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## 1.1 Sealing Element (Rubber)

An oil seal normally consists of three basic components : Sealing Element, Metal Case, and Spring. It is a widely used sealing component. The function of a seal is to prevent the leakage of medium along the moving parts. This is mainly achieved by the sealing element. The materials normally used are Nitrile, Acrylic, Silicone, and Fluorinated Rubber.

### ▶ 1.1.1 Nitrile Rubber (NBR)

NBR is most commonly used material. It has good heat resistance properties, good resistance to oils, salt solutions, hydraulic oils, and gasoline. Operation temperatures are recommended from  $-40$  to  $120^{\circ}\text{C}$ . It also functions well under dry environment, but only for intermittent periods. The disadvantage is poor chemical resistance.

### ▶ 1.1.2 Polyacrylate Rubber (PA)

Acrylic rubber has better heat resistance than Nitrile. It is recommended for high surface speed environment. The operation temperatures are recommended from  $-20$  to  $150^{\circ}\text{C}$ . It should not be used with water or in temperature below  $-20^{\circ}\text{C}$ .

### ▶ 1.1.3 Silicone Rubber (SI)

Silicone compounds operate effectively in a broad temperature range of  $-50$  to  $180^{\circ}\text{C}$ . It is unsurpassed in its resistance to heat and low temperatures. The high lubricant absorbency of silicone minimizes friction and wear. It is usually used for crank shaft seals. Silicone has poor hydrolysis resistance. It should not be used in oxidized or hypoid oils.

### ▶ 1.1.4 Fluorinated Rubber (VI)

Fluorinated rubber is widely known under the du Pont trade name of Viton<sup>®</sup>. It has the best resistance to chemicals, and superior performance to high temperatures. Though VITON provides so many good prospects, it has the highest cost.

### ► 1.1.5 Performances of TTO Oil Seals

MATERIALS ITEMS	NBR	PA (ACM)	SI (VMQ)	VI (FKM)
Temp. Range( °C)	-40 to 120	-20 to 150	-50 to 180	-30 to 200
Hardness(Shore)	70/80/90	70/80	75/85	70/80
Wear Resistance	○	△	×	⊙
Costs	most economical	3rd costly	2nd costly	highest

**P.S.** Temp. Range may be vary in different grade.

### ► 1.1.6 Resistance to Chemicals TTO Oil Seals

MATERIALS MEDIUM	NBR	PA (ACM)	SI (VMQ)	VI (FKM)
Inorganic acids	△	△	△	△
Organic acids	××	×	×	△
Alkali	×	○	○	○
Salt	○	○	○	○
Alcohol	××	○	○	○
Esters	××	××	△	××
Phenol	××	××	○	△
Ketones	××	××	△	×

○ : Applicable

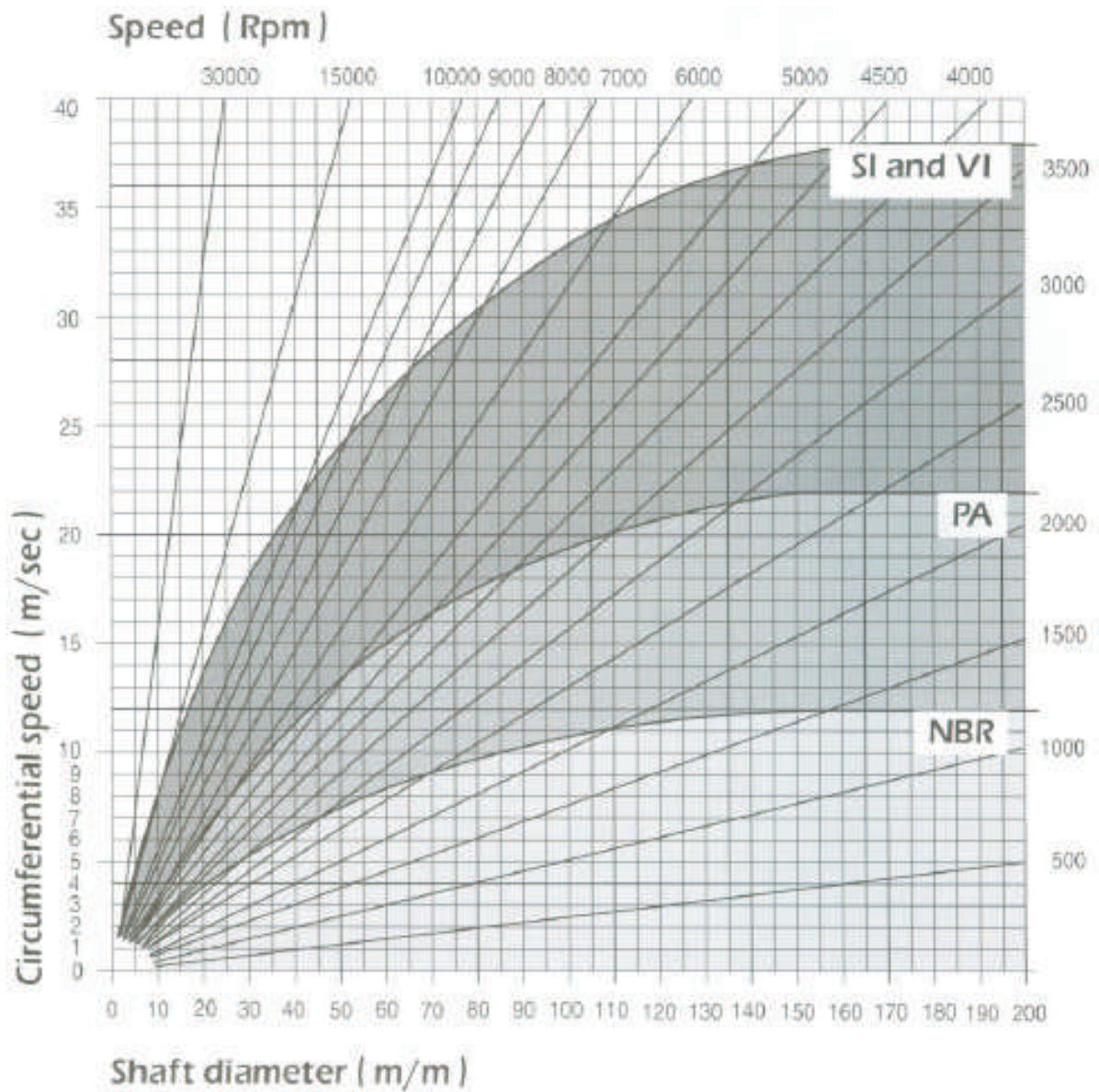
△ : Applicable but must be observed

× : Applicable in a limited of time

× × : Not applicable

### ▶ 1.1.7 RPM and Surface Speed

The following table shows you the permissible surface speed and RPM for various sealing element materials and shaft diameters.



## 1.2 Metal Case

The principle function of the metal case is to impart rigidity and strength to the seal. Its material must be selected depending on the environment where the seal is to be used. Please refer to the following table.







Materials of metal Case	Applicable Environment
(SAE) 1008-1010 Carbon Steel	Regular types of seals
(SAE) 30302-30304 Stainless Steel	Applicable to the conditions where resistance to water, chemical and corrosion is required.

## 1.3 Spring




The springs of TTO oil seals are made of the following materials:

Materials of Spring	Applicable Environment
(SAE) 1050-1095	Regular lubricants
(SUS) 30302/30304	When resistance to water, sea water, and chemicals is required.



























## 2.1 Classification by Sealing Element

Code	Style	Characteristics
S		A standard oil seal with a sealing lip design. It is used to seal against internal media. Limitations : Peripheral Speed : 12 m/sec Temperature : 120°C Pressure : 0.3 kg/cm <sup>2</sup>
T		A double sealing lips design. The main lip seals against internal media, while the auxiliary lip provides protection against dirt. Limitations : Peripheral Speed : 10 m/sec Temperature : 120°C Pressure : 0.3 kg/cm <sup>2</sup>
V		No spring is loaded. The flexible sealing element is used to seal internal media. It is suitable for sealing grease, and protecting against dirt. It can also be used along with other types of seals. Limitations : Peripheral Speed : 8 m/sec Temperature : 120°C Pressure : 0 kg/cm <sup>2</sup>
K		No spring is loaded. The flexible sealing element is used to seal against both internal and outer media, and provides protection against dirt. Limitations : Peripheral Speed : 5 m/sec Temperature : 120°C Pressure : 0 kg/cm <sup>2</sup>
D		This type is intended for sealing against both internal and external media. It is usually used to separate two liquids. The area between two lips must be lubricated with grease, etc. Limitations : Peripheral Speed : 5 m/sec Temperature : 120°C Pressure : 0.3 kg/cm <sup>2</sup>
TX4		The design is intended for reciprocating motion, especially for pressurized media. Limitations : Reciprocating Speed : 0.3 m/sec Temperature : 120°C Pressure : 7 kg/cm <sup>2</sup>

## 2.2 Classification by Structure


























Structure	Characteristics
 <p style="text-align: center;"><b>C</b></p>	<p>A rubber covered case can be used on any sizes of shafts. It prevents the metal case from rusting, corrosion, or prevents damage to the housing bore during assembly. Especially in aluminum metal housings; or due to thermal expansion.</p>
 <p style="text-align: center;"><b>B</b>                      <b>B2</b></p>	<p>Seals with a metal case on the periphery. It is mainly used on shafts when the diameters are below 150 mm.</p>
 <p style="text-align: center;"><b>A</b>                              <b>A2</b></p>	<p>Seals with a reinforced metal case. It is mainly used on shafts when the diameters are beyond 150 mm, or small shafts that need extra strength, or when special rubber compounds are required.</p>

## 2.3 Common Types of TTO Oil Seal

	S Single	T Double Lip	V Single Lip (w/o)	K Double Lip (w/o)	D Two Spring Lips
Type C	 SC	 TC	 VC	 KC	 DC
Type B	 SB	 TB	 VB	 KB	 DB
	 SB2	 TB2	 VB2	 KB2	 DB2
	 SBR	 TBR	 VBR	 KBR	 DBR
Type A	 SA2	 TA2	 VA2	 KA2	 DA2











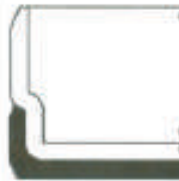
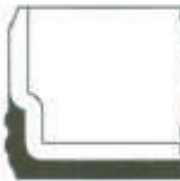


## TTO Type : 3 / 4 (Reciprocation) / 5 (Flange)

TTO		Various Design				
Type 3						
	TC3	TB3	TA3	KC3	KB3	
Type 4						
	TC4	TB4	TC1	TC4L	TC4P	
						
	DC4	DC4Y	DC4P	TC42 (rotary)	TC40 (rotary)	
Type 5						
	SC5	TC5	VC5	KC5	DC5	
						
	SB5	TB5	VB5	KB5	DB5	



## TTO Type : 6 / 7 / End Cover

TTO	Various Design				
Type 6					
	SB6	TB6	VB6	KB6	
Type 7					
	SA6	TA6	VA6	KA6	
End Cover					
	EC	ECW	VK	VKW	

# 2

## Types of TTO Oil Seals



### TTO Type : W (Corrugated OD)/ B C / Wiper Seal

		Various Design				
Type W						
	SCW	TCW	VCW	KCW		
	Partly Metal / Rubber					
		SBC	TBC	VBC	KBC	
Partly Metal / Rubber						
	SBCW	TBCW	VBCW	KBCW		
Wiper Seal						
	WPB	DKB	DWI	GA	DKH	
	WPC	DKC	LBH	GC	DSI	

## TTO Type : E / L3 / O (Outward design)

TTO	Various Design					
Type E						
	SCE	TCE	SBE	TBE		
	Type L3					
		KCL3	KBL3	KAL3		
Type O						
	OSC	OTC	OVC	OKC	OKCL3	
	OSB	OTB	OVB	OKB	OKBL3	
OSA	OTA	OVA	OKA	OKAL3		


















## TTO Type : Valve / Bond / Face / Pressure Seal

TTO		Various Design				
Valve Seal						
	VSB1	VSB2	VSB3	VSB4	VSB5	
Bond/Face Seal						
	BO-1	VA	VS	R	9R	
Pressure Seal						
	TCV	TCP	TCP2	TCHP	TCN	
	SCV	SCP	SCP2	SCHP		
	SBP2	TBP2	TAP2			








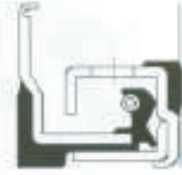


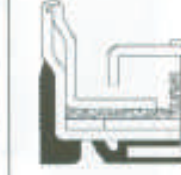
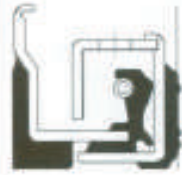



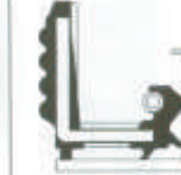










### TTO Type : Power Steering Seal

TTO		Various Design				
Power Steering Seal						
	SCT	SCT	SCT			
						
	SCT	SCT	SC5T	SC5T		
						
	SCVT	SCVT	VCVT			
						
	SBYT	UPVT	UPT			
						
	TCAVT	TCAVT				



## TTO Type : Axile Seal / UA, UAO

TTO		Various Design				
Axile Seal (UA)						
	UA1	UA2	UA3	UA4	UA5	
						
	UA6	UA7	UA8	UA9	UA10	
						
	UA11	UA12	UA13	UA14	UA15	
						
	UA16	UA17	UA18	UA19	UA20	
						
	(UAO)	UAO1	UAO2	UAO3		





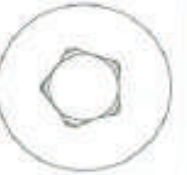
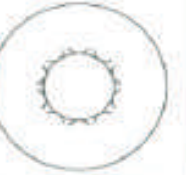









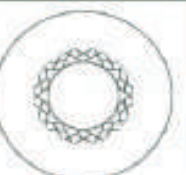


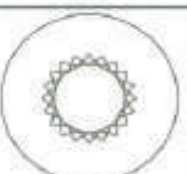












## TTO Type : Agriculture Seal Special Design ( S, X,Y means special )

TTO		Various Design				
Agriculture Seal						
	QA	QLF	TCFY	TCFA		
	TCJ	TAFM	HTCK	XICY	TCA	
Special Design ( S, X, Y )						
	VBRX	VBRX2	KBRY	KBY		
	VB18	VB21	VB2Y	VAY		
	TB14	TB31	TB95	TA5Y	TA9Y	





## TTO Helix Design

TTO		Helix Design				
Bi-Directional						
	H0	H1	H2	H3	H4	
						
	H5	H6	H7	H8	H9	
						
	H10	H11	H12	H13	H14	
						
	H15	H16	H17	H18		
	Counter Clock Wise					
		L	L1	L2	L3	L4
Clock Wise						
	R	R1	R2	R3	R4	

### 3.1 The Description of TTO Oil Seals

In order to suit your convenience to inquire TTO oil seals, The following sections will make a description on TTO oil seals. Basically there are seven parts regarding the description of oil seals. For example :

	A Tool No.	B Type	C Shaft	D Bore	E Depth	F Material	G Note
m/m	F1178	DCY	30	62	9	PA	SS

The description in Inch System is different from that of Metric System. It usually uses three or four digits. For example :

	A Tool No.	B Type	C Shaft	D Bore	E Depth	F Material	G Note
Inch	H081	TA2	3.125	4.125	0.437	SI	ND
Inch	H081	TA2	3125	4125	437	SI	ND
Inch	H081	TA2	312	412	43	SI	ND

A	Tool No.	Tool number of TTO oil seals; see tooling lists.
B	Type	For types of TTO, see Chapter 2
C	Shaft	The diameter of shaft where the seal will operate.
D	Bore	The diameter of bore where the seal will operate.
E	Depth	Depth of the bore. When the width of the seal is not strictly specified, the depth of bore is usually made big enough. So a seal might be replaced by a wider one.

F	Lip Material	The material of sealing element, NBR, PA, SI, VI. See Chapter 1.	
	Special Note	For some special cases, seals need special treatment. See following table:	
G	SS	Stainless steel spring	
	SSS	Stainless steel spring & case	
	GD	Metal O. D. Ground	
	PD	Metal O. D. Painted	
		P0	Red Color Paint
		P1	Black Color Paint
		P2	Blue Color Paint
		P3	Light Blue Color Paint
		P4	Gray Color Paint
		P5	Green Color Paint
		P6	Yellow Color Paint
		P7	Orange Color Paint
		P8	Brown Color Paint
	P9	Light Green Color Paint	
	ND	Without grinding & painting	
GR	Grease filled between lips		
RD	Curled edge		
LF	Low Friction Design		

## 3.2 The Tolerance of TTO Oil Seals

In regard to tolerance, TTO oil seals are made to the corresponding German Standard DIN 3760. For detail information, see chapter 4 "Assembly Guides".

### ▶ 3.2.1 DIN / RMA Standard

Bore Dia.	DIN 3760 ( m / m )		RMA ( m / m )	
	Metal O.D.	Rubber O.D.	Metal O.D.	Rubber O.D.
up to 50	+0.10 / +0.20	+0.15 / +0.30	+0.08 / +0.20	+0.15 / +0.30
up to 80	0.13 / 0.23	0.20 / 0.35	0.09 / 0.23	0.20 / 0.35
up to 120	0.15 / 0.25	0.20 / 0.35	0.10 / 0.25	0.20 / 0.35
up to 180	0.18 / 0.28	0.25 / 0.45	0.12 / 0.28	0.25 / 0.45
up to 300	0.20 / 0.30	0.25 / 0.45	0.15 / 0.35	0.25 / 0.45
up to 400	0.23 / 0.35	0.30 / 0.55	0.20 / 0.45	0.30 / 0.55

### ▶ 3.2.2 RMA Standard

Bore Dia.	Metal OD		Rubber OD	
	Nominal Press Fit	Tolerance	Nominal Press Fit	Tolerance
up to 2"	0.005 ± 0.002		0.008 ± 0.003	
	+0.003~0.007	+0.08~0.17mm	+0.005~0.011	+0.13~0.28mm
up to 3"	0.0055 ± 0.0025		0.010 ± 0.003	
	+0.003~0.008	+0.08~0.20mm	+0.007~0.013	+0.18~0.33mm
up to 5"	0.0065 ± 0.003		0.0105 ± 0.003	
	+0.0035~0.0095	+0.09~0.24mm	+0.0075~0.0135	+0.19~0.34mm
up to 7"	0.007 ± 0.003		0.012 ± 0.004	
	+0.004~0.010	+0.10~0.25mm	+0.008~0.016	+0.20~0.40mm
up to 12"	0.0085 ± 0.0035		0.0125 ± 0.004	
	+0.005~0.012	+0.13~0.30mm	+0.0085~0.0165	+0.22~0.42mm
up to 20"	0.012 ± 0.005		0.015 ± 0.005	
	+0.007~0.017	+0.18~0.43mm	+0.010~0.020	+0.26~0.50mm

### 3.3 Factors in Seals Selection

There are several factors affecting the performance of seal such as media type, media temperature, shaft finish, pressure, and surface speed of shaft, etc.

#### ▶ 3.3.1 Types of Motion

Types	Choices
Rotation	Any type of seal other than TX4
Reciprocating	TX4 seals ( TC4, TB4.....)

#### ▶ 3.3.2 Media

Media	Choices
Regular lubricants	Regular Seals
Water, non lubrication liquids	Using two single-lip seals with grease or lubricants in between.
Chemicals	When sealing element material is not acceptable, try mechanical seal.

#### ▶ 3.3.3 Pressure

General seals are not intended for pressurized condition. However V types of seals can withstand pressure up to 3 kg/cm<sup>2</sup>, such as TCV, TBV, and SBV, etc.

P type can withstand up to 10 kg/cm<sup>2</sup>, such as TCP,.....( 1kg/cm<sup>2</sup>=14.2 psi)

#### ▶ 3.3.4 Existence of dust

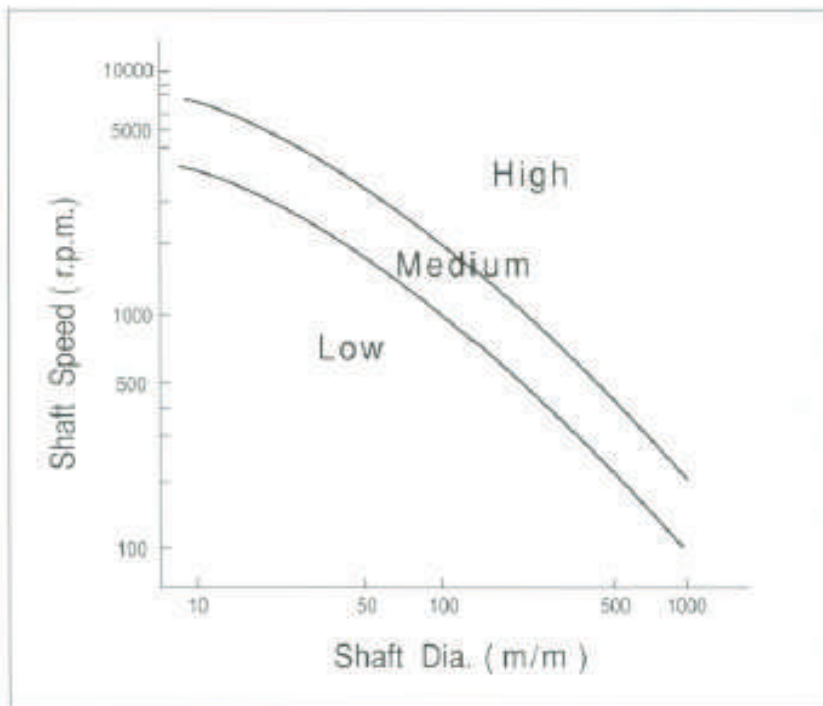
Environment	Choice
No Dust	Single-lip Seals ( S Type)
Dust	Double-lip Seals ( T Type)

#### ▶ 3.3.5 Temperature

The media temperature plus the friction between seal and the shaft will cause the temperature of the seal increase by as much as 40°C. Therefore temperature plays a very important role in material selection.

► **3.3.6 Speed of Shaft**

The tolerated speed depends on the material, type & eccentricity. For the design of shaft, see Chapter 4. "Assembly Guides" . The Speed of shaft is categorized into three levels :



► **3.3.7 Shaft Finish**

Since the sealing lip in most cases seals directly on a shaft, the shaft finish is important for proper seal performance. General speaking, a finish of 3-S for low speed, and 1.5-S for high speed should be achieved.

► **3.3.8 Shaft Eccentricity**

There are two types of shaft eccentricities which affect the seals performance. They are Shaft to Bore Misalignment and Dynamic Run-Out, see Chapter 4 "Assembly Guides" .

### 3.4 The Appearance of Oil Seals

On the appearance, there are three important parts :

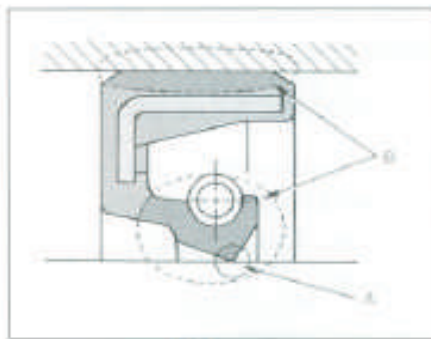
A. The front end of the lip Fig-A is a critical area.

B. Dark area

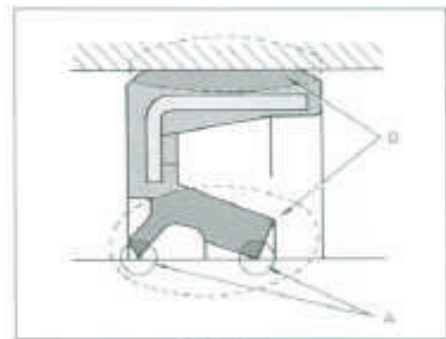
A little flaw on the appearance will not affect the performance of the seal .

C. Other parts

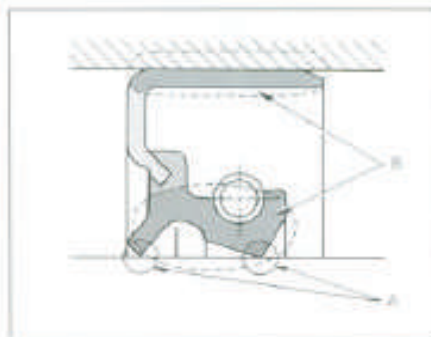
Unless the defect is severe, it will not hurt much the function of the seal.



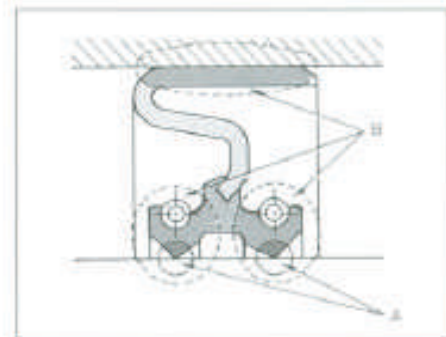
S Type



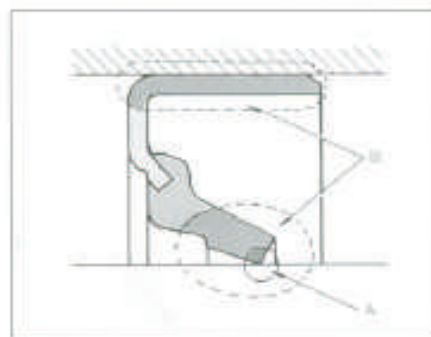
K Type



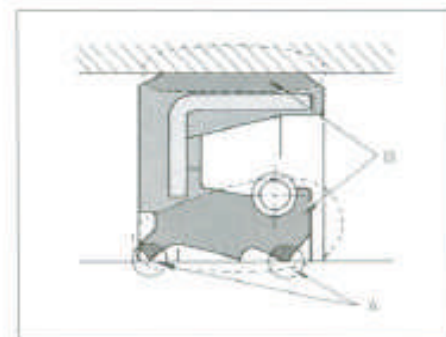
T Type



D Type



V Type



TX4 Type

### 3.5 Inspection

TTO oil seals are inspected piece by piece during the manufacturing process. Therefore all finished products are excellent and reliable. The extent of each inspection operation is outlined below.

Metal Case	The dimensions are checked before production is started.
Spring	The dimensions and spring force are checked in a random sampling method.
Rubber Compound	Before the start of a production run, each rubber batch is checked.
Curing	Dimension, bonding and finish are checked before the start of a production run. The manufacturing process is continuously supervised.
Completed seal	Each seal is visually inspected.



## 4.1 The Design of Shaft

Proper seal installation assures proper sealing performance. How a seal is fitted is very important.

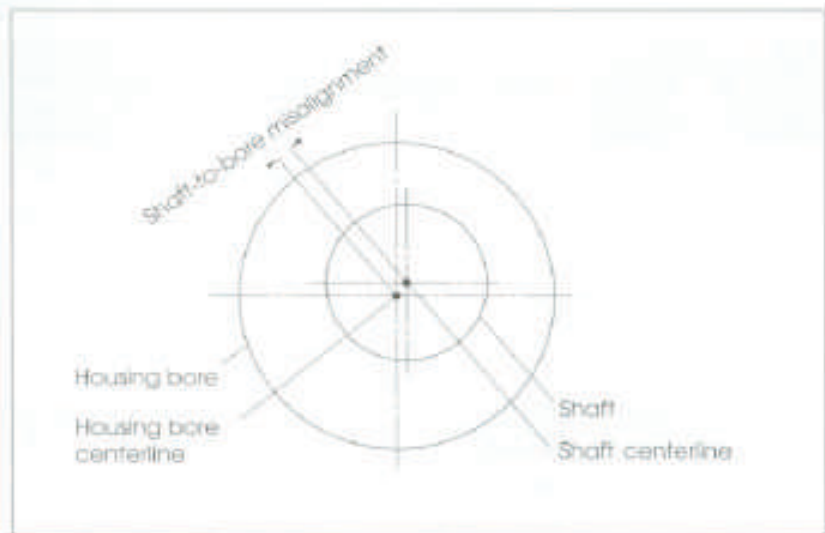
The end of the shaft must be chamfered, corners must be rounded, free from burrs and sharp edges to protect seals from damage during assembly.

### ► 4.1.1 Shaft Material and Finish

The shaft must be hardened to Rockwell C45 minimum. And surface roughness should be within 1.5 to 3 S(=0.001mm) with no machine leads. This shaft finish can be best obtained by plunge grinding.

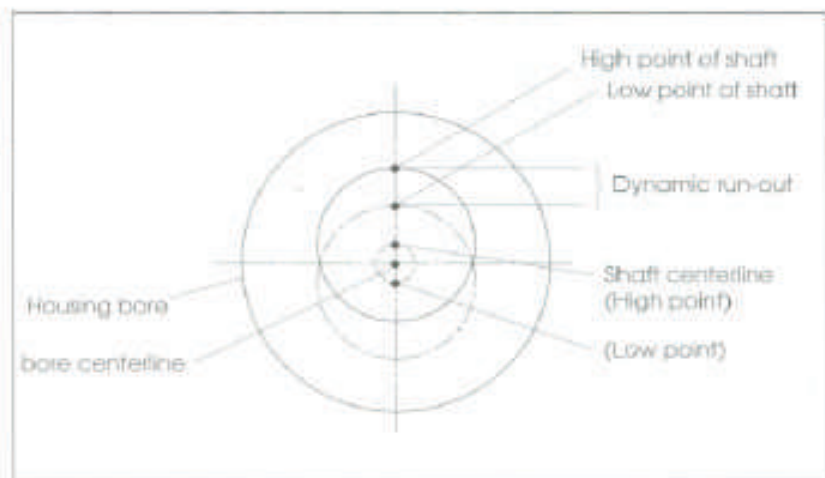
#### Shaft to bore Misalignment

It is the distance that the center of shaft rotation is from the center of the bore.

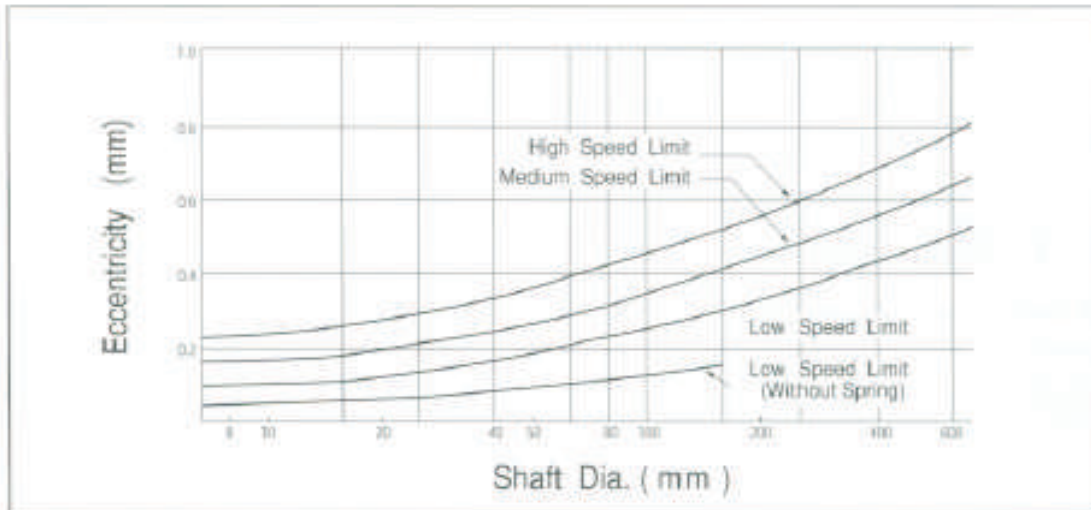


#### Dynamic run-out

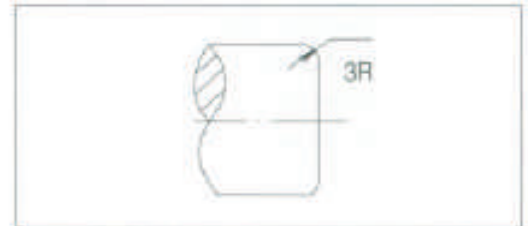
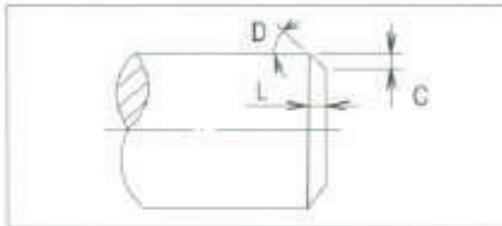
It is twice the distance the center of the shaft is displaced from the actual center of rotation.



► 4.1.2 The Shaft Eccentricity Limits



► 4.1.3 Shaft Diameter and Chamfer



Shaft Diameter (mm)	Tolerance range (h9)	C (mm)	L (mm)	D
up to 6	-30 ~ 0	1.5	2	30°
up to 10	-36 ~ 0			
up to 18	-43 ~ 0			
up to 30	-52 ~ 0			
up to 50	-62 ~ 0			
up to 80	-74 ~ 0	2.0	5	20°
up to 120	-87 ~ 0			
up to 180	-100 ~ 0			
up to 250	-115 ~ 0			
up to 315	-130 ~ 0			
up to 400	-145 ~ 0	5.0		

## 4.2 The Design of Bore

The lead corner, or entering edge of the bore should be chamfered and free of burrs.

### ▶ 4.2.1 Bore Material and Finish

There is no recommended Rockwell hardness for the bore. However, the bore should be of sufficient hardness to withstand the seal's O.D. For soft metal, such as Aluminum, a rubber O.D. is recommended. The bore finish should be within 3S for metal O.D. seal and should be within 6S (=0.001mm) for rubber O.D. seal. If surface roughness exceeds this then paint sealant can be added to the O.D. of the metal seal.

### ▶ 4.2.2 Bore Diameter and Seal O. D.(DIN)

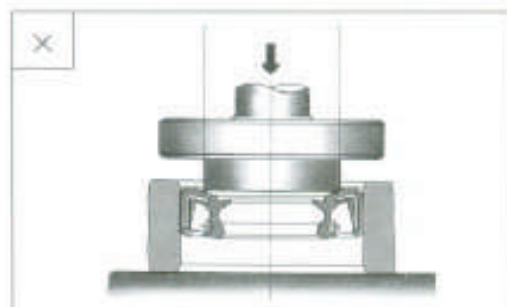
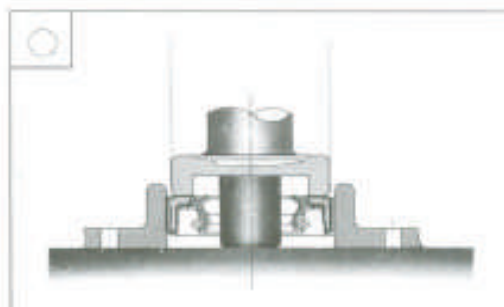
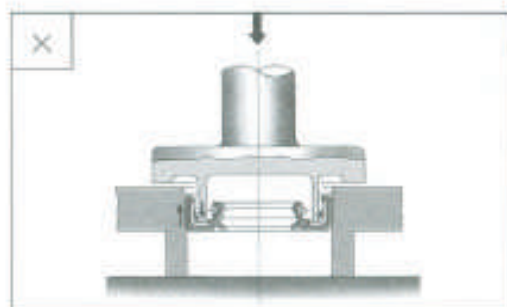
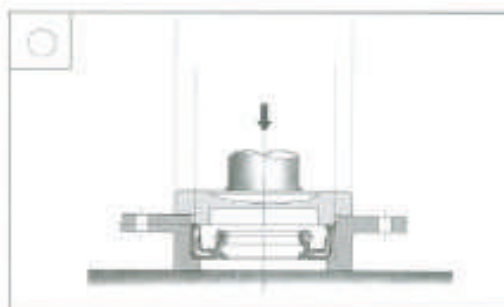
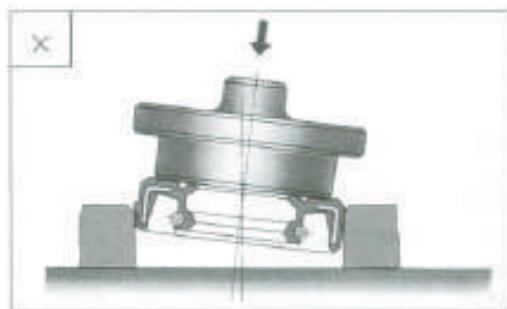
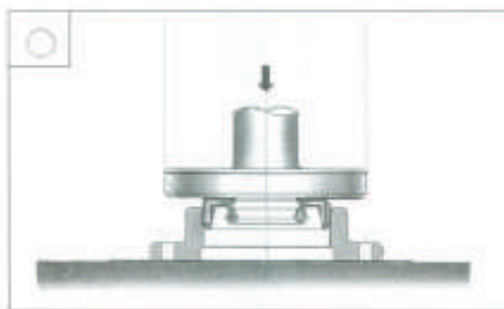
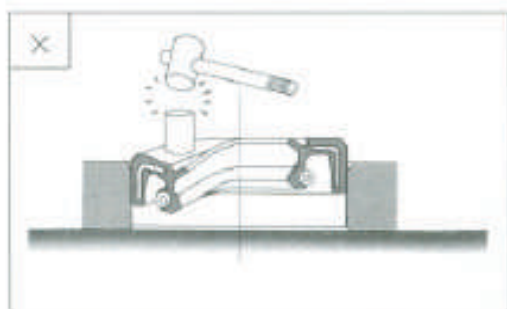
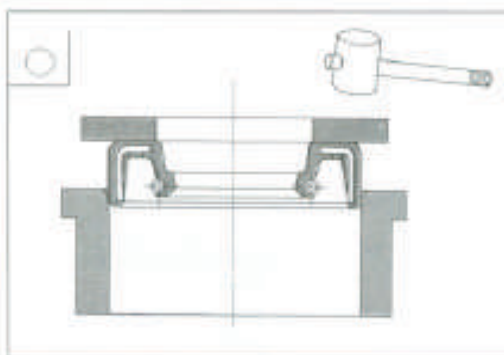
Bore Diameter (mm)	Tolerance Range (H8)	Metal Cased Seal O.D. (mm)	Rubber Covered Seal O.D. (mm)
up to 6	0 to +18	+0.10 to +0.20	+0.15 to +0.30
up to 10	0 to +22		
up to 18	0 to +27		
up to 30	0 to +33		
up to 35	0 to +39		
up to 50	0 to +39		
up to 80	0 to +46	+0.13 to +0.23	+0.20 to +0.35
up to 120	0 to +54	+0.15 to +0.25	+0.20 to +0.35
up to 180	0 to +63	+0.18 to +0.28	+0.25 to +0.45
up to 250	0 to +72	+0.20 to +0.30	+0.25 to +0.45
up to 300	0 to +81		
up to 315	0 to +81	+0.23 to +0.35	+0.30 to +0.55
up to 400	0 to +89		

### 4.3 Cautions on Assembly

Bore	The leading edge must be deburred. A rounded corner or chamfer should be provided.
Shaft	Remove surface nicks, burrs, grooves and spiral machine leads.
Shaft End	Remove burrs or sharp edges. The shaft end should be chamfered in applications where the shaft enters the seal against the sealing lip.
Dimensions	Be sure shaft and bore diameters match those specified for the seal selected. Damage may have occurred prior to installation. A Seal sealing lip that is turned back, cut or otherwise damaged should be replaced.
Seal Direction	Make sure that the new seal faces in the same direction as the original one. Generally, the lip faces the lubricant or fluid to be retained.
Correct Tools	Press fitting tools should have outside diameter 0.3 mm smaller than the bore size. For best results, the center of the tool should be open so the pressure is applied only at the outer edge.
Pre-lubricate	Before installation, wipe the sealing element with the lubricant being retained.
Proper force	Use proper driving force, such as a soft-face tool, arbor press, or wood. Apply force evenly around the outer edge to avoid cocking the seal.

## 4.4 Assembly Illustration

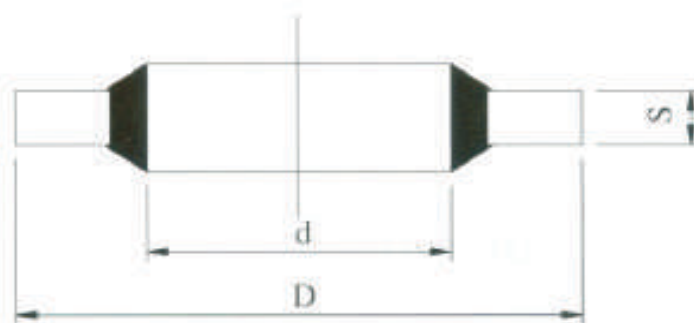
The following pictures illustrate the correct and wrong assembly.



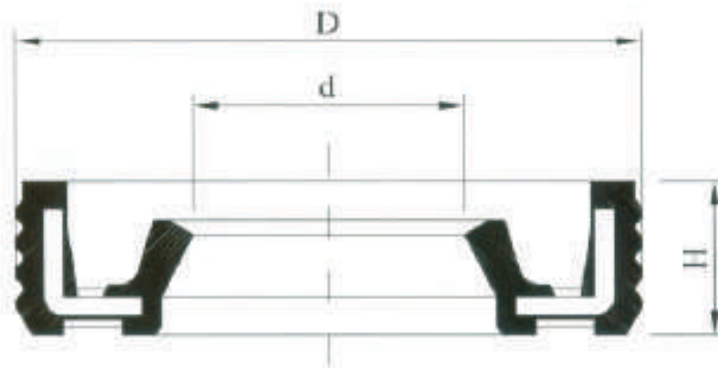


# TTO-Seal Type BO-1

TTO

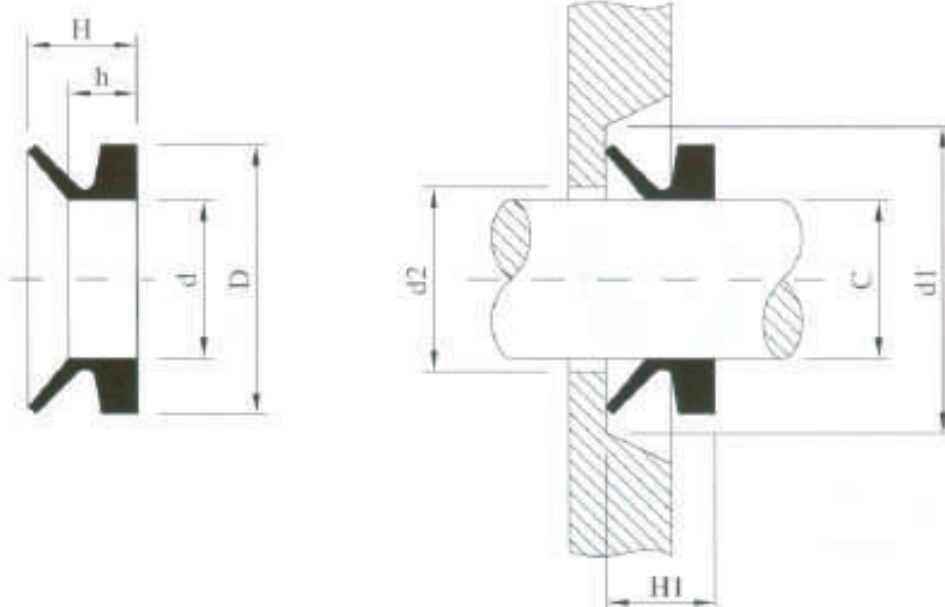


P/N	d	D	S	P/N	d	D	S	P/N	d	D	S
#001	3.05	6.35	1.2	#207	6.7	11	1	#252	68.6	79.5	3.5
#002	4.12	7.26	1.2	#208	6.7	11	2.5	#253	76.08	90.3	3.38
#003	5.21	8.38	1.2	#209	7.1	12	1	#254	89.09	101.48	3.2
#004	6.86	13.21	1.2	#210	7.3	10.2	1	#255	127	143.67	5
#005	6.99	13.34	1.2	#211	8.5	13.4	1	#301	3.6	7.5	1
#006	8.31	13.34	1.2	#212	8.7	13	1	#302	4.6	9	1
#007	8.64	14.22	1.2	#213	8.7	14	1	#303	5.6	10	1
#008	11.26	18.36	2	#214	8.7	16	1	#304	6.6	11	1
#009	11.69	19.05	2	#215	9.3	13.3	1	#305	6.86	13.27	1.3
#010	14.86	22.23	2	#216	10.35	16	2	#306	7	11.4	1
#011	16.51	25.4	2	#217	10.7	16	1.5	#307	8.6	13	1
#012	18.16	25.4	2.3	#218	10.7	18	1.5	#310	10.7	17	1.5
#013	24.26	33.27	2.3	#219	11.4	16.3	1.5	#312	11.8	18.1	1.5
#014	29.33	36.58	2.3	#220	11.8	18.5	1.5	#313	12.7	19	1.5
#015	32.64	41.4	3.2	#221	11.8	19.1	1.5	#315	13.8	20.1	1.5
#016	35.94	44.45	3.2	#222	12.7	18	1.5	#316	14.7	21	1.5
#017	38.96	47.75	3.2	#223	12.7	20	1.5	#317	16.7	23	1.5
#018	45.34	57.15	3.2	#224	13.7	20	1.5	#319	17.2	23.9	2
#019	51.69	63.5	3.2	#225	13.7	22	1.5	#320	18.7	27	2
#020	10.37	15.88	2	#226	14	18.7	1.5	#321	20.7	29	2
#021	13.74	20.57	2	#227	14.7	22	1.5	#324	22.7	31	2
#022	15.83	22.23	2	#228	16	22.7	1.5	#325	23.7	32	2
#023	17.28	23.8	2	#229	16.7	24	1.5	#326	24.7	33	2
#024	19.69	26.92	2.3	#230	17.4	24	1.5	#327	27	35.3	2
#025	21.54	28.58	2.5	#231	18	24.7	1.5	#328	27.7	36	2
#026	23.49	31.75	2.3	#232	18.7	26	1.5	#329	28.6	36	2
#027	27.05	34.93	2.3	#233	20.7	28	1.5	#330	29.2	37.5	2
#028	27.82	38.61	2.3	#234	21.5	28.7	2.5	#331	30.7	39	2
#029	30.81	38.1	2.3	#235	22.5	28	1.5	#332	33.7	42	2
#030	33.89	42.8	3.2	#236	22.7	30	2	#333	37	48	2.5
#031	33.89	42.8	2.3	#237	22.7	30	3	#334	40	51	2.5
#032	42.93	52.38	3.2	#238	24.7	32	2	#335	43	54	2.5
#033	48.44	58.6	3.2	#239	26.7	35	2	#336	46	57	2.5
#034	54.89	69.85	3.2	#240	27.2	36	2	#337	49	60	2.5
#035	58.04	70.36	3.2	#241	28.7	37	2	#510	10.4	14.7	1.2
#036	60.58	73.03	3.2	#242	31	39	2	#511	13.85	18.7	1.2
#037	64.99	77.22	3.2	#243	33.7	42	2	#512	17.35	22.7	1.2
#038	66.68	79.5	3.2	#244	34.3	43	2	#513	21.65	26.7	1.2
#039	76.08	90.17	3.2	#245	36.7	46	2	#514	27.3	32.5	1.2
#201	4.1	7.2	1	#246	40	51	2.5	#515	34.2	39.5	2
#202	4.5	7	1	#247	42.7	53	3	#516	42.8	49.5	2
#203	5.7	9	1	#248	48.7	59	3	#517	48.7	55.5	2
#204	5.7	10	1	#249	52	60	3	#518	60.5	68.5	2
#205	6.2	9.2	1	#250	53.3	64.5	3	#519	8.3	12.7	1.2
#206	6.7	10	1	#251	60.7	73	3	#520	27.3	32.6	2



TYPE	d	D	H	TTO NO.
VCW	6	15	3.3	A530
VCW	7	15	5	A528
VCW	8	12	3	A218
VCW	8	15	3	A524
VCW	9	13	3	A305
VCW	9	16	3	A636
VCW	10	14	3	A422
VCW	10	17	3	A730
VCW	10	29.7	3	B925
VCW	12	16	3	A619
VCW	12	18	3	A834
VCW	12	19	3	A939
VCW	12	29.7	3	B926
VCW	13	19	3	A958
VCW	14	20	3	B050
VCW	14	21	3	B118
VCW	14	22	3	B2123
VCW	14	22	4	B2116
VCW	15	21	3	B127
VCW	15	23	3	B306
VCW	16	22	3	B2101
VCW	16	24	3	B461
VCW	16	25	3	B5128
VCW	17	23	3	B323
VCW	17	25	3	B5127
VCW	18	24	3	B469
VCW	18	24	4	B475
VCW	18	26	4	B674
VCW	19	27	4	B716
VCW	20	26	4	B673
VCW	20	28	4	B8115
VCW	22	28	4	B8163
VCW	22	30	4	C0129
VCW	24	32	4	C2127
VCW	25	32	4	C2126
VCW	25	34	4	C4154
VCW	25	35	4	C5115
VCW	26	34	4	C447
VCW	27	35	4	C5215
VCW	28	35	4	C5157

TYPE	d	D	H	TTO NO.
VCW	28	37	4	C735
VCW	29	38	4	C889
VCW	30	37	4	C771
VCW	30	38	4	C8164
VCW	30	40	4	D0134
VCW	30	50	5	E0314
VCW	30	55	5	E5191
VCW	30	56	5	E6122
VCW	31	38	4	C8205
VCW	32	42	4	D2132
VCW	32	45	4	D565
VCW	35	42	4	D2131
VCW	35	45	4	D5105
VCW	37	47	4	D7280
VCW	37	47.5	5	D7219
VCW	38	45	4	D5149
VCW	38	48	4	D871
VCW	40	47	4	D7164
VCW	40	50	4	E0252
VCW	40	52	5	E2131
VCW	42	52	4	E282
VCW	42	52.5	5	E2226
VCW	42	55	6	E5192
VCW	43	53	4	S047
VCW	45	52	4	E2193
VCW	45	55	4	E5147
VCW	45	71	5	F5165
VCW	46	54	4	E489
VCW	48	58	5	EB108
VCW	50	58	4	EB103
VCW	50	60.5	5	F0195
VCW	50	62	5	F1213
VCW	53	65	5	F2168
VCW	58	70.5	5	F5118
VCW	63	75	5	F7109
VCW	70	78	5	F956
VCW	72	85.5	5	G2130
VCW	76	90.5	8	G5128
VCW	80	95	5	G7102
VCW	90	105	5	H184



Reference	Shaft C	d	D	h	H	d2	d1	HI	TTO NO.
VA 3	2.7 - 3.5	2.5	5.5	2.1	3	C + 1	G + 4	2.5 ± 0.3	P181
VA 4	3.5 - 4.5	3.2	7.2	2.4	3.7	C + 1	G + 6	3 ± 0.4	P182
VA 5	4.5 - 5.5	4	8	2.4	3.7	C + 1	G + 6	3 ± 0.4	P183
VA 6	5.5 - 6.5	5	9	2.4	3.7	C + 1	G + 6	3 ± 0.4	P094
VA 7	6.5 - 8	6	10	2.4	3.7	C + 1	G + 6	3 ± 0.4	
VA 8	8 - 9.5	7	11	2.4	3.7	C + 1	G + 6	3 ± 0.4	P095
VA 10	9.5 - 11.5	9	16	3.4	5.5	C + 2	G + 9	4.5 ± 0.6	P096
VA 12	11.5 - 13.5	10.5	16.5	3.4	5.5	C + 2	G + 9	4.5 ± 0.6	P097
VA 14	13.5 - 15.5	12.5	18.5	3.4	5.5	C + 2	G + 9	4.5 ± 0.6	P035
VA 16	15.5 - 17.5	14	20	3.4	5.5	C + 2	G + 9	4.5 ± 0.6	P018
VA 18	17.5 - 19	16	22	3.4	5.5	C + 2	G + 9	4.5 ± 0.6	P088
VA 20	19 - 21	18	26	4.7	7.5	C + 2	G + 12	6 ± 0.8	P019
VA 22	21 - 24	20	28	4.7	7.5	C + 2	G + 12	6 ± 0.8	P099
VA 25	24 - 27	22	30	4.7	7.5	C + 2	G + 12	6 ± 0.8	P020
VA 28	27 - 29	25	33	4.7	7.5	C + 3	G + 12	6 ± 0.8	P046
VA 30	29 - 31	27	35	4.7	7.5	C + 3	G + 12	6 ± 0.8	P021
VA 32	31 - 33	29	37	4.7	7.5	C + 3	G + 12	6 ± 0.8	P047
VA 35	33 - 36	31	39	4.7	7.5	C + 3	G + 12	6 ± 0.8	P100
VA 38	36 - 38	34	42	4.7	7.5	C + 3	G + 12	6 ± 0.8	P101
VA 40	38 - 43	36	46	5.5	9	C + 3	G + 15	7 ± 1	P022
VA 45	43 - 48	40	50	5.5	9	C + 3	G + 15	7 ± 1	P023
VA 50	48 - 53	45	55	5.5	9	C + 3	G + 15	7 ± 1	P024
VA 55	53 - 58	49	59	5.5	9	C + 3	G + 15	7 ± 1	P049
VA 60	58 - 63	54	64	5.5	9	C + 3	G + 15	7 ± 1	P102
VA 65	63 - 68	58	68	5.5	9	C + 3	G + 15	7 ± 1	P045
VA 70	68 - 73	63	75	6.8	11	C + 4	G + 18	9 ± 1.2	P103
VA 75	73 - 78	67	79	6.8	11	C + 4	G + 18	9 ± 1.2	P104
VA 80	78 - 83	72	84	6.8	11	C + 4	G + 18	9 ± 1.2	P105
VA 85	83 - 88	76	88	6.8	11	C + 4	G + 18	9 ± 1.2	P106
VA 90	88 - 93	81	93	6.8	11	C + 4	G + 18	9 ± 1.2	P107
VA 95	93 - 98	85	97	6.8	11	C + 4	G + 18	9 ± 1.2	P108
VA 100	98 - 105	90	102	6.8	11	C + 4	G + 18	9 ± 1.2	P109
VA 110	105 - 115	99	113	7.9	12.8	C + 4	G + 21	10.5 ± 1.5	P110
VA 120	115 - 125	108	122	7.9	12.8	C + 4	G + 21	10.5 ± 1.5	P111
VA 130	125 - 135	117	131	7.9	12.8	C + 4	G + 21	10.5 ± 1.5	P112

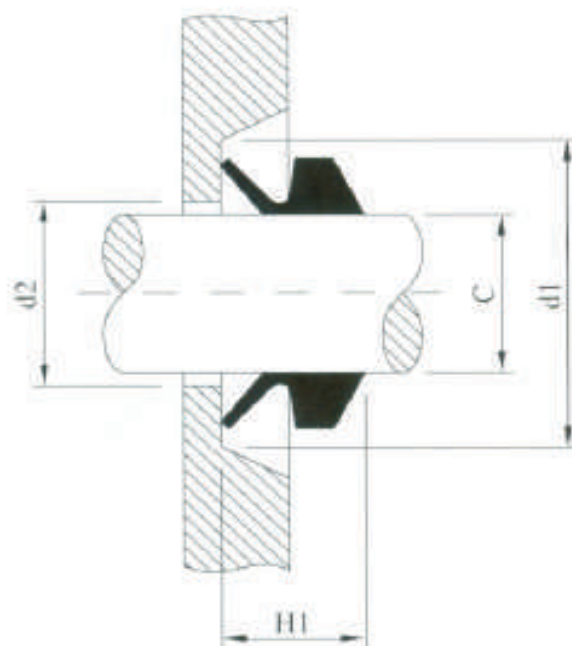
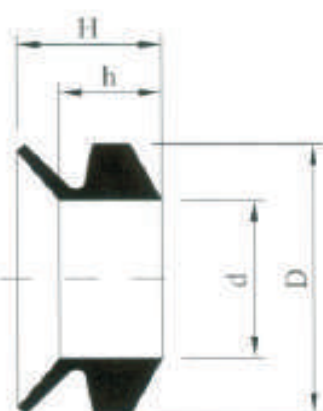




Reference	Shaft C	d	D	h	H	d2	d1	H1	TTO NO.
VA 140	135 - 145	126	140	7.9	12.8	C + 4	C + 21	10.5 ± 1.5	P113
VA 150	145 - 155	135	149	7.9	12.8	C + 4	C + 21	10.5 ± 1.5	P114
VA 160	155 - 165	144	160	9	14.5	C + 5	C + 24	12 ± 1.8	P115
VA 170	165 - 175	153	169	9	14.5	C + 5	C + 24	12 ± 1.8	P161
VA 180	175 - 185	162	178	9	14.5	C + 5	C + 24	12 ± 1.8	P162
VA 190	185 - 195	171	187	9	14.5	C + 5	C + 24	12 ± 1.8	P163
VA 199	195 - 210	180	196	9	14.5	C + 5	C + 24	12 ± 1.8	P176
VA 200	190 - 210	180	210	14.3	25	C + 10	C + 45	20 ± 4	P164
VA 220	210 - 235	198	228	14.3	25	C + 10	C + 45	20 ± 4	P184
VA 250	235 - 265	225	255	14.3	25	C + 10	C + 45	20 ± 4	P185
VA 275	265 - 290	247	277	14.3	25	C + 10	C + 45	20 ± 4	P186
VA 300	290 - 310	270	300	14.3	25	C + 10	C + 45	20 ± 4	P187
VA 325	310 - 335	292	322	14.3	25	C + 10	C + 45	20 ± 4	P188
VA 350	335 - 365	315	345	14.3	25	C + 10	C + 45	20 ± 4	P189
VA 375	365 - 390	337	367	14.3	25	C + 10	C + 45	20 ± 4	P190
VA 400	390 - 430	360	390	14.3	25	C + 10	C + 45	20 ± 4	P191
VA 450	430 - 480	405	435	14.3	25	C + 10	C + 45	20 ± 4	
VA 500	480 - 530	450	480	14.3	25	C + 10	C + 45	20 ± 4	
VA 550	530 - 580	495	525	14.3	25	C + 10	C + 45	20 ± 4	
VA 600	580 - 630	540	570	14.3	25	C + 10	C + 45	20 ± 4	
VA 650	630 - 665	600	630	14.3	25	C + 10	C + 45	20 ± 4	
VA 700	665 - 705	630	660	14.3	25	C + 10	C + 45	20 ± 4	
VA 725	705 - 745	670	700	14.3	25	C + 10	C + 45	20 ± 4	
VA 750	745 - 785	705	735	14.3	25	C + 10	C + 45	20 ± 4	
VA 800	785 - 830	745	775	14.3	25	C + 10	C + 45	20 ± 4	
VA 850	830 - 875	785	815	14.3	25	C + 10	C + 45	20 ± 4	
VA 900	875 - 920	825	855	14.3	25	C + 10	C + 45	20 ± 4	
VA 950	920 - 965	865	895	14.3	25	C + 10	C + 45	20 ± 4	
VA 1000	965 - 1015	910	940	14.3	25	C + 10	C + 45	20 ± 4	
VA 1050	1015 - 1065	955	985	14.3	25	C + 10	C + 45	20 ± 4	
VA 1100	1065 - 1115	1000	1030	14.3	25	C + 10	C + 45	20 ± 4	
VA 1150	1115 - 1165	1045	1075	14.3	25	C + 10	C + 45	20 ± 4	
VA 1200	1165 - 1215	1090	1120	14.3	25	C + 10	C + 45	20 ± 4	
VA 1250	1215 - 1270	1135	1165	14.3	25	C + 10	C + 45	20 ± 4	
VA 1300	1270 - 1320	1180	1210	14.3	25	C + 10	C + 45	20 ± 4	
VA 1350	1320 - 1370	1225	1255	14.3	25	C + 10	C + 45	20 ± 4	
VA 1400	1370 - 1420	1270	1300	14.3	25	C + 10	C + 45	20 ± 4	
VA 1450	1420 - 1470	1315	1345	14.3	25	C + 10	C + 45	20 ± 4	
VA 1500	1470 - 1520	1360	1390	14.3	25	C + 10	C + 45	20 ± 4	
VA 1550	1520 - 1570	1405	1435	14.3	25	C + 10	C + 45	20 ± 4	
VA 1600	1570 - 1620	1450	1480	14.3	25	C + 10	C + 45	20 ± 4	
VA 1650	1620 - 1670	1495	1525	14.3	25	C + 10	C + 45	20 ± 4	
VA 1700	1670 - 1720	1540	1570	14.3	25	C + 10	C + 45	20 ± 4	
VA 1750	1720 - 1770	1585	1615	14.3	25	C + 10	C + 45	20 ± 4	
VA 1800	1770 - 1820	1630	1660	14.3	25	C + 10	C + 45	20 ± 4	
VA 1850	1820 - 1870	1675	1705	14.3	25	C + 10	C + 45	20 ± 4	
VA 1900	1870 - 1920	1720	1750	14.3	25	C + 10	C + 45	20 ± 4	
VA 1950	1920 - 1970	1765	1795	14.3	25	C + 10	C + 45	20 ± 4	
VA 2000	1970 - 2020	1810	1840	14.3	25	C + 10	C + 45	20 ± 4	



# TTO -Seal Type VS



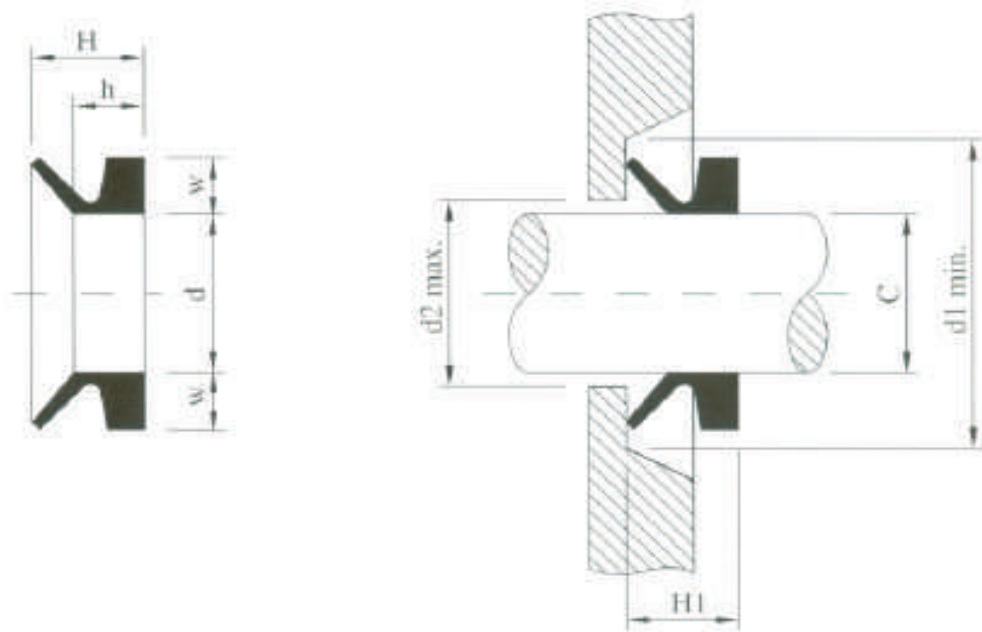
Reference	Shaft C	d	D	h	H	d2	d1	H1	TTO NO.
VS 5	4.5 - 5.5	4	8	3.9	5.2	C + 1	C + 6	4.5 ± 0.4	P192
VS 6	5.5 - 6.5	5	9	3.9	5.2	C + 1	C + 6	4.5 ± 0.4	P193
VS 7	6.5 - 8	6	10	3.9	5.2	C + 1	C + 6	4.5 ± 0.4	P194
VS 8	8 - 9.5	7	11	3.9	5.2	C + 1	C + 6	4.5 ± 0.4	P146
VS 10	9.5 - 11.5	9	15	5.6	7.7	C + 2	C + 9	6.7 ± 0.6	P195
VS 12	11.5 - 13.5	10.5	16.5	5.6	7.7	C + 2	C + 9	6.7 ± 0.6	P170
VS 14	13.5 - 15.5	12.5	18.5	5.6	7.7	C + 2	C + 9	6.7 ± 0.6	P171
VS 16	15.5 - 17.5	14	20	5.6	7.7	C + 2	C + 9	6.7 ± 0.6	P144
VS 18	17.5 - 19	16	22	5.6	7.7	C + 2	C + 9	6.7 ± 0.6	P172
VS 20	19 - 21	18	26	7.9	10.5	C + 2	C + 12	9 ± 0.8	P116
VS 22	21 - 24	20	28	7.9	10.5	C + 2	C + 12	9 ± 0.8	P117
VS 25	24 - 27	22	30	7.9	10.5	C + 2	C + 12	9 ± 0.8	P118
VS 28	27 - 29	25	33	7.9	10.5	C + 3	C + 12	9 ± 0.8	P119
VS 30	29 - 31	27	35	7.9	10.5	C + 3	C + 12	9 ± 0.8	P120
VS 32	31 - 33	29	37	7.9	10.5	C + 3	C + 12	9 ± 0.8	P240
VS 35	33 - 36	31	39	7.9	10.5	C + 3	C + 12	9 ± 0.8	P121
VS 38	36 - 38	34	42	7.9	10.5	C + 3	C + 12	9 ± 0.8	P173
VS 40	38 - 43	36	46	9.5	13	C + 3	C + 15	11 ± 1	P122
VS 45	43 - 48	40	50	9.5	13	C + 3	C + 15	11 ± 1	P123
VS 50	48 - 53	45	55	9.5	13	C + 3	C + 15	11 ± 1	P124
VS 55	53 - 58	49	59	9.5	13	C + 3	C + 15	11 ± 1	P125
VS 60	58 - 63	54	64	9.5	13	C + 3	C + 15	11 ± 1	P126
VS 65	63 - 68	58	68	9.5	13	C + 3	C + 15	11 ± 1	P127
VS 70	68 - 73	63	75	11.3	15.5	C + 4	C + 18	13.5 ± 1.2	P128
VS 75	73 - 78	67	79	11.3	15.5	C + 4	C + 18	13.5 ± 1.2	P129
VS 80	78 - 83	72	84	11.3	15.5	C + 4	C + 18	13.5 ± 1.2	P130
VS 85	83 - 88	76	88	11.3	15.5	C + 4	C + 18	13.5 ± 1.2	P131
VS 90	88 - 93	81	93	11.3	15.5	C + 4	C + 18	13.5 ± 1.2	P132
VS 95	93 - 98	85	97	11.3	15.5	C + 4	C + 18	13.5 ± 1.2	P196
VS 100	98 - 105	90	102	11.3	15.5	C + 4	C + 18	13.5 ± 1.2	P133
VS 110	105 - 115	99	113	13.1	18	C + 4	C + 21	15.5 ± 1.5	P134
VS 120	115 - 125	108	122	13.1	18	C + 4	C + 21	15.5 ± 1.5	P135
VS 130	125 - 135	117	131	13.1	18	C + 4	C + 21	15.5 ± 1.5	P136
VS 140	135 - 145	126	140	13.1	18	C + 4	C + 21	15.5 ± 1.5	P137
VS 150	145 - 155	135	149	13.1	18	C + 4	C + 21	15.5 ± 1.5	P138



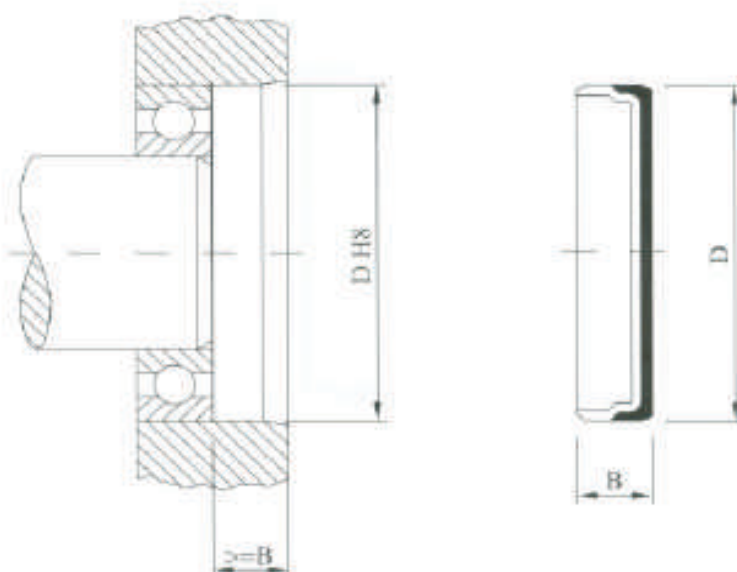
# TTO-Seal Type VS



Reference	Shaft C	d	w	h	H	d2	d1	HI	TTO NO.
VS 160	155 - 165	144	160	15	20,5	C + 5	C + 24	18± 1,8	P139
VS 170	165 - 175	153	169	15	20,5	C + 5	C + 24	18± 1,8	P165
VS 180	175 - 185	162	178	15	20,5	C + 5	C + 24	18± 1,8	P166
VS 190	185 - 195	171	187	15	20,5	C + 5	C + 24	18± 1,8	P167
VS 199	195 - 210	180	196	15	20,5	C + 5	C + 24	18± 1,8	P168

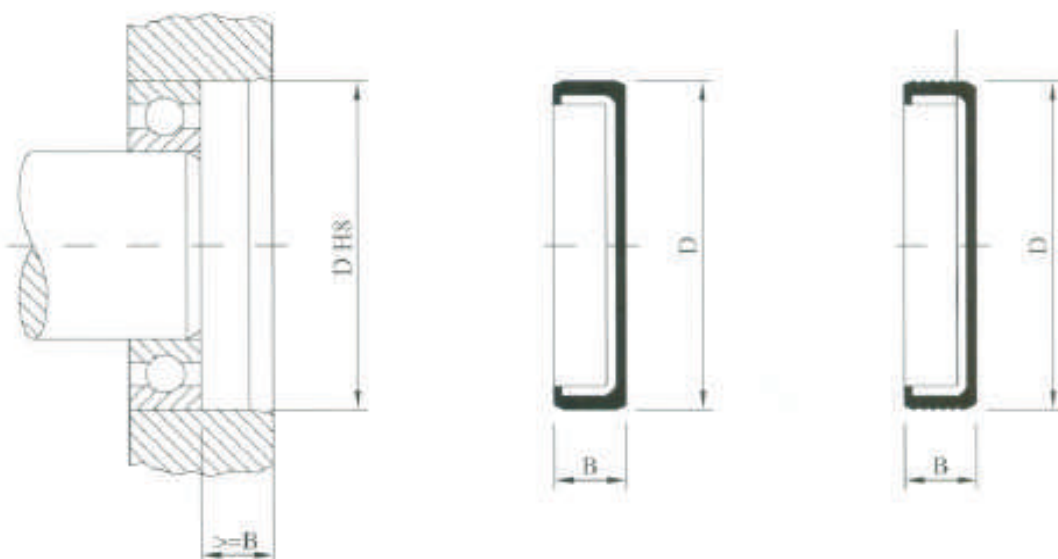


Reference	Shaft C	d	w	h	H	d2	d1	H1	TTO NO.
VL 140	135 - 145	126	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P147
VL 150	145 - 155	135	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P148
VL 160	155 - 165	144	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P149
VL 170	165 - 175	153	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P150
VL 180	175 - 185	162	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P151
VL 190	185 - 195	171	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P152
VL 200	195 - 210	182	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P153
VL 220	210 - 233	198	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P154
VL 250	233 - 260	225	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P155
VL 275	260 - 285	247	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P156
VL 300	285 - 310	270	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P157
VL 325	310 - 335	292	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P158
VL 350	335 - 365	315	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P159
VL 375	365 - 385	337	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P177
VL 400	385 - 410	360	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	P160
VL 425	410 - 440	382	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	
VL 450	440 - 475	405	6.5	6	10.5	C + 5	C + 20	8 ± 1.5	



TYPE	D	B	TTO NO.
VK	22	5	B2137
VK	24	7	B486
VK	28	7	B8185
VK	30	8	C0203
VK	32	8	C2164
VK	32	9.5	C2150
VK	35	5	
VK	35	8	C5176
VK	37	7	C783
VK	37	10	C784
VK	40	7	D0204
VK	42	7	D2154
VK	42	9.5	D2150
VK	47	7	D7221
VK	47	10	D7215
VK	52	7	E2231
VK	52	10	E2219
VK	55	8	E5156
VK	55	10	E5148
VK	62	8	F1359
VK	68	8	F4219
VK	72	9	F6229
VK	75	7	F7121
VK	80	8	G0239
VK	80	12	G0163
VK	85	12	G2139
VK	90	12	G5132
VK	95	12	G7121
VK	100	12	H0187
VK	110	12	H2133
VK	120	12	H495
VK	130	12	H668
VK	140	15	H8103
VK	145	12	H980
VK	150	15	K084

TYPE	D	B	TTO NO.
VK	160	15	K242
VK	170	15	K447
VK	200	13	M029
VK	210	15	M221
VK	225	14	M412
VK	240	15	M714



TYPE	D	B	TTO NO.
EC	12	5	A219
EC	12.78	2.54	A211
EC	13	4.5	A306
ECW	19	6	A962
EC	19	7	A963
EC	20	4	B070
EC	22	4	B2139
EC	22	5	B2119
EC	22	7	B254
EC	24	7	B481
EC	25	5	B5103
EC	25	6	B5167
EC	25	7	B5131
EC	25.35	6.4	B5146
EC	26	6.5	B681
EC	28	4	B8132
EC	28	7	B8116
EC	30	4	C0146
EC	30	5	C0123
EC	30	6	C0142
EC	30	8	C071
EC	31.75	4.8	C184
EC	32	5	C2134
EC	32	7	C2102
EC	32	8	C2161
EC	32	9.5	C242
EC	34	8	C496
EC	34	18	C472
EC	35	3.5	C592
EC	35	5	C5161
EC	35	6.5	C5144
EC	35	7	C5131
ECW	35	8	C5168
EC	35	8	C558
EC	36	6	C677
EC	37	5	C776

TYPE	D	B	TTO NO.
EC	37	7	C757
EC	37	10	C729
EC	38	10	C868
ECW	38.05	7.9	C8162
EC	38.1	4.8	C894
EC	38.1	6.4	C8117
EC	39.69	6.4	C911
EC	40	2.5	D0143
EC	40	5	D0142
EC	40	7	D0135
EC	40	7	D067
EC	40	8	D0136
ECW	41.23	7.9	D184
EC	42	7	D2120
EC	42	8	D2129
EC	42	9.5	D250
ECW	44.5	7.9	D4160
EC	45	5	D5152
EC	45.29	6.4	D572
EC	45.97	6.4	D571
EC	47	5	D7130
EC	47	6.5	D7156
EC	47	7	D7194
EC	47	8	D7114
EC	47	8	D7148
ECW	47	8.5	D7212
EC	47	10	D770
EC	47.02	4.7	D7224
EC	47.02	6.4	D7218
EC	50	7	E0218
EC	50	9	E071
EC	50	16	E0169
ECW	50.34	7.9	E0237
EC	50.8	6.4	E0182
EC	50.8	7.9	E0146
EC	52	6	E2149



# TTO-Seal Type EC & ECW

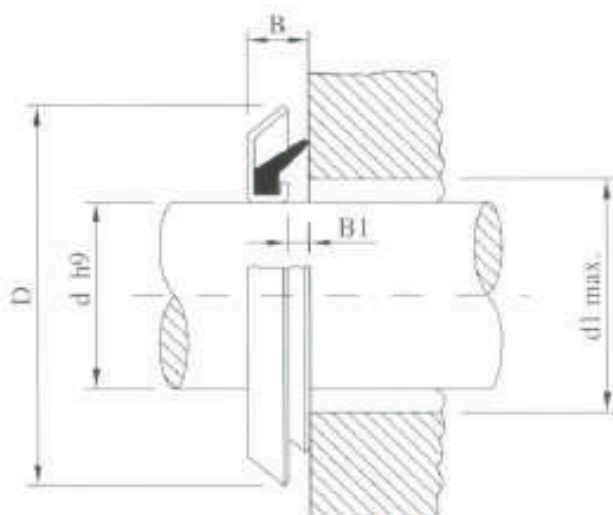
TYPE	D	B	TTO NO.
EC	52	7	E2150
EC	52	8	E288
EC	52	6.5	E2272
ECW	52.39	8.5	E2281
ECW	52	9	E2215
EC	52	10	E266
EC	52	10	E2238 (★)
EC	55	7	E5137
EC	55	10	E551
EC	56	10	E6114
ECW	57.15	7.9	E796
EC	58.74	7.9	E842
EC	58.75	7.9	E8112
EC	60	7	F0164
EC	60	16	F0115
ECW	60.27	7.9	F0189
EC	62	4.3	F1268
EC	62	6.4	F1197
EC	62	7	F1347
EC	62	8	F1100
ECW	62	8	F1342
ECW	62	8.9	F1333
EC	62	9.5	F1198
EC	63.5	7.9	F1211
EC	63.55	6.4	F1325
EC	65	8	F2144
EC	65	10	F288
EC	66.62	7.9	F321
EC	68	8	F4158
EC	70	7.9	F550
EC	70	10	F5111
EC	70	16	F566
ECW	72	8.5	F6221
EC	72	9	F6120
EC	72	9	F651
ECW	72	9.8	F6220
EC	72	10	F6246
EC	75	7	F789
ECW	80	6.4	G0195
EC	80	10	G0137
ECW	80	12	G0213
EC	80	12	G044
EC	80	16	G0140
EC	82.65	6.4	G126
EC	83	7	G1104
EC	85	10	G2127
ECW	85	10.7	G2125
EC	85	12	G239
EC	85	20	G283
EC	87	12	G317
EC	88.9	9.5	G421
EC	90	7	G5123
EC	90	10	G5116
ECW	90	11.5	G5126
EC	90	12	G525

TYPE	D	B	TTO NO.
ECW	95	10	G7100
EC	95	10	G7136
EC	100	10	H0173
ECW	100	11.3	H0179
EC	100	12	H073
EC	100	25	H093
EC	100	31	H0122
EC	110	10	H2129
EC	110	12	H265
EC	110	21	H2109
EC	120	12	H435
EC	120	27	H443
EC	120	33	H460
EC	125	12	H558
EC	130	12	H646
EC	130	27	H633
EC	140	15	H830
EC	140	37	H849
EC	145	15	H929
EC	150	15	K059
EC	150	27	K048
EC	160	15	K225
EC	165	12	K339
EC	167	15	K331
EC	170	15	K430
EC	170	43	K424
EC	180	12	K621
EC	180	15	K638
EC	180	30	K624
EC	185	15	K708
EC	190	12	K820
EC	210	15	M219
EC	210	27	M209
EC	225	14	M407
EC	230	14	M617
EC	235	15	M710
EC	240	15	M707
EC	260	15	N204
EC	270	15	N406
EC	290	15	N801



# TTO-Seal Type R (RB)

TTO



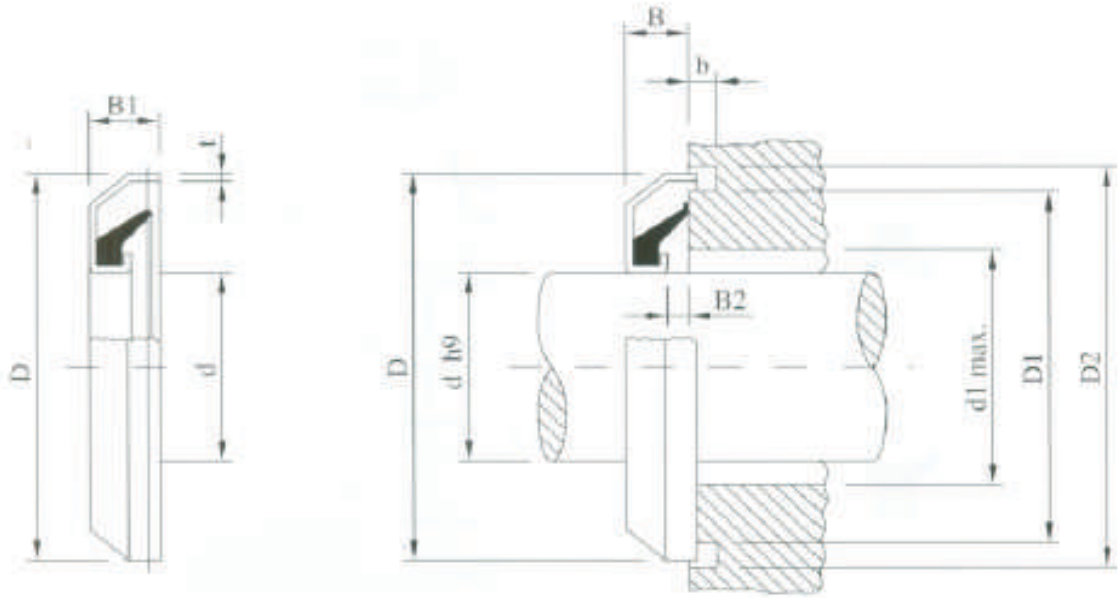
d	D	B	B1	d1	TTO NO.
10	24	3.5	1	15	B4108
11	26	3.5	1	17	
12	26	3.5	1	17	B643
14	30	4	1	21	
15	30	4	1	21	C079
16	32	4	1	23	
17	32	4	1	23	C238
18	33	4	1	24	
20	35	4	1	26	G545
22	40	4	1	31	
24	40	4	1	31	
25	40	4	1	31	D054
26	40	4	1	31	
28	43	4	1	34	D333
30	47	4.5	1	37	D747
32	49	4.5	1	39	
35	52	4.5	1	42	E254
38	55	4.5	1	45	
40	57	4.5	1	47	E714
41	57	4.5	1	48	
42	59	4.5	1	49	
45	62	4.5	1	52	F175
48	65	4.5	1	55	F2109
50	70	5.5	1	58	F527
52	72	5.5	1	60	
54	76	5.5	1	62	S092
55	75	5.5	1	63	F734
58	78	5.5	1	66	F989
60	80	5.5	1	68	G034
62	82	5.5	1	70	
65	85	5.5	1	73	G224
68	88	5.5	1	76	G490
70	90	5.5	1	78	G520
72	92	5.5	1	80	G625
75	95	5.5	1	83	G803

d	D	B	B1	d1	TTO NO.
75	96	5.5	1	83	G803
78	98	5.5	1	86	G904
80	100	5.5	1	88	H036
85	105	5.5	1	93	H119
90	110	5.5	1	98	H223
95	115	5.5	1	103	H324
100	120	5.5	1	108	H417
105	125	5.5	1	113	H522
135	159	6.5	1	145	
225	250	7.5	1	235	





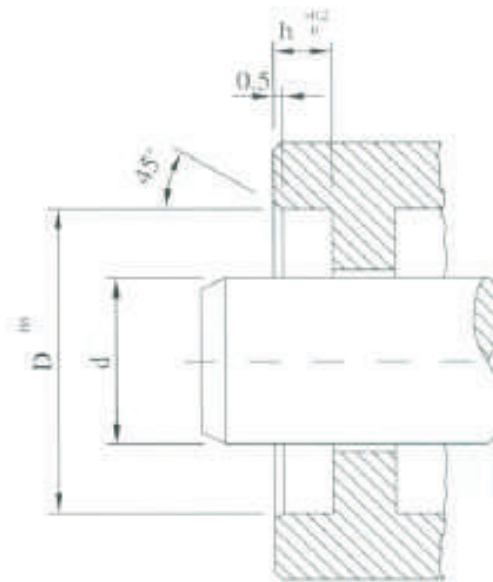
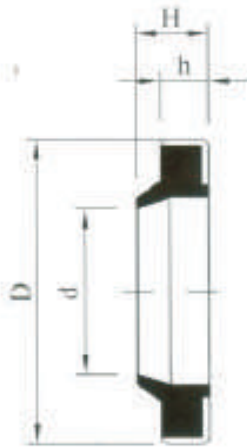
# TTO-Seal Type 9R ( 9RB )



d	D	B	B1	B2	b	d1	D1	D2	t	TTO NO.
15	32	4	6	1	3	21	29	34	0.5	C295
17	34	4	6	1	3	23	31	36	0.5	C4141
20	37	4	6	1	3	26	34	39	0.5	C756
25	42	4	6	1	3	31	39	44	0.5	D2107
26	43	4	6	1	3	32	40	45	0.5	D339
30	48	4.5	6.5	1	3	37	45	50	0.5	D850
32	53	6.5	8.5	1	3	39	50	55	0.5	E352
33.34	53.1	6.6	8.6	1	3	40.3	50	55	0.5	E357
35	53	4.5	6.5	1	3	42	50	55	0.5	E353
40	58	4.5	6.5	1	3	47	55	60	0.5	E840
41.28	57.9	6.6	8.6	1	3	48.3	55	60	0.5	E751
44.45	63	6.6	8.6	1	3	51.5	60	65	0.5	F1253
44.45	74	6.6	8.6	1	3	51.5	71.2	78.2	0.5	F6157
45	63	4.5	6.5	1	3	52	60	65	0.5	F1243
50	72	5.5	7.5	1	3	58	68.5	74	0.75	F6216
55	77	5.5	7.5	1	3	63	73.5	79	0.75	F8143
60	82	5.5	7.5	1	3	68	78.5	84	0.75	G123
65	87	5.5	7.5	1	3	73	83.5	89	0.75	G318
70	92	5.5	7.5	1	3	78	88.5	94	0.75	G624
75	97	5.5	7.5	1	3	83	93.5	99	0.75	
80	102	5.5	7.5	1	3	88	98.5	104	0.75	H087
85	107	5.5	7.5	1	3	93	103.5	109	0.75	H185
90	112	5.5	7.5	1	3	98	108.5	114	0.75	H2202
95	117	5.5	7.5	1	3	103	113.5	119	0.75	
100	122	5.5	7.5	1	3	108	118.5	124	0.75	H4147
110	132.08	5.5	7.5	1	3	118	128.5	134	0.75	H650



# TTO-Seal Type GA



TYPE	d	D	h	H	TTO NO.
GA	10	16	3	4.5	A655
GA	10	20	5	8	B067
GA	11.1	16.66	6.1	8.5	A618
GA	12	20	4	6	B049
GA	12	22	5	8	B2166
GA	14	20	3.5	5	B053
GA	14	22	3	4	B2165
GA	15	25	5	8	B5105
GA	15.88	22.23	3.2	4.7	B283
GA	16	22	3	4	B313
GA	16	26	5	8	B671
GA	18	28	7	10	B8136
GA	18	35	5	8	C5145
GA	19	31.75	3.2	4	C170
GA	19.05	26.99	6.4	9.5	B648
GA	19.05	26.58	4.8	7.6	B896
GA	20	28	3	5	B8225
GA	20	28	3.5	5	B8159
GA	20	28	5	8	B8144
GA	20	30	4	6	C0125
GA	20	30	7	10	C0130
GA	20	35	7	10	C5174
GA	22	28	5	8	B8208
GA	22	32	5	8	C2143
GA	22	32	7	10	C2172
GA	22	35	5	8	C5117
GA	24	32	5	7	C2106
GA	25	31	5	7	C1106
GA	25	35	5	8	C5128
GA	25	35	7	10	C5101
GA	25.4	34.93	6.4	9.5	C458
GA	28	38	5	8	C8115
GA	28	38	7	10	C8130
GA	28	40	7	10	D0164
GA	30	40	5	8	D0162

TYPE	d	D	h	H	TTO NO.
GA	30	40	7	10	D0163
GA	32	42	7	10	D2115
GA	32	45	5	8	D589
GA	32	45	7	10	D590
GA	35	41	5	7	D153
GA	35	45	7	10	D560
GA	36	45	5	7	D598
GA	36	45	7	10	D580
GA	36	46	7	10	D652
GA	40	50	5	8	E0163
GA	40	50	7	10	E0102
GA	42	52	7	10	E2280
GA	45	55	7	10	E569
GA	45	60	7	10	F0104
GA	48	60	7	10	F0157
GA	50	56	5	7	E6106
GA	50	60	7	10	F069
GA	50	65	5	8	F2147
GA	52	62	7	10	F1219
GA	55	63	7	10	F1230
GA	55	65	7	10	F299
GA	56	65	7	10	F2113
GA	56	66	7	10	F354
GA	60	70	7	10	F541
GA	63	73	7	10	F6176
GA	63	75	7	10	F7164
GA	65	75	7	10	F766
GA	70	80	7	10	G0108
GA	75	85	7	10	G2113
GA	80	88	7	10	G478
GA	80	90	7	10	G5105
GA	85	95	7	10	G7108
GA	90	100	7	10	H0144
GA	95	105	7	10	H170
GA	100	110	7	10	H289

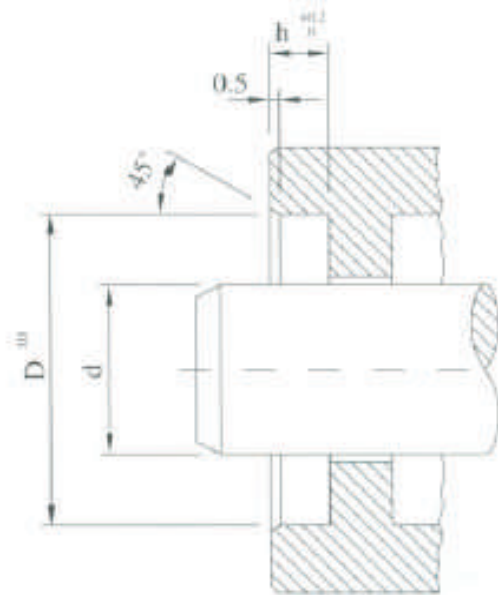
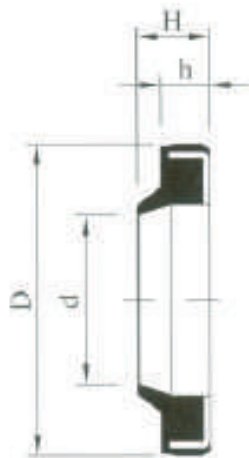


# TTO-Seal Type GA



TYPE	d	D	h	H	TTO NO.
GA	110	120	7	10	H476
GA	115	125	7	10	H588
GA	120	130	7	10	H656
GA	125	140	9	12	H888
GA	130	145	9	12	H958
GA	140	155	9	12	K090
GA	170	185	10	14	K712
GA	180	195	10	14	
GA	200	220	12	16	

TYPE	d	D	h	H	TTO NO.



TYPE	d	D	h	H	TTO NO.
GC	6	13	3	4.5	
GC	6	13	3.5	4.5	A304
GC	8	14	3.5	5	A421
GC	10	16	3.5	5	A635
GC	10	20	5	8	B058
GC	12	18	3.5	5	A839
GC	12	22	5	8	
GC	14	20	3.5	5	B048
GC	15	21	3.5	5	B126
GC	15	25	5	8	B5126
GC	16	22	3	5	
GC	16	22	3.5	5	B2122
GC	16	26	5	8	B672
GC	18	24	4	7	B474
GC	18	28	5	7	B8161
GC	18	28	7	10	B8210
GC	20	30	5	7	C0148
GC	20	30	7	10	C0149
GC	22	32	5	7	C2122
GC	22	32	7	10	C2123
GC	24	35	5	8	
GC	25	35	5	7	C5154
GC	25	35	7	10	C5155
GC	26	35	7	10	C5156
GC	28	38	5	7	C8149
GC	28	40	7	10	D0230
GC	30	40	5	7	D0180
GC	30	40	7	10	D0181
GC	32	42	5	7	D2130
GC	32	45	7	10	D5120
GC	35	45	7	10	D5103
GC	36	45	7	10	D5104
GC	36	46	5	7	D661
GC	38	48	7	10	D870
GC	40	50	5	8	E0219

TYPE	d	D	h	H	TTO NO.
GC	40	50	7	10	E0220
GC	42	52	7	10	
GC	45	55	5	7	E5128
GC	45	55	7	10	E5129
GC	48	60	7	10	
GC	50	60	5	7	F0166
GC	50	60	7	10	F0167
GC	52	62	7	10	
GC	55	65	5	7	F2145
GC	55	65	7	10	F2146
GC	60	70	5	7	F595
GC	60	70	7	10	F596
GC	65	75	5	7	F793
GC	65	75	7	10	F794
GC	70	80	5	7	G0144
GC	70	80	7	10	G0145
GC	75	83	7	10	G177
GC	75	85	7	10	G2111
GC	80	88	7	10	G462
GC	80	90	7	10	G5107
GC	85	95	7	10	G791
GC	90	100	7	10	H0151
GC	95	105	7	10	
GC	100	110	7	10	H2111
GC	100	120	7	10	H474
GC	105	115	7	10	
GC	110	120	7	10	H479
GC	115	125	7	10	
GC	120	130	7	10	H653
GC	125	140	9	12	
GC	130	145	9	12	H925
GC	140	155	9	12	K066
GC	150	165	9	12	K231
GC	160	175	9	12	K432
GC	170	185	10	14	



TYPE	d	D	h	H	TTO NO.
GC	180	195	10	14	
GC	200	220	12	16	
GC	220	240	12	16	

TYPE	d	D	h	H	TTO NO.
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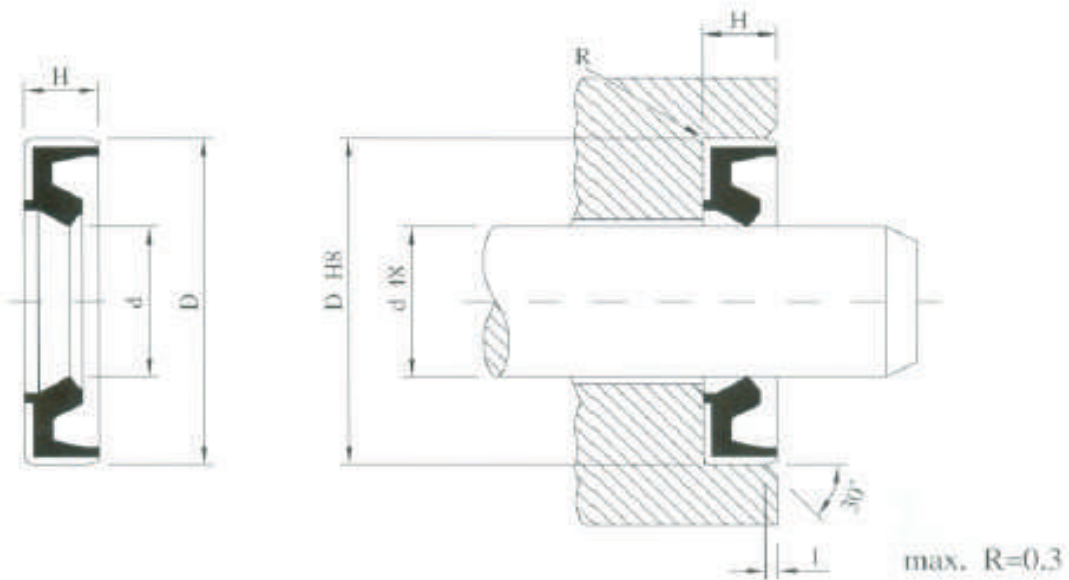
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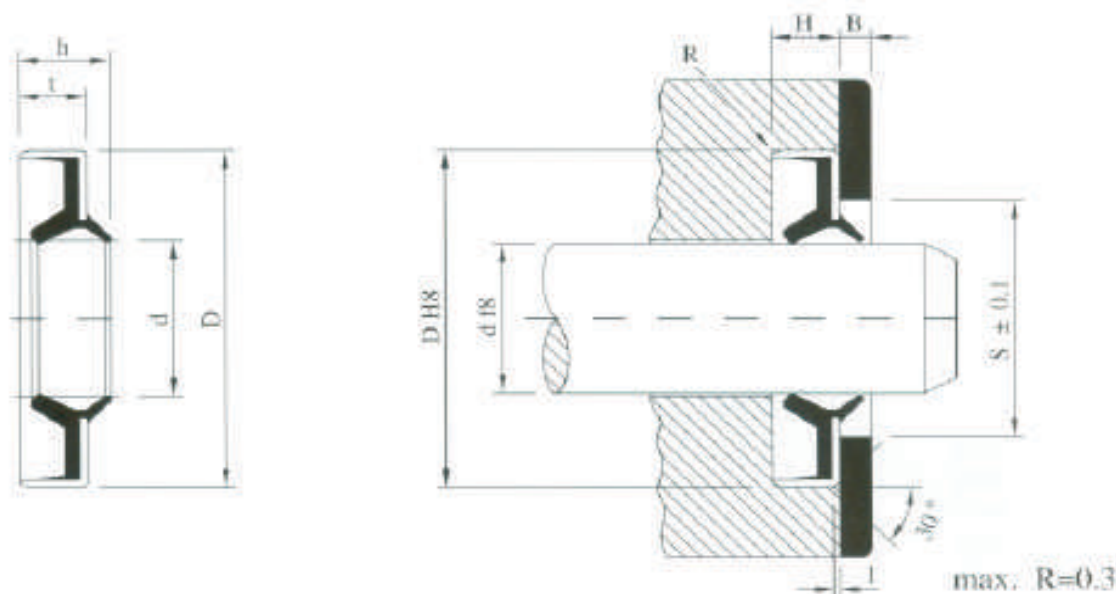
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TYPE	d	D	H	d	D	H	TTO NO.
WPB	0250	0437	125	1/4	7/16	1/8	A111
WPB	0312	0566	125	5/16		1/8	A413
WPB	0312	0625	156	5/16	5/8	5/32	A515
WPB	0375	0562	094	3/8	9/16	3/32	A407
WPB	0375	0625	125	3/8	5/8	1/8	A512
WPB	0375	0687	157	3/8	11/16	5/32	A721
WPB	0469	0836	187	15/32		3/16	B115
WPB	0500	0750	125	1/2	3/4	1/8	A932
WPB	0562	0812	125	9/16	13/16	1/8	B027
WPB	0625	0875	125	5/8	7/8	1/8	B286
WPB	0625	1062	250	5/8	1 1/16	1/4	B651
WPB	0625	1250	250	5/8	1 1/4	1/4	C166
WPB	0687	0937	125	11/16	15/16	1/8	B311
WPB	0687	0999	187	11/16	1	3/16	B5101
WPB	0750	1000	125	3/4	1	1/8	B569
WPB	0750	1125	187	3/4	1 1/8	3/16	B8104
WPB	0750	1250	250	3/4	1 1/4	1/4	C160
WPB	20	28	4				B8129
WPB	0875	1125	125	7/8	1 1/8	1/8	B8146
WPB	0875	1125	125	7/8	1 1/8	1/8	B894 (N70)
WPB	0875	1250	187	7/8	1 1/4	3/16	C147
WPB	23	28	3				B8130
WPB	0937	1187	125	15/16	1 3/16	1/8	C0105
WPB	24,8	42	4,6				S144
WPB	1000	1250	125	1	1 1/4	1/8	C123
WPB	1000	1375	187	1	1 3/8	3/16	C455
WPB	1000	1500	187	1	1 1/2	3/16	C887
WPB	1000	1500	312	1	1 1/2	5/16	C8124
WPB	1000	1625	250	1	1 5/8	1/4	D188
WPB	1061	1312	125	1 1/16	1 5/16	1/8	C351
WPB	1062	1500	187	1 1/16	1 1/2	3/16	CB111(N70)
WPB	1062	1500	187	1 1/16	1 1/2	3/16	C861
WPB	1125	1375	125	1 1/8	1 3/8	1/8	C431
WPB	1125	1500	187	1 1/8	1 1/2	3/16	C876
WPB	1125	1561	250	1 1/8		1/4	C923



TYPE	d	D	H	d	D	H	TTO NO.
WPB	1125	1625	187	1 1/8	1 5/8	3/16	D125
WPB	1125	1625	250	1 1/8	1 5/8	1/4	D127
WPB	1187	1562	187	1 3/16	1 9/16	3/16	C914
WPB	1250	1500	125	1 1/4	1 1/2	1/8	C879
WPB	1250	1625	250	1 1/4	1 5/8	1/4	D166
WPB	1250	1687	187	1 1/4	1 11/16	3/16	D2103
WPB	1250	1687	187	1 1/4	1 11/16	3/16	D285
WPB	1250	1690	187	1 1/4		3/16	D277
WPB	1250	1752	250	1 1/4		1/4	D446
WPB	1312	1562	125	1 5/16	1 9/16	1/8	C915
WPB	1375	1625	125	1 3/8	1 5/8	1/8	D126
WPB	1375	1750	187	1 3/8	1 3/4	3/16	D458
WPB	1375	1875	250	1 3/8	1 7/8	1/4	D7101
WPB	1375	2000	312	1 3/8	2	5/16	E0115
WPB	1488	2442	186			3/16	F1302
WPB	1500	1750	375	1 1/2	1 3/4	3/8	D498
WPB	1500	1875	187	1 1/2	1 7/8	3/16	D7126
WPB	1500	1875	250	1 1/2	1 7/8	1/4	D7146
WPB	1500	2000	250	1 1/2	2	1/4	E0110
WPB	1500	2000	250	1 1/2	2	1/4	E0160 (N70)
WPB	1500	2000	312	1 1/2	2	5/16	E0122
WPB	1500	2437	250	1 1/2	2 7/16	1/4	F0112
WPB	1662	2062	203	1 9/16	2 1/16	13/64	E2135
WPB	1625	2000	187	1 5/8	2	3/16	E0153
WPB	1625	2125	250	1 5/8	2 1/8	1/4	E308
WPB	1750	2125	187	1 3/4	2 1/8	3/16	E346
WPB	1750	2250	187	1 3/4	2 1/4	3/16	E742
WPB	1750	2250	250	1 3/4	2 1/4	1/4	E721
WPB	1750	2250	312	1 3/4	2 1/4	5/16	E732
WPB	1750	2375	250	1 3/4	2 3/8	1/4	F099
WPB	1750	2437	375	1 3/4	2 7/16	3/8	F0210
WPB	1750	2623	250	1 3/4		1/4	F351
WPB	1875	2250	187	1 7/8	2 1/4	3/16	E725
WPB	1875	2500	250	1 7/8	2 1/2	1/4	F1217
WPB	2000	2375	187	2	2 3/8	3/16	F068
WPB	2000	2500	250	2	2 1/2	1/4	F1180
WPB	2000	2623	250	2		1/4	F336
WPB	2000	2625	250	2	2 5/8	1/4	F333
WPB	2000	2625	250	2	2 5/8	1/4	F338
WPB	2000	2686	250	2		1/4	F4123
WPB	2125	2500	187	2 1/8	2 1/2	3/16	F1189
WPB	2250	2625	187	2 1/4	2 5/8	3/16	F337
WPB	2250	2625	250	2 1/4	2 5/8	1/4	F335
WPB	2250	2750	250	2 1/4	2 3/4	1/4	F4101
WPB	2375	2875	250	2 3/8	2 7/8	1/4	F6126
WPB	2500	3000	250	2 1/2	3	1/4	F853
WPB	2625	3125	250	2 5/8	3 1/8	1/4	F928
WPB	2750	3125	187	2 3/4	3 1/8	3/16	F941
WPB	2750	3250	250	2 3/4	3 1/4	1/4	G152
WPB	2875	3371	250	2 7/8		1/4	G278
WPB	3000	3500	250	3	3 1/2	1/4	G446
WPB	3250	3750	250	3 1/4	3 3/4	1/4	G785
WPB	3500	3875	187	3 1/2	3 7/8	3/16	G910
WPB	3500	4003	250	3 1/2		1/4	H096

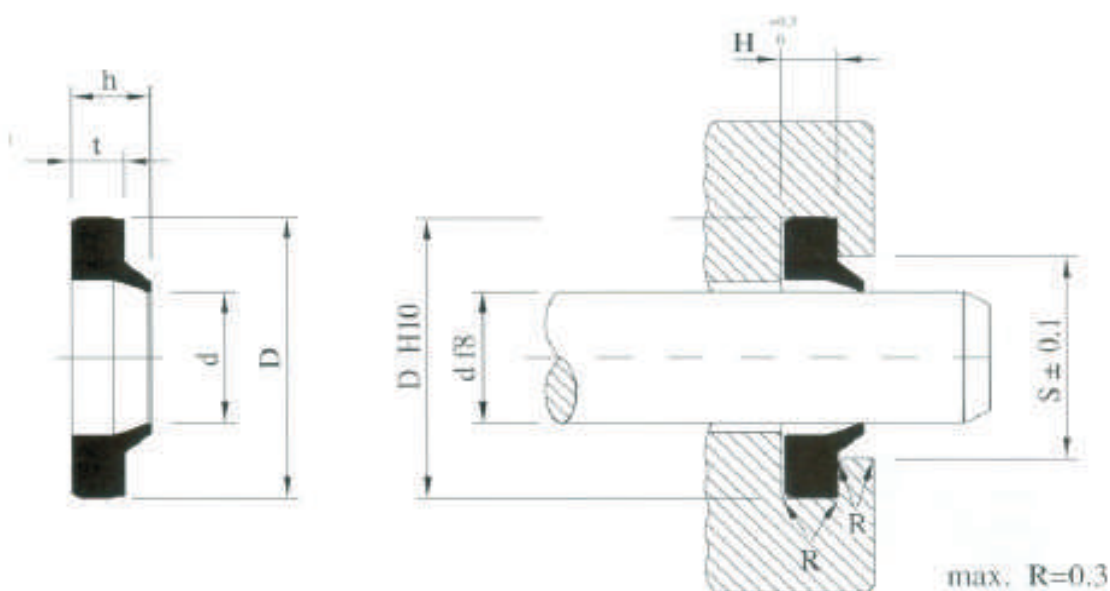


TYPE	d	D	t	h	H	S	B	TTO NO.
DKB	14	24	5	7	5 $\begin{smallmatrix} +0.04 \\ -0.05 \end{smallmatrix}$	19	4	B4107
DKB	16	26	5	7	5 $\begin{smallmatrix} +0.04 \\ -0.05 \end{smallmatrix}$	21	4	B6103
DKB	18	30	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	25	4	C092
DKB	19	26	5	7	5 $\begin{smallmatrix} +0.03 \\ -0.05 \end{smallmatrix}$	25	4	B675
DKB	19	31	6	9	6 $\begin{smallmatrix} +0.02 \\ -0.02 \end{smallmatrix}$	26	4	C148
DKB	19	32	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.04 \end{smallmatrix}$	26	4	C269
DKB	20	30	4	6	4 $\begin{smallmatrix} +0.03 \\ -0.05 \end{smallmatrix}$	27	4	C0124
DKB	20	32	6	9	5 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	27	4	C270
DKB	22	32	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	29	4	C271
DKB	22	34	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	29	4	C442
DKB	22.4	34.4	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	29	4	
DKB	25	37	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	32	4	C746
DKB	28	38	7	10	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	35	4	C8173
DKB	28	40	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	35	4	D0240
DKB	30	42	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	37	4	D272
DKB	30	45	6	9	6 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	37	4	D559
DKB	31.5	44	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	38.5	4	
DKB	32	44	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	39	4	D457
DKB	32	45	5	8	5 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	39	4	D587
DKB	32	45	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	39	4	D5109
DKB	32	52	8	11	8 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	39	4	E2108
DKB	35	47	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	42	4	D7116
DKB	35.5	47.5	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	42.5	4	
DKB	36	48	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	43	4	D860
DKB	40	50	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	47	4	E0253
DKB	40	52	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	47	4	E2109
DKB	44.45	60.2	7.1	9	7.1 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	51.5	4	F0151
DKB	45	57	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	52	4	E728
DKB	50	62	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	57	4	F1186
DKB	55	65	7	10	7 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	62	4	F297
DKB	55	69	8	11	8 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	62	4	F467
DKB	56	70	8	11	8 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	63	4	F5161
DKB	60	74	8	11	8 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	67	4	F746
DKB	63	77	8	11	8 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	70	4	F8172
DKB	65	79	8	11	8 $\begin{smallmatrix} +0.03 \\ -0.02 \end{smallmatrix}$	72	4	F931





TYPE	d	D	t	h	H	S	B	TTO NO.
DKB	70	84	8	11	8	77	4	G254
DKB	75	89	8	11	8	82	4	G432
DKB	80	94	8	11	8	87	4	G741
DKB	85	99	8	11	8	92	4	G908
DKB	90	104	8	11	8	97	4	H059
DKB	95	109	8	11	8	102	4	H132
DKB	100	114	8	11	8	107	4	H245
DKB	105	121	9	12	9	113	5	H433
DKB	110	126	9	12	9	118	5	H560
DKB	112	128	9	12	9	120	5	H587
DKB	115	131	9	12	9	123	5	H662
DKB	120	136	9	12	9	128	5	H751
DKB	125	141	9	12	9	133	5	H862
DKB	140	160	10	14	10	150	5	K247
DKB	145	165	10	14	10	155	5	K332
DKB	150	170	10	14	10	160	5	K449
DKB	155	175	10	14	10	165	5	K522
DKB	160	180	10	14	10	170	5	K640
DKB	170	190	10	14	10	180	5	K831
DKB	175	195	10	14	10	185	5	K904
DKB	180	205	12	17	12	191	5	M104
DKB	200	225	12	17	12	212	6	M510
DKB	225	250	12	17	12	237	6	N013
DKB	250	275	12	17	12	262	6	N503



TYPE	d	D	t	h	H	S	TTO NO.
DSI	12	18	3.5	5	3.8	15	
DSI	13	19	3.5	5	3.8	16	
DSI	14	21	3.5	5	3.8	18	
DSI	15	21	3.5	5	3.8	18	
DSI	16	22	3.5	5	3.8	19	
DSI	17	23	3.5	5	3.8	20	
DSI	18	24	3.5	5	3.8	21	
DSI	19	28	5	7	5.3	22	
DSI	20	28	5	7	5.3	23	B8162
DSI	22	30	5	7	5.3	25	C0153
DSI	24	32	5	7	5.3	27	
DSI	25	33	5	7	5.3	28	C345
DSI	26	34	5	7	5.3	29	
DSI	27	35	5	7	5.3	30	
DSI	28	36	5	7	5.3	31	C660
DSI	30	38	5	7	5.3	33	C8153
DSI	32	40	5	7	5.3	35	D0190
DSI	33	41	5	7	5.3	36	
DSI	35	43	5	7	5.3	38	D353
DSI	36	44	5	7	5.3	39	D4121
DSI	38	46	5	7	5.3	41	D668
DSI	40	48	5	7	5.3	43	D873
DSI	42	50	5	7	5.3	45	E0228
DSI	45	53	5	7	5.3	48	E378
DSI	45	55	5	7	5.3	48	E5135
DSI	46	54	5	7	5.3	49	
DSI	48	56	5	7	5.3	51	
DSI	50	58	5	7	5.3	53	E8110
DSI	50	60	5	7	5.3	53	F0174
DSI	53	61	5	7	5.3	56	
DSI	55	63	5	7	5.3	58	F1361
DSI	55	65	5	7	5.3	58	F2154
DSI	56	64	5	7	5.3	59	
DSI	56	66	5	7	5.3	59	F385
DSI	60	68	5	7	5.3	63	F4199



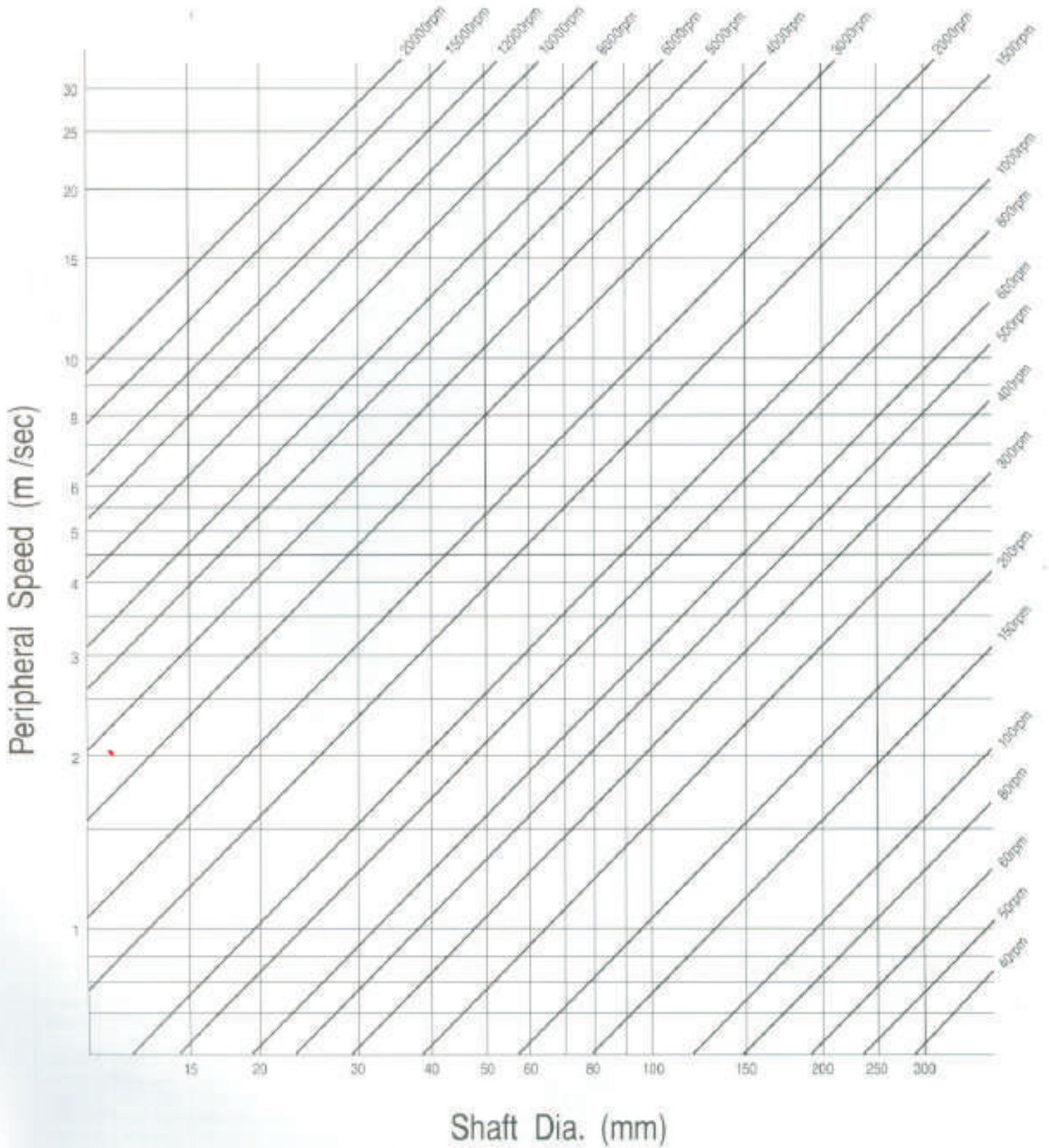
TYPE	d	D	t	h	H	S	TTO NO.
DSI	60	70	5	7	5.3	63	F599
DSI	63	71	5	7	5.3	66	
DSI	63	73	5	7	5.3	66	F6198
DSI	65	73	5	7	5.3	68	
DSI	65	75	5	7	5.3	68	F796
DSI	70	78	5	7	5.3	73	F968
DSI	70	80	5	7	5.3	73	G0149
DSI	70	82	7	12	7.1	76	
DSI	73	81	5	7	5.3	76	
DSI	75	83	5	7	5.3	78	
DSI	75	87	7	12	7.1	81	G313
DSI	78	92	7	12	7.1	85	
DSI	80	88	5	7	5.3	83	
DSI	80	92	7	12	7.1	86	G636
DSI	83	91	5	7	5.3	86	
DSI	85	93	5	7	5.3	88	
DSI	85	97	7	12	7.1	91	
DSI	88	100	7	12	7.1	94	
DSI	90	102	7	12	7.1	96	
DSI	95	107	7	12	7.1	101	
DSI	100	112	7	12	7.1	106	H2167
DSI	105	117	7	12	7.1	111	
DSI	110	122	7	12	7.1	116	
DSI	115	127	7	12	7.1	121	
DSI	120	132	7	12	7.1	126	
DSI	125	137	7	12	7.1	131	
DSI	125	140	10	16	10.1	132.6	
DSI	130	142	7	12	7.1	136	
DSI	135	147	7	12.5	7.1	141	
DSI	140	155	10	16	10.1	147.6	
DSI	145	157	7	12.5	7.1	151	
DSI	150	165	10	16	10.1	157.6	
DSI	160	175	10	16	10.1	167.6	
DSI	170	185	10	16	10.1	178	
DSI	180	195	10	16	10.1	188	
DSI	180	200	10	18	10.2	190	
DSI	200	220	10	18	10.2	210	

# Temperature Conversion Table

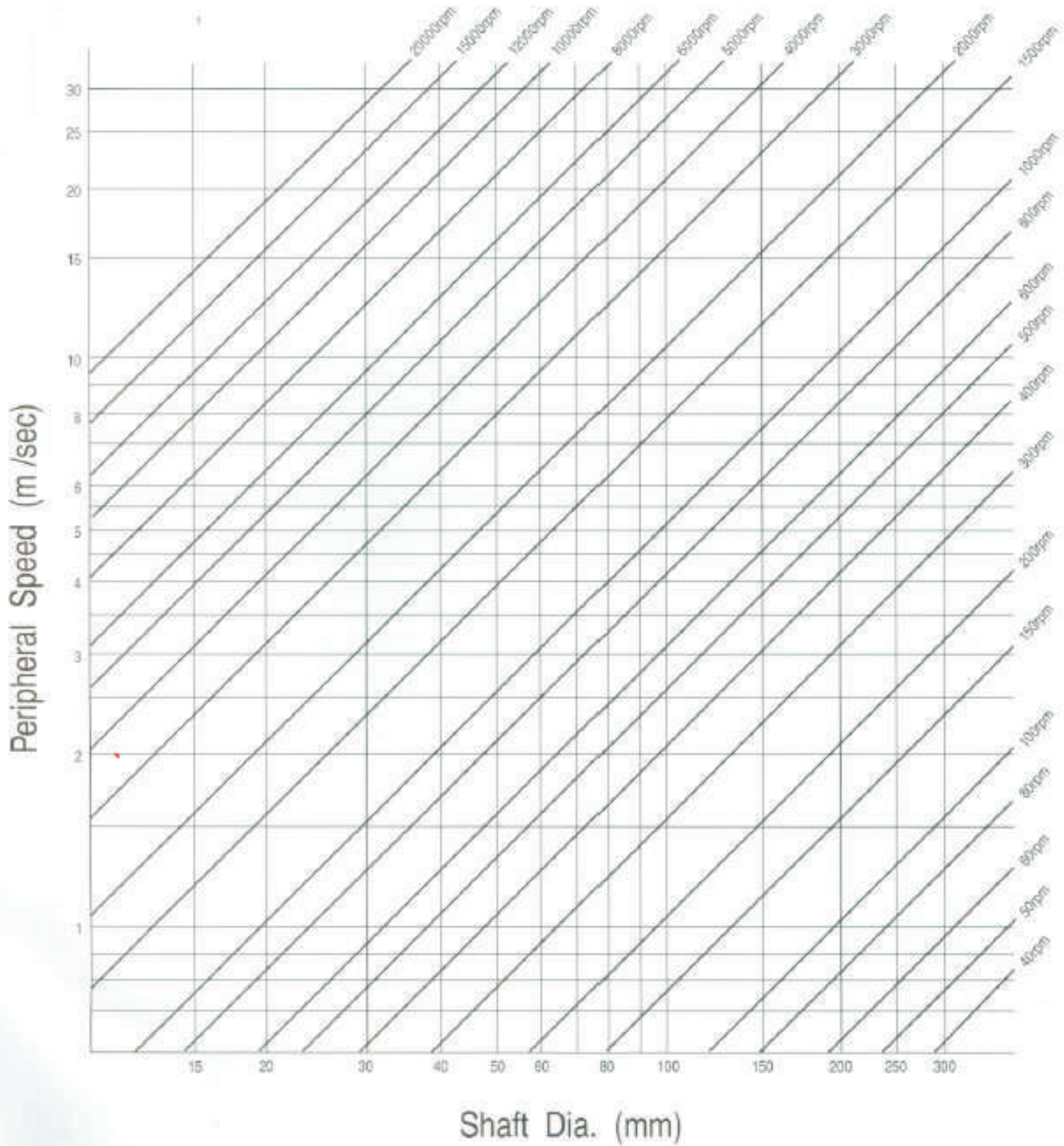
-459 to 0			0 to 100						100 to 1000						
C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F
-273	-459		-17.8	0	32	10.0	50	122.0	37.8	100	212	260	500	932	
-268	-450		-17.2	1	33.8	10.6	51	123.8	43	110	230	266	510	950	
-262	-440		-16.7	2	35.6	11.1	52	125.6	49	120	248	271	520	968	
-257	-430		-16.1	3	37.4	11.7	53	127.4	54	130	266	277	530	986	
-251	-420		-15.6	4	39.2	12.2	54	129.2	60	140	284	282	540	1004	
-246	-410		-15.0	5	41.0	12.8	55	131.0	66	150	302	288	550	1022	
-240	-400		-14.4	6	42.8	13.3	56	132.8	71	160	320	293	560	1040	
-234	-390		-13.9	7	44.6	13.9	57	134.6	77	170	338	299	570	1058	
-229	-380		-13.3	8	46.4	14.4	58	136.4	82	180	356	304	580	1076	
-223	-370		-12.8	9	48.2	15.0	59	138.2	88	190	374	310	590	1094	
-218	-360		-12.2	10	50.0	15.6	60	140.0	93	200	392	316	600	1112	
-212	-350		-11.7	11	51.8	16.1	61	141.8	99	210	410	321	610	1130	
-207	-340		-11.1	12	53.6	16.7	62	143.6	100	212	413.6	327	620	1148	
-201	-330		-10.6	13	55.4	17.2	63	145.4	104	220	428	332	630	1166	
-196	-320		-10.0	14	57.2	17.8	64	147.2	110	230	446	338	640	1184	
-190	-310		-9.4	15	59.0	18.3	65	149.0	116	240	464	343	650	1202	
-184	-300		-8.9	16	60.8	18.9	66	150.8	121	250	482	349	660	1220	
-179	-290		-8.3	17	62.6	19.4	67	152.6	127	260	500	354	670	1238	
-173	-280		-7.8	18	64.4	20.0	68	154.4	132	270	518	360	680	1255	
-169	-273	-459	-7.2	19	66.2	20.6	69	156.2	138	280	536	366	690	1274	
-168	-270	-454	-6.7	20	68.0	21.1	70	158.0	143	290	554	371	700	1292	
-162	-260	-436	-6.1	21	69.8	21.7	71	159.8	149	300	572	377	710	1310	
-157	-250	-418	-5.6	22	71.6	22.2	72	161.6	154	310	590	382	720	1328	
-151	-240	-400	-5.0	23	73.4	22.8	73	163.4	160	320	608	388	730	1346	
-146	-230	-382	-4.4	24	75.2	23.3	74	165.2	166	330	626	393	740	1364	
-140	-220	-364	-3.9	25	77.0	23.9	75	167.0	171	340	644	399	750	1382	
-134	-210	-346	-3.3	26	78.8	24.4	76	168.8	177	350	662	404	760	1400	
-129	-200	-328	-2.8	27	80.6	25.0	77	170.6	182	360	680	410	770	1418	
-123	-190	-310	-2.2	28	82.4	25.6	78	172.4	188	370	698	416	780	1436	
-118	-180	-292	-1.7	29	84.2	26.1	79	174.2	193	380	716	421	790	1454	
-112	-170	-274	-1.1	30	86.0	26.7	80	176.0	199	390	734	427	800	1472	
-107	-160	-256	-0.6	31	87.8	27.2	81	177.8	204	400	752	432	810	1490	
-101	-150	-238	0	32	89.6	27.8	82	179.6	210	410	770	438	820	1508	
-96	-140	-220	0.6	33	91.4	28.3	83	181.4	216	420	788	443	830	1526	
-90	-130	-202	1.1	34	93.2	28.9	84	183.2	221	430	806	449	840	1544	
-84	-120	-184	1.7	35	95.0	29.4	85	185.0	227	440	824	454	850	1562	
-79	-110	-166	2.2	36	96.8	30.0	86	186.8	232	450	842	460	860	1580	
-73	-100	-148	2.8	37	98.6	30.6	87	188.6	238	460	860	466	870	1598	
-68	-90	-130	3.3	38	100.4	31.1	88	190.4	243	470	878	471	880	1616	
-62	-80	-112	3.9	39	102.2	31.7	89	192.2	249	480	896	477	890	1634	
-57	-70	-94	4.4	40	104.0	32.2	90	194.0	254	490	914	482	900	1652	
-51	-60	-76	5.0	41	105.8	32.8	91	195.8				488	910	1670	
-46	-50	-58	5.6	42	107.6	33.8	92	197.6				493	920	1688	
-40	-40	-40	6.1	43	109.4	33.9	93	199.4				499	930	1706	
-34	-30	-22	6.7	44	111.2	34.4	94	201.2				504	940	1724	
-29	-20	-4	7.2	45	113.0	35.0	95	203.0				510	950	1742	
-23	-10	14	7.8	46	114.8	35.6	96	204.8				516	960	1760	
-17.8	0	32	8.3	47	116.6	36.1	97	206.6				521	970	1778	
			8.9	49	118.4	36.7	98	208.4				527	980	1795	
			9.4	49	120.2	37.2	99	210.2				532	990	1814	
						37.8	100	212.0				538	1000	1832	

*Look up reading in bold column. If in degrees Celsius, read Fahrenheit equivalent in right-hand column; if in Fahrenheit degrees, read Celsius equivalent in left-hand column.*

# Table of Peripheral Speed




# Table of Peripheral Speed



# Table of Metric & Inch System (In - mm)

Inch		0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"
0	0.0000	0.000	25.400	50.800	76.200	101.600	127.000	152.400	177.800	203.200	228.600	254.000
1/64	0.0156	0.397	25.797	51.197	76.597	101.997	127.397	152.797	178.197	203.597	228.997	254.397
1/32	0.0313	0.794	26.194	51.594	76.994	102.394	127.794	153.194	178.594	203.994	229.394	254.794
3/64	0.0469	1.191	26.591	51.991	77.391	102.791	128.191	153.591	178.991	204.391	229.791	255.191
1/16	0.0625	1.588	26.988	52.388	77.788	103.188	128.588	153.988	179.388	204.788	230.188	255.588
5/64	0.0781	1.984	27.384	52.784	78.184	103.584	128.984	154.384	179.784	205.184	230.584	255.984
3/32	0.0938	2.381	27.781	53.181	78.581	103.981	129.381	154.781	180.181	205.581	230.981	256.381
7/64	0.1094	2.778	28.178	53.578	78.978	104.378	129.778	155.178	180.578	205.978	231.378	256.778
1/8	0.1250	3.175	28.575	53.975	79.375	104.775	130.175	155.575	180.975	206.375	231.775	257.175
9/64	0.1406	3.572	28.972	54.372	79.772	105.172	130.572	155.972	181.372	206.772	232.172	257.572
5/32	0.1563	3.969	29.369	54.769	80.169	105.569	130.969	156.369	181.769	207.169	232.569	257.969
11/64	0.1719	4.366	29.766	55.166	80.566	105.966	131.366	156.766	182.166	207.566	232.966	258.366
3/16	0.1875	4.763	30.163	55.563	80.963	106.363	131.763	157.163	182.563	207.963	233.363	258.763
13/64	0.2031	5.159	30.559	55.959	81.359	106.759	132.159	157.559	182.959	208.359	233.759	259.159
7/32	0.2188	5.556	30.956	56.356	81.756	107.156	132.556	157.956	183.356	208.756	234.156	259.556
15/64	0.2344	5.953	31.353	56.753	82.153	107.553	132.953	158.353	183.753	209.153	234.553	259.953
1/4	0.2500	6.350	31.750	57.150	82.550	107.950	133.350	158.750	184.150	209.550	234.950	260.350
17/64	0.2656	6.747	32.147	57.547	82.947	108.347	133.747	159.147	184.547	209.947	235.347	260.747
9/32	0.2813	7.144	32.544	57.944	83.344	108.744	134.144	159.544	184.944	210.344	235.744	261.144
19/64	0.2969	7.541	32.941	58.341	83.741	109.141	134.541	159.941	185.341	210.741	236.141	261.541
5/16	0.3125	7.938	33.338	58.738	84.138	109.538	134.938	160.338	185.738	211.138	236.538	261.938
21/64	0.3281	8.334	33.734	59.134	84.534	109.934	135.334	160.734	186.134	211.534	236.934	262.334
11/32	0.3438	8.731	34.131	59.531	84.931	110.331	135.731	161.131	186.531	211.931	237.331	262.731
23/64	0.3594	9.128	34.528	59.928	85.328	110.728	136.128	161.528	186.928	212.328	237.728	263.128
3/8	0.3750	9.525	34.925	60.325	85.725	111.125	136.525	161.925	187.325	212.725	238.125	263.525
25/64	0.3906	9.922	35.322	60.722	86.122	111.522	136.922	162.322	187.722	213.122	238.522	263.922
13/32	0.4063	10.319	35.719	61.119	86.519	111.919	137.319	162.719	188.119	213.519	238.919	264.319
27/64	0.4219	10.716	36.116	61.516	86.916	112.316	137.716	163.116	188.516	213.916	239.316	264.716
7/16	0.4375	11.113	36.513	61.913	87.313	112.713	138.113	163.513	188.913	214.313	239.713	265.113
29/64	0.4531	11.509	36.909	62.309	87.709	113.109	138.509	163.909	189.309	214.709	240.109	265.509
15/32	0.4688	11.906	37.306	62.706	88.106	113.506	138.906	164.306	189.706	215.106	240.506	265.906
31/64	0.4844	12.303	37.703	63.103	88.503	113.903	139.303	164.703	190.103	215.503	240.903	266.303
1/2	0.5000	12.700	38.100	63.500	88.900	114.300	139.700	165.100	190.500	215.900	241.300	266.700
33/64	0.5156	13.097	38.497	63.897	89.297	114.697	140.097	165.497	190.897	216.297	241.697	267.097
17/32	0.5313	13.494	38.894	64.294	89.694	115.094	140.494	165.894	191.294	216.694	242.094	267.494
35/64	0.5469	13.891	39.291	64.691	90.091	115.491	140.891	166.291	191.691	217.091	242.491	267.891
9/16	0.5625	14.288	39.688	65.088	90.488	115.888	141.288	166.688	192.088	217.488	242.888	268.288
37/64	0.5781	14.684	40.084	65.484	90.884	116.284	141.684	167.084	192.484	217.884	243.284	268.684
19/32	0.5938	15.081	40.481	65.881	91.281	116.681	142.081	167.481	192.881	218.281	243.681	269.081
39/64	0.6094	15.478	40.878	66.278	91.678	117.078	142.478	167.878	193.278	218.678	244.078	269.478
5/8	0.6250	15.875	41.275	66.675	92.075	117.475	142.875	168.275	193.675	219.075	244.475	269.875
41/64	0.6406	16.272	41.672	67.072	92.472	117.872	143.272	168.672	194.072	219.472	244.872	270.272
21/32	0.6563	16.669	42.069	67.469	92.869	118.269	143.669	169.069	194.469	219.869	245.269	270.669
43/64	0.6719	17.066	42.466	67.866	93.266	118.666	144.066	169.466	194.866	220.266	245.666	271.066
11/16	0.6875	17.463	42.863	68.263	93.663	119.063	144.463	169.863	195.263	220.663	246.063	271.463
45/64	0.7031	17.859	43.259	68.659	94.059	119.459	144.859	170.259	195.659	221.059	246.459	271.859
23/32	0.7188	18.256	43.656	69.056	94.456	119.856	145.256	170.656	196.056	221.456	246.856	272.256
47/64	0.7344	18.653	44.053	69.453	94.853	120.253	145.653	171.053	196.453	221.853	247.253	272.653
3/4	0.7500	19.050	44.450	69.850	95.250	120.650	146.050	171.450	196.850	222.250	247.650	273.050
49/64	0.7656	19.447	44.847	70.247	95.647	121.047	146.447	171.847	197.247	222.647	248.047	273.447
25/32	0.7813	19.844	45.244	70.644	96.044	121.444	146.844	172.244	197.644	223.044	248.444	273.844
51/64	0.7969	20.241	45.641	71.041	96.441	121.841	147.241	172.641	198.041	223.441	248.841	274.241
13/16	0.8125	20.638	46.038	71.438	96.838	122.238	147.638	173.038	198.438	223.838	249.238	274.638
53/64	0.8281	21.034	46.434	71.834	97.234	122.634	148.034	173.434	198.834	224.234	249.634	275.034
27/32	0.8438	21.431	46.831	72.231	97.631	123.031	148.431	173.831	199.231	224.631	250.031	275.431
55/64	0.8594	21.828	47.228	72.628	98.028	123.428	148.828	174.228	199.628	225.028	250.428	275.828
7/8	0.8750	22.225	47.625	73.025	98.425	123.825	149.225	174.625	200.025	225.425	250.825	276.225
57/64	0.8906	22.622	48.022	73.422	98.822	124.222	149.622	175.022	200.422	225.822	251.222	276.622
29/32	0.9063	23.019	48.419	73.819	99.219	124.619	150.019	175.419	200.819	226.219	251.619	277.019
59/64	0.9219	23.416	48.816	74.216	99.616	125.016	150.416	175.816	201.216	226.616	252.016	277.416
15/16	0.9375	23.813	49.213	74.613	100.013	125.413	150.813	176.213	201.613	227.013	252.413	277.813
61/64	0.9531	24.209	49.609	75.009	100.409	125.809	151.209	176.609	202.009	227.409	252.809	278.209
31/32	0.9688	24.606	50.006	75.406	100.806	126.206	151.606	177.006	202.406	227.806	253.206	278.606
63/64	0.9844	25.003	50.403	75.803	101.203	126.603	152.003	177.403	202.803	228.203	253.603	279.003

Date : \_\_\_\_\_

Cust. :		P/N :		Application : <input type="checkbox"/> Machine <input type="checkbox"/> Car Engine <input type="checkbox"/> Wheel Axle <input type="checkbox"/> Transmission <input type="checkbox"/> Agriculture <input type="checkbox"/> Marine <input type="checkbox"/> Others:				
		TTO NO.:						
<input type="checkbox"/> Drawing <input type="checkbox"/> For Duplicated Only <input type="checkbox"/> For Reference Only		<input type="checkbox"/> Sample <input type="checkbox"/> For Duplicated Only <input type="checkbox"/> For Reference Only		<input type="checkbox"/> Material Specification: <input type="checkbox"/> Legislation - Special Particularity:				
Type :		Size :		Material :		Additional Req. : <input type="checkbox"/> APQP <input type="checkbox"/> PPAP		
		Standard : <input type="checkbox"/> DIN <input type="checkbox"/> RMA <input type="checkbox"/> JIS <input type="checkbox"/> Customer Assign. :		Color :		<input type="checkbox"/> GD (grind OD) <input type="checkbox"/> PD (paint color= ) <input type="checkbox"/> ND (non GD/PD) <input type="checkbox"/> GR (Pre-Greased) <input type="checkbox"/> LF (Low-Friction) <input type="checkbox"/> Helix lip		
Annual QTY :		Monthly Capacity :		Durability (Life) :		Quality Goal :		
Shaft	Dia. :		Material :		Finish :		Hardness :	
							Chamfer : <input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical	
	<input type="checkbox"/> Rotation		<input type="checkbox"/> Clock Wise <input type="checkbox"/> Counter Clock Wise <input type="checkbox"/> Bi - Directional		Normal : RPM		Shaft Runout : TIR	
					Max : RPM		Misalignment : m/m	
<input type="checkbox"/> Reciprocation		Stroke Length :		Speed :		Cycle/min		
<input type="checkbox"/> Oscillation		Degree of Arc :		Speed :		Cycle/min		
Bore	Dia. :		Material :		Finish :		Depth :	
							Installation : 	
Medium	Internal :		External :		Temperature :		Pressure :	
	<input type="checkbox"/> Dry <input type="checkbox"/> Mist <input type="checkbox"/> Flooded		<input type="checkbox"/> Air <input type="checkbox"/> Slight Dust <input type="checkbox"/> Mud <input type="checkbox"/> Heavy Dust		<input type="checkbox"/> °C / <input type="checkbox"/> °F Min : _____ Normal : _____ Max : _____		<input type="checkbox"/> Kg/cm <sup>2</sup> , <input type="checkbox"/> Psi , <input type="checkbox"/> Bar Normal : _____ Max : _____	