

CARCO®

LARGE DIAMETER SEALS

**ROTARY AND HYDRAULIC SEALS FOR
STEEL AND ALUMINIUM INDUSTRY**

Manufacturing sealing solutions
for heavy duty applications



CRITICAL SEALS ARE OUR SPECIALIZATION

In a steel mill or aluminium plant there are a large number of seals, whose failure can cause costly consequences. Engineering, expertise and superior seal quality are essential to withstand the extreme working conditions of this environment and to avoid unplanned machinery shutdown.

Here some examples of typical applications of CARCO seals:

HOT AND COLD ROLLING MILLS



PROBLEM: damage of rotary shaft seals during fitting of work roll or back up roll into the bearing, corrosion of the bearing, reduction of its life, pieces of broken spring in the bearing.



SOLUTION: Carcoseal/ATLMP “Anti Twist Lip” (page 6)

- innovative seal profile
- protecting the value of the bearing.



PROBLEM: leakage from automatic gauge cylinders (AGC) in the rolling mill / contamination inside the AGC.



SOLUTION: Alphaseal composite seals (page 11)

- great sealing and wiping performance
- low friction, no stick-slip effect
- D-shaped energizing ring for great seal stability



CONTINUOUS CASTING

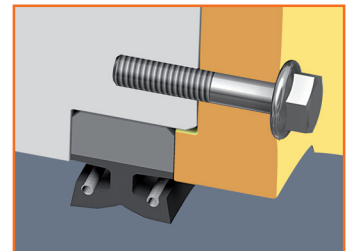


PROBLEM: short life of roll bearings due to inadequate seal protection.



SOLUTION: Carcoseal/DUO (page 7)

- seal material withstanding heat from continuous casting
- double lip design to prevent lubricant leakage and contamination entering into the bearing



HEAVY DUTY HYDRAULIC CYLINDERS



PROBLEM: oil leakage from cylinders for slab handling.

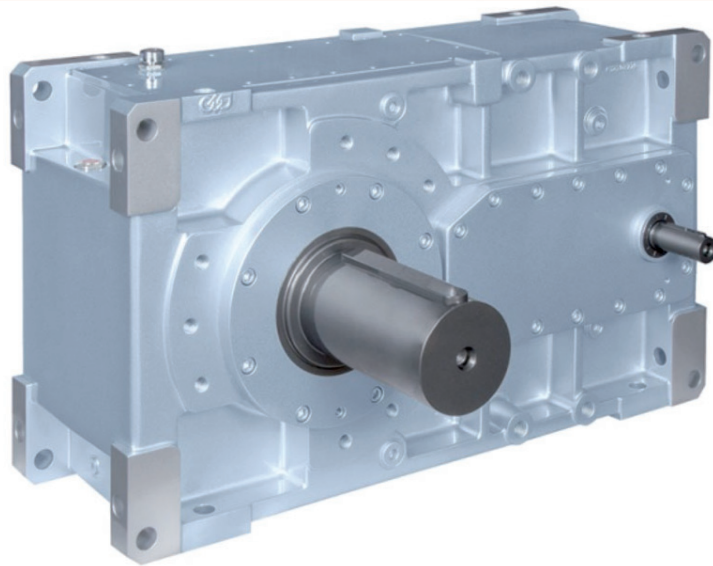


SOLUTION: Carcotex/UN V-Packings (page 9)

- multi-lip design enhancing seal robustness and reliability
- no sudden seal breakdown
- split version for on site seal replacement, no need to remove the hydraulic cylinder



GEARBOXES



PROBLEM: oil leakage from gearboxes, need to replace shaft seals



SOLUTION: Carcoseal/UN/SPLIT (page 6)

- **Carcoseal** in split version with „soft ends“ to avoid lubricant leakage
- easy and quick seal replacement on site, no need to remove shaft



ROD WIRE MILLS



PROBLEM: cooling water mixing with bearing lubricant



SOLUTION: Carcoseal/TAD (page 7)

- seal suitable for extreme high speed
- rubber compounds with additives to withstand the toughest working conditions



HYDRAULIC PRESSES FOR OPEN DIE FORGING

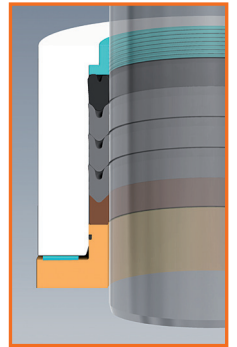


PROBLEM: oil leakage from main ram seal, risk of fire

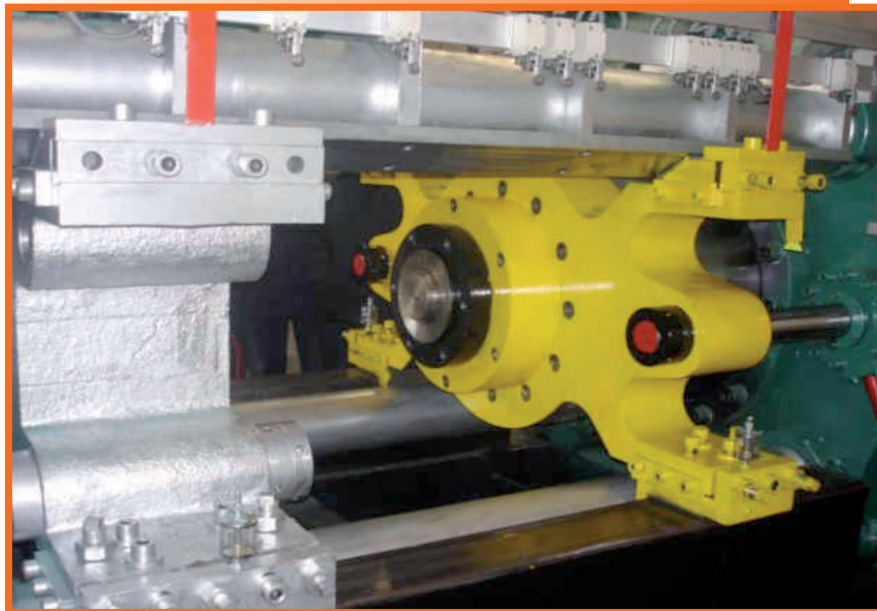


SOLUTION: Carcotex/SP/SG V-packing (page 10)

- withstanding shock loads and large extrusion gaps
- designed for damaged contact surface and large ram misalignment



HYDRAULIC PRESSES FOR ALUMINIUM EXTRUSION

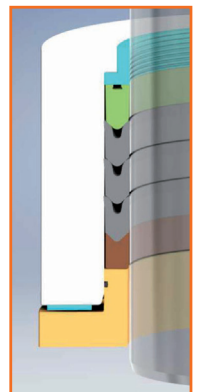


PROBLEM: short life of main cylinder seal



SOLUTION: Carcotex/SP V-packing (page 10)

- robust design for longest working life
- suitable for adjustable housing
- **Carcoflon** coating to avoid stick-slip



CARCO[®] SEAL

HIGH PERFORMANCE ROTARY SHAFT SEALS

FABRIC RUBBER BACK:

- EASY TO FIT
- SPLIT VERSION TO REDUCE MAINTENANCE TIME
- STATIC SEAL ON THE OUTER DIAMETER PREVENTS LEAKAGE BETWEEN SEAL AND HOUSING
- NO RISK OF HOUSING DAMAGE DURING SEAL FITTING

RUBBER LIP:

- SPECIAL PROFILE TO GUARANTEE NO LEAKAGE AND ADEQUATE LIP LUBRICATION
- STAINLESS STEEL GARTER SPRING TO KEEP THE LIP HOMOGENEOUSLY IN CONTACT WITH THE SHAFT AT HIGH SPEED AND HIGH SHAFT ECCENTRICITY
- DEEP GROOVE TO ENSURE THE SPRING IS ALWAYS IN THE CORRECT POSITION
- **CARCOSEAL'S LIP IS TREATED WITH "CARCOFLON" TO AVOID STICK-SLIP EFFECT AND REDUCE FRICTION**



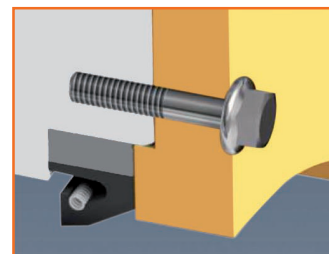
MATERIAL CODE	DESCRIPTION	PRESSURE (bar/psi)	SPEED (m/s - ft/min)	WORKING TEMPERATURE (°C - °F)	PEAK TEMPERATURE (°C - °F)
S820	Standard use	<0,5/7	15/3000	-20 +100 / -4 +210	-30 +120 / -22 +250
HT720	High speed and temperature	<0,5/7	25/5000	-30 +140 / -22 +280	-40 +160 / -40 +320
HT790	High speed and temp. - aramid	<0,5/7	25/5000	-30 +150 / -22 +300	-40 +170 / -40 +340
Z420	High temp. and chemical resistance	<0,5/7	25/5000	-20 +150 / -4 +300	-30 +170 / -22 +340
Z490	High temp. and chem. res. - aramid	<0,5/7	25/5000	-20 +180 / -4 +350	-30 +200 / -22 +390

Peak temperatures are respectively the lowest admissible survival temperature in static conditions and the highest admissible under-lip temperature.

CARCOSEAL/UN

MOST POPULAR PROFILE

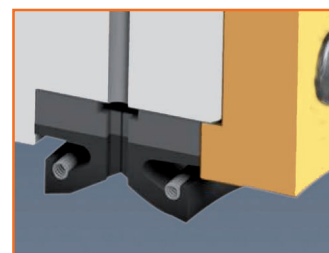
- Suitable for most applications
- Fitted with retaining plate



CARCOSEAL/SCA

SEAL PROFILE WITH LUBRICATION GROOVES

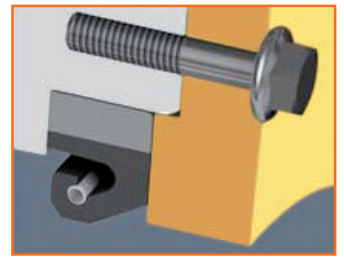
- Providing additional external lubrication
- Back to back fitting: seal lips facing opposite sides to protect the bearing from contamination and prevent leakage of lubricant
- Tandem fitting: seal lips facing same side for double barrier



CARCOSEAL/UN/ATLMP - CARCOSEAL/SCA/ATLMP

ANTI TWIST LIP

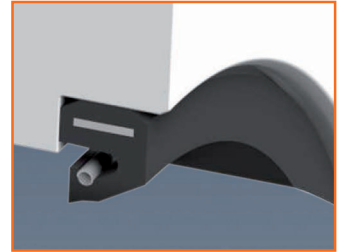
- Seal design developed for steel and aluminium rolling mills for best bearing protection
- Seal lip not twisted and damaged during roll fitting into the bearing
- No bearing contamination and corrosion
- Available with lubrication grooves (SCA/ATLMP)



CARCOSEAL/UN/MB

SELF-RETAINING DESIGN

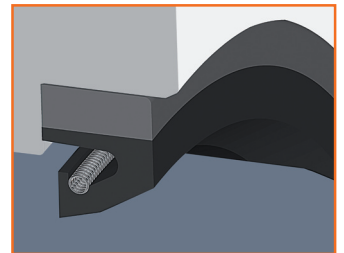
- Fitted without retaining plate
- Suitable for high speed
- Available with lubrication grooves (SCA/MB)



CARCOSEAL/UN/SF

SELF-RETAINING DESIGN

- Fitted without retaining plate
- Suitable up to 5 m/s
- Fitting with glue recommended
- Available with lubrication grooves (SCA/SF)



CARCOSEAL/UN/SPLIT **CARCOSEAL/SCA/SPLIT**

SPLIT DESIGN

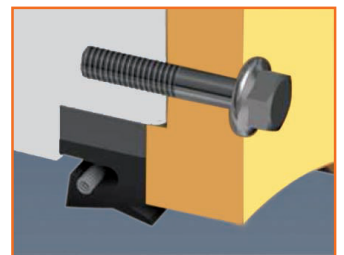
- Short maintenance time, shaft removal not necessary
- Easy seal fitting
- Seal with “soft ends” to avoid leakage



CARCOSEAL/UN/LA

ANTI DUST LIP

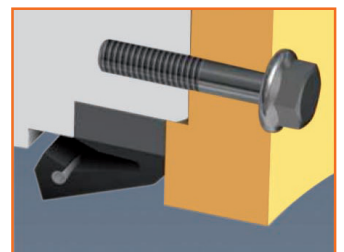
- Additional lip to keep dust and water away from the main lip contact area



CARCOSEAL/UN/LL

LONG LIP

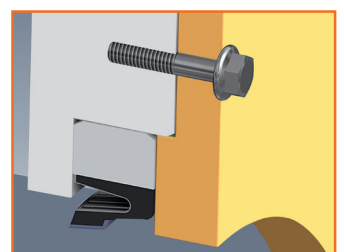
- Recommended for very large eccentricity of the shaft
- Seal lip design customized depending on shaft eccentricity



CARCOSEAL/UN/o6

FINGER SPRING

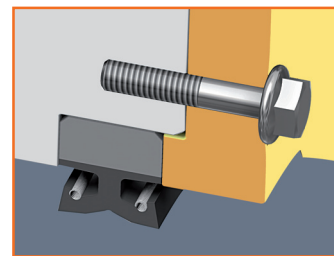
- Spring vulcanized into the seal
- Easy fitting of large diameter seals



CARCOSEAL/DUO

DOUBLE LIP SEAL

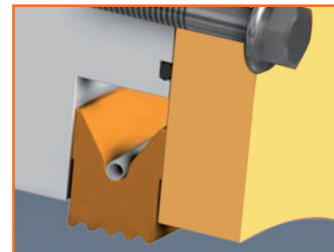
- Two lips in one seal
- Sealing on both sides in limited space



CARCOSEAL/LDS

DOUBLE FACE SEAL

- Suitable for rotating shafts with very large eccentricity
- LDS rotates with the shaft and its lips slide against seal housing
- Energised with a stainless steel garter spring



CARCOSEAL/TAD

DOUBLE FACE SEAL FOR ROD WIRE MILLS

- Suitable for very high speed (> 100 m/s)
- Proprietary low friction filler to reduce the overall friction

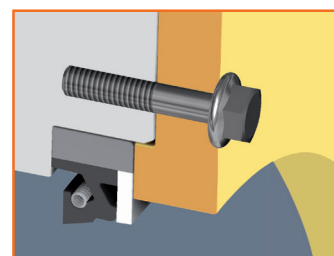


ROTARY SHAFT SEALS FOR PRESSURE - Over 0,5 bar

CARCOSEAL/AP

SEAL WITH SUPPORT RING

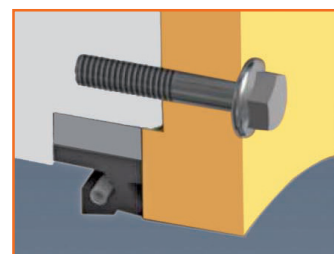
- Lip supported by PTFE ring in case of incorrect retaining flange
- Available in endless version
- Can replace braided packings and reduce shaft wear



CARCOSEAL/AP/WT

SEAL WITHOUT SUPPORT RING

- Lip supported by the retaining flange
- SPLIT version available: reducing maintenance cost & time (ISP gluing kit is required)



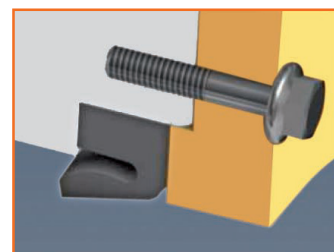
ISP KIT FOR ON SITE GLUING

- The kit is available with clear instructions to glue seals on site
- "ISP" provides large saving of time and money in maintenance

CARCOSEAL/TM

ROBUST DESIGN

- Thick rounded seal lip without spring
- Suitable for severe applications: abrasive media, slurries, etc.
- Also available in full rubber (Carcoseal/TM/FR)



HIGH PERFORMANCE V-RINGS

MATERIAL CODE	DESCRIPTION	PRESSURE (bar/psi)	SPEED (m/s - ft/min)	WORKING TEMPERATURE (°C - °F)	PEAK TEMPERATURE (°C - °F)
S800	Standard use	<0,5/7	15/3000	-20 +100 / -4 +210	-30 +120 / -22 +250
HT700	High speed and temperature	<0,5/7	20/4000	-30 +150 / -22 +300	-40 +170 / -40 +340
Z400	High temp. and chemical resistance	<0,5/7	25/5000	-20 +180 / -4 +350	-30 +200 / -22 +390

Peak temperatures are respectively the lowest admissible survival temperature in static conditions and the highest admissible under-lip temperature.

CARCOSEAL/FM/02

V-RING WITH PTFE RING

- Recommended for roll neck in rolling mills
- Special lip design with PTFE RING for lowest friction coefficient
- Enhancing seal efficiency and working life
- Replacing traditional V-rings



CARCOSEAL/FM/03

ROBUST V-RING

- Recommended for roll neck in rolling mills
- Robust lip design to enhance working life in comparison to traditional V-rings (Type A, L, AX)



CARCOSEAL/FM/03/C

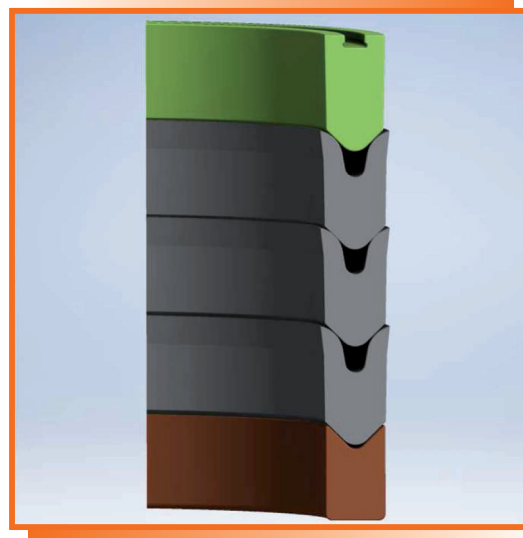
ROBUST V-RING WITH CLAMPING BAND

- Recommended for roll neck of rolling mills
- Robust lip design to enhance working life in comparison to traditional V-rings (Type A, L, AX)
- Fitting with metal clamping band



LONG LIFE V-PACKINGS FOR HEAVY DUTY APPLICATIONS

- HIGH RESISTANCE RUBBER MALE ADAPTER;
VARIOUS DESIGNS AVAILABLE ACCORDING TO WORKING
CONDITIONS
- FABRIC RUBBER INTERMEDIATE RINGS TO GUARANTEE MAXIMUM
SERVICE LIFE AND NO LEAKAGE
- THICK FABRIC RUBBER FEMALE ADAPTER WITH ADDITIONAL KEVLAR
REINFORCEMENT TO PREVENT EXTRUSION UNDER HEAVY SHOCK LOADS
- READY FOR FITTING, NO NEED TO TRIM THE V-PACKING ON SITE
- CERTIFICATE WITH RECOMMENDED FITTING HEIGHT



MATERIAL CODE	DESCRIPTION	WORKING TEMPERATURE (°C - °F)	PEAK TEMPERATURE (°C - °F)
S800	Standard use	-20 +100 / -4 +210	-30 +120 / -22 +250
HT700	Enhanced seal performance	-30 +140 / -22 +280	-40 +160 / -40 +320
Z400	High temp. and chemical resistance	-20 +150 / -4 +300	-30 +170 / -22 +340
Z490	High temp. and chemical resistance - aramid	-20 +180 / -4 +350	-30 +200 / -22 +390

*CARCOFLON surface treatment option is available up on request (Reducing friction)

NORMAL DUTY APPLICATIONS UP TO 400 bar (5800 psi)

- Hydraulic cylinders
- Side cylinders in forging and extrusion presses
- Billet shears
- Scrap metal presses

CARCOTEX/UN

CLASSIC V-PACKING

- Piston seal (Carcotex/UN/PIS) and rod seal (Carcotex/UN/ROS)
- Designed to be compressed axially: intermediate rings energized by male adapter
- Suitable for fixed and adjustable housings
- Available in endless and split versions



CARCOTEX/SG

AUTOMATIC V-PACKING

- Rod seal
- Applications with pressure cycles, assuring no leakage at both high & very low pressure
- No axial preload: orange male adapter is pressure responsive
- Usually fitted in fixed housings, any housing height
- Available in endless and split versions



CARCOTEX/SG/AS

AUTOMATIC V-PACKING WITH ASYMMETRICAL HEADER

- Rod seal
- Applications with pressure cycles, assuring no leakage at both high & very low pressure
- No axial preload: male adapter is pressure responsive
- Usually fitted in fixed housings, any housing height
- Available in endless and split versions



CARCOTEX/UG

AUTOMATIC V-PACKING

- Rod seal for small housing
- No axial preload; orange male adapter is pressure responsive
- Suitable for fixed housings
- Available only in endless version
- CARCOFLON surface treatment on dynamic side



HEAVY DUTY APPLICATIONS UP TO 630 bar (9200 psi)

- Forging presses
- Aluminium extrusion presses
- Forging and extrusion of other non-ferrous metals
- Steel mill hydraulic cylinder

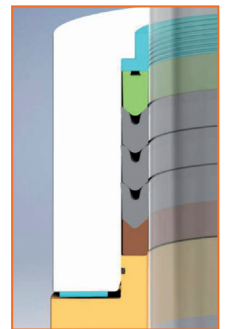
Providing maximum resistance to cope with toughest working conditions:

- Heavy shock loads
- Lateral thrust
- Large ram misalignment
- Large extrusion gaps

CARCOTEX/SP

HEAVY DUTY V-PACKING

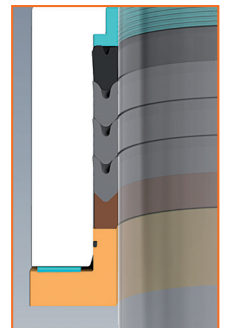
- Anti-extrusion female adapter with Kevlar extra reinforcement
- Compressed axially in the housing
- Suitable for adjustable housing
- Supplied split
- No need to trim intermediate rings during fitting

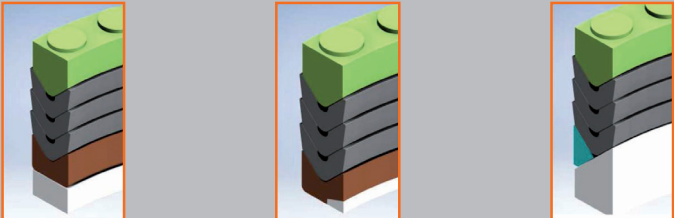


CARCOTEX/SP/SG

HEAVY DUTY AUTOMATIC V-PACKING

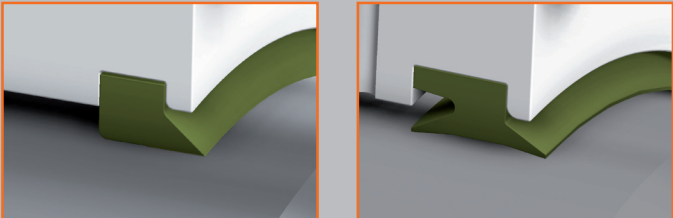
- Special asymmetrical male adapter giving excellent sensitivity even at very low pressure
- Leak-free performance in case of worn rams and large misalignment
- Not compressed axially in the housing
- No periodic adjustment is required





ANTI-EXTRUSION FEMALE RING OPTIONS

- Back-up ring with standard female ring
- Anti-extrusion wedge support
- Self-aligning female ring



CARCOWIP

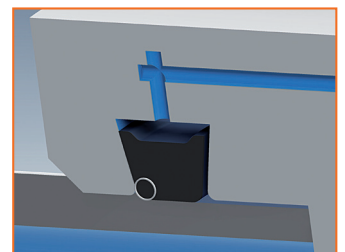
HIGHLY EFFECTIVE SCRAPERS

- Recommended for abrasive dirty and dusty environment
- Double acting version is available (CARCOWIP/2)

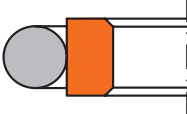
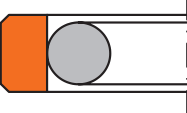
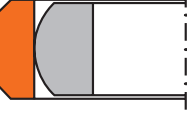
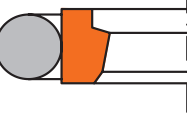
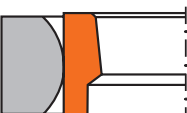
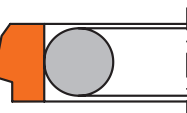
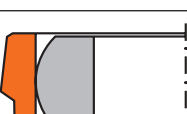
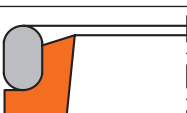
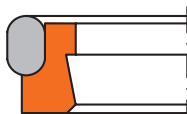
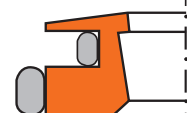
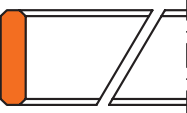
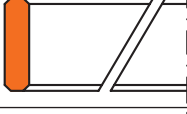

CARCO/PRO

TUBE TEST SEAL

- Seal for tube hydrotester
- Seal based on Kochs design











ALPHASEAL COMPOSITE SEALS




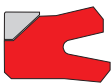
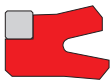



Identification	Designation	Press. Mpa (bar)	Temp. °C	Speed m/s	Page
	ROD SEAL PRP-01 Double effect rod seal, energised by an O-RING. In dynamic applications it generates low friction without stick-slip phenomena; it allows a very long operating life of the system due to its high wear resistance.	80 (800)	-60 +200	15	18
	PISTON SEAL PRP-02 Double effect piston seal, energised by an O-RING. In dynamic applications it generates low friction without stick-slip phenomena; it allows a very long operating life of the system due to its high wear resistance.	80 (800)	-60 +200	15	19
	PISTON SEAL PRP-02S Double effect piston seal energized by an elastomeric component. The special shape of the energizer makes this seal very stable even under high loads. Recommended for heavy duty applications and dirty environments, for example in steel mills.	80 (800)	-35 +200	5	19.1
	ROD SEAL PRP-11 Single effect rod seal, energised by an O-RING. In dynamic applications it generates low friction without stick-slip phenomena; it allows a very long operating life of the system due to its strong wear resistance. Exceptional efficiency of seal is obtained with a combination in tandem together with a scraper of series PRP-21B.	80 (800)	-60 +200	15	20
	ROD SEAL PRP-11S Simple effect rod seal energized by an elastomeric component. The special shape of the energizer makes this seal very stable even under high loads. Recommended for heavy duty applications and dirty environments, for example in steel mills.	60 (600)	-35 +200	5	20.1
	PISTON SEAL PRP-12 Single effect piston seal, energised by an O-RING. In dynamic applications it generates low friction without stick-slip phenomena; it allows a very long operating life of the system due to its strong wear resistance. Exceptional efficiency of seal is obtained with a combination of 2 seals in tandem.	80 (800)	-60 +200	15	21
	PISTON SEAL PRP-12S Simple effect piston seal energized by an elastomeric component. The special shape of the energizer makes this seal very stable even under high loads. Recommended for heavy duty applications and dirty environments, for example in steel mills.	60 (600)	-35 +200	5	21.1
	SCRAPER PRP-21A Scraper ring of great efficiency thanks to the energizing O-RING. It enhances the service life of the seal system even in presence of ice and mud.		-60 +200	15	31
	SCRAPER PRP-21B Double effect scraper ring energised by means of an O-RING. Its double action enhances the effect of the seal system. Its high efficiency prevents pollution from entering in the seal area.		-60 +200	15	31
	SCRAPER PRP-21E Double effect scraper energised by double O-RING. Its double action enhances the performance of the seal. Being very efficient, it is recommended for dirty and contaminating environments.		-60 +200	15	31.1
	GUIDE RING PRP-81/82 PTFE Guide rings for rod and piston. They are meant to avoid metal-to-metal contact, absorbing any radial stress. Guide rings prevent risk of seizure and stick-slip phenomena, enhancing service life of the system.	14 N/mm ²	-60 +200	15	40 41 46
	GUIDE RING PRP-81/82 D Guide rings suitable for high radial loads. PRP-81/82 D guide rings are made of cotton fabric impregnated with phenolic resin and lubricating additives.	80 N/mm ²	-40 +120	1	42 43
	GUIDE RING PRP-81/82 T100/T200 Guide rings suitable for high radial loads. PRP-81/82 T100/T200 guide rings are made of polyester fabric and polyester resin with lubricating additives. Please check page 6 for material selection.	100 N/mm ²	-40 +120	1	44 45 46

CARCOMACH - MACHINED SEALS

R - Rod Seals

Seal profile	Part number	Standard materials	Pressure (bar)	Temperature (°C)	Speed (m/sec)
	R01-	PU NBR FPM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	R01A	PU NBR FPM	160 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	R01B	PU NBR FPM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	R02-	PU/POM NBR/POM FPM/PTFE	700 250 250	-30 to 105 -25 to 100 -20 to 210	0,5
	R02A	PU/POM NBR/POM FPM/PTFE	700 250 250	-30 to 105 -25 to 100 -20 to 210	0,5
	R03-	PU/NBR	400	-25 to 100	0,5
	R04-	PU/NBR/POM	700	-25 to 100	0,5
	R05-	PU NBR	25	-30 to 105 -25 to 100	0,5

P - Piston Seals

Seal profile	Part number	Standard materials	Pressure (bar)	Temperature (°C)	Speed (m/sec)
	P01-	PU NBR FPM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	P01A	PU NBR FPM	160 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	P01B	PU NBR FPM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	P02-	PU/POM NBR/POM FPM/PTFE	700 250 250	-30 to 105 -25 to 100 -20 to 210	0,5
	P02A	PU/POM NBR/POM FPM/PTFE	700 250 250	-30 to 105 -25 to 100 -20 to 210	0,5
	P03-	PU/NBR	400	-25 to 100	0,5
	P04-	PU/NBR/POM	700 700	-25 to 100	0,5
	P05-	PU NBR	25	-30 to 105 -25 to 100	1

CARCOAIR INFLATABLE SEALS



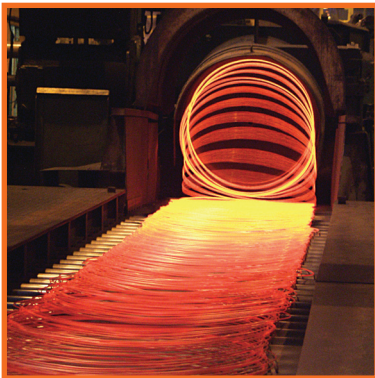
CARCO offers the CARCOAIR line, inflatable seals in full rubber or fabric reinforced rubber. Our technical department is at your disposal for the development of projects, on the basis of our extensive know-how.

CARCOAIR inflatable seals are manufactured in different elastomers: VMQ, EPDM, NBR, FKM and with fabric reinforcement.

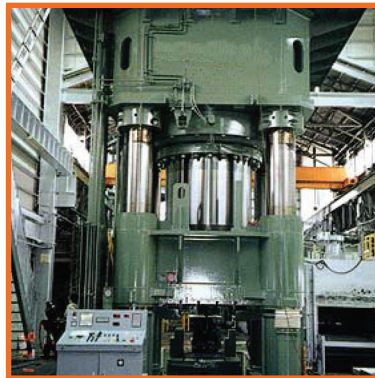
Our material range includes FDA approved elastomers.



CARCO IS A LEADING SUPPLIER OF SEALING SOLUTIONS IN THE FOLLOWING MARKETS



HEAVY INDUSTRY



HEAVY HYDRAULICS



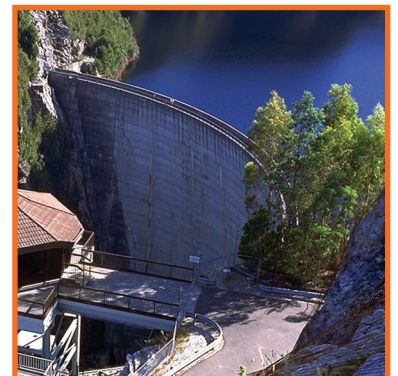
SHIPBUILDING



WINDPOWER



TUNNELLING



HYDROPOWER

MORE THAN A CENTURY OF EXPERIENCE



From leather seals for hydropower plants in the Alps back in year 1900 to today's giant seals for Tunnel Boring Machines.

This is the CARCO evolution in more than a century. Never compromising on quality, we have been manufacturing a huge number of rotary and hydraulic seals with no limit in diameter. Each CARCO seal takes large responsibility, as we dedicate to challenging and critical applications, with no room for mistakes.

Today CARCO is a Group of companies with more than 130 people in 5 Countries. Headquarter is in Basiano (Milan - Italy).

Other sales offices are in Germany, France, USA and China. Manufacturing facilities are in Italy and USA.

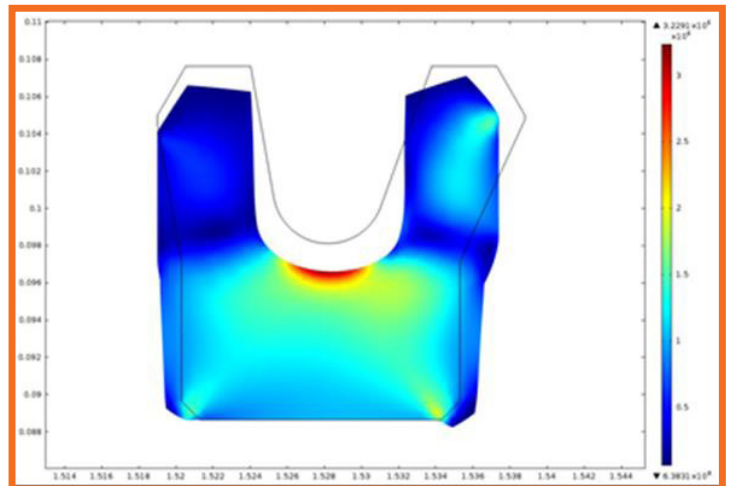
CARCO is a global seal supplier covering a variety of seal profiles and materials, from fabric reinforced elastomers to thermoplastic polymers. In 1992 we were amongst the first ISO certified companies in Italy.

FAST AND EXPERT

Short delivery time is part of CARCO image; even large diameter seals for metal forging presses or giant wind mills are available in 1 week or less. We are proud of remaining always above 95% of orders delivered on time.

CARCO is application oriented: to satisfy the customer's requirements we need to know deeply the machinery in which our seal is fitted. Our technical department specifies the correct seal profile and material to offer the longest seal life and prevent unscheduled machine shutdown.

CARCO engineers recommend: type of seal, seal housing, lubrication, metalwork hardness and roughness, etc.: the complete project. With FEA analysis we can predict the behaviour of the seal under certain conditions. Our test rigs enable us to explore new projects and our laboratory can test the chemical compatibility of our materials with biolubricants. CARCO staff can replace seals on site worldwide with gluing and hot joint technologies to prevent costly machine disassembling. YOU CAN HAVE ALL THIS FROM CARCO!





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