrical design for equalized lip forces
- Robust full-face backup ring
- Highly extrusion resistant
- Premium wear resistance
- Easy to install



MATERIAL

The 156 Series rod seal features high-grade polyurethane. Standard materials are MP03 machined H-PU, available up to 2100mm in diameter, and MP50 injection-molded TPU. To suit a variety of applications the 156 series is also available in NBR, H-NBR, EPDM and high temperature-resistant FPM. The backup ring materials include POM, Polyamides and PEEK.

Material	Code
Polyurethane H-PU / POM (Shown in photo)	MP30
Hydrogenerated NBR, PTFE/ Bz	MN32

OPERATING PARAMETERS

Temperature	MP30	
	°C	°F
hydraulic oil	-20...+115	-5...+240
water oil emulsions (HFA)	+5...+55	+40...+130
water-glycol fluids (HFC)	-20...+55	-5...+130
polyol esters (HFD)	-	-
water	+5...+55	+40...+130
speed	0.5 m/s (1.6 ft/sec)	
pressure	≤1,380 bar (20,000psi)	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 156 Series U-Cup seal is a high-performance design used in heavy-duty applications, where high pressures and high clearances exist. The full-face backup ring ensures maximum support for the seal and prevents extrusion. Its symmetrical design ensures that the seal lip forces are equal for every cross section and diameter. Manufactured in a variety of materials and sizes from 6mm up to 2100 millimeters in standard and custom diameters.

PRODUCT BENEFITS

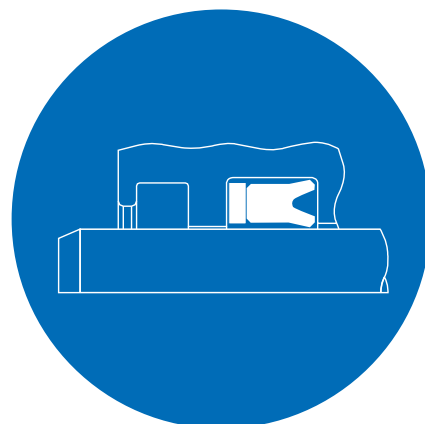
- High pressure capability and wide temperature range
- Excellent fluid compatibility including water-based fluids (H-PU)
- Exceptional abrasion resistance
- Available in diameters up to 2100 millimeters

APPLICATIONS

The 156 Series U-Cup is typically used in high-pressure and high clearance applications.

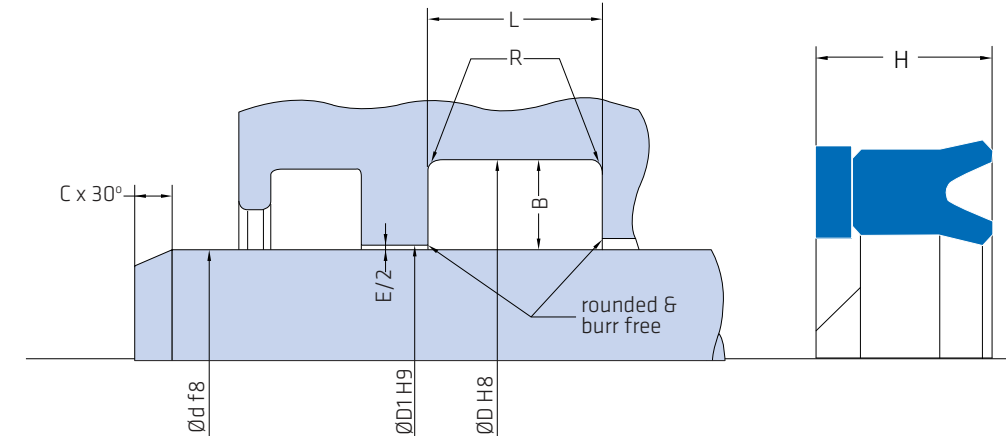
Typical applications include:

- Forging and Extrusion Presses
- Mobile Hydraulics
- Hydraulic Cylinder Rebuild
- Agricultural Hydraulics
- Construction Equipment
- Hydraulic Presses
- Injection Molding Machines



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	B	L ^{+0.20}	H	ØD	ØD1	R	C
Series 1	5.00 mm	11.00	9.90	d + 10.00	d + E	0.40	2.50
Series 2	7.50 mm	15.00	13.50	d + 15.00	d + E	0.40	3.75
Series 3	10.00 mm	22.00	20.80	d + 20.00	0.40	0.40	5.00
Series 4	12.50 mm	27.00	25.80	d + 25.00	d + E	0.40	6.25
Series 5	15.00 mm	33.00	31.80	d + 30.00	d + E	0.40	7.50

INCH SERIES

	B	L ^{+0.008}	H	ØD	ØD1	R	C
Series 1	0.250 in	0.550	0.495	d + 0.500	d + E	0.016	0.125
Series 2	0.375 in	0.825	0.743	d + 0.750	d + E	0.016	0.188
Series 3	0.500 in	1.125	1.013	d + 1.000	d + E	0.016	0.250
Series 4	0.625 in	1.375	1.238	d + 1.250	d + E	0.016	0.313
Series 5	0.750 in	1.675	1.508	d + 1.500	d + E	0.016	0.375

Note: The extrusion gap "E" is suitable for pressure up to 400bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Pressure (bar)	E
≤100 bar	1.00
≤250 bar	0.85
≤400 bar	0.70

Pressure (psi)	E
≤1,450 psi	0.040
≤3,625 psi	0.035
≤6,000 psi	0.030

Features:

- Robust design
- Profiled energizer ring that maintains seal force throughout service life
- Integrated backup ring for maximum extrusion resistance
- Optimized seal-lip position
- Easy to install
- No twisting during installation



MATERIAL

The 188 Series is a custom blended PTFE filled compound that provides ultra-low friction and high-speed performance with minimal wear. The standard compounds are PTFE filled with Bronze filler, or PTFE filled with Glass-Moly. The backup ring can be made from polyamides, Delrin or POM. The temperature range of the seal can be increased by selecting a FPM energizer in place of the standard NBR energizer.

Material	Code
PTFE-Bronze, NBR, POM	MT24
PTFE-Glass-Moly	MT84

OPERATING PARAMETERS

Temperature	MT24		MT84	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22... + 212	-30... +100	-22... +212
water oil emulsions (HFA)	-	-	+5... +60	+40... +140
water-glycol fluids (HFC)	-	-	-30... +60	-22... +140
polyol esters (HFD)	-	-	-	-
water	-	-	-5... +100	+40... +212
speed	5 m/s (16.5 ft/sec)			
pressure	400 bar (6,000psi)			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 188 Series rod seal is a heavy-duty, low-friction design, consisting of a PTFE filled seal, a profiled energizer and an integrated backup ring. It is designed for large diameter and challenging applications, where high pressure and large extrusion gaps exist. The seal is ideal for short-stroke, dithering applications.

PRODUCT BENEFITS

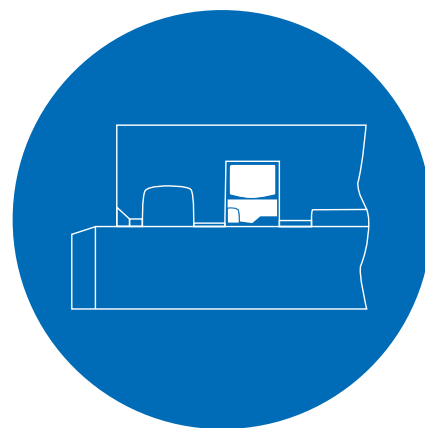
- Low friction
- Short-stroke applications
- High-temperature resistance
- Low wear
- Extrusion resistant
- Compatible with a wide range of media
- Available in diameters up to 2100 millimeters

APPLICATIONS

The 188 Series heavy-duty rod seal is ideal for high-pressure sealing applications, offering low-friction performance and short-stroke capability.

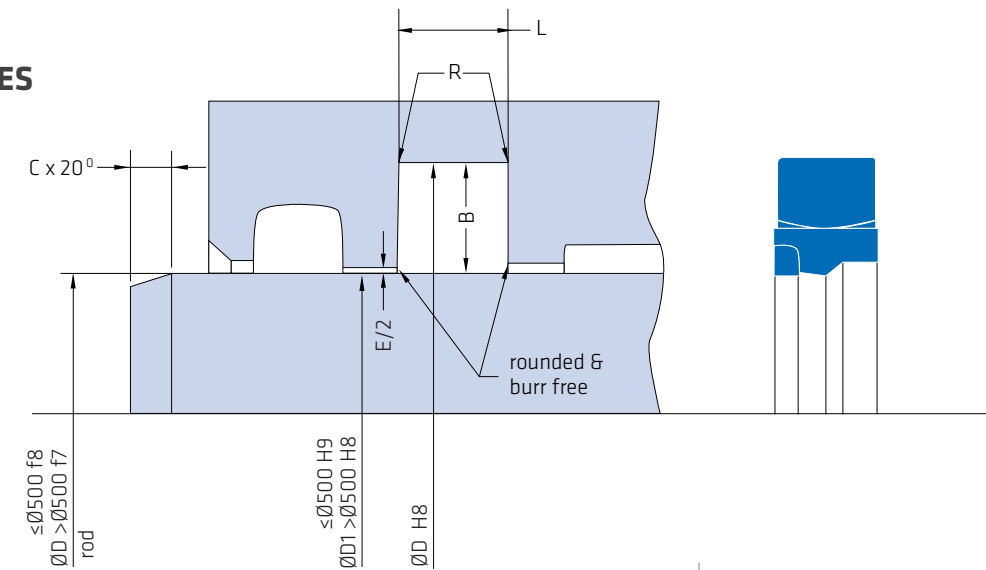
Typical applications include:

- Forging presses
- Extrusion Presses
- Stamping presses
- Rolling Mills
- Injection Molding Machines
- Hydraulic Presses



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.20}	C	R
Series 1	<200 mm	10.00	d + 20.00	d + E	8.10	7.50	0.40
Series 2	<300 mm	12.50	d + 25.00	d + E	10.00	10.00	0.40
Series 3	<450 mm	15.00	d + 30.00	d + E	12.50	12.00	0.80
Series 4	<685 mm	17.50	d + 35.00	d + E	15.00	12.00	1.20
Series 5	<1270 mm	20.00	d + 40.00	d + E	17.50	12.00	1.20

INCH SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.008}	C	R
Series 1	<8.000 in	0.394	d + 0.787	d + E	0.319	0.300	0.016
Series 2	<12.000 in	0.492	d + 0.984	d + E	0.394	0.390	0.016
Series 3	<18.000 in	0.591	d + 1.181	d + E	0.492	0.470	0.032
Series 4	<27.000 in	0.689	d + 1.378	d + E	0.591	0.470	0.050
Series 5	<50.000 in	0.787	d + 1.575	d + E	0.689	0.470	0.050

Note: The extrusion gap "E" is suitable for pressure up to 400bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Pressure	E
≤100 bar	1.00
≤250 bar	0.85
≤400 bar	0.70

Pressure	E
<1,450 psi	0.040
<3,625 psi	0.035
<6,000 psi	0.030

Features:

- Robust design
- Profiled energizer ring that maintains seal force throughout service life
- Optimized seal-lip position
- Easy to install
- No twisting during installation



MATERIAL

The 190 series is made from custom blended PTFE filled compounds that provide ultra-low friction and high-speed performance with minimal wear. The standard compounds are PTFE filled with Bronze filler, or Teflon filled with Glass-Moly. The temperature range of the seal can be increased by selecting a FPM energizer in place of the standard NBR energizer.

Material	Code
PTFE-Bronze compound + NBR energizer	MT23
PTFE-Bronze compound + FPM energizer	MT26
PTFE-Glass/MoS2 compound + NBR energizer (shown in photo)	MT83
PTFE-Glass/MoS2 compound + FPM energizer	MT86

OPERATING PARAMETERS

Temperature	MT23		MT83	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22... +212	-30... +100	-22... +212
water oil emulsions (HFA)	-	-	+5... +60	+40... +140
water-glycol fluids (HFC)	-	-	-30... +60	-22... +140
polyol esters (HFD)	-	-	-	-
water	-	-	-5... +100	+40... +212
speed	5 m/s (16.5 ft/sec)			
pressure	400 bar (6,000psi)			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 190 Series rod seal is a heavy-duty, low-friction design, consisting of a PTFE filled seal and a profiled energizer. It is designed for large diameter and challenging applications, where high pressure and large extrusion gaps exist. The seal is ideal for short-stroke, dithering applications.

PRODUCT BENEFITS

- Low friction
- Short-stroke applications
- High-temperature resistance
- Low wear
- Extrusion resistant
- Compatible with a wide range of media
- Available in diameters up to 2100 millimeters.

APPLICATIONS

The 190 Series Heavy-Duty rod seal is ideal for high-pressure sealing applications, offering low-friction performance and short-stroke capability.

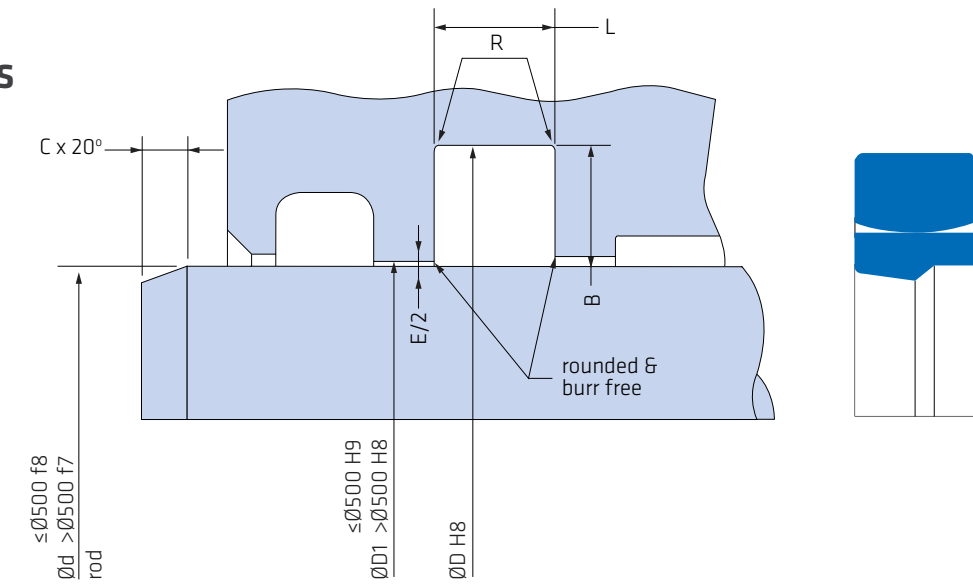
Typical applications include:

- Rolling Mills
- Injection Molding Machines
- Hydraulic Presses
- Forging Presses



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter ØD	B	ØD	ØD1	L ^{+0.20}	E	C	R
Series 1	<200mm	10.00	d + 20.00	d + 0.50	10.00	0.50	7.50	0.40
Series 2	<300mm	12.50	d + 25.00	d + 0.60	12.50	0.60	10.00	0.40
Series 3	<450mm	15.00	d + 30.00	d + 0.60	15.00	0.60	12.00	0.80
Series 4	<685mm	17.50	d + 35.00	d + 0.60	17.50	0.60	12.00	1.20
Series 5	<1270mm	20.00	d + 40.00	d + 0.60	20.00	0.60	12.00	1.20

INCH SERIES

	Rod Diameter ØD	B	ØD	ØD1	L ^{+0.008}	E	C	R
Series 1	<8in	0.394	d + 0.787	d + 0.020	0.394	0.020	0.300	0.016
Series 2	<12in	0.492	d + 0.984	d + 0.024	0.492	0.024	0.390	0.016
Series 3	<18in	0.591	d + 1.181	d + 0.024	0.591	0.024	0.470	0.032
Series 4	<27in	0.689	d + 1.378	d + 0.024	0.689	0.024	0.470	0.050
Series 5	<50in	0.787	d + 1.575	d + 0.024	0.787	0.024	0.470	0.050

Note: The extrusion gap "E" is suitable for pressure up to 400 bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

- Low compression set profiled energizer
- Low friction Teflon seal cap
- Very robust design
- Extrusion resistance under high pressure



MATERIAL

The 254 Series piston seal features a robust NBR elastomer, a seal cap in low-friction Teflon and two backup rings in high-strength thermoplastic.

Material	Code
PTFE-Bronze compound /NBR / POM (shown in photo)	MT24

OPERATING PARAMETERS

Temperature	MT24	
	°C	°F
hydraulic oil	-30...+100	-22...+212
water oil emulsions (HFA)	-	-
water-glycol fluids (HFC)	-	-
polyol esters (HFD)	-	-
water	-	-
speed	1.5 m/s (5 ft/sec)	
pressure	500 bar (7250psi)	

Note: for other materials or fluids please contact our engineering department.

DESCRIPTION

The 254 Series is one of the most robust four-piece piston seals available on the market. It consists of a profiled energizer, a Teflon seal element and two active anti-extrusion backup rings. It is designed for double-acting cylinders in heavy-duty applications subject to severe pressure spikes coupled with high running clearance.

PRODUCT BENEFITS

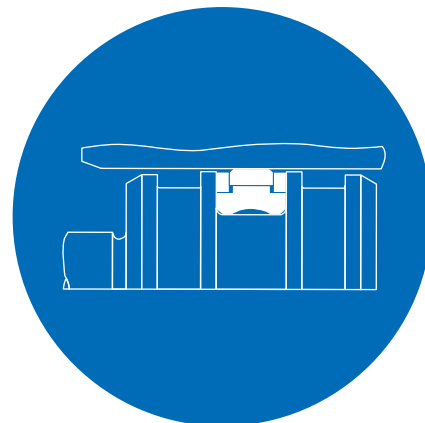
- Long service life under the harshest conditions
- Compatible with water-based fluids
- Optimized for high running clearance
- Easy installation

APPLICATIONS

The 254 Series, four-piece piston seal is ideal for heavy duty sealing applications where pressure spiking can occur.

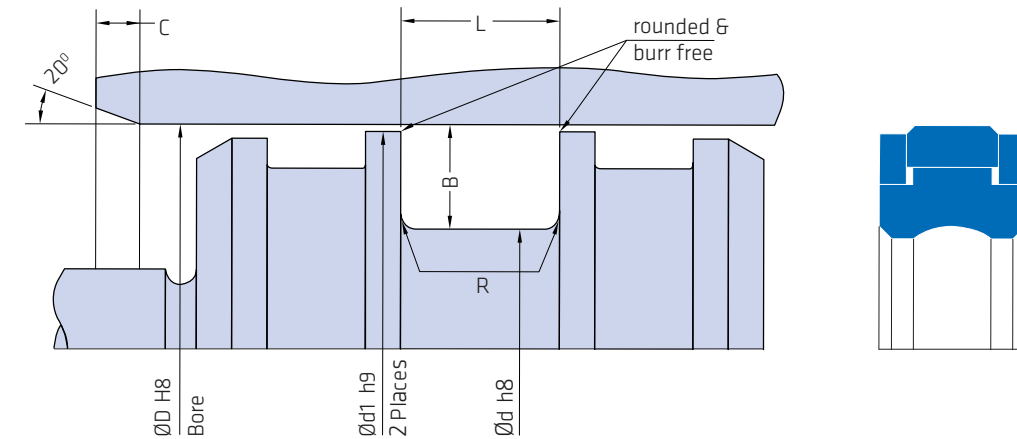
Typical applications include:

- Forging Presses
- Extrusion Presses
- Stamping Presses
- Mining
- Specialty High-Pressure Cylinders
- Various Advancing and Secondary Cylinders



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	B	Ød	L ^{+0.2}	C	Ød1 <500bar	R typical
Series 1	6.00 mm	D-12.00	10.00	6.00 mm	D-0.40	0.50
Series 2	8.50 mm	D-17.00	14.00	8.00 mm	D-0.50	0.50
Series 3	10.00 mm	D-20.00	17.50	10.50 mm	D-0.50	0.50
Series 4	12.50 mm	D-25.00	19.00	10.50 mm	D-0.70	0.50

INCH SERIES

	B	Ød	L ^{+0.008"}	C	Ød1 <7250psi	R typical
Series 1	0.236 in	D-0.472	0.395	0.250 inches	D-0.016	0.020
Series 2	0.335 in	D-0.670	0.550	0.313 inches	D-0.020	0.020
Series 3	0.393 in	D-0.787	0.688	0.438 inches	D-0.020	0.020
Series 4	0.492 in	D-0.984	0.750	0.438 inches	D-0.028	0.020

Note: The extrusion gap "E" is suitable for pressure up to 500 bar (7250 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	6-12 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

- Robust, double-acting design
- Profiled energizer ring that maintains seal force throughout service life
- Easy to install
- No twisting during installation



MATERIAL

System Seals' custom blended PTFE filled compounds provide ultra-low friction and high-speed performance with minimal wear. The standard compounds are PTFE with Bronze filler, or PTFE filled with Glass-Moly. The temperature range of the seal can be increased by selecting a FPM energizer in place of the standard NBR energizer.

Material	Code
PTFE-Bronze compound + NBR energizer (shown in photo)	MT23
PTFE-Bronze compound + FPM energizer	MT26
PTFE-Glass/MoS2 compound + NBR energizer	MT83
PTFE-Glass/MoS2 compound + FPM energizer	MT86

OPERATING PARAMETERS

Temperature	MT23		MT83	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22... +212	-30... +100	-22... +212
water oil emulsions (HFA)	-	-	+5... +60	+40... +140
water-glycol fluids (HFC)	-	-	-30... +60	-22... +140
polyol esters (HFD)	-	-	-	-
water	-	-	-5... +100	+40... +212
speed	5 m/s (16.5 ft/sec)			
pressure	400 bar (6,000psi)			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 280 Series heavy-duty piston seal is a low-friction design, consisting of a PTFE filled seal and a profiled energizer. It is designed for large-diameter, double-acting cylinders in challenging applications, where high pressure and large extrusion gaps exist.

PRODUCT BENEFITS

- Low friction
- Double acting applications
- High-temperature resistance
- Low wear
- Extrusion resistant
- Compatible with a wide range of media
- Available in diameters up to 2100 millimeters

APPLICATIONS

The 280 Series heavy-duty piston seal is ideal for high-pressure sealing applications, offering low-friction performance and double-acting operation.

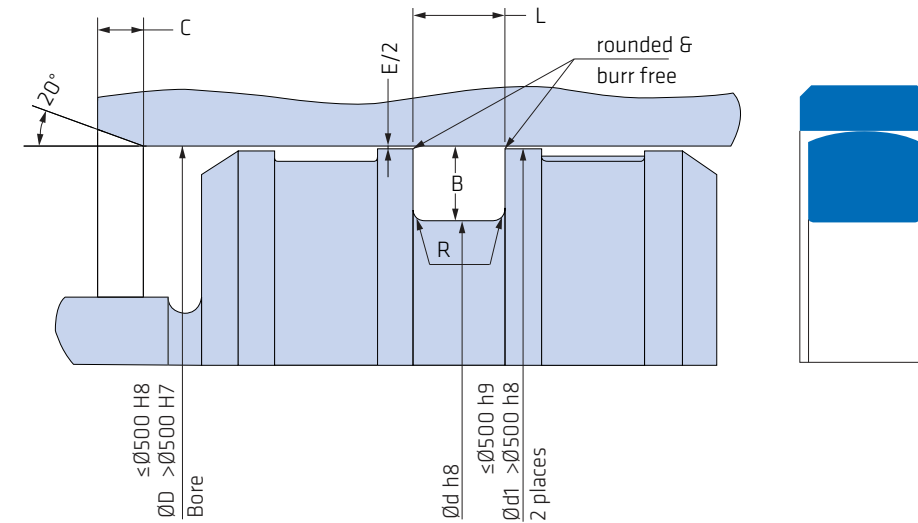
Typical applications include:

- Rolling Mills
- Injection Molding Machines
- Hydraulic Presses
- Forging Presses



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Piston Bore Diameter ØD	B	Ød	Ød1	L ^{+0.20}	E	C	R
Series 1	Up to 200 mm	10.01	D - 20.00	D - 0.50	10.00	0.50	7.50	0.40
Series 2	Up to 300 mm	12.50	D - 25.00	D - 0.60	12.50	0.60	10.00	0.40
Series 3	Up to 450 mm	15.01	D - 30.00	D - 0.60	15.00	0.60	12.00	0.80
Series 4	Up to 685 mm	17.50	D - 35.00	D - 0.60	17.50	0.60	12.00	1.20
Series 5	Up to 1270 mm	19.99	D - 40.00	D - 0.60	20.00	0.60	12.00	1.20

INCH SERIES

	Piston Bore Diameter ØD	B	Ød	Ød1	L ^{+0.008"}	E	C	R
Series 1	Up to 8.000 in	0.394	D - 0.787	D - 0.020	0.394	0.020	0.300	0.016
Series 2	Up to 12.000 in	0.492	D - 0.984	D - 0.024	0.492	0.024	0.390	0.016
Series 3	Up to 18.000 in	0.591	D - 1.181	D - 0.024	0.591	0.024	0.470	0.032
Series 4	Up to 27.000 in	0.689	D - 1.378	D - 0.024	0.689	0.024	0.470	0.050
Series 5	Up to 50.000 in	0.787	D - 1.575	D - 0.024	0.787	0.024	0.470	0.050

Note: The extrusion gap "E" is suitable for pressure up to 400 bar (6000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

- Robust, double-acting design
- Profiled energizer ring that maintains seal force throughout service life
- Integrated backup rings provide maximum extrusion resistance
- Easy to install
- No twisting during installation



MATERIAL

The 288 Series is made from custom blended PTFE filled compounds that provide ultra-low friction and high-speed performance with minimal wear. The standard compounds are PTFE filled with Bronze filler, or PTFE filled with Glass-Moly. The backup rings can be made from nylon, Delrin and POM. The temperature range of the seal can be increased by selecting a FPM energizer in place of the standard NBR energizer.

Material	Code
PTFE/Bronze, NBR, POM	MT24
PTFE/Glass-Moly, NBR, POM	MT84

OPERATING PARAMETERS

Temperature	MT24		MT84	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22...+212	-30... +100	-22...+212
water oil emulsions (HFA)	-	-	+5... +60	+40... +140
water-glycol fluids (HFC)	-	-	-	-
polyol esters (HFD)	-	-	-5...+100	+40...+212
water	-	-	-	-
speed	5 m/s (16.5 ft/sec)			
pressure	400 bar (6,000psi)			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 288 Series Heavy-Duty Piston Seal with Integrated Backup Ring is a low-friction design, consisting of a PTFE filled seal, a profiled energizer and two integrated backup rings. It is designed for large-diameter, double-acting cylinders in challenging applications, where high pressure and large extrusion gaps exist.

PRODUCT BENEFITS

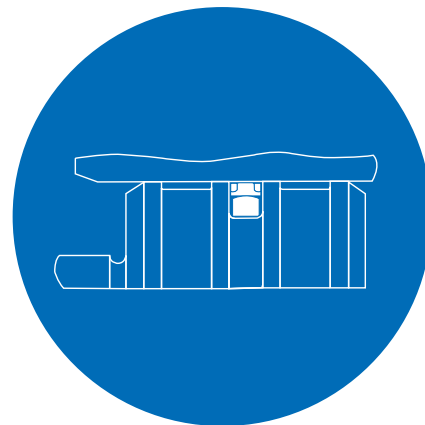
- Low friction
- Double acting applications
- High-temperature resistance
- Low wear
- Compatible with a wide range of media
- Available in diameters up to 2100 millimeters

APPLICATIONS

The 288 Series Heavy-Duty Piston Seal with Integrated Backup Ring is ideal for high-pressure sealing applications, offering low-friction performance and double-acting operation.

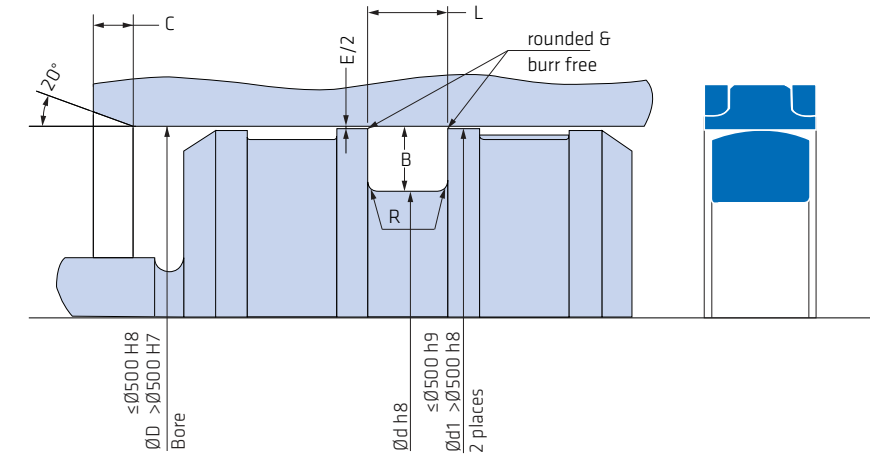
Typical applications include:

- Forging Presses
- Extrusion presses
- Stamping presses
- Rolling Mills
- Injection Molding Machines
- Hydraulic Presses



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Bore Diameter ØD	B	Ød	Ød1	L ^{+0.20}	C	R
Series 1	<200 mm	10.00	D - 20.00	D - E	8.10	7.50	0.40
Series 2	<300 mm	12.50	D - 25.00	D - E	10.00	10.00	0.40
Series 3	<450 mm	15.00	D - 30.00	D - E	12.50	12.00	0.80
Series 4	<685 mm	17.50	D - 35.00	D - E	15.00	12.00	1.20
Series 5	<1270 mm	20.00	D - 40.00	D - E	17.50	12.00	1.20

INCH SERIES

	Bore Diameter ØD	B	Ød	Ød1	L ^{+0.008}	C	R
Series 1	<8.000 in	0.394	D - 0.787	D - E	0.319	0.300	0.016
Series 2	<12.000 in	0.492	D - 0.984	D - E	0.394	0.390	0.016
Series 3	<18.000 in	0.591	D - 1.181	D - E	0.492	0.470	0.032
Series 4	<27.000 in	0.689	D - 1.378	D - E	0.591	0.470	0.050
Series 5	<50.000 in	0.787	D - 1.575	D - E	0.689	0.470	0.050

Note: The extrusion gap "E" is suitable for pressure up to 400bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Pressure	E
≤100 bar	1.00
≤250 bar	0.85
≤400 bar	0.70

Pressure	E
<1,450 psi	0.040
<3,625 psi	0.035
<6,000 psi	0.030

Features:

- Excellent wiping and scraping performance
- Abrasion resistant
- Beveled lip offers maximum dirt exclusion
- Easy snap-in installation



MATERIAL

The 302 Series Single-Lip Wiper features high-grade polyurethane. Standard materials are MP03 machined H-PU, available up to 2100 millimeters in diameter, and MP50 injection-molded TPU. To suit a variety of applications the series is also available in NBR, H-NBR, EPDM and high temperature-resistant FPM.

Material	Code
Polyurethane H-PU (shown in photo)	MP03
Nitrile NBR	MN01
Fluoroelastomer FPM	MF01
Polyurethane TPU	MP50

OPERATING PARAMETERS

Temperature	MP03	
	°C	°F
hydraulic oil	-20...+115	-5...+240
water oil emulsions (HFA)	+5...+55	+40...+130
water-glycol fluids (HFC)	-20...+55	-5...+130
polyol esters (HFD)	-	-
water	+5...+55	+40...+130
speed	2 m/s (6.5 ft/sec)	
pressure	-	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 302 Series Snap-In Wiper is one of the most popular wipers available. It is manufactured from high-quality polyurethane, which ensures aggressive wiping performance and maximum abrasion resistance. The wiper is designed to exclude and protect the hydraulic cylinder in the harshest conditions.

PRODUCT BENEFITS

- Prevents pressure build up between wiper and seal
- Designed to fit securely in the groove
- Long service life

APPLICATIONS

The 302 Series Wiper is used in a range of standard applications where heavy contamination is present.

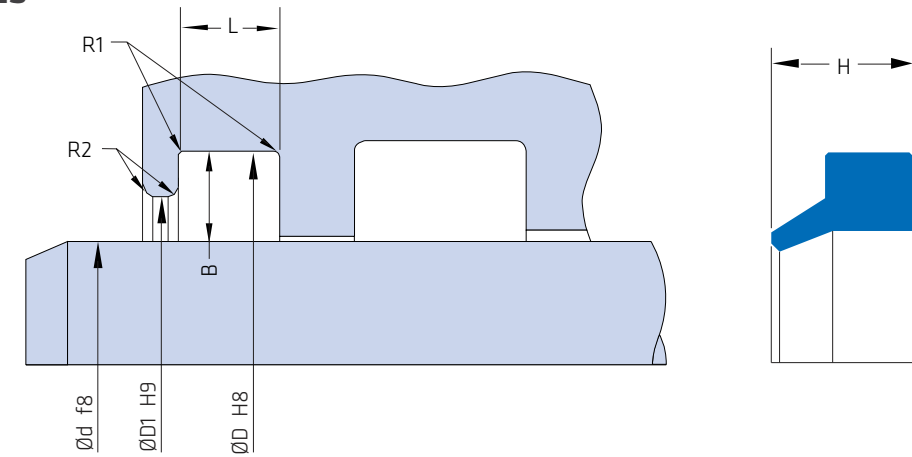
Typical applications include:

- Mining
- Mobile Hydraulics
- Agricultural
- Standard Hydraulic Cylinders



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.20}	H	R1	R2
Series 1	up to 40 mm	4.30	d+8.60	d+3.00	5.30	7.00	0.30	0.50
Series 2	up to 70 mm	5.30	d+10.60	d+3.00	5.30	7.00	0.30	0.50
Series 3	up to 175 mm	7.50	d+15.00	d+7.60	10.20	16.00	0.30	0.50
Series 4	up to 250 mm	10.00	d+20.00	d+10.00	10.20	18.00	0.30	0.50
Series 5	up to 350 mm	12.50	d+25.00	d+12.60	12.70	20.00	0.30	0.50
Series 6	up to 1000 mm	15.00	d+30.00	d+15.00	15.20	25.00	0.30	0.50

INCH SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.008}	H	R1	R2
Series 1	up to 1.625 in	0.169	d+0.339	d+0.118	0.209	0.276	0.012	0.020
Series 2	up to 2.750 in	0.209	d+0.417	d+0.118	0.209	0.276	0.012	0.020
Series 3	up to 6.750 in	0.295	d+0.591	d+0.299	0.402	0.630	0.012	0.020
Series 4	up to 10.000 in	0.394	d+0.787	d+0.394	0.402	0.709	0.012	0.020
Series 5	up to 13.750 in	0.492	d+0.984	d+0.496	0.500	0.787	0.012	0.020
Series 6	up to 40.000 in	0.591	d+1.181	d+0.591	0.598	0.984	0.012	0.020

Note: For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	6-12 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

Heavy duty wiping performance

Abrasion resistant material

Double acting inner lip, which removes oil film from the rod as it cycles

Easily retrofitted into existing wiper grooves



MATERIAL

The 311 Series Double-Acting Wiper features high-grade polyurethane. Standard materials are MP03 machined H-PU, available up to 2100 millimeters in diameter and MP50 injection-molded TPU. To suit a variety of applications the series is also available in NBR, H-NBR, EPDM and high temperature-resistant FPM.

Material	Code
Polyurethane H-PU	MP03
Nitrile NBR (shown in photo)	MN01
Fluoroelastomer FPM	MF01
Polyurethane TPU	MP50

OPERATING PARAMETERS

Temperature	MP03	
	°C	°F
hydraulic oil	-20...+115	-5...+240
water oil emulsions (HFA)	+5...+55	+40...+130
water-glycol fluids (HFC)	-20...+55	-5...+130
polyol esters (HFD)	-	-
water	+5...+55	+40...+130
speed	2 m/s (6.5 ft/sec)	
pressure	-	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 311 Series Double-Acting Wiper is a popular upgrade to the traditional single-lip wiper designs. It offers enhanced performance and can be easily retrofitted into existing wiper grooves. The double acting design ensures maximum resistance to contamination, while working in tandem with the rod seal to maximize performance. The internal wiping lip is notched to prevent pressure trapping between the wiper and the rod seal. The wiper is designed to exclude and protect the hydraulic cylinder in the harshest conditions.

PRODUCT BENEFITS

- Internal notches prevent pressure trapping
- Designed to fit securely in the groove
- Long service life
- Easy snap-in installation
- Available in large diameter up to 2100 millimeters

APPLICATIONS

The 311 Series Wiper is particularly suited for operating in contaminated or outside environments.

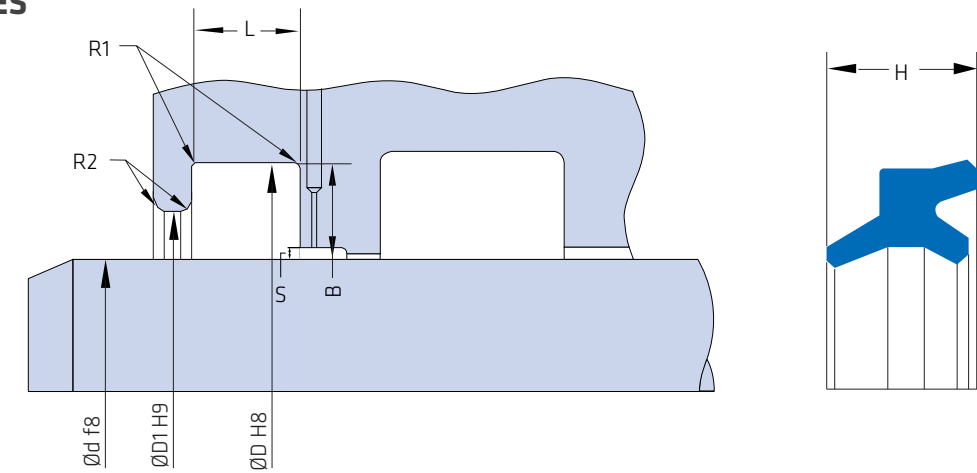
Typical applications include:

- Steel and Aluminum Processing
- Mobile Hydraulics
- Agricultural
- Standard Hydraulic Cylinders



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.20}	H	R1	R2	S
Series 1	Up to 40mm	4.30	d + 8.60	d + 3.00	5.30	7.00	0.30	0.50	2.50
Series 2	Up to 70mm	5.30	d + 10.60	d + 3.00	5.30	7.00	0.30	0.50	2.50
Series 3	Up to 175mm	7.50	d + 15.00	d + 7.60	10.20	16.00	0.30	0.50	2.50
Series 4	Up to 250mm	10.00	d + 20.00	d + 10.00	10.20	18.00	0.30	0.50	2.50
Series 5	Up to 350mm	12.50	d + 25.00	d + 12.60	12.70	20.00	0.30	0.50	2.50
Series 6	Up to 1000mm	15.00	d + 30.00	d + 15.00	15.20	25.00	0.30	0.50	2.50

INCH SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.008}	H	R1	R2	S
Series 1	Up to 1.625 inches	0.169	d + 0.339	d + 0.118	0.209	0.276	0.012	0.020	0.100
Series 2	Up to 2.750 inches	0.209	d + 0.417	d + 0.118	0.209	0.276	0.012	0.020	0.100
Series 3	Up to 6.750 inches	0.295	d + 0.591	d + 0.299	0.402	0.630	0.012	0.020	0.100
Series 4	Up to 10.000 inches	0.394	d + 0.787	d + 0.394	0.402	0.709	0.012	0.020	0.100
Series 5	Up to 13.750 inches	0.492	d + 0.984	d + 0.496	0.500	0.787	0.012	0.020	0.100
Series 6	Up to 40.000 inches	0.591	d + 1.181	d + 0.591	0.598	0.984	0.012	0.020	0.100

Note: For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	6-12 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

- High-performance wiping ability
- Low-friction PTFE filled scraper ring
- Excellent wear resistance
- Available in large diameter up to 2100 millimeters



MATERIAL

The 314 Series wiper consists of a custom-blended PTFE filled compound that provides ultra-low friction and high-speed performance with minimal wear. The standard compound is PTFE filled with Bronze filler. The temperature range of the wiper can be increased by selecting an FPM energizer in place of the standard NBR energizer.

Material	Code
PTFE-Bronze compound + NBR o-ring (shown in photo)	MT23
PTFE-Bronze compound + FPM o-ring	MT26

OPERATING PARAMETERS

Temperature	MT23		MT26	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22... +212	-10... +200	-15... +392
water oil emulsions (HFA)	-	-	-	-
water-glycol fluids (HFC)	-	-	-	-
polyol esters (HFD)	-	-	-	-
water	-	-	-10... +200	-15... +392
speed	5 m/s (16.5 ft/sec)			
pressure	-			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 314 Series Heavy-Duty, Double-Acting Wiper is one of the most popular mill-duty wipers in the steel industry. It includes a reinforced PTFE filled scraper ring and two energizing O-rings. The design incorporates a wiping lip to prevent contamination from entering the cylinder and an inner sealing lip to remove any oil film from the rod as it cycles. The O-rings individually energize the two wiper lips. In most applications, a pressure relief port between the wiper and the rod seal is recommended.

PRODUCT BENEFITS

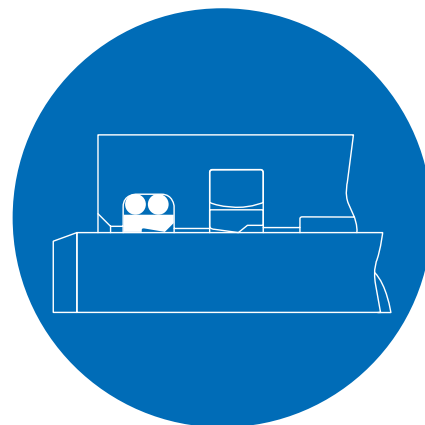
- Protects the hydraulic cylinder internals
- Self-lubricating
- Works in short stroke applications
- Works in high-temperature environments

APPLICATIONS

The 314 Series Wiper prevents contamination ingress in harsh environments, while maintaining low friction.

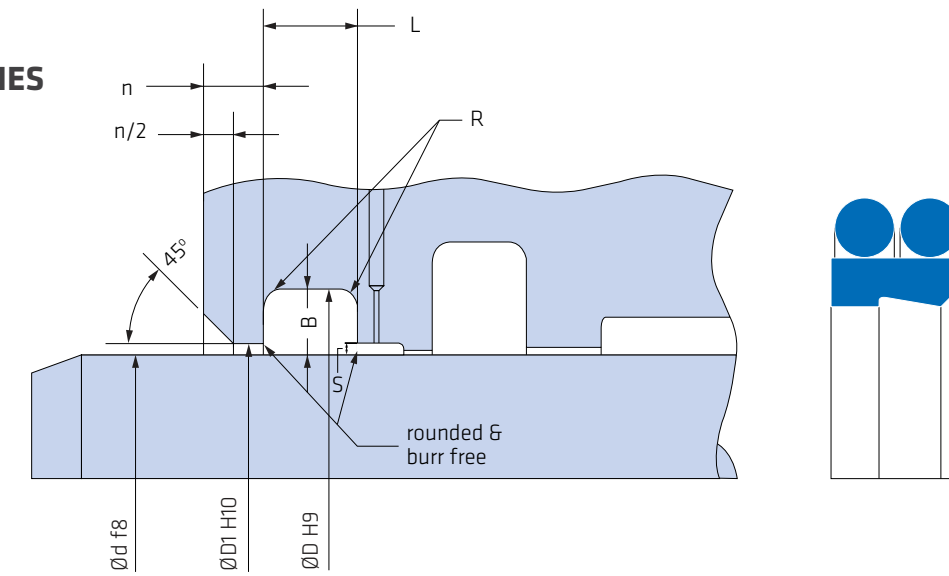
Typical applications include:

- Steel and Aluminum Mills
- Positive and Negative Bending Cylinder
- Work Roll Balance Cylinders
- Injection Molding Machines
- Pullback/Return Cylinders
- Traverse Cylinders
- Cold and Hot Strip Mills



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.20}	R	n	S
Series 1	up to 45 mm	3.80	d+7.60	d+1.00	4.20	0.40	4.00	2.50
Series 2	up to 70 mm	4.40	d+8.80	d+1.50	6.30	1.20	4.00	2.50
Series 3	up to 140 mm	6.10	d+12.20	d+2.00	8.10	2.00	4.00	2.50
Series 4	up to 400 mm	8.00	d+16.00	d+2.00	11.50	2.00	4.00	2.50
Series 5	up to 650 mm	12.00	d+24.00	d+2.50	15.50	2.00	4.00	2.50
Series 6	up to 1000 mm	13.65	d+27.30	d+2.50	18.00	2.00	5.00	2.50

INCH SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.008}	R	n	S
Series 1	up to 1.750 in	0.150	d+0.300	d+0.040	0.165	0.015	0.160	0.100
Series 2	up to 2.750 in	0.173	d+0.346	d+0.060	0.248	0.050	0.160	0.100
Series 3	up to 5.500 in	0.240	d+0.480	d+0.080	0.319	0.080	0.160	0.100
Series 4	up to 15.750 in	0.315	d+0.630	d+0.080	0.453	0.080	0.160	0.100
Series 5	up to 25.500 in	0.472	d+0.944	d+0.100	0.610	0.080	0.160	0.100
Series 6	up to 40.000 in	0.537	d+1.074	d+0.100	0.709	0.080	0.200	0.100

Note: For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

- High-performance wiping ability
- Low-friction Teflon scraper ring
- Excellent wear resistance
- Available in large diameter up to 2 meters



MATERIAL

The 315 Series wiper consists of a custom-blended PTFE filled compound that provides ultra-low friction and high-speed performance with minimal wear. The standard compound is PTFE with Bronze filler. The temperature range of the wiper can be increased by selecting an FPM energizer in place of the standard NBR energizer.

Material	Code
PTFE-Bronze compound + NBR o-ring (shown in photo)	MT23
PTFE-Bronze compound + FPM o-ring	MT26

OPERATING PARAMETERS

Temperature	MT23		MT26	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22... +212	-10... +200	-15... +392
water oil emulsions (HFA)	-	-	-	-
water-glycol fluids (HFC)	-	-	-	-
polyol esters (HFD)	-	-	-	-
water	-	-	-10... +200	-15... +392
speed	5 m/s (16.5 ft/sec)			
pressure	-			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 315 Series Heavy-Duty, Double-Acting Wiper is one of the most popular heavy-duty wipers. It includes a reinforced PTFE filled scraper ring and one energizing O-ring. The design incorporates a wiping lip to prevent contamination from entering the cylinder and an inner sealing lip to remove any oil film from the rod as it cycles. The O-ring energizes the two wiper lips. In most applications, a pressure relief port between the wiper and the rod seal is recommended.

PRODUCT BENEFITS

- Protects the hydraulic cylinder internals
- Self-lubricating
- Works in short stroke applications
- Works in high-temperature environments

APPLICATIONS

The 315 Series Wiper prevents contamination ingress in harsh environments, while maintaining low friction.

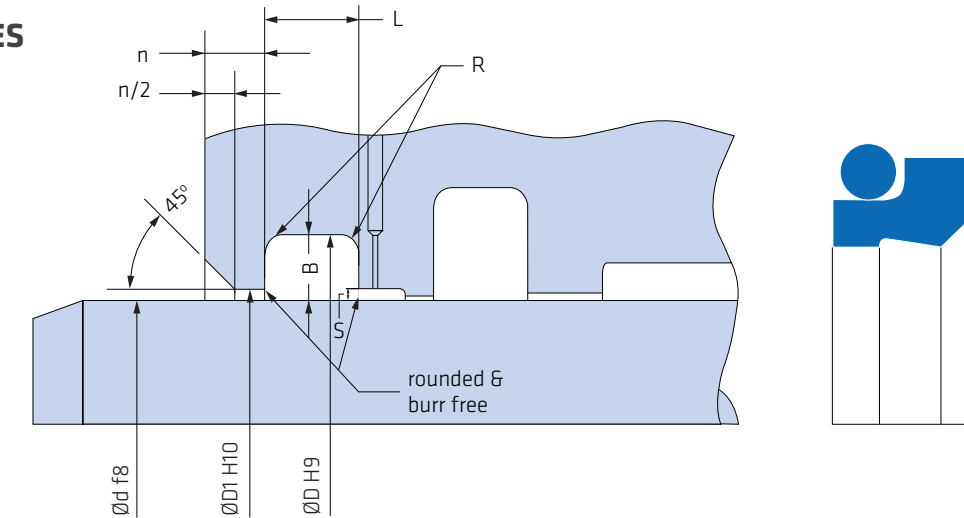
Typical applications include:

- Forging Presses
- Extrusion Presses
- Stamping Presses
- Steel and Aluminum Mills
- Injection Molding Machines
- Cold and Hot Strip Mills



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.20}	R	n	S
Series 1	up to 45 mm	3.80	d+7.60	d+1.00	4.20	0.40	4.00	2.50
Series 2	up to 70 mm	4.40	d+8.80	d+1.50	6.30	1.20	4.00	2.50
Series 3	up to 140 mm	6.10	d+12.20	d+2.00	8.10	2.00	4.00	2.50
Series 4	up to 400 mm	8.00	d+16.00	d+2.00	11.50	2.00	4.00	2.50
Series 5	up to 650 mm	12.00	d+24.00	d+2.50	15.50	2.00	4.00	2.50
Series 6	up to 1000 mm	13.65	d+27.30	d+2.50	18.00	2.00	5.00	2.50

INCH SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.008}	R	n	S
Series 1	up to 1.750 in	0.150	d+0.300	d+0.040	0.165	0.015	0.160	0.100
Series 2	up to 2.750 in	0.173	d+0.346	d+0.060	0.248	0.050	0.160	0.100
Series 3	up to 5.500 in	0.240	d+0.480	d+0.080	0.319	0.080	0.160	0.100
Series 4	up to 15.750 in	0.315	d+0.630	d+0.080	0.453	0.080	0.160	0.100
Series 5	up to 25.500 in	0.472	d+0.944	d+0.100	0.610	0.080	0.160	0.100
Series 6	up to 40.000 in	0.537	d+1.074	d+0.100	0.709	0.080	0.200	0.100

Note: For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

- High-performance wiping ability
- Low-friction Teflon scraper ring
- Excellent wear resistance
- Notched inner lip prevents pressure trapping
- Available in large diameter up to 2100 millimeters



MATERIAL

The 318 Series wiper consists of a custom-blended PTFE filled compound that provides ultra-low friction and high-speed performance with minimal wear. The standard compound is PTFE with Bronze filler. The temperature range of the wiper can be increased by selecting an FPM energizer in place of the standard NBR energizer.

Material	Code
PTFE-Bronze compound + NBR o-ring (shown in photo)	MT23
PTFE-Bronze compound + FPM o-ring	MT26

OPERATING PARAMETERS

Temperature	MT23		MT26	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22... +212	-10... +200	+15... +392
water oil emulsions (HFA)	-	-	-	-
water-glycol fluids (HFC)	-	-	-	-
polyol esters (HFD)	-	-	-10... +200	+15... +392
water	-	-	-	-
speed	5 m/s (16.5 ft/sec)			
pressure	-			

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 318 Series Heavy-Duty, Double-Acting Wiper is one of the most popular mill-duty wipers in the steel industry. It includes a reinforced PTFE filled scraper ring and two energizing O-rings. The design incorporates a unique umbrella feature that wraps around the face of the cylinder to create an impenetrable barrier as well as an inner sealing lip to remove any oil film from the rod as it cycles. The O-rings individually energize the two wiper lips. In most applications, a pressure relief port between the wiper and the rod seal is recommended.

PRODUCT BENEFITS

- Protects the hydraulic cylinder internals
- Self-lubricating
- Works in short stroke applications
- Works in high-temperature environments

APPLICATIONS

The 318 Series Wiper prevents contamination ingress in harsh environments, while maintaining low friction.

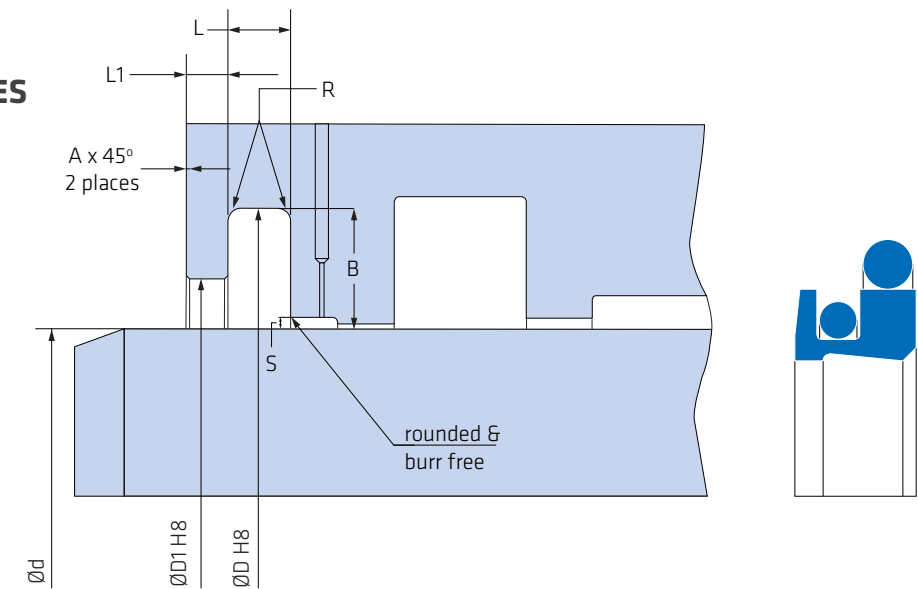
Typical applications include:

- Steel and Aluminum Processing
- Cold and Hot Strip Mills
- Automatic Gauge Control Cylinders



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.20}	L1 ^{-0.10}	R	A	S
Series 1	100 mm to 220 mm	11.10	d+22.20	d+10.70	6.30	4.20	1.20	0.50	2.50
Series 2	up to 295 mm	12.10	d+24.20	d+10.70	6.30	4.20	1.20	0.50	2.50
Series 3	up to 600 mm	16.50	d+33.00	d+15.10	8.10	6.30	1.20	0.50	2.50
Series 4	up to 1000 mm	18.25	d+36.50	d+15.10	9.50	6.30	2.00	0.50	2.50

INCH SERIES

	Rod Diameter Ød	B	ØD	ØD1	L ^{+0.008}	L1 ^{-0.004}	R	A	S
Series 1	4.000 to 8.625 Inch	0.437	d+0.874	d+0.421	0.248	0.165	0.050	0.020	0.100
Series 2	up to 11.625 Inch	0.476	d+0.952	d+0.421	0.248	0.165	0.050	0.020	0.100
Series 3	up to 23.625 Inch	0.650	d+1.300	d+0.595	0.319	0.248	0.050	0.020	0.100
Series 4	up to 40.000 Inch	0.719	d+1.438	d+0.595	0.374	0.248	0.080	0.020	0.100

Note: For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

Aggressive wiping and high scraping performance

Abrasion resistant

Unique umbrella designs ensures maximum exclusion

Easy snap-in installation

Water resistant



MATERIAL

The 324 Series Single Lip Wiper features high-grade polyurethane. Standard materials are MP03 machined H-PU, available up to 2100 millimeters in diameter, and MP50 injection-molded TPU. To suit a variety of applications the series is also available in NBR, H-NBR, EPDM and high temperature-resistant FPM.

Material	Code
Polyurethane H-PU (shown in photo)	MP03
Nitrile NBR	MN01
Fluoroelastomer FPM	MF01
Polyurethane TPU	MP50

OPERATING PARAMETERS

Temperature	MP03	
	°C	°F
hydraulic oil	-20...+115	-5...+240
water oil emulsions (HFA)	+5...+55	+40...+130
water-glycol fluids (HFC)	-20...+55	-5...+130
polyol esters (HFD)	-	-
water	+5...+55	+40...+130
speed	2 m/s (6.5 ft/sec)	
pressure	-	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 324 Series Heavy-Duty Snap-In Wiper is the most aggressive excluder available, which earned the nickname "Rambo" by customers who swear by its excellent performance. The aggressive design includes a unique umbrella feature that wraps around the face of the cylinder that creates an impenetrable barrier. It works particularly well in vertically mounted cylinders, where contamination collects or fluid splashes on top of the cylinder. The wiper is designed to exclude and protect the hydraulic cylinder in the harshest conditions.

PRODUCT BENEFITS

- Internal notches prevent pressure trapping
- Ability to retrofit and upgrade existing wipers
- Designed to fit securely in the groove
- Long service life

APPLICATIONS

The 324 Series Wiper is used in severely contaminated, wet, or abrasive conditions.

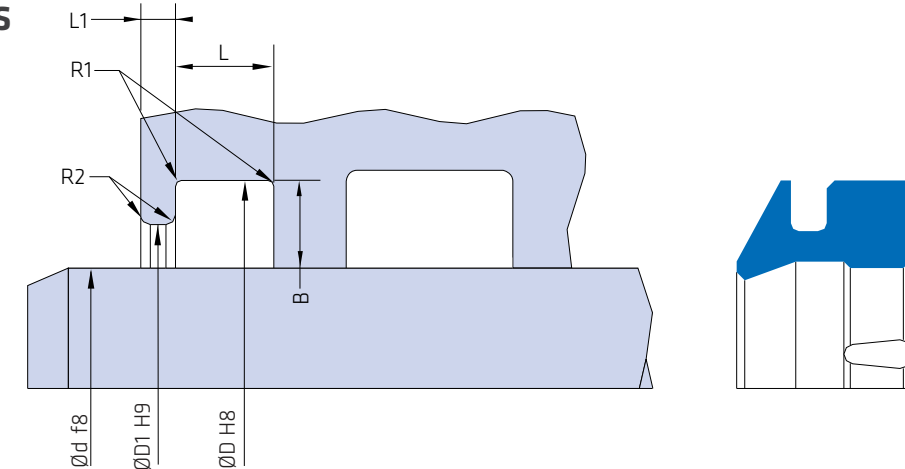
Typical applications include:

- Mining
- Mobile Hydraulics
- Steel and Aluminum Processing
- Agricultural
- Oil and Gas
- Mineral Processing



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Rod Diameter Ød	B	ØD	ØD1	L +0.20	L1 -0.10	R1	R2
Series 1	up to 40 mm	3.00	d+6.00	d+3.75	3.00	1.00	0.30	0.50
Series 2	up to 50 mm	5.00	d+10.00	d+5.75	5.00	1.50	0.30	0.50
Series 3	up to 90 mm	6.50	d+13.00	d+7.50	6.50	2.00	0.30	0.50
Series 4	up to 115 mm	8.00	d+16.00	d+9.10	8.00	3.00	0.30	0.50
Series 5	up to 175 mm	10.00	d+20.00	d+11.25	10.00	4.00	0.30	0.50
Series 6	up to 1000 mm	12.50	d+25.00	d+15.00	12.50	5.00	0.30	0.50

INCH SERIES

	Rod Diameter Ød	B	ØD	ØD1	L +0.008	L1 +0.004	R1	R2
Series 1	up to 1.625 in	0.125	d+0.250	d+0.148	0.125	0.040	0.012	0.020
Series 2	up to 1.875 in	0.188	d+0.376	d+0.222	0.188	0.060	0.012	0.020
Series 3	up to 3.500 in	0.250	d+0.500	d+0.296	0.250	0.080	0.012	0.020
Series 4	up to 4.375 in	0.313	d+0.626	d+0.358	0.313	0.118	0.012	0.020
Series 5	up to 6.750 in	0.375	d+0.750	d+0.442	0.375	0.158	0.012	0.020
Series 6	up to 40.000 in	0.500	d+1.000	d+0.590	0.500	0.197	0.012	0.020

Note: For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

Features:

- Machined from MTC1 composite
- Compressive strength of 50,000 psi
- Dimensionally stable in water-based fluids
- Low friction
- Easy to install
- Available in large diameter up to 2100 millimeters



MATERIAL

The 845/890 Series Guide Band is made from MTC1, a thermoset polyester resin reinforced with a synthetic fabric.

Material	Code
Polyester Resin Fabric TC1 (shown in photo)	MTC1
PTFE w/ Bronze filler (shown in photo)	MT21

OPERATING PARAMETERS

Temperature	MTC1	
	°C	°F
hydraulic oil	-40...+120	-40...+248
water oil emulsions (HFA)	+5...+60	+41...+140
water-glycol fluids (HFC)	-40...+60	-40...+140
polyol esters (HFD)	-40...+100	-40...+140
water	+5...+60	+41...+140
max speed (FPM)	1 m/s (3.3 ft/sec)	
load	<50 n/mm (<7250 psi)	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 845/890 Series is a low-friction guide band made from MTC1, a high-compressive strength composite. This guide band is substantially stronger than polyamide-based materials and offers considerably lower water absorption. This new composite provides more accurate piston and rod guidance inside the cylinder under widely varying load conditions. Reduced bushing deformation allows the seals and wipers to perform at maximum efficiency, while minimizing the risk of scoring and abrasion. The 845 is split at a 45° angle, and the 890 is cut at a 90° angle.

PRODUCT BENEFITS

- Very accurate and precise guidance of the cylinder components
- Withstands very high side loads during operation
- Maximizes efficiency of the dynamic seals
- Wide temperature range

APPLICATIONS

The 845/890 Series Guide Band is the ideal solutions where high side loads and deflections are present.

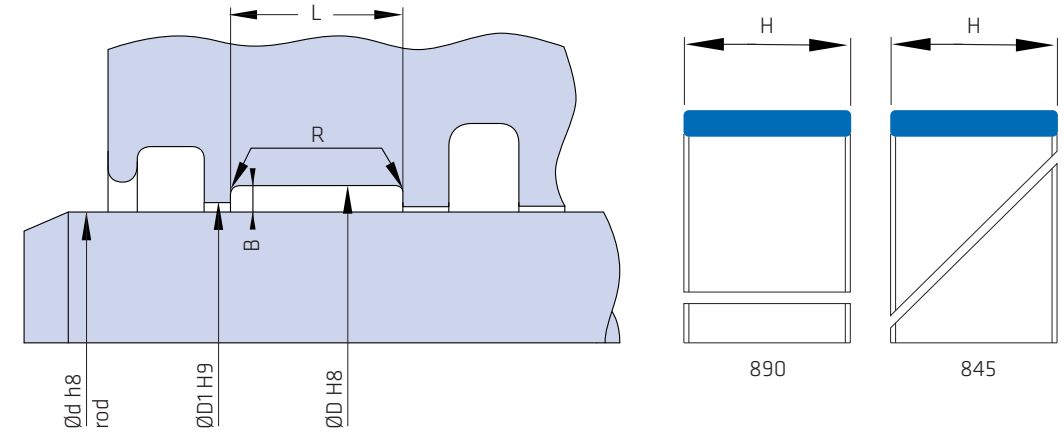
Typical applications include:

- Steel and Aluminum Processing
- Injection Molding Machines
- Mining
- Agricultural
- Construction
- Oil and Gas
- Mobile Hydraulics



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Groove Dimensions & Tolerances					Guide Band Dimensions	
	Nominal	L	Ød (rod)	ØD	ØD1*	section (cs)	height (H)
Series 1	1.50 x 5.60	5.60 +0.20	tol f8	d+3.0 H8	d+1.0 H9	1.45 ±0.03	5.30 ±0.10
Series 2	1.50 x 9.70	9.70 +0.20	tol f8	d+3.0 H8	d+1.0 H9	1.45 ±0.03	9.40 ±0.10
Series 3	1.50 x 15.00	15.00 +0.20	tol f8	d+3.0 H8	d+1.0 H9	1.45 ±0.03	14.70 ±0.10
Series 4	2.50 x 5.60	5.60 +0.20	tol f8	d+5.0 H8	d+1.6 H9	2.45 ±0.03	5.30 ±0.10
Series 5	2.50 x 9.70	9.70 +0.20	tol f8	d+5.0 H8	d+1.6 H9	2.45 ±0.03	9.40 ±0.10
Series 6	2.50 x 15.00	15.00 +0.20	tol f8	d+5.0 H8	d+1.6 H9	2.45 ±0.03	14.70 ±0.10
Series 7	2.50 x 20.00	20.00 +0.20	tol f8	d+5.0 H8	d+1.6 H9	2.45 ±0.03	19.65 ±0.15
Series 8	2.50 x 25.00	25.00 +0.20	tol f8	d+5.0 H8	d+1.6 H9	2.45 ±0.03	24.65 ±0.15
Series 9	4.00 x 25.00	25.00 +0.20	tol f8	d+8.0 H8	d+2.3 H9	3.95 ±0.03	24.65 ±0.15
Series 10	4.00 x 30.00	30.00 +0.20	tol f8	d+8.0 H8	d+2.3 H9	3.95 ±0.03	29.60 ±0.20

INCH SERIES

	Groove Dimensions & Tolerances					Guide Band Dimensions	
	Nominal	L	Ød (rod)	ØD	ØD1*	section (cs)	height (H)
Series 1	1/16 x 1/4	0.260 +0.010	tol h8	d+0.127	d+0.040	0.062 ±0.001	0.250 ±0.004
Series 2	1/16 x 3/8	0.385 +0.010	tol h8	d+0.127	d+0.040	0.062 ±0.001	0.375 ±0.004
Series 3	1/8 x 1/4	0.260 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	0.250 ±0.004
Series 4	1/8 x 3/8	0.385 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	0.375 ±0.004
Series 5	1/8 x 1/2	0.510 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	0.500 ±0.004
Series 6	1/8 x 3/4	0.760 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	0.750 ±0.004
Series 7	1/8 x 1	1.010 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	1.000 ±0.004
Series 8	1/8 x 1-1/4	1.260 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	1.250 ±0.004
Series 9	1/8 x 1-1/2	1.510 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	1.500 ±0.004
Series 10	1/8 x 2	2.010 +0.010	tol h8	d+0.252	d +0.063	0.124 ±0.001	2.000 ±0.004

Note: If guide band is used adjacent to a primary seal, Ød1 & ØD1 are superseded by the primary seal extrusion gap diameter guidelines. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.

Features:

- Machined from MTC1 composite
- Compressive strength of 50,000 psi
- Dimensionally stable in water-based fluids
- Low friction
- Easy to install
- Available in large diameter up to 2100 millimeters



MATERIAL

The 845/890 Series Guide Band is made from MTC1, a thermoset polyester resin reinforced with a synthetic fabric.

Material	Code
Polyester Resin Fabric TC1 (shown in photo)	MTC1
PTFE w/ Bronze filler (shown in photo)	MT21

OPERATING PARAMETERS

Temperature	MTC1	
	°C	°F
hydraulic oil	-40...+120	-40...+248
water oil emulsions (HFA)	+5...+60	+41...+140
water-glycol fluids (HFC)	-40...+60	-40...+140
polyol esters (HFD)	-40...+100	-40...+140
water	+5...+60	+41...+140
max speed (FPM)	1 m/s (3.3 ft/sec)	
load	<50 n/mm (<7250 psi)	

Note: For other materials or fluids please contact our engineering department.

DESCRIPTION

The 845/890 Series is a low-friction guide band made from MTC1, a high-compressive strength composite. This guide band is substantially stronger than olyamide-based materials and offers considerably lower water absorption. This new composite provides more accurate piston and rod guidance inside the cylinder under widely varying load conditions. Reduced bushing deformation allows the seals and wipers to perform at maximum efficiency, while minimizing the risk of scoring and abrasion. The 845 is split at a 45° angle, and the 890 is cut at 90° angle.

PRODUCT BENEFITS

- Very accurate and precise guidance of the cylinder components
- Withstands very high side loads during operation
- Maximizes efficiency of the dynamic seals
- Wide temperature range

APPLICATIONS

The 845/890 Series Guide Band is the ideal solutions where high side loads and deflections are present.

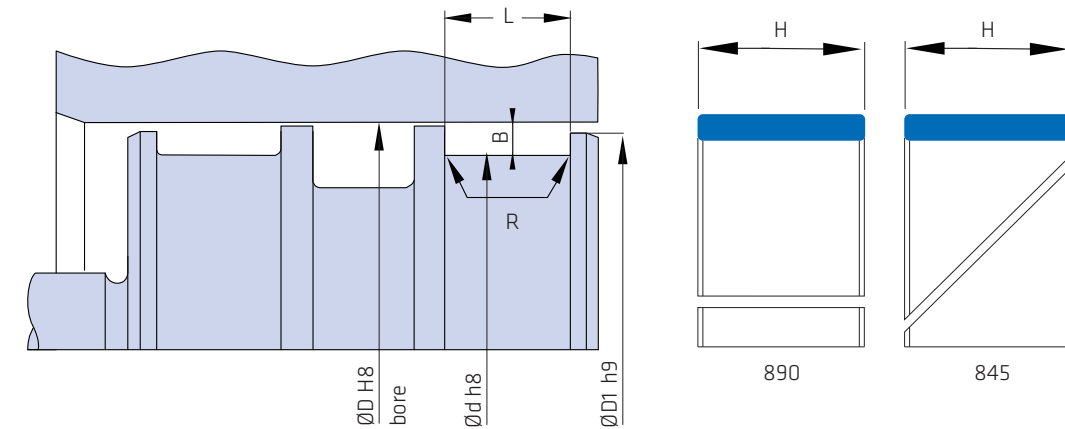
Typical applications include:

- Steel and Aluminum Processing
- Injection Molding Machines
- Mining
- Agricultural
- Construction
- Oil and Gas
- Mobile Hydraulics



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	Groove Dimensions & Tolerances					Guide Band Dimensions	
	Nominal	L	ØD (bore)	Ød	Ød1*	section (cs)	height (H)
Series 1	1.50 x 5.60	5.60 +0.20	tol H8	D-3.0 h8	D-1.0 h9	1.45 ±0.03	5.30 ±0.10
Series 2	1.50 x 9.70	9.70 +0.20	tol H8	D-3.0 h8	D-1.0 h9	1.45 ±0.03	9.40 ±0.10
Series 3	1.50 x 15.00	15.00 +0.20	tol H8	D-3.0 h8	D-1.0 h9	1.45 ±0.03	14.70 ±0.10
Series 4	2.50 x 5.60	5.60 +0.20	tol H8	D-5.0 h8	D-1.6 h9	2.45 ±0.03	5.30 ±0.10
Series 5	2.50 x 9.70	9.70 +0.20	tol H8	D-5.0 h8	D-1.6 h9	2.45 ±0.03	9.40 ±0.10
Series 6	2.50 x 15.00	15.00 +0.20	tol H8	D-5.0 h8	D-1.6 h9	2.45 ±0.03	14.70 ±0.10
Series 7	2.50 x 20.00	20.00 +0.20	tol H8	D-5.0 h8	D-1.6 h9	2.45 ±0.03	19.65 ±0.15
Series 8	2.50 x 25.00	25.00 +0.20	tol H8	D-5.0 h8	D-1.6 h9	2.45 ±0.03	24.65 ±0.15
Series 9	4.00 x 25.00	25.00 +0.20	tol H8	D-8.0 h8	D-2.3 h9	3.95 ±0.03	24.65 ±0.15
Series 10	4.00 x 30.00	30.00 +0.20	tol H8	D-8.0 h8	D-2.3 h9	3.95 ±0.03	29.60 ±0.20

INCH SERIES

	Groove Dimensions & Tolerances					Guide Band Dimensions	
	Nominal	L	ØD (bore)	Ød	Ød1*	section (cs)	height (H)
Series 1	1/16 x 1/4	0.260+0.010	tol H8	D-0.127	D-0.040	0.062 ±0.001	0.250 ±0.004
Series 2	1/16 x 3/8	0.385+0.010	tol H8	D-0.127	D-0.040	0.062 ±0.001	0.375 ±0.004
Series 3	1/8 x 1/4	0.260+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	0.250 ±0.004
Series 4	1/8 x 3/8	0.385+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	0.375 ±0.004
Series 5	1/8 x 1/2	0.510+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	0.500 ±0.004
Series 6	1/8 x 3/4	0.760+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	0.750 ±0.004
Series 7	1/8 x 1	1.010+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	1.000 ±0.004
Series 8	1/8 x 1-1/4	1.260+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	1.250 ±0.004
Series 9	1/8 x 1-1/2	1.510+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	1.500 ±0.004
Series 10	1/8 x 2	2.010+0.010	tol H8	D-0.252	D-0.063	0.124 ±0.001	2.000 ±0.004

Note: If guide band is used adjacent to a primary seal, Ød1 & ØD1 are superseded by the primary seal extrusion gap diameter guidelines. For a complete list of available sizes please refer to the System Seals online product catalogue at www.systemseals.com.



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