

ProGum



O I L

S E A L

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I. Introduction

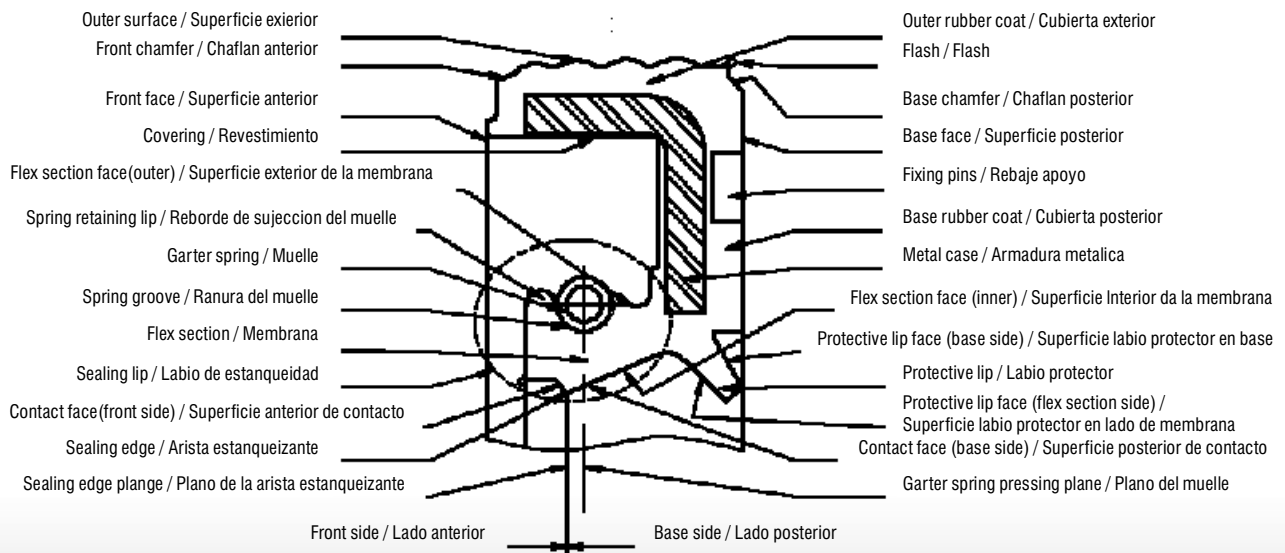
Oil Seals have been used for decades in assembled sealing elements. Because of their operational reliability, they are valued world-wide and have become a name as precision parts in the automotive industry, engine and machine manufacturing industry.

Oil seals consist of a cylindrical outer surface consisting of a steel band or elastomer rubber coat that statically seals the bore holes of the housing as well as an elastomer or PTFE sealing lip that enables the dynamic sealing of the shafts. The sealing of the shaft is accomplished by the radial seal interfering and pressing on to the shaft with a diameter larger than the sealing lip as well as by the contact pressure of a ring-shaped, closed spiral tension spring that is arranged around the sealing lip.

I. Introduccion

Los retenes de aceite se han usado durante décadas en elementos ensamblados de sellado. Debido a su gran fiabilidad operacional, han obtenido una buena valoración a nivel mundial y un renombre como partes de precisión para la industria automovilística y productora de motores y maquinaria.

Los retenes de aceite consisten en una superficie cilíndrica exterior de acero o recubierto de elastómero que tiene como función el sellado estático de las cavidades del alojamiento así como un labio de sellado de elastómero o PTFE que permite el sellado dinámico del eje. El sellado del eje es llevado a cabo por el reten radial interfiriendo y presionando el eje de diámetro superior que el labio sellador así como el contacto a presión del muelle en forma de anillo situado alrededor del labio de sellado.



II. Material Selection

Metal case and Garter Spring

The metal case and garter spring are important components of **oil seal**. The most common case is carbon steel. Stainless steel is an option for corrosion resistance. The garter spring is generally piano wire but stainless steel is available.

Standard	SAE NO. (AISI)	DIN NO.	Application
Metal Case	1008-1010 Carbon Steel	1624 Carbon Steel	General
	30302/30304 Stainless Steel	17224 Stainless Steel	Corrosive protection and extreme conditions
Garter Spring	1050-1095 Carbon Steel	17223 Carbon Steel	General
	30302/30304 Stainless Steel	17224 Stainless Steel	Corrosive protection and extreme conditions

Elastomeric Materials

It is important to consider the seal's environment when selecting the lip material. The most important factors are the medium being sealed, the temperature of medium, the pressure and shaft speed.

Material	Type of Polymer Most Often Used	ASTM D2000 Class	Generally Resistant to	Generally Attacked by
NBR	NITRILE, BUNA N	BF, BG, BK, CH	Many hydrocarbons, fats, oils, greases, hydraulic fluids, chemicals	Ozone, ketones, esters, aldehydes, chlorinated and nitro hydrocarbons
ACM	PA, POLYACRYLATE	DH	Ozone, extreme pressure, lubricants, hot oils, petroleum solvents, animal and vegetable fats	Water, alcohols, glycols alkali, esters, aromatic hydrocarbons, halogenated hydrocarbons, phenol
SILICONE	VMQ, POLYSILOXANE	FC, FE, GE	Moderate or oxidizing chemicals, ozone, concentrated sodium hydroxide	Many solvents, oils, concentrated acids, dilute sodium hydroxide
PTFE/ TEFLON	TEFLON		Resistant to virtually all fluids	
FKM/ VITON	FPM, FMC, FLUOROCARBON, FLUOROELASTOMER	HK	All aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils*Best fluid resistance of any elastomer	Ketones, low molecular weight esters and alcohols and nitro-containing compounds *Fluorocarbon-containing refrigerants cause minor effects

Material Selection Based Upon Temperature and Physical Properties

Basic Polymer	NITRILE (NBR)	POLYACRYLATE (ACM)	SILICONE (VMQ)	PTFE (TEFLON)	FLUOROELASTOMER (FPM/VITON)
Temperature Range	-40 °C to 120 °C	-30 °C to 150 °C	-60 °C to 200 °C	-85 °C to 250 °C	-40 °C to 250 °C
Abrasion Resistance	Excellent	Fair	Poor	Poor	Fair
Compression Set	Good	Fair	Good	Poor	Good
Cracking Resistance	Fair	Fair	Excellent	Poor	Good
Cut Growth Resistance	Good	Good	Poor	Excellent	Poor
Flex Cracking Resistance	Fair	Fair	Good	Good	Good
Impact Strength	Good	Poor	Poor	Excellent	Fair
Oxidation Resistance	Fair	Good	Excellent	Excellent	Excellent
Sunlight Resistance	Good	Excellent	Excellent	Excellent	Excellent
Tear Resistance	Good	Poor	Poor	Excellent	Excellent
Weathering Resistance	Fair	Poor	Excellent	Excellent	Excellent
Ozone Resistance	Poor	Good	Excellent	Excellent	Excellent
Cold Resistance	Fair	Poor	Excellent	Excellent	Good
Heat Resistance	Fair	Good	Excellent	Excellent	Excellent
Wear Resistance	Excellent	Excellent	Good	Excellent	Excellent
Water Resistance (Includes Steam)	Good	Poor	Good	Excellent	Good

II. Selección del Material

Soporte metálico y resorte

El soporte metálico y el resorte son componentes muy importantes de los retenes de aceite. El acero es el material más utilizado. Acero inoxidable es una opción para obtener resistencia a la corrosión. El resorte es normalmente de alambre pero en acero inoxidable está disponible.

Standard	SAE NO. (AISI)	DIN NO.	Aplicación
Soporte metálico	1008-1010 Acero	1624 Acero	General
	30302/30304 Acero inoxidable	17224 Acero inoxidable	Protección corrosiva y condiciones extremas
Resorte	1050-1095 Acero	17223 Acero	General
	30302/30304 Acero inoxidable	17224 Acero inoxidable	Protección corrosiva y condiciones extremas

Materiales elastómeros

Importante a considerar el ambiente de sellado en la selección del material del labio.

Los factores más importantes son el medio a ser sellado, la temperatura del medio, la presión así como la velocidad del eje.

Material	Clase de polímero	ASTM D2000 Clase	Resistente a	Agresivo a
NBR	NITRILO, BUNA N	BF, BG, BK, CH	Gran variedad de hidrocarburos, aceites, grasas, fluidos hidráulicos, productos químicos	Ozono, cetonas, esters, aldehidos, clorados y nitro hidrocarburos
ACM	PA, POLIACRILATO	DH	Ozono, presiones extremas, lubricantes, aceites calientes, petróleo solventes, aceites animales y vegetales	Agua, alcoholes, glicoles alcalinos, esters, hidrocarburos aromáticos, hidrocarburos halogenados, fenol
SILICONA	VMQ, POLISILOXANO	FC, FE, GE	Moderadas o sustancias químicas oxidantes, ozono, hidróxido sódico concentrado	Gran variedad de solventes, aceites, ácidos concentrados, hidróxido sódico diluido
PTFE/ TEFLON	TEFLON		Resistente a todos los fluidos	
FKM/ VITON	FPM, FMC, FLUOROCARBON, FLUOROELASTOMERO	HK	Todos los hidrocarburos alifáticos, aromáticos y halogenados, ácidos, aceites animales y vegetales. Mejor resistencia a fluidos de todos los elastómeros	Cetonas, alcoholes y esters con bajo peso molecular y componentes con nitrógeno. *Fluorocarbon conteniendo refrigerantes causa efectos menores

Selección del material en función de la temperatura y propiedades físicas

Polímero base	NITRILO (NBR)	POLIACRILATO (ACM)	SILICONA (VMQ)	PTFE (TEFLON)	FLUROELASTOMERO (FPM/VITON)
Rango temperatura	-40 °C to 120 °C	-30 °C to 150 °C	-60 °C to 200 °C	-85 °C to 250 °C	-40 °C to 250 °C
Resistencia abrasión	Excelente	Regular	Baja	Baja	Regular
Compresión Set	Buena	Regular	Buena	Baja	Buena
Resistencia cracking	Regular	Regular	Excelente	Baja	Buena
Resist. corte crecimiento	Buena	Buena	Baja	Excelente	Baja
Resistencia Flex Cracking	Regular	Regular	Buena	Buena	Buena
Resistencia golpe	Buena	Baja	Baja	Excelente	Regular
Resistencia oxidación	Regular	Buena	Excelente	Excelente	Excelente
Resistencia luz solar	Buena	Excelente	Excelente	Excelente	Excelente
Resistencia rotura	Buena	Baja	Baja	Excelente	Excelente
Resistencia ambiente	Regular	Baja	Excelente	Excelente	Excelente
Resistencia ozono	Baja	Buena	Excelente	Excelente	Excelente
Resistencia frio	Regular	Baja	Excelente	Excelente	Buena
Resistencia calor	Regular	Buena	Excelente	Excelente	Excelente
Resistencia desgaste	Excelente	Excelente	Buena	Excelente	Excelente
Resistencia agua (incluye vapor)	Buena	Baja	Buena	Excelente	Buena

III. Standard Seal Designs

Generally, seals with spring loaded lips are used for retaining oil lubricants and non-spring loaded lips are used for low speed grease retention. Ground metal O.D. seals are more suited for steel and cast iron housing. Rubber O.D. seals are more suited to soft alloy or plastic housing, for rough bore finishes above 100 μ inch (2.54 μ m), or for applications where the housing is subject to large thermal expansion. A press fit metal O.D. seal has greater holding strength and better alignment.

Apart from the standard seal designs, we also accept all kind of customer requests according to your designs, samples or drawings. (Table.1,2)

Diseño standard de retenes

Los retenes con resorte en los labios son usados para retener aceite lubricantes mientras que los retenes sin resorte son utilizados para retener grasa a bajas velocidades.

Retenes de superficie exterior de metal sin brillo pulido son más convenientes en alojamientos de acero y hierro. Retenes de superficie exterior de goma son más convenientes en alojamientos de aleaciones blandas o plásticos, para acabados de cavidades rugosas por encima de 100 μ inch, o para aplicaciones donde el alojamiento es sujeto a grandes expansiones térmicas. Un reten con metal instalado tiene más fuerza de agarre y mejor alineación.

Aparte de los diseños standard, tambien fabricamos bajo plano o muestra cualquier pieza que nuestros clientes puedan requerir. (Tabla.1,2)

Table/Tabla1





















Lip Designs	S	T	V	K	D
Case Designs	Single Lip With a Garter Spring	Double Lip With a Garter Spring	Single Lip (w/o spring)	Double Lip (w/o spring)	Two Spring Lips With a Garter Spring
TYPE A (Metal O.D. With an inner case)	 SA	 TA	 VA	 KA	 DA
TYPE B (Metal O.D. With ground surface and front chamfer)	 SB	 TB	 VB	 KB	 DB
TYPE C (Rubber covered O.D. for improving O.D. sealing ability and for large thermal expansion of soft alloy or plastic housing)	 SC	 TC	 VC	 KC	 DC
TYPE M (Metal O.D. With fully rubberized inner case)	 SM	 TM	 VM	 KM	 DM

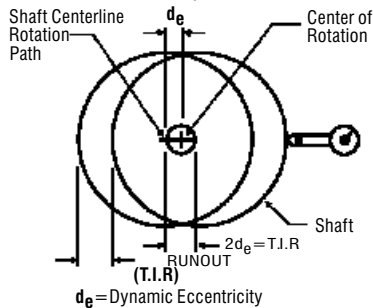


Chart for most popular design

Type / Brand	SC	TC	SB	TB	SA	TA
DIN3760	A	AS	B	BS	C	CS
CFW	BA	BASL	B1	B1 SL	B2	B2 SL
GOETZE	827N	827S	822N	822S	824N	824S
KA0	DG	DGS	DF	DFS	SFK	DFSK
STEFA	CB	CC	BB	BC	DB	DC

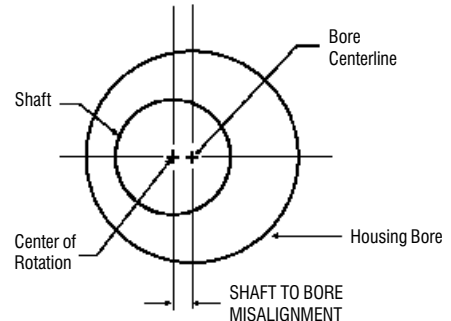
IV. Shaft Eccentricity

Two types of shaft eccentricities effect seal performance. They are dynamic runout (double dynamic eccentricity) and offset (shaft to bore misalignment or static eccentricity).



Excentricidad del eje

Dos tipos de excentricidades del eje afectan su funcionamiento. Runout dinámico (excentricidad dinámica doble) y offset (excentricidad estática).



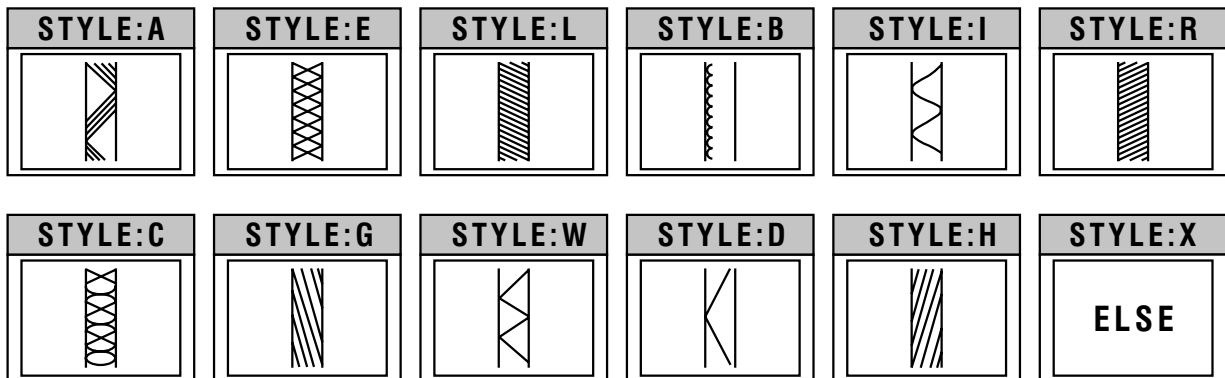
V.Special Helix Design

The use of a hydrodynamics aid or helix can improve the performance of the sealing lip. The helix is engraved on the primary lip and caused a pumping action to push any medium back towards the fluid side. There are designs available for bidirectional, left and right hand shaft rotations as below.

Diseño especial de hélices

El uso de un hélice mejora la función del labio de sellado. El hélice es gravado en el labio primario causando una acción de bombeo que obliga a toda clase de medios a regresar al lado del fluido. Se dispone de diseños para rotación del eje bi-direccional así como hacia la izquierda y derecha.

SPECIAL STYLE HELIX



VI. Oil Seal Standard Tolerances

Tolerancias standard de los retenes de aceite

Nominal outside diameter D Diámetro nominal externo D	Diametric tolerance Tolerancia del diámetro		Roundness tolerance(1) Ovalado admisible(1)	
	Metal cased Caja metálica	Rubber covered (2,3) Recubierto de elastómero (2,3)	Metal cased Caja metálica	Rubber covered Recubierto de elastómero
$D \leq 50$	0.20	0.30	0.18	0.25
	0.80	0.15		
$50 < D1 \leq 80$	0.23	0.35	0.25	0.35
	0.09	0.20		
$80 < D1 \leq 120$	0.25	0.35	0.30	0.50
	0.10	0.20		
$120 < D1 \leq 180$	0.28	0.45	0.40	0.65
	0.12	0.25		
$180 < D1 \leq 300$	0.35	0.45	0.25% of out-side diameter	0.80
	0.15	0.25		
$300 < D1 \leq 440$	0.45	0.55	0.25% of out-side diameter	1.00
	0.20	0.30		

Table 5 Seal outside diameter tolerance

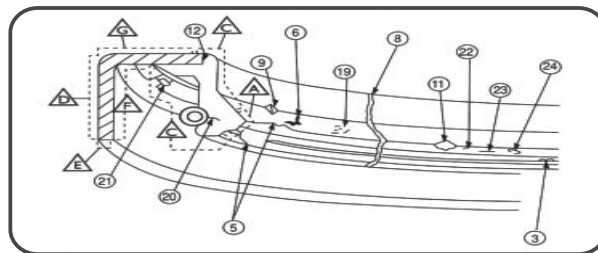
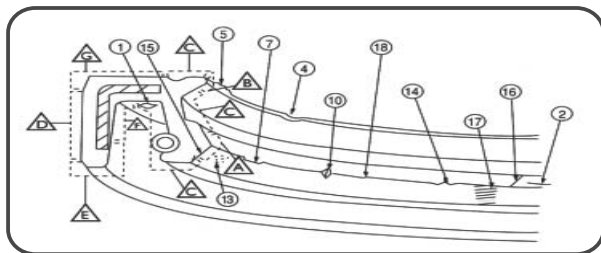
- (1) The roundness tolerance is equal to the difference between the maximum diameter and the minimum diameter derived from three or more equally spaced measurement.
- (2) Rubber-covered seals having a wave profile outside surface are acceptable but will require different tolerance to be agreed between manufacturer and purchaser.
- (3) Rubber-covered seals employing certain materials other than nitrile may require different tolerance to be agreed between manufacturer and purchaser

Tabla 5 Tolerancia del diámetro exterior del reten

- (1) El ovalado admisible es igual a la diferencia entre el diámetro máximo y el diámetro mínimo derivado de tres o más medidas equitativamente espaciadas.
- (2) Retenes recubiertos de goma con perfiles de superficie externa ondulada son aceptables pero requieren tolerancias diferentes a concretar entre el fabricante y el comprador.
- (3) Retenes recubiertos de goma empleando materiales distintos a nitrilo requieren diferentes tolerancias a concretar entre el fabricante y el comprador.



VII. Inspection Standard/ Inspeccin standard



Table/ Tabla 6 Visual imperfection/ Imperfeccin visual

Item/ Núm.	Term/Término	Definition/Definición	Critical/ Crítico	Minor/ Menor
1	Blister Formación burbujas	Hollow surface protrusion. Protuberancia en la superficie.	ABCDEG	F
2	Split Derrame	Tensile failure in the elastomer Anomalía en la tensión del elastómero.	ABCDE	FG
3	Stuck flash Adhesión flash	Flash which adheres to the main body of the seal. Flash que se adhiere al cuerpo principal del reten.	ABCDEG	F
4	Deformation Deformación	Stress-induced change of form or shape. Estrés inducido por un cambio de forma.	ABCDE	FG
5	Flash	Thin extensions of the elastomer formed by extrusion at the parting lines in the mould cavity. Extensiones finas del elastómero formado por extrusión en las líneas divisorias de la cavidad del molde.	ABCDEG	F
6	Inclusion Inclusión	Foreign matter included in the seal material. Sustancia ajena incluida en el material del reten.	ABCDE	FG
7	Incomplete trim Recortado incompleto	Trimmed surface which does not have all designated material removed. Superficie recortada que no se ha desprendido todo el material designado.	AB	
8	Knit line ; flow mark Marcas de flujo	Blemish of the sealing element crested by premature curing during moulding operation. Defecto en el elemento sellador debido a vulcanización prematura en la operación de moldeado.	ABCDE	FG
9	Mould imperfection Imperfección del molde	Moulded imperfection caused by damage to the mould surfaces. Imperfección del molde debido a deterioro de la superficie del molde.	ABCDE	FG
10	Nick	Localised loss of material due to damage after moulding. Localizada pérdida de material debido a deterioro después del moldeado.	ABCDE	FG
11	Nonfill No relleno	Randomly spaced irregularly shaped surface indentation caused by incomplete filling of the mould cavity. Espaciado aleatorio irregular en la superficie debido a un incompleto relleno de la cavidad del molde.	ABCDE	FG
12	Bond failure Falta de unión	Lack of adhesion between the elastomer and the reinforcing materials. Falta de adhesión entre el elastómero y aditivos reforzadores.	CDEFG	
13	Porosity Porosidad	Multitude of minute cavities within the elastomer. Gran cantidad de cavidades diminutas en el elastómero.	ABCDE	FG
14	Rough trim Recorte rugoso	Trimmed surface which irregularities on the outside and inside lip surfaces in the immediate vicinity of the contact line. Superficie recortada con irregularidades en la superficie interior y exterior del labio próxima a la línea de contacto.	AB	
15	Scoop trim Recortado en cóncavo	Trimmed surface which is concave. Superficie recortada que es cóncava.	AB	
16	Scratch Rasguño	Shallow discontinuity on the seal caused by abrasive object passing over a surface. Discontinuidad no profunda en el reten causado por el contacto de un objeto abrasivo en la superficie.	ABCDE	FG
17	Spiral trim Recorte en espiral	Trimmed surface which shows a spiral pattern. Superficie recortada en que se muestra un dibujo en espiral.	AB	
18	Step trim Recorte en huella	Trimmed surface having step in the contact line. Superficie recortada con huella en la línea de contacto.	AB	
19	Surface contamination Contaminación en la superf.	Foreign matter on the seal surface. Sustancias ajenas en la superficie del reten.	ABCDE	FG
20	Tear Rotura	Shear rupture of the elastomeric material, usually in the form of separation of a portion. Desgarro del material elastómero.	ABCDE	FG
21	Unbonded flash Flash no adherido	Flash which does not properly adhere to the mating material to which it is intended to be bonded. Flash no adherido al material a unir.	ABCDEFG	
22	Crack	Sharp break or fissure in the metal or elastomer. Quebradura o fisura en el metal o elastómero.	ABCDE	
23	Cut Corte	Relatively deep discontinuity in the seal material caused by a sharp instrument. Discontinuidad relativamente profunda en el material de sellado causado por elementos afilados.	ABCDE	

VIII. Shaft installation

The advisable sequence of installation is to install the seal over the shaft and then into the housing bore. Care should be exercised not to damage the seal lip. The proper chamfer angle will minimize this problem. When installing over a keyway or spine, a sleeve or bullet should be employed to protect the seal lip from cuts.

Where the shaft must be installed through the seal, centering guides for the shaft will prevent lip deformation and dislodging of the spring. When possible, the shaft should be rotated as it passes through the seal to reduce sliding friction.

Sealing lips must always face the medium to be sealed. The lips should be absolutely free. Seal lip contact area on the shaft should be smooth and must be defect free.

In order to avoid damage during assembly the shaft should be as follows:

- Assembling in direction z: radiused 0.6 or 1 mm as per fig. 1 or chambered to the diameter given in table 1
- Assembling in direction y: chambered to the diameter given in table 7

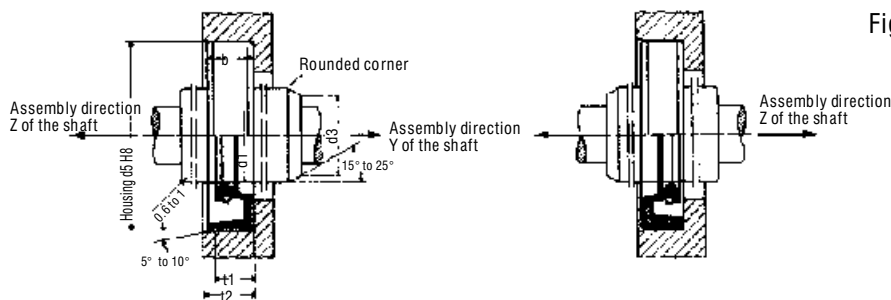


Fig. 1

Instalación eje

La secuencia de instalación recomendable es instalar el reten encima del eje y después en la cavidad del alojamiento. Tener cuidado de no dañar el labio de sellado. El ángulo de chafán adecuado minimizará este problema. Cuando el reten tenga que pasar por una muesca o apertura de clavija, se empleará una manga de protección para proteger el labio de posibles cortes.

Para instalaciones del eje a través del reten, guías de centrado para el eje prevendrán posibles deformaciones del labio y desalojamiento del muelle. A ser posible, el eje debe de ser rotado al introducirse a través del sellado a fin de reducir fricciones en el deslizamiento.

Los labios de sellado han de estar siempre vueltas al lado que se hace junta. Los labios han de quedar totalmente. Las superficies de rodadura para labios de junta han de ser lisas y no deben presentar ninguna clase de defectos.

El labio de sellado no debe sufrir daños en el montaje. Por consiguiente, se recomienda para:

- dirección del montaje Z del eje: redondeado del eje con 0.6 o 1mm, véase figura x o achaflanar el eje correspondiendo a tabla y
- dirección del montaje Y del eje: achaflanar el eje correspondiendo a tabla 7

Table/Tabla 7

d_1	D_3	d_1	D_3	d_1	D_3	d_1	D_3	d_1	D_3	d_1	D_3
h_{11}		h_{11}		h_{11}		h_{11}		h_{11}		h_{11}	
6	4.8	24	21.5	52	48.3	85	80.4	160	153	340	329
7	5.7	25	22.5	55	51.3	90	85.3	170	163	360	349
8	6.6	26	23.4	56	52.3	95	90.1	180	173	380	369
9	7.5	28	25.3	58	54.2	100	95.0	190	183	400	389
10	8.4	30	27.3	60	56.1	105	99.9	200	193	420	409
11	9.3	32	29.2	62	58.1	110	104.7	210	203	440	429
12	10.2	35	32.0	63	59.1	115	109.6	220	213	460	449
14	12.1	36	33.0	65	61.0	120	114.5	230	223	480	469
15	13.1	38	34.9	68	63.9	125	119.4	240	233	500	489
16	14.0	40	36.8	70	65.8	130	124.3	250	243		
17	14.9	42	38.7	72	67.7	135	129.2	260	249		
18	15.8	45	41.6	75	70.7	140	133.0	280	269		
20	17.7	48	44.5	78	73.6	145	138.0	300	289		
22	19.6	50	46.4	80	75.5	150	143.0	320	309		

IX. Shaft Recommendation

SHAFT MATERIAL, SURFACE HARDNESS AND TOLERANCE

Seals perform best on a medium carbon steel or stainless steel shaft. To seal water at low surface velocity, stainless steel is more suitable.

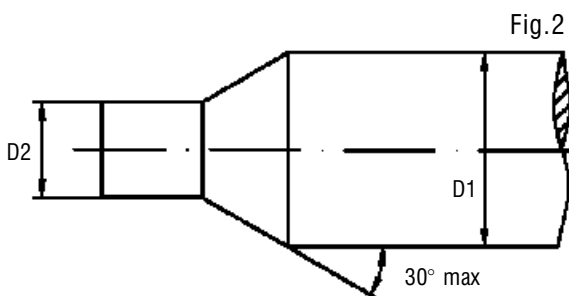
The surface hardness of the shaft in the contact zone has a considerable influence on the service life of the dynamic sealing point. It must be at least 45 HRC at that zone. When used with very contaminated media and sliding velocities exceeding 4m/s, an increase in hardness up to 55 HRC has proved to extend service life. Surface hardenings require a hardness penetration of at least 0.3 mm.

The tolerance range is as follows:
Table 8

Shaft Diameter Dimetro eje (mm)	Tolerance h11 Tolerancia h11 (mm)	Shaft Diameter Dimetro eje (mm)	Tolerance h11 Tolerancia h11 (mm)
Over 6 up to 10	+0 -0.09	Over 80 up to 120	+0 -0.22
Over 10 up to 18	+0 -0.11	Over 120 up to 180	+0 -0.25
Over 18 up to 30	+0 -0.13	Over 180 up to 250	+0 -0.29
Over 30 up to 50	+0 -0.16	Over 250 up to 315	+0 -0.32
Over 50 up to 80	+0 -0.19	Over 315 up to 400	+0 -0.36

SHAFT CHAMFER

Without proper chamfer on shaft, the seal lip may be damaged or distorted or resulting from dislodged garter spring. We suggest chamfer as table x to assist in the application process.



Recomendaciones del eje

MATERIAL, DUREZA SUPERFICIAL Y TOLERANCIA

El material adecuado para la fabricación del eje es acero o acero inoxidable. Este ultimo es mas adecuado para sellados de agua a bajas velocidades superficiales.

La dureza superficial del eje en la zona de contacto tiene una influencia considerable en la vida útil del punto dinámico de sellado. En este punto, la dureza debe de ser al menos de 45 HRC. En medios muy contaminados y velocidades deslizantes excediendo de 4 m/s, un incremento de la dureza a partir de 55 HRC prolonga la vida útil. La dureza superficial requiere una penetración de al menos 0.3 mm

Rango de tolerancia según tabla adjunta:
Tabla 8

CHAFLANES

Para facilitar el montaje y prevenir el deterioro del reten es conveniente que el eje disponga de un chaflán de entrada como se indica en la siguiente tabla:

D ₁ (mm)	D ₁ -D ₂ (mm)	D ₁ (mm)	D ₁ -D ₂ (mm)
To 10	1.5	50 to 70	4
10 to 20	2	70 to 95	4.5
20 to 30	2.5	95 to 130	5.5
30 to 40	3	130 to 240	7
40 to 50	3.5	240 to 400	11

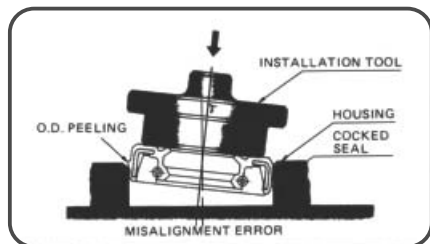
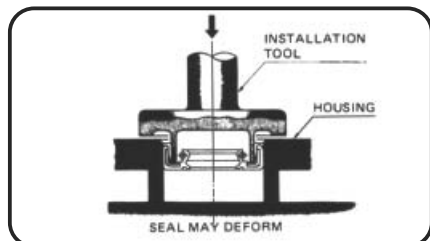
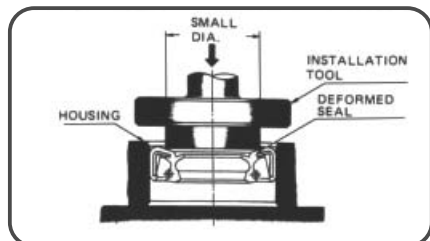
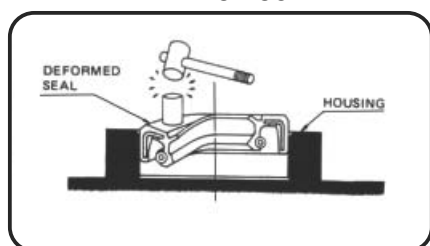
X.Oil Seal Installation Procedures

The subject of installation represents an area commonly overlooked when selecting an oil seal for an application. Studies have shown this area to be one of the major causes of premature seal failure. Greasing of both seal and shaft must be done prior to installation to assure sealing lip lubrication during initial start up of the application. An installation tool should always be used when installing an oil seal. The use of a tool improves ease of installation and reduces the possibility of seal cocking (non-perpendicular to shaft). To install seals a mechanical or hydraulic press device should be used. Following are examples of both recommended and improper installation methods.

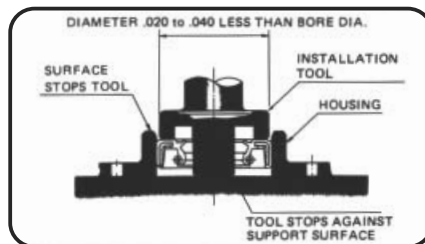
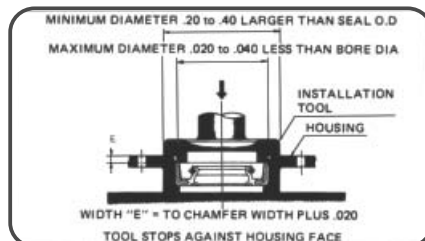
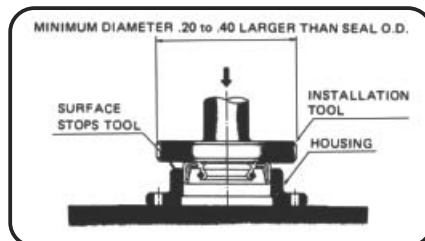
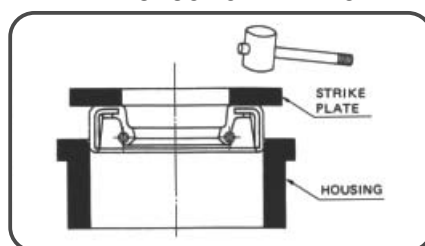
Procedimiento para instalación de retenes de grasa

El campo de la instalación representa una área comúnmente descuidada en la selección de un reten de aceite para una aplicación. Estudios han demostrado que esta área es una de las principales causantes de anomalía prematura en los retenes. El engrasado del reten y el eje debe realizarse antes de la instalación a fin de asegurar la lubricación del labio de sellado durante el arranque de la aplicación. En la instalación del reten de aceite se deben utilizar siempre herramientas adecuadas. El uso de estas herramientas facilita la instalación y reduce la posibilidad de descolocación (no perpendicular al eje). Para la instalación de los retenes se debe utilizar herramientas de compresión mecánica o hidráulica. A continuación se observan ejemplos de métodos de instalación recomendados y no recomendados.

IMPROPER IMPROPIOS



ACCEPTABLE METHODS METODOS ACEPTABLES



XI. BORE CHAMFER

To assist in installation of seals, a bore chamfer is necessary. Bore tolerance allowed is ISO H8. The tolerance of the shaft seal outer diameter ensures a permanent coupling between shaft seal and bore.

Bore diameter Diámetro agujero (inch)	Bore tolerance Tolerancia
UP to 3.000	+/- 0.001
3.001 to 6.000	+/- 0.0015
6.001 to 10.000	+/- 0.002
10.001 to 20.000	+0.002/-0.004
20.001 to 40.000	+0.002/-0.006
40.000 to 60.000	+0.002/-0.0010

Table/Tabla 10

ALOJAMIENTO

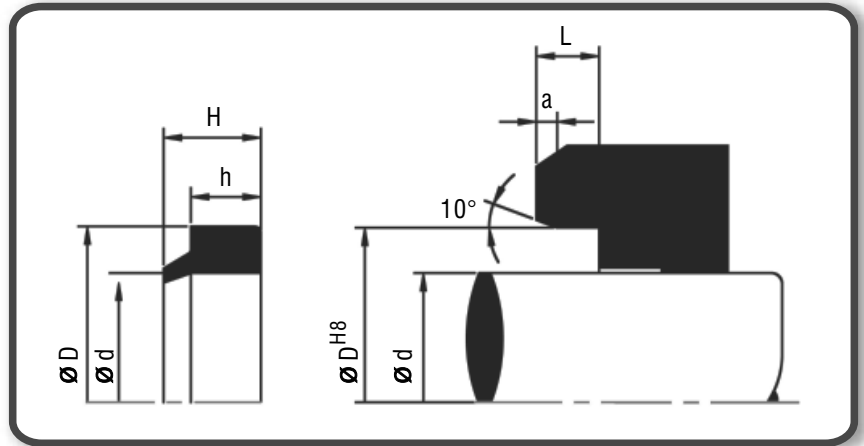
El alojamiento es necesario para la instalación del reten. La tolerancia permitida es ISO H8. La tolerancia del diámetro exterior del eje asegura un encaje permanente entre el eje y el alojamiento.

Bore diameter Alojamiento (mm)	Bore tolerance Tolerancia (ISO/H8)
Over 6 to 10	+0.022/-0.000
Over 10 to 18	+0.027/-0.000
Over 18 to 30	+0.033/-0.000
Over 30 to 50	+0.039/-0.000
Over 50 to 80	+0.046/-0.000
Over 80 to 120	+0.054/-0.000
Over 120 to 180	+0.063/-0.000
Over 180 to 250	+0.072/-0.000
Over 250 to 315	+0.081/-0.000
Over 315 to 400	+0.089/-0.000
Over 400 to 500	+0.097/-0.000

Table/Tabla 11



XII. Wiper Seals



REF.	d	D	h	H
AS 6X14X5/8	6,00	14,00	5,00	8,00
AS 6X18X3/4,5	6,00	18,00	3,00	4,50
AS 8X16X5/8	8,00	16,00	5,00	8,00
AS 10X16X3/4,5	10,00	16,00	3,00	4,50
AS 10X20X5/8	10,00	20,00	5,00	8,00
AS 12X18X4/6	12,00	18,00	4,00	6,00
AS 14X20X3,5/5	14,00	20,00	3,50	5,00
AS 14X22X3/4	14,00	22,00	3,00	4,00
AS 15X25X5/8	15,00	25,00	5,00	8,00
AS 16X22X3/4	16,00	22,00	3,00	4,00
AS 16X26X5/8	16,00	26,00	5,00	8,00
AS 16X26X7/10	16,00	26,00	7,00	10,00
AS 18X28X7/10	18,00	28,00	7,00	10,00
AS 18X28X5/7	18,00	28,00	5,00	7,00
AS 18X35X5/8	18,00	35,00	5,00	8,00
AS 18X26X5/8	18,00	26,00	5,00	8,00
AS 20X26X5/8	20,00	26,00	5,00	8,00
AS 20X28X3,5/5	20,00	28,00	3,50	5,00
AS 20X28X3,5/4,5	20,00	28,00	3,50	4,50
AS 20X28X5/8	20,00	28,00	5,00	8,00
AS 20X30X4/6	20,00	30,00	4,00	6,00
AS 20X30X5/8	20,00	30,00	5,00	8,00
AS 20X30X7/10	20,00	30,00	7,00	10,00
AS 20X35X7/10	20,00	35,00	7,00	10,00
AS 22X28X5/8	22,00	28,00	5,00	8,00
AS 22X32X7/10	22,00	32,00	7,00	10,00
AS 22X32X5/7	22,00	32,00	5,00	7,00
AS 22X35X5/8	22,00	35,00	5,00	8,00
AS 22X35X7/10	22,00	35,00	7,00	10,00
AS 22X38X5/8	22,00	38,00	5,00	8,00

REF.	d	D	h	H
AS 24X35X7/10	24,00	35,00	7,00	10,00
AS 24X37X7/10	24,00	37,00	7,00	10,00
AS 25X35X5/8	25,00	35,00	5,00	8,00
AS 25X35X7/10	25,00	35,00	7,00	10,00
AS 26X34X5/8	26,00	34,00	5,00	8,00
AS 28X38X5/8	28,00	38,00	5,00	8,00
AS 28X38X7/10	28,00	38,00	7,00	10,00
AS 28X40X7/10	28,00	40,00	7,00	10,00
AS 30X40X5/8	30,00	40,00	5,00	8,00
AS 30X40X7/10	30,00	40,00	7,00	10,00
AS 30X45X5/8	30,00	45,00	5,00	8,00
AS 30X45X7/10	30,00	45,00	7,00	10,00
AS 32X38X5/8	32,00	38,00	5,00	8,00
AS 32X40X4/7	32,00	40,00	4,00	7,00
AS 32X42X7/10	32,00	42,00	7,00	10,00
AS 32X45X4/8	32,00	45,00	4,00	8,00
AS 32X45X5/7	32,00	45,00	5,00	7,00
AS 32X45X7/10	32,00	45,00	7,00	10,00
AS 33X43X7/10	33,00	43,00	7,00	10,00
AS 35X45X5/8	35,00	45,00	5,00	8,00
AS 35X45X7/10	35,00	45,00	7,00	10,00
AS 35X47X7/10	35,00	47,00	7,00	10,00
AS 35X52X7/10	35,00	52,00	7,00	10,00
AS 36X45X7/10	36,00	45,00	7,00	10,00
AS 36X46X5/8	36,00	46,00	5,00	8,00
AS 36X46X7/10	36,00	46,00	7,00	10,00
AS 38X48X7/10	38,00	48,00	7,00	10,00
AS 40X50X5/8	40,00	50,00	5,00	8,00
AS 40X50X7/10	40,00	50,00	7,00	10,00
AS 40X52X5/8	40,00	52,00	5,00	8,00

REF.	d	D	h	H
AS 40X52X7/10	40,00	52,00	7,00	10,00
AS 42X52X7/10	42,00	52,00	7,00	10,00
AS 45X55X5/7	45,00	55,00	5,00	7,00
AS 45X55X7/10	45,00	55,00	7,00	10,00
AS 45X60X7/10	45,00	60,00	7,00	10,00
AS 48X60X7/10	48,00	60,00	7,00	10,00
AS 50X56X5/7	50,00	56,00	5,00	7,00
AS 50X56X5/8	50,00	56,00	5,00	8,00
AS 50X60X5/7	50,00	60,00	5,00	7,00
AS 50X60X7/10	50,00	60,00	7,00	10,00
AS 50X65X7/10	50,00	65,00	7,00	10,00
AS 52X62X7/10	52,00	62,00	7,00	10,00
AS 55X63X7/10	55,00	63,00	7,00	10,00
AS 55X65X7/10	55,00	65,00	7,00	10,00
AS 56X65X7/10	56,00	65,00	7,00	10,00
AS 56X66X5/8	56,00	66,00	5,00	8,00
AS 56X66X7/10	56,00	66,00	7,00	10,00
AS 60X68X5/7	60,00	68,00	5,00	7,00
AS 60X70X7/10	60,00	70,00	7,00	10,00
AS 60X74X5/8	60,00	74,00	5,00	8,00
AS 60X75X7/10	60,00	75,00	7,00	10,00
AS 61X72X7/10	61,00	72,00	7,00	10,00
AS 63X72X7/10	63,00	72,00	7,00	10,00
AS 63X73X6/9	63,00	73,00	6,00	9,00
AS 63X73X7/10	63,00	73,00	7,00	10,00
AS 63X75X7/10	63,00	75,00	7,00	10,00
AS 65X75X7/10	65,00	75,00	7,00	10,00
AS 70X80X5/8	70,00	80,00	5,00	8,00
AS 70X80X7/10	70,00	80,00	7,00	10,00
AS 72X82X7/10	72,00	82,00	7,00	10,00
AS 75X85X7/10	75,00	85,00	7,00	10,00
AS 75X87X5/7	75,00	87,00	5,00	7,00
AS 75X87X7/10	75,00	87,00	7,00	10,00
AS 80X90X7/10	80,00	90,00	7,00	10,00
AS 82X92X7/10	82,00	92,00	7,00	10,00
AS 85X95X7/10	85,00	95,00	7,00	10,00
AS 90X100X7/10	90,00	100,00	7,00	10,00

REF.	d	D	h	H
AS 95X105X7/10	95,00	105,00	7,00	10,00
AS 100X110X7/10	100,00	110,00	7,00	10,00
AS 100X115X9/12	100,00	115,00	9,00	12,00
AS 105X115X7/10	105,00	115,00	7,00	10,00
AS 108X120X7/10	108,00	120,00	7,00	10,00
AS 110X120X7/10	110,00	120,00	7,00	10,00
AS 110X125X9/12	110,00	125,00	9,00	12,00
AS 115X125X7/10	115,00	125,00	7,00	10,00
AS 120X130X9/12	120,00	130,00	7,00	10,00
AS 125X140X9/12	125,00	140,00	9,00	12,00
AS 130X140X7/10	130,00	140,00	7,00	10,00
AS 130X145X9/12	130,00	145,00	9,00	12,00
AS 135X145X7/10	135,00	145,00	7,00	10,00
AS 135X150X9/12	135,00	150,00	9,00	12,00
AS 140X150X7/10	140,00	150,00	7,00	10,00
AS 140X155X9/12	140,00	155,00	9,00	12,00
AS 145X160X9/12	145,00	160,00	9,00	12,00
AS 145X165X10/15	145,00	165,00	10,00	15,00
AS 150X165X9/12	150,00	165,00	9,00	12,00
AS 160X175X9/12	160,00	175,00	9,00	12,00
AS 165X180X9/12	165,00	180,00	9,00	12,00
AS 170X185X10/14	170,00	185,00	10,00	14,00
AS 175X190X9/12	175,00	190,00	9,00	12,00
AS 180X195X10/14	180,00	195,00	10,00	14,00
AS 185X200X10/14	185,00	200,00	10,00	14,00
AS 200X215X9/12	200,00	215,00	9,00	12,00
AS 200X220X10/14	200,00	220,00	10,00	14,00
AS 210X230X10/15	210,00	230,00	10,00	15,00
AS 220X240X12/16	220,00	240,00	12,00	16,00
AS 250X270X12/16	250,00	270,00	12,00	16,00
AS 280X300X12/16	280,00	300,00	12,00	16,00
AS 310X340X16/22	310,00	340,00	16,00	22,00
AS 320X340X12/16	320,00	340,00	12,00	16,00
AS 360X380X12/16	360,00	380,00	12,00	16,00
AS 390X420X16/22	390,00	420,00	16,00	22,00
AS 400X420X12/16	400,00	420,00	12,00	16,00
AS 490X520X16/22	490,00	520,00	16,00	22,00