ROLMAN WORLD

NAK®

THE WORLD IN MOTION

About NAK Sealing Technologies

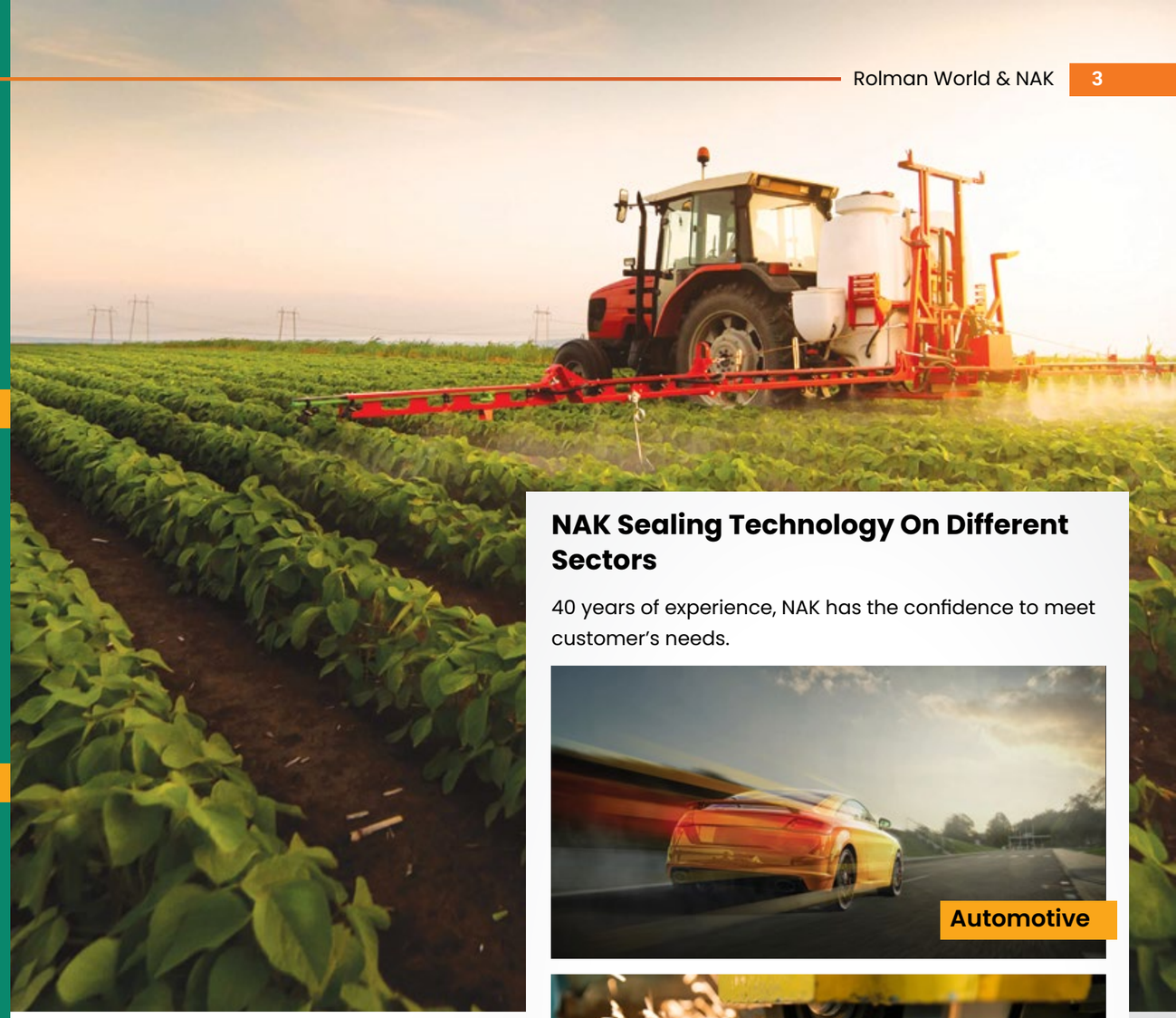
NAK Sealing Technologies has a great and robust history dating back to the 1970's, established on 1976 to drive an organization with its fundamental principles based on innovation, research, perseverance and social commitment. Today, NAK Sealing Technologies is the largest manufacturer of sealing products across Taiwan and the first ever corporate organization in this sector to ever go public on the Taiwanese Stock Exchange, as in the year 2002. NAK's high quality products driven by extensive research and innovation have been acknowledged by customers both in the domestic and international markets for decades.

Caring

Trimming

QC Inspecting

Packing



NAK Sealing Technology On Different Sectors

40 years of experience, NAK has the confidence to meet customer's needs.

Automotive

Industry

Agricultural / Construction & Mining

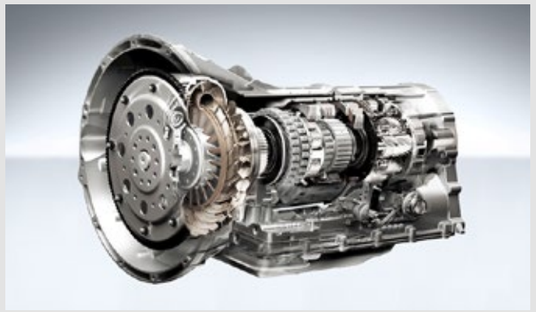
As sealing products are being used widely in our daily lives, NAK has progressively moved into the development of various seals to suit different kinds of applications. They aggressively continue to develop high tech and high value added sealing products so that it can be used in wide ranging environments such as Automotive, Industrial, Agricultural, Hydraulic & Pneumatic etc. NAK's experience of over 40 years in developing sealing products has given them the confidence to meet customer requirements.

Automotive

Automotive

NAK Automotive Seals are applied to important four dynamic systems:

DRIVING SYSTEM :
Gear Box, Drive Shaft, Differential Gear Box, and etc.



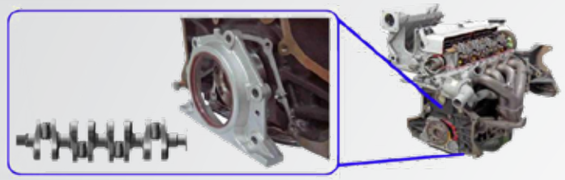
STEERING SYSTEM :
Axial Gear Box, Wheel Axle, Hub, Progressive Power Steering, and etc.

SUSPENSION SYSTEM :
Shock Absorber, Automobile Bearing Ball.

ENGINE SYSTEM :
Crank Shaft, Valve, Camshaft, Timing Gear, and etc.

ENGINE

NAK offers Rotary Seals for the automotive engine application including crankshaft and camshaft seals.



CRANKSHAFT & CAMSHAFT SEALS

Crankshaft and camshaft seals are critical components in the automotive engine system. As nowadays the automotive engine has become more and more subtle, the requirement for better sealing of the crankshaft and camshaft has become one of the major concerns in the design of the engine system.

PA TEFLON SEALS

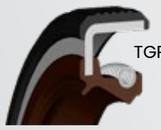
PA8

- PTFE (Teflon) sealing lip offers excellent chemical resistance and temperature capability and low friction.

PA11R

- Suitable for high-speed applications and when the reductions in under lip running temperature is required.

BI SEAL



TGR-BI

- Special design of two different rubber materials for O.D and sealing lip.

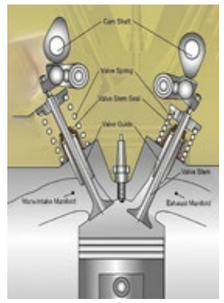
CSS SEAL

CSS

- This type of seal is applied in the rear crankshaft of the internal combustion engine.
- The seal is featured with rapid installation and position.
- Eliminates potential leak paths

VALVE STEM SEALS

These are important components that directly affect the efficiency of engine operation. Their function is to control the leakage of oil to lubricate the interface of valve stems and valve guide.



NAK provides a wide range of material selections and technical consultation services for customers.

NAK's capabilities of doing material research and analysis can provide suitable materials for different applications. Material research and analysis can provide suitable materials for different applications.

VSG1 SEAL

VSG1

- Maintains an appropriate and stable oil leak volume over longer periods of operation to ensure the proper functioning of the valve stem.

TRANSMISSION

In order to support automatic transmission manufacturers continually develop new designs that accelerate automatic transmission. NAK has developed a complete range of bonded piston seals for automatic transmission to offer longer service life and premium efficiency in technical performance.

Main Characteristics:

1. Cost-effective
2. Integrated characteristics
3. Ease of installation
4. Robust design

NAK transmission input seal has an excellent sealing contact between the seal I.D and shaft to retain the lubricant; output seal has special design of multiple dust lips those can provide better protection against contaminations.

TYPE AT SEALS

AT11

AT63

AT79

AT107

- This type of seal is used within the clutch of Auto Transmission.
- The seal design is based on the structure of the Auto Transmission in order to reduce the complexities of installation and to save space

SHIFT LEVER SEALS

TBCJ4

TCJ1

TZ5

- This seal is designed takes inspiration from the way an Auto Transmission is structured. This approach helps to streamline the installation process and optimize space utilization.
- Designed for an oscillating and reciprocating motion.

INPUT SHAFT SEALS

KBC3R2

SBGR9

SC

SG

- The design of hydrodynamic aid increases the pumping rate and reduces temperature rise and rubber wear.
- Excellent sealing contact between the seal I.D and the shaft to retain the lubricant.

OUTPUT SHAFT SEALS

TGW

TC9W14

TC29

TGW14-PL1

- Excellent sealing contact between the seal I.D and the shaft to retain the lubricant.
- Multiple dust lip design to prevent the contamination.

POWER STEERING

NAK Power Steering Seals, including rotary seals on the steering shaft and reciprocating seals on the rack shaft it designed with excellent quality for sealing of the hydraulic power steering fluid.

Main Characteristics:

1. To prevent pressure loss
2. To ensure power steering's operation

i. TYPICAL NAK PINION SHAFT SEALS

- Rotary seal installed on the steering shaft to prevent leakage and maintain lubrication
- Bonded rubber-metal design to ensure strength while offering excellent sealing
- Secondary lip to prevent reversion of the main lip

ii. TYPICAL NAK RACK SHAFT SEALS

- Reciprocating seals installed on the rack shaft of the power cylinder
- Compounded design with metal casing and back-up ring to ensure sealing at high pressures
- Integrated back-up ring to enable better pressure resistance
- Hydrodynamic helix to reduce friction and heating thus to prolong seal life

iii. NAK BELLOWS

- NAK Bellows are installed on the steering system to protect the parts of the steering rack against external contaminants to maintain proper lubrication of the gears that are key components of the steering rack.

TYPE CNB SEAL

CNB CNB1 CNB5 GNB17

- This seal type is used in the rack shaft of the power steering system within the vehicle.
- Excellent sealing capability for highly pressurized PSF (Power-Steering Fluid) and driving on low friction surface.
- Integrated back-up ring providing further support for the sealing lip to enable better pressure resistance and to prevent lip reversion.

TYPE 4P SEAL

SC4P SG4P TG4P

- This type of seal is applied in the pinion shaft of the power steering system within the vehicle.
- It possesses an outstanding ability to create a tight and reliable seal, specifically when dealing with Power-Steering Fluid (PSF) that is under high pressure.
- Secondary lip provides better support to the seal and less contact width with the shaft.

AXLE SEALS

i. NAK WHEEL HUB SEALS

- NAK Wheel Hub Seals for light vehicles have an axial excluder design to provide sealing against perpendicular counter surfaces.

ii. NAK C.V. JOINT BOOTS

- NAK C.V. Joint Boots are designed to operate in critical conditions such as high speed, large rotational angle, and extreme temperatures. They are technical rubber components in the vehicle for protecting transmission from outside contaminants. They are made of high-performance elastomers can ensure greater durability thus reducing the cost for replacements.

iii. NAK ST SERIES HUB SEALS

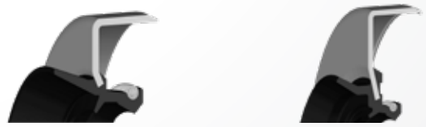
- NAK ST Series Hub Seals are high-durability wheel hub seals for medium to heavy duty vehicles. They are made by integrating multiple components to offer the best sealing and service life for the heavy haulers in the trucking industry. The labyrinth design of dust lips effectively prevents mud penetration and dissipates the heat produced during operation. The special style of hydrodynamic aid increases the pumping rate and reduces temperature rise and rubber wear.

TYPE ST HUB SEAL

ST5 ST10 ST14 ST34

- This seal type is used within wheel hub of heavy duty vehicles.
- Design of hydrodynamic aid increases the pumping rate and reduces temperature rise and rubber wear.

TYPE 9 SEAL



TB9 TB9W14

- These type of seals are used within the wheel hub of light vehicles.
- Axial excluder design provides sealing against perpendicular counter surfaces.

SHOCK ABSORBER

NAK Shock Absorber Seals are specialty oil seals for use in the automotive shock absorber with double functions, to prevent the leakage of the dampening fluid / gas and to seal against external contaminants during the reciprocating motion of the shaft, which are critical requirements for the shock absorber in regard to its function and service life.

Main Characteristics:

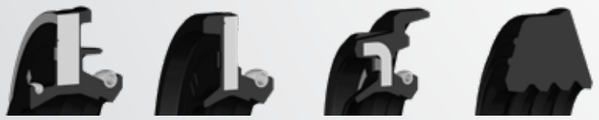
1. Resistant to high and low temperatures
2. Resistant to high pressures
3. Work well under high surface velocity
4. Resistant to shock absorber fluid

NAK designs and manufactures seals in this category for automotive, motorcycle, bicycle, and many other industrial applications.

MEASURABILITY OF NAK DYNAMIC TESTING RIG:

- Service Life
- Pressure
- Stroke Length
- Damper Force
- Friction
- Oil Temperature
- Rod Velocity

TYPE 4S/AS SEAL



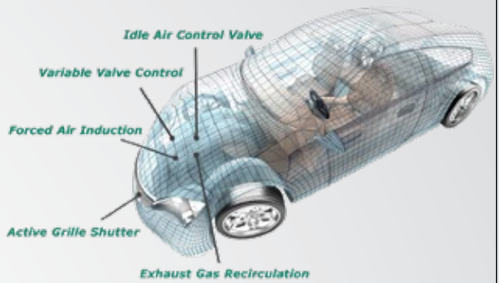
DC4S TC4S TC4S7 AS1

- This seal type is used within automotive shock absorber unit.
- The semicircular design of the secondary lip reduces friction and prevents lip reversion during the reciprocating movements.

AUTOMOTIVE ACTUATOR

To have a safe and comfortable driving experience, and to reduce fuel consumption and CO_2, the development of vehicles trend to the intelligentization (innovation), motorization (automation) and energy-saving thus, the demands for automotive motors used in cars are increasing dramatically.

Because of operating in the high temperature environment, automotive motors are required in high quality and efficiency. NAK sealing products are designed in high quality to suit automotive applications.



TYPE G1 SEAL

KG1

VG1

- Special design of a corrugated rubber OD with a lip profile suitable for applications with limited radial space.
- Particularly suitable for application where the housing material is subject to larger coefficient of thermal expansion.
- High-deflection sealing lip to have a low torque.

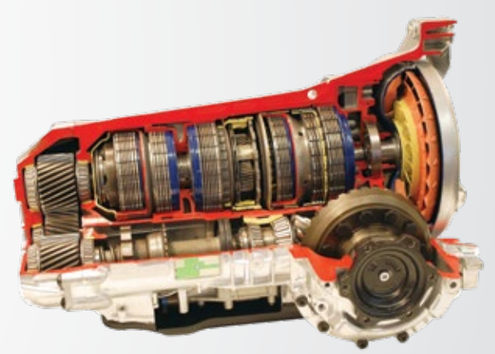
(TPSK) - AUTOMATIC TRANSMISSION BONDED PISTON SEAL KIT

Automatic transmission is the type of transmission that automatically changes the gears with regard to speed of the vehicle. The primary components of automatic transmission include planetary gear sets, hydraulic system, seals and gaskets, torque converter, governor, modulator and computer.

The modern automatic transmission system comprises many components and devices that are designed to achieve all the sophisticated functions demanded by acute buyers. These components of transmission are required higher stability and response.

To support automatic transmission manufacturers continually developing new designs that accelerate automatic transmission. NAK has developed a complete range of bonded piston seals for automatic transmission to offer longer service life and technical performance efficiency.

NAK Bonded Piston Seals provide good durability functions with consistently low friction, maximum pressure resistance and other strict specifications requirements. The one-piece, rubber to metal piston seals provides several benefits to transmission manufacturers. The bonded piston is one piece versus the 3 to 5 parts needed when utilizing convenient lip seal, O-Ring and D-Ring designs. It reduces the overall cost, weight, space and simplifies installation procedures. The integral structure also reduces the regular tight tolerance required in machines piston designs while providing greater seal characteristics.



Complete TPSK kits with individual vacuum pack make it more convenient for rebuilders to stock and rebuild transmissions.

High reliability

Cost-effective

Ease of installation
Integrated characteristics

Robust design

Weight reduction

STRUCTURE & FUNCTION

While in the manual transmission system, driver drives the vehicle with the help of a hand-operated gearshift and a foot operated clutch. Both types of transmissions make use of a clutch, which allows the gears to be engaged and disengaged. The piston seal is operated by oil pressure and transmits power through engagement with a clutch. And the balancer seal cancels the centrifugal oil pressure generated on the piston side through drum rotation.

NAK Bonded piston seals for automatic transmission are primarily made out of following materials; **POLYACRYLATE** (ACM), **ETHYLENE ACRYLIC** (AEM), **HYDROGENATED NITRILE** (HNBR) and **FLUOROCARBON** (FKM).

- ACM performs excellent resistance to petroleum fuels and oils.
- AEM exhibits properties similar to those of Polyacrylate (ACM), but with extended low temperature range and with enhanced mechanical properties.
- HNBR is made from NBR by hydrogenation with high temperature resistance, abrasion resistance and good physical properties.
- FKM is recommended for applications involving fluids in high operating temperatures.

All of these materials listed above perform excellent heat stability and resistance to oil, ozone and temperatures. Additional elastomeric compounds are available to fit different applications.

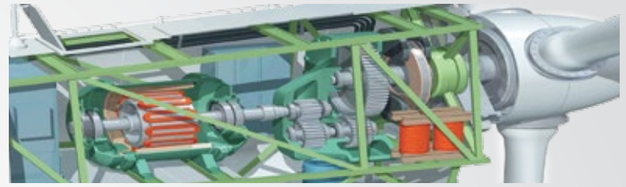
NAK dedicates building the highest quality products for automotive transmissions along with our outstanding technique and customer service. NAK produces and provides OEM quality of all kinds of sealing products for transmissions.

Sealing Products for
Automotive Application

INDUSTRY

Industry

NAK's Industrial Seals are widely used in different applications, i.e.: Gear Reducers, Gearboxes, Motors, Power Tools, Pumps, Robotic Arms, Washing Machines, Wind Turbines, and etc. Their seals are all made of high-performance materials and have excellent capabilities.



PUMPS

PUMP :

Pumps are used for a variety of applications and they are designed to satisfy customer requirements for higher pressure, quiet operation, long life, and a full range of options and features. NAK provides customized designs and dimensions with a different set of materials in NBR, HNBR, FKM and PTFE.

HYDRAULIC PUMP :

Hydraulic pumps include Piston pumps (Axial, Radial), Gear pumps (External, Internal, Gear ring, Screw) & Vane pumps (Single chamber, Double chamber). They are used for agriculture, water treatment, chemical industry, construction, refinery, food industry and in various other industrial applications.

VACUUM PUMP :

Vacuum pumps are found in many applications. These include, among others, vacuum packaging of food evacuation and environment-friendly charging of refrigerators and air conditioners production of ultrapure high-strength metals evacuation of lamps and picture tubes manufacture of flat-panel displays.

SUBMERSIBLE PUMP :

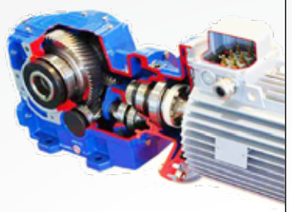
Submersible pumps can feature a single stage or multiple stages that can be connected to various types of pipes, flexible hoses or wires, depending on the job and the liquid being pumped. Submersible pumps are suitable for most applications, such as drinking, irrigation, and various industrial applications.

TYPE N SEAL

- Special design of the shorter flex section to provide better pressure resistance.
- Special materials and structural designs for different levels of high-pressure applications.
- Dust lip design protects the seal from external contamination

GEAR REDUCER, GEARBOX

NAK sealing solutions for industrial gear reducers/ gear include rotary seals, oil gauge seals and end caps. Rotary seals are manufactured to keep lubricants in and contaminants out. Oil gauge seal indicates the oil level for people to replenish it if necessary. End cap is designed for static sealing to act as a plug or barrier which is effective protection against air side contaminants.



MEASURABILITY OF NAK DYNAMIC TESTING RIG:

- Good O.D. static sealing
- Compensation of the resulting gap by different thermal expansion
- Reliable tightness
- Low friction
- Capable of sealing for larger surface roughness
- Simple and easy installation
- Reduce risk of corrosion

TYPE C SEAL

SC TC VC KC

- Rubber covered OD to increase the OD sealing capability.
- Suitable for soft alloy, plastic, steel or cast iron housing materials.
- Dust lip design protects the seal from external contamination

MOTOR

The seal for industrial motor is mainly to seal the gap between the shaft and the bore, either retaining the lubricant or excluding the contaminants.

The installation direction is based on the application. For instance, the spring lip should face inward to retain the lubricant and face outward to exclude the contaminants.

TYPE G/G1 SEAL

VG KG VG1 KG1

- Special design of a corrugated OD.
- Particularly suitable for applications where the housing material is subject to larger coefficient of thermal expansion.

POWER TOOL

Power Tools are used widely in commercial and industrial applications, i.e. they can be used to cut quickly into concrete, stone, cement block, or brick. In addition, they are also used broadly in consumer-related settings, i.e., in do-it-yourself and home remodeling activities for drilling, grinding, shaping and more.

NAK sealing solution for industrial power tools include rotary seals and O-rings. Rotary seals are the sealing elements that have specific interference between the sealing lip and the shaft. O-rings are kind of sealing ring to be installed in grooves. It can be used to seal oil, water, air, gas and other fluids, for both static and dynamic applications.

TYPE B SEAL

SB TB VB KB

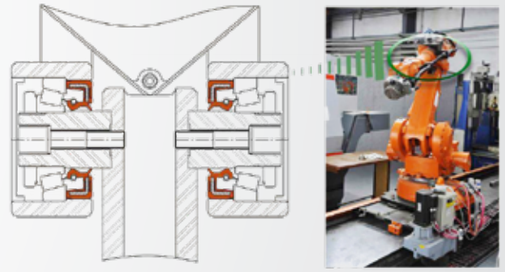
- Outer metal case provides a firm and accurate seat in the housing, but the static sealing on OD is partially limited.
- Suitable for steel or cast iron housing materials

TYPE C SEAL (SAME AS GEAR REDUCER, GEARBOX)

ROBOTIC ARM

NAK sealing solutions for industrial Robotic Arms include rotary seals, V-seals, O-rings, and end caps. Rotary seals are used for lubricant retention and contaminant exclusion while V-seal is generally for dust exclusion. The chosen seals lip materials are determined by the operating environment such as temperature, sealing media, pressure and rotary speed.

O-ring is fit into the groove and sealing surface has been applied significant pressure that have compressed and deformed the O-ring for sealing function. End cap is designed for static sealing as a plug or barrier which is compatible with both grease and oil lubricants.



TYPE V-RING SEAL

VA VS VL

- V-Rings are mounted on the shaft, rotate with the shaft, and seal against a perpendicular counter surface.
- They protect bearings and radial seals in dirty and demanding applications.

TYPE TGA SEAL

TGA

- This seal type is used in industrial gearbox.
- Extra dust lip design prevents metal shavings from damaging the main lip.

TYPE C SEAL (SAME AS GEAR REDUCER, GEARBOX)

WIND TURBINE

NAK Rotary Seals & V-Seals for Wind Turbines provide dedicated solutions with functional reliability, weather resistance, and highest performance to protect wind turbine energy units and components such as generators, main shafts, gearboxes, and etc. Standard designs made in NBR and FKM materials are available especially for wind turbines.

Additional elastomeric compounds are available to fit different applications. NAK sealing solutions are designed to offer the best protection against contaminants while retaining the lubricant both in the original equipment and for maintenance.

Main Characteristics:

- Long service life
- Outstanding weather resistance
- Excellent temperature resistance
- Excellent lubricant resistance
- Reduce energy losses
- Minimize environmental impact

TYPE C SEAL (SAME AS GEAR REDUCER, GEARBOX)

TYPE V-RING SEAL (SAME AS UNDER ROBOTIC ARM)

NAK®

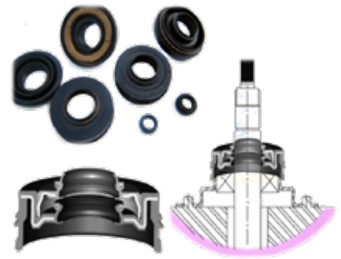
WASHING MACHINE

Washing Machine Seals are important components for washing machine mechanism. They are used to prevent water or detergent liquid leaking from wash bath and retain grease in mechanism side. NAK provides various types of seals to suit for top loading or front loading washing machines.

Main Characteristics:

- Excellent chemical and physical property
- Wear resistance in poor lubricating conditions
- High performance in fluid resistance
- High / Low temperature resistance
- Ease of installation

1. TOP LOADING WASHING MACHINES SEALS



2. FRONT LOADING WASHING MACHINES SEALS

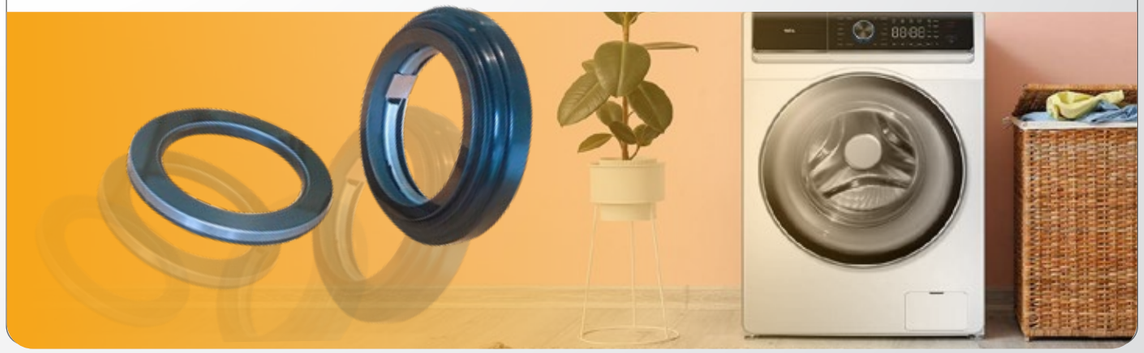
TYPE WA

SGWA1 SGWA5 TGWA TGWA21

DCWA DCWA1 TCWA1 TCWA2

TCWA5 TCWA7 TCWA8

- NAK's advanced rubber formulas, such as NBR, HNBR and FKM, have an excellent resistance to detergents and bleach.
- The customized multi-lip design is effective in sealing in the lubrication while also keeping contaminants out.



AGRICULTURAL / CONSTRUCTION & MINING

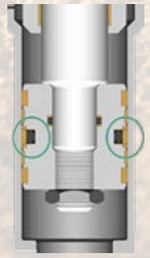
Agricultural
Construction & Mining

NAK Agricultural “AP” Seal is designed for use in heavy contaminated applications such as Agricultural Machinery, Construction and Mining Equipment, Track Driven Vehicles, etc. It is ideal for use where oil or grease must be held in contact with rotary shaft and bearing assemblies, while at the same time sealing against external contaminants is required. NAK Hydraulic and Pneumatic range of seals include Piston Seals, Rod Seals, Wiper Seals, Cushion Seals, Wear Rings, etc.

Rubber, Polyurethane, PTFE, Nylon and other materials are used to create a variety of seals to work under different Hydraulic and Pneumatic conditions. Most of these seals are designed for the reciprocating motion used commonly in Hydraulic and Pneumatic applications such as Cylinders. To meet the critical requirements of the Hydraulic and Pneumatic equipment industries, NAK offers a wide range of designs.

PISTON

These seals are Installed and fixed on the piston groove to seal against the cylinder.



- Rubber, Polyurethane, PTFE, Nylon and other materials are used to create a variety of seals to work under different hydraulic and pneumatic conditions.
- Most of these seals are designed for the reciprocating motion used commonly in hydraulic and pneumatic applications such as cylinders.

TYPE UOP SEAL

UOP

- Seal designed with asymmetric lips.
- Used for hydraulic piston application.

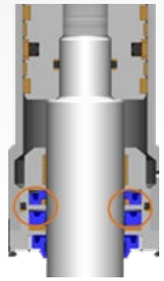
TYPE HPO SEAL | TYPE HPS SEAL | TYPE HOD SEAL

HPO | HPS | HOD

- Seal designed symmetrically. Used for hydraulic piston application.
- PTFE is used for sliding m aterial. This packing has low frictional resistance, eliminating stick slip and assuring high wear resistance.
- Reduced installation space because of standard O-ring design

ROD SEAL

These are Installed and fixed on the cylinder bore to seal against the rod.



- Different types of seals are made from materials like rubber, polyurethane, PTFE, nylon, etc., and each seal is suited for specific hydraulic and pneumatic environments.
- These seals are primarily designed to withstand the reciprocating (back-and-forth) movement that occurs in applications such as hydraulic cylinders or pneumatic systems.

TYPE HRO SEAL

HRO

- Seal is symmetrically designed for hydraulic piston applications.
- It employs PTFE as a sliding material, which minimizes friction and enhances wear resistance, preventing stick-slip issues.
- The use of a standard O-Ring enables the seal to occupy less installation space.

TYPE UIB SEAL

UIB3

- This seal is designed to buffer the impact pressure generated on the rod side of a hydraulic cylinder.
- To inhibit transmission of oil temperature to rod packing.
- Special shaped slit at the sliding lip that can leak back pressure eliminates the pressure between the rod packing and buffer ring.

TYPE UIP SEAL

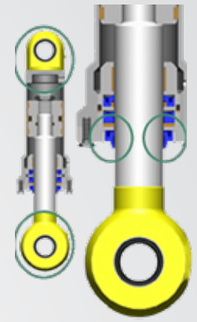
UIP

UIP2

- Seal designed with asymmetric lips. Used for hydraulic rod application.
- Additional sealing lip prevents the ingress of dirt.
- Lubricant oil between two lips results in the reduction of wear.

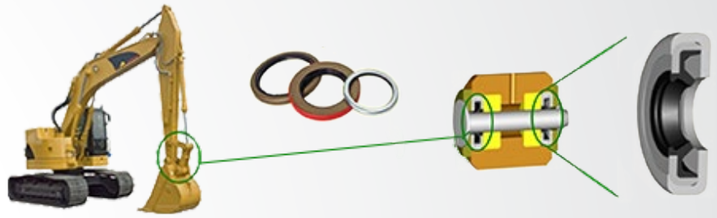
WIPER

The main factor and importance of this seals is to prevent external contaminants from entering the system



- Various types of materials like Rubber, Polyurethane, PTFE, Nylon, are utilized to manufacture a diverse range of seals that can function effectively in different hydraulic and pneumatic conditions.
- The majority of these seals are specifically designed to accommodate the back-and-forth motion commonly encountered in hydraulic and pneumatic systems, particularly in applications involving cylinders.

NAK Pin Dust Seals are designed for oscillating, swivel motion in the hinge pin or joint part to keep lubricant in, prevent dirt in the bushings and reduce inner wear.



TYPE VA SEAL

VA1 VA2 VA3 VA5

- Effective barrier against dirt intrusion.
- Excellent sealing performance with lubricant retention.

TYPE WPK SEAL

WPK1 WPK3

- Designed for oscillating, swivel motion.
- Easy press-fit installation.

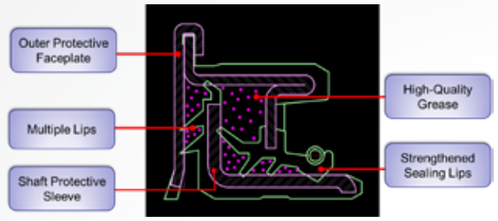
TYPE WP SEAL

WP1 WP2 WP3 WP4

- Used for heavy duty applications.
- Popular dust seals.
- Popular dust seals with a covered metal case

AXLE/HUB SEAL

NAK AP Seals are created for heavy-duty applications especially where environmental and operating conditions are very harsh. The traditional lip seal that consists of a spring loaded radial sealing lip and a static dust lip often falls short in heavy duty and at the same time heavy contaminated applications.



The Ultimate Dirt Excluder for Heavy Duty and Heavy Contaminated Applications.

TYPE AP SEAL

AP5 AP6 AP12 AP13

- Special design for heavy dirt exclusion.
- With a press fit on the shaft and also in the housing it is easy to install and replace without damage to the shaft or the housing.
- Variations as well as custom designs are available for different equipment and applications.
- Multi dust lip design prevents mud penetration.

TYPE ST SEAL

ST6 ST16 ST19 ST52

TYPE CRS SEAL

CRS2 CRS10 CRS11 CRS13

- Special design with PU and felt composed which can increase the dust-proof capability.

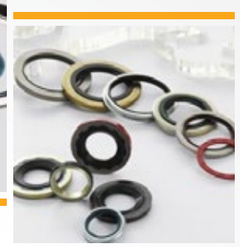
TYPE U SEAL

UA UB UC UM

- Special triple flat lip design suitable for use in heavy dirt applications.
- Commonly used in agricultural equipment in which external contamination is high.

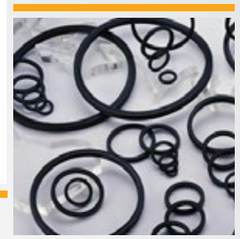
Other Popular Types of Seals From NAK

AXIAL FACE SEAL (RE TYPE)



BONDED SEAL (WS / KDS TYPE)

WEAR PRO SLEEVES



O RINGS / KITS

RUBBER PARTS

AXIAL FACE SEAL (RE TYPE)

RE RE1

- Axial Face Seals are mounted on the shaft, rotate with the shaft, and seal against a perpendicular counter face.
- Metal case added on a rubber V-ring to increase rigidity and enhance protection against dust.

BONDED SEAL (WS / KDS TYPE)

KDS1 KDS3 WS WS1

- The bonded seal is a static seal used as a sealing ring fitted under the bolt head and nut.
- The rubber part provides good sealing capabilities and the metal part limits the compression.

WEAR PRO SLEEVES

SLEEVE 4

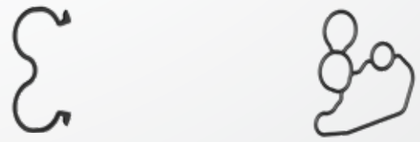
- Used for repairing the worn out shaft in different applications on various industries.
- Stainless material with thin-wall design, and high quality surface roughness.
- It contains the sleeve and assembly tool, simply and fast assembly installation.

O RINGS / KITS

O-RING X-RING SQUARE RING H-RING

- O-ring, X-ring, Square ring, D-ring, H-ring, V-ring, Backup Ring with custom shapes and sizes.
- Complete AS568, JIS B2401 P/G/S O-rings.
- Made of high-performance rubber compounds with excellent capabilities.

RUBBER PARTS



GASKET-R3 GASKET-R7

- Made of high-performance rubber compounds with excellent capabilities.
- Molded specifically as per customer requirements or application criteria.

Dedication of NAK R&D Team

NAK has a strong and dedicated team of R&D, they not only design, develop and do material research on their own, but they also take the initiatives on following up with our customers, providing competent technical support. NAK R&D act has direct link with the customer so to be able to obtain first-hand information of the specifications, requirements and demands of our customer thus improving the successive rates of new product development and customer satisfaction to a higher level.

Decrease in overhead costs and coming up with the finest design by full implementation of the **FEA SOFTWARE (FINITE ELEMENT ANALYSIS)**, building up theoretical analysis for various manufacturing process; combine the designed product, tooling and CNC code with the original self-developed software design known as the **SCAD (SEAL COMPUTER AIDED DESIGN)** software design to decrease the failure rates during trial runs. Thus making the manufacture of our tooling molds much more precise and efficient to further secure our product quality.

As for the material research, NAK has a complete line of equipment and ingredient research lab. Starting from the research and development of rubber compounding, characteristic testing, rubber material analysis, down to the quality inspection are all done systematically here in NAK. NAK also implement the ASTM rubber testing method including process ability test of pre-vulcanized rubber, test of hardness of plastic and rubber, test of material tensile strength and adhesive strength, test of heat aging /oil immersion/ fuel immersion/low temp. properties /compression set, test of rebound properties/ microscopy of compound dispersion, **FT-IR** analysis, and etc. Throughout the years NAK has also developing environmental friendly material, which follows several international standards such as

ROHS (RESTRICTION OF HAZARDOUS SUBSTANCES DIRECTIVE), REACH (REGISTRATION, EVALUATION, AUTHORIZATION AND RESTRICTION OF CHEMICALS), GADSL (GLOBAL AUTOMOTIVE DECLARABLE SUBSTANCE LIST) and etc.

NAK also take investment of advanced testing equipment as one of our high priorities, therefore, they have built their own in house dynamic test center and material research laboratory. Regarding to industry-academy cooperation, NAK is working with schools and research centers to bring our developing capabilities to even higher level.

Owning a wide product range, copyright from multiple countries in the world, and a strong R&D team with prestige result in the field of research and development is one of the key factors to our rapid growth every year. With the advanced technology and complete range of product lines, NAK has the absolute advantage in growth.

ROLMAN WORLD

Just scan this QR code with your smartphone or visit our website at: **www.rolman.com** - there you will find a highly competent contact in your immediate vicinity

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