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**SEALING PRODUCTS FOR MAIN SHAFT
BEARING OF WIND TURBINE**



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All the information of this catalog is based on our experience and relevant national standards. On specific application, the sealing effect depends on the working environment, pressure, medium, lubricant, vibration effect, dust, and other factors. These unknown factors have notable effect on the sealing products on actual application. Thus, we suggest to consult with us based on specific application and adopt a certain reliable testing.



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COMPANY PROFILE

DALIAN YINGYU CO., LIMITED

We are a firm with a rich history of over 20 years of independent design, development, and research experience focused on wind turbine bearing sealing products. Our wholly owned facilities are equipped with state-of-the-art testing equipment and laboratories. As the first one of Chinese manufacturer of wind power bearing seals, we obtained a number of national patents in the past decade. The Chinese National Standard 《GB/T33154-2016 RUBBER SEALS OF SLEWING BEARING USED IN WIND POWER INDUSTRY》 that drafted and established by us, has published and implemented from 1th in May 2017.





MATERIALS

MATERIAL TECHNOLOGY

Sealing materials have a significant impact on sealing performance and reliability, we have independent R&D lab to develop the recipes of material to meet different kinds of application requirements. Wind turbine seals are generally made of the materials listed in the table below, by adjusting the formulation the following properties of the material will be changed accordingly.

- Elongation and tensile strength
- Chemical resistance, heat resistance
- Abrasion resistance

Compound Code	Material	Performance		Application Features
7402	AU	Tensile strength MPA	38	Normally used in the environment that take oil as the medium, the working temperature is from -60 °C to +95 °C
		Break elongation %	373	
		-40°C x 4H Hardness Shore A	98	
		Hot air aging (100°C x 70H) Hardness change	-5	
		Akron abrasion (cm ³ /1.6km)	0.05	
7205	NBR	Tensile strength MPA	19	Normally used in the hydraulic system below 100 °C, working temperature is from -45°C to +100°C
		Break elongation %	348	
		-40°C x 4H Hardness Shore A	93	
		Hot air aging (100°C x 70H) Hardness change	+6	
		Akron abrasion (cm ³ /1.6km)	0.08	
7305	H-NBR	Tensile strength MPA	24	Heat resistance, low temperature resistance, wear resistance, aging resistance, working temperature is from -50°C to 120°C
		Break elongation %	377	
		-40°C x 4H Hardness Shore A	90	
		Hot air aging (100°C x 70H) Hardness change	+4	
		Akron abrasion (cm ³ /1.6km)	0.07	
7304	H-NBR	Tensile strength MPA	21	Heat resistance, low temperature resistance, wear resistance, aging resistance, working temperature is from -50°C to 120°C
		Break elongation %	350	
		-40°C x 4H Hardness Shore A	93	
		Hot air aging (100°C x 70H) Hardness change	+5	
		Akron abrasion (cm ³ /1.6km)	0.06	
6003	Neoprene	Tensile strength MPA	18	Excellent aging resistance
		Break elongation %	486	
		-40°C x 4H Hardness Shore A		
		Hot air aging (100°C x 70H) Hardness change	+1	
		Akron abrasion (cm ³ /1.6km)		

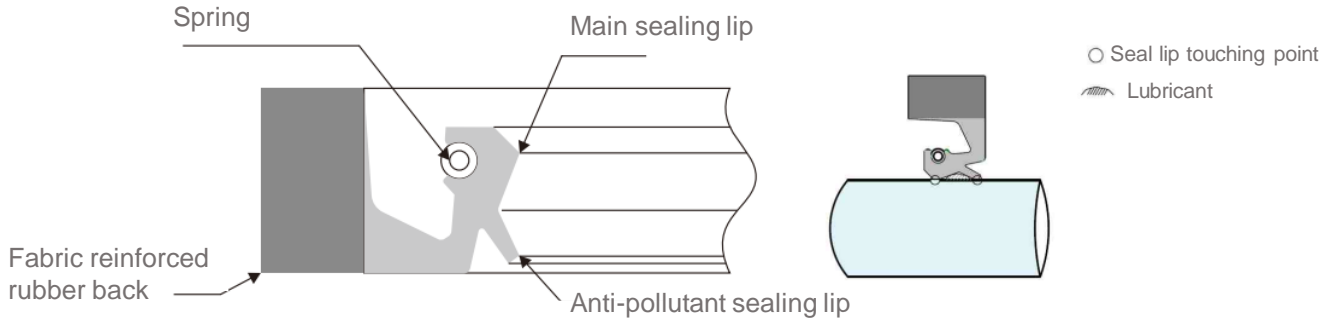
ADHESION TECHNOLOGY

Adhesion technology is mainly used for accomplishing the combination between different kinds of materials. The chosen of Adhesive depends on the materials, such as rubber, metal, fiber composites material etc. With more than twenty years of practical experience and a mass of adhesive testing bring us a very satisfying feedback.



MAIN SHAFT BEARING SEALS

MAIN-VICE LIPS SEAL (TJRF)



Brief

The main function of oil seal is to prevent the inside space oil and lubricating grease from leakage to outside, meanwhile it can also prevent the outside dust and impurity invaded into the inside space.

Features

1.Main lip

This is the most important part of oil seal, the tip of the lip is installed with interference fit with the surface of the shaft, this part also bears the major sealing function of the oil seal.

2. Vice lip

The main function of vice lip is to prevent outside impurity from entering inside sealing space. Meanwhile, it also improves the deformation of main lip and prolong the service time of oil seal

3.Spring

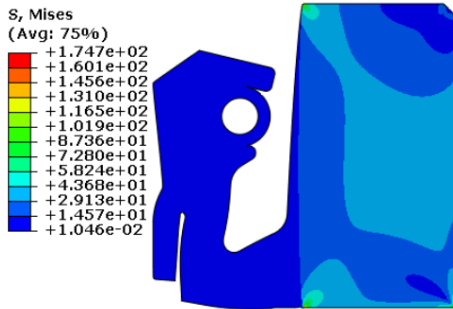
Garter spring maintains a certain pressure on the seal lip to keep a steady contact between the sealing lip and the surface of the shaft

4.Textile frame

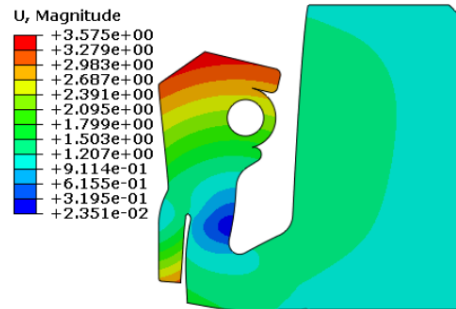
It improves the rigidity of the product which can make the installation work much more secure and easier.



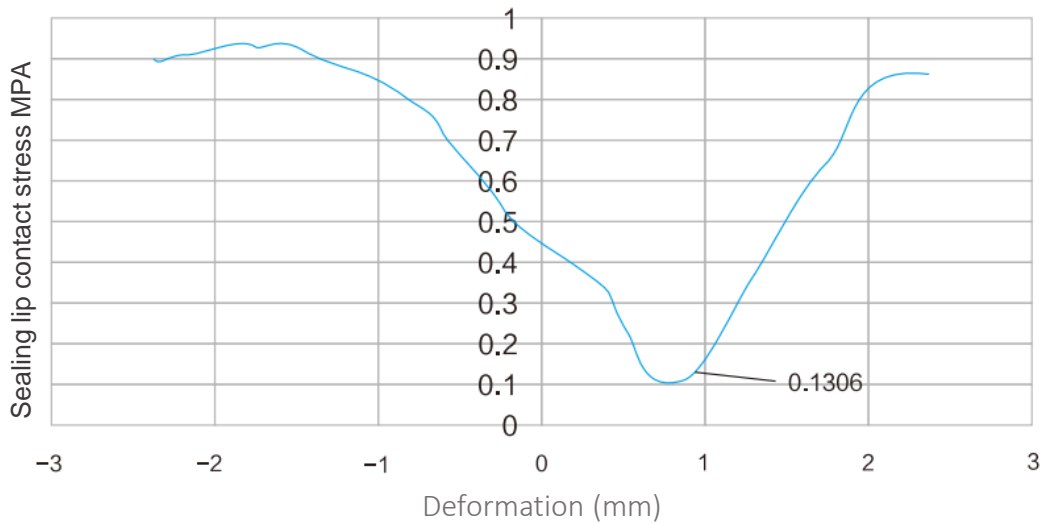
MAIN SHAFT BEARING SEALS



(A) Section stress distribution



(B) Section deformation volume

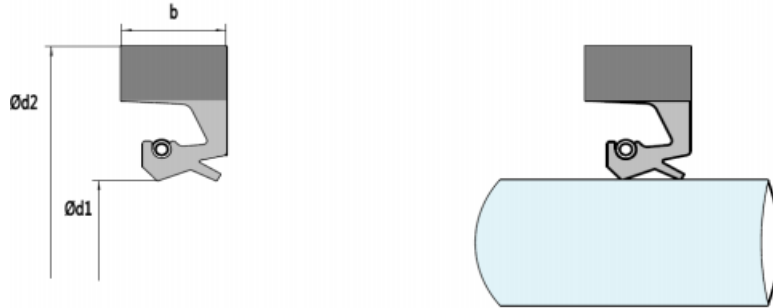


The Deformation curve of the sealing lip under the working condition

"+" means that the shaft and the sealing ring is relatively compact;

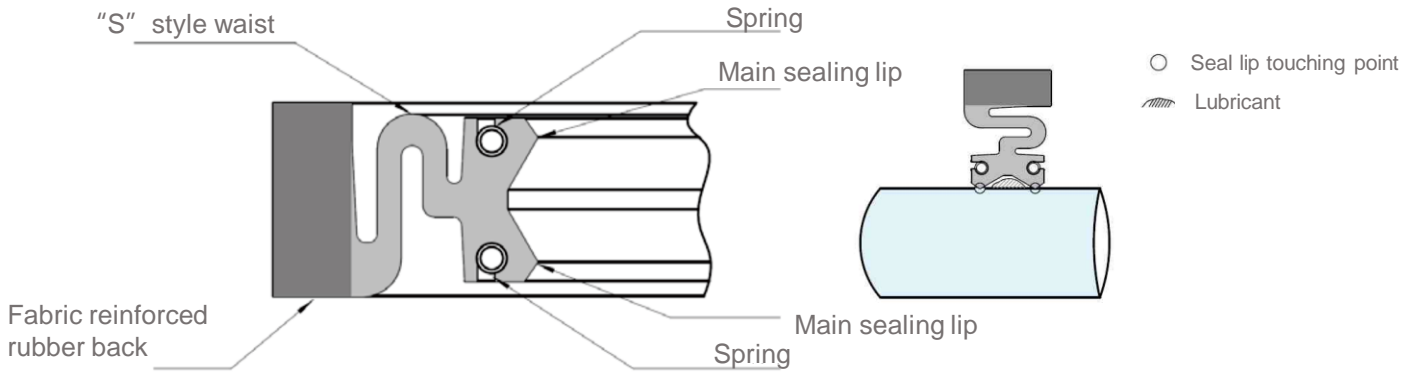
"-" means that the shaft and the sealing ring is relatively separate.

MAIN-VICE LIPS SEAL (TJRF)



Sr No.	d1	d2	b	Code
1	590	640	22	TJRF590
2	630	694	25	TJRF630
3	630	690	30	TJRF630X1
4	670	734	12.5	TJR670
5	680	730	22	TJRF680
6	700	764	12.5	TJR700
7	700	764	25	TJRF700
8	710	774	12.5	TJR710
9	720	784	25	TJRF720
10	750	800	22	TJRF750
11	780	844	25	TJRF780
12	790	854	25	TJRF790
13	810	860	12.5	TJR810
14	810	874	22	TJRF810
15	830	880	22	TJRF830
16	836	896	15	TJR836
17	850	910	15	TJR850
18	850	900	22	TJRF850
19	870	920	20	TJR870
20	870	920	25	TJRF870
21	870	934	25	TJRF870X1
22	875	939	12.5	TJR875
23	890	954	25	TJRF890
24	920	970	25	TJRF920
25	920	980	30	TJRF920X1
26	940	1004	25	TJRF940
27	970	1034	25	TJRF970
28	1020	1084	25	TJRF1020
29	1150	1214	25	TJRF1150
30	1180	1230	32	TJRF1180
31	1300	1364	25	TJRF1300
32	1729	1796	25	TJR1729

DOUBLE MAIN LIPS SEAL(TJY)



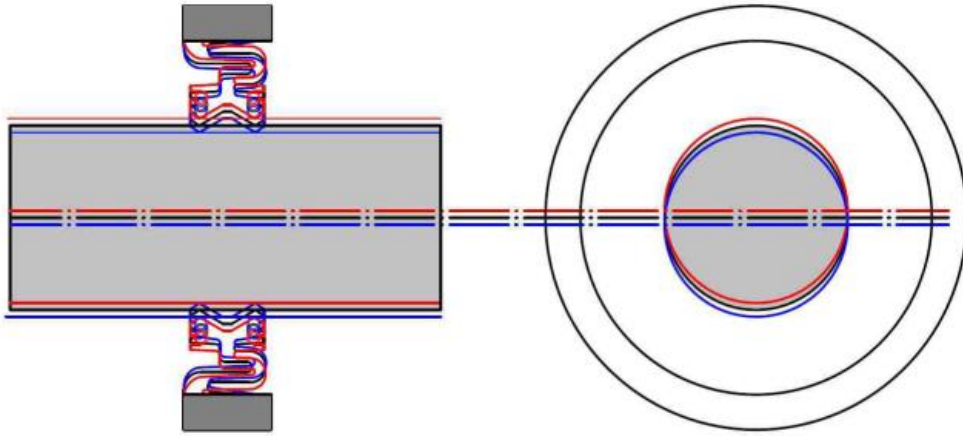
Brief

Typical advantage of TJY oil seal is that when the main shaft is in radial vibration, the oil seal can keep well followed. The design of "S" style waist and double sealing lip can quickly compensate the offset and pressure for the contact interface which can prevent the leakage.

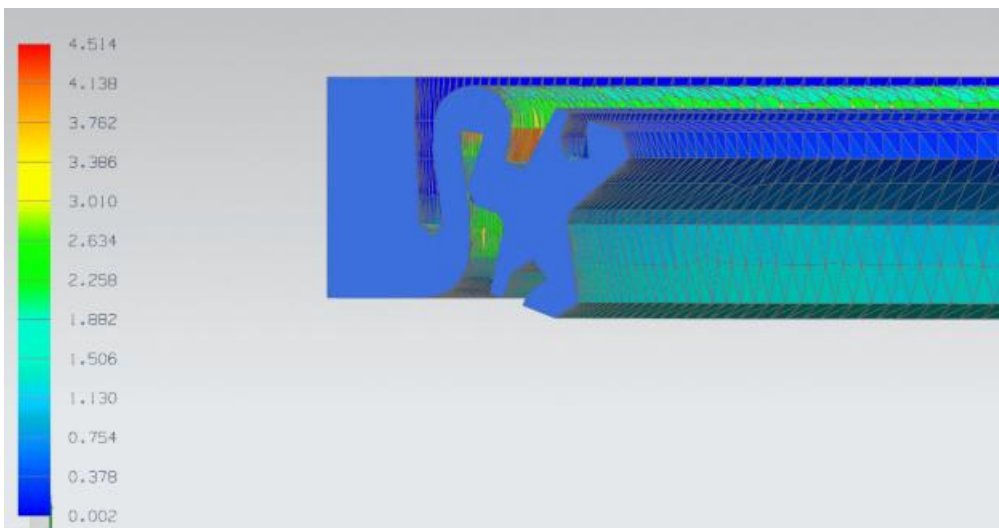
Features

- 1.Main lip**
This is the most important part of oil seal, the tip of the lip is installed with interference fit with the surface of the shaft, this part also bears the major sealing function of the oil seal.
- 2. "S" style waist**
The "S" style waist is designed to make the sealing lips well followed and keep contacting pressure so that the sealing performance can be improved, when the radial movement on main shaft lead to a gap between the lip and shaft.
- 3.Spring**
Garter spring maintains a certain pressure on the seal lip to keep a steady contact between the sealing lip and the surface of the shaft
- 4.Textile frame**
It improves the rigidity of the product which can make the installation work much more secure and easier.



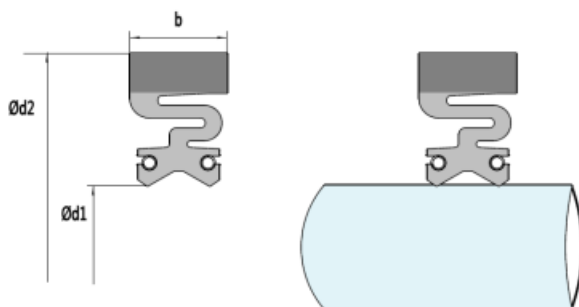


The diagram of TJK sealing ring radial vibration compensation to the shaft



Section stress distribution

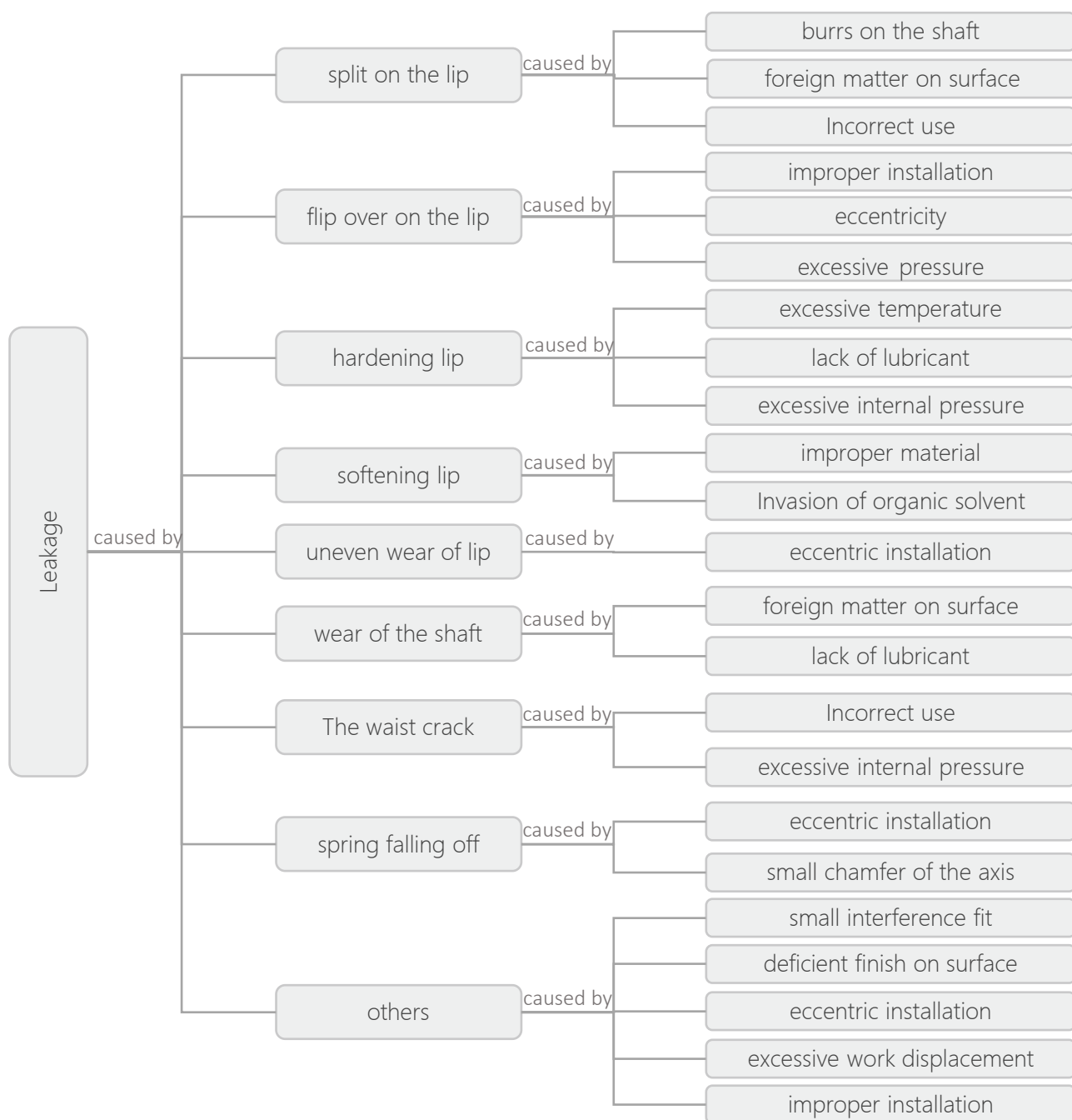
DOUBLE MAIN LIPS SEAL(TJY)







Sr No.	d1	d2	b	Code
1	710	774	25	TJY710
2	744	808	25	TJY744
3	780	844	25	TJY780
4	830	894	25	TJY830
5	850	910	30	TJY850
6	850	914	25	TJY850X1
7	875	939	25	TJY875
8	880	944	25	TJY880
9	920	984	25	TJY920
10	1020	1084	25	TJY1020



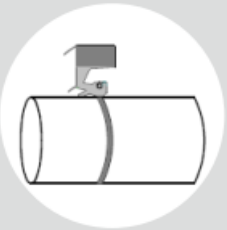


ANALYSIS OF SEALING FAILURE

When the sealing failure occurs, we should analyze the reason of the failure and make the countermeasures correspondingly by observing the oil seal lip, inspecting and judging the clearness degree of contact interface, checking lubricant etc.

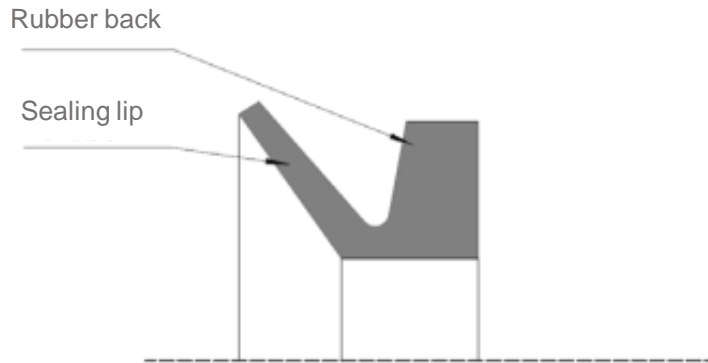


SOLUTION OF SEALING FAILURE

Damage	Look	Possible reason	Solution
Damage of the lip		<ul style="list-style-type: none"> • burrs on the axis • foreign matter on contact surface • improper use 	<ul style="list-style-type: none"> • clean the burr • clean the surface • improve the use
Spring falling off		<ul style="list-style-type: none"> • improper installation • eccentricity • excessive pressure 	<ul style="list-style-type: none"> • consult with us • improve eccentricity • lower the pressure
Hardening of the lip		<ul style="list-style-type: none"> • excessive temperature • lack of lubrication • excessive pressure 	<ul style="list-style-type: none"> • lower the temperature • improve the lubrication • lower the pressure
Softening of the lip		<ul style="list-style-type: none"> • invasion of organic solvent 	<ul style="list-style-type: none"> • avoid organic solvents

Damage	Look	Possible reason	Solution
Pitting of the lip		<ul style="list-style-type: none"> • burrs on the axis • foreign matter on contact surface • improper use 	<ul style="list-style-type: none"> • clean the burr • clean the surface • improve the use
Crack of the lip		<ul style="list-style-type: none"> • excessive temperature • lack of lubrication • excessive pressure • out of service life 	<ul style="list-style-type: none"> • lower the temperature • improve the lubrication • lower the pressure • change the seal
Wear of the shaft		<ul style="list-style-type: none"> • foreign matter on contact surface • lack of lubrication 	<ul style="list-style-type: none"> • clean the surface • improve the lubrication
Uneven wear of the lip		<ul style="list-style-type: none"> • eccentricity 	<ul style="list-style-type: none"> • improve eccentricity
Deformation of the lip		<ul style="list-style-type: none"> • hardening of rubber, lack of interference fit 	<ul style="list-style-type: none"> • improve the heat resistance of the materials

V RING (VA)



Brief

V Ring adopts the design of wear-resisting sealing lip to achieve efficient axial sealing.

Function

V Ring is usually used for sealing the lubricating grease of bearings. Generally, it is pressed on the shaft surface by stretching tension to have the effect of static sealing and fixture. With good adaptability it can compensate a larger tolerance and angular deviation. There is no high requirement for the surface finish and hardness of shaft, it can protect against dust, impurities, water and other medium.

Features

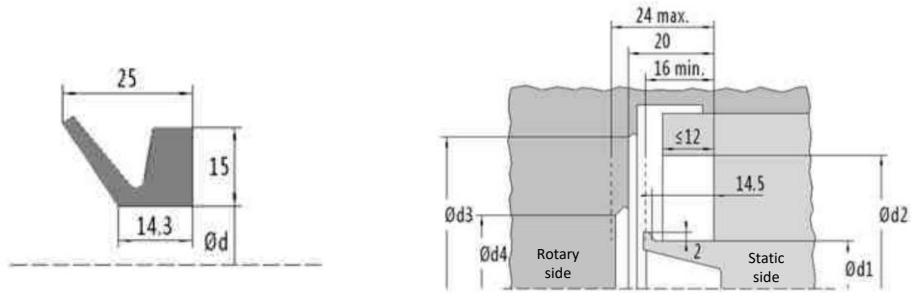
- 1, Easy Installation
- 2, Small friction
- 3, High adaptability



Material	7205 NBR		6003 CR	
Medium	Grease, dust, water		Grease, dust, water	
Pressure	0.03Mpa		0.03Mpa	
Speed	≤15m/s		≤10m/s	
Finish of lip(μm)	Ra≤0.8	Rmax≤2.5	Ra≤0.8	Rmax≤2.5
Finish of shaft surface(μm)	Ra≤4	Rmax≤16	Ra≤4	Rmax≤16

MAIN SHAFT BEARING SEALS

V RING (VA)



Sr No.	code	standard	d1	d
1	TV220A	V220A	210-235	198
2	TV250A	V250A	235-265	225
3	TV275A	V275A	265-290	247
4	TV300A	V300A	290-310	270
5	TV325A	V325A	310-335	292
6	TV350A	V350A	335-365	315
7	TV375A	V375A	365-390	337
8	TV400A	V400A	390-430	360
9	TV450A	V450A	430-480	405
10	TV500A	V500A	480-530	450
11	TV525A	V525A	515-545	475
12	TV550A	V550A	530-580	495
13	TV600A	V600A	580-630	540
14	TV650A	V650A	630-665	600
15	TV700A	V700A	665-705	630
16	TV725A	V725A	705-745	670
17	TV750A	V750A	745-785	705
18	TV800A	V800A	785-830	745
19	TV850A	V850A	830-875	785
20	TV900A	V900A	875-905	825
21	TV925A	V925A	905-935	840
22	TV950A	V950A	935-965	865
23	TV1000A	V1000A	965-1015	910
24	TV1050A	V1050A	1015-1065	955
25	TV1100A	V1100A	1065-1115	1000
26	TV1150A	V1150A	1115-1165	1045

ASSEMBLY GUIDE OF SPLIT SEAL

To ensure sealing effect and prevent damage to split seal and equipment, please follow below installation instructions.

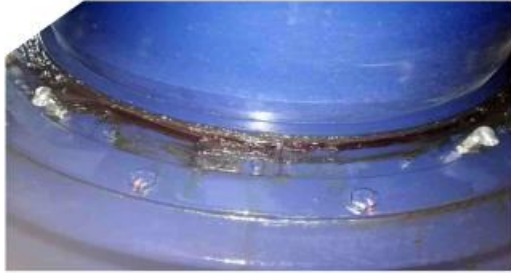
1. Ensure the split oil seal conform to the equipment requirement (such as dimension and finish etc.) before installation.
2. Remove the cover plate, clean the dust, impurities, grease, burrs etc.
3. Apply appropriate amount of lubricating grease onto the sealing lip. Open the split seal joint and place it around the shaft near the cavity where the seal is installed.
4. Locate the split seal opening at the highest point (12 o'clock position) and apply appropriate amount of glue to ensure the joint is glued correctly, and let it stand for 2-3 minutes until the glue is cured.
5. Load the spring into the lip groove .
6. Slowly push the seal into the groove from the joint, ensure the edge of the seal is flat, continue to push in along the perimeter of the shaft until it's completely loaded into the housing.
7. Install the cover plate then installation is finished.



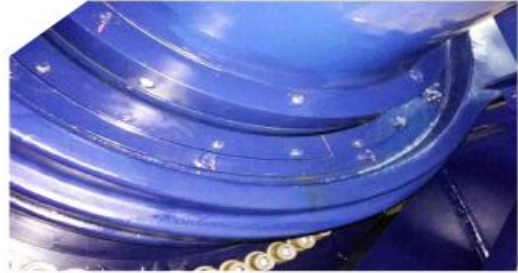
MAIN SHAFT BEARING SEALS

WIND FIELD APPLICATION CASE

Model	2MW	Serial No.	2# fan	Location	Yongshun wind field in HuNan province	Seal type	Double independent seals
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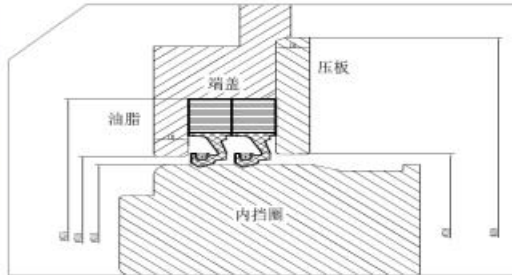
Before installation 2017/4/5



After installation 2017/6/23



After installation 2017/8/14



Install diagram

Model	2MW	Serial No.	11# fan	Location	BaiLingMiao wind field in Inner Mongolia Autonomous Region	Seal type	Double main lips seal (TJY seal)
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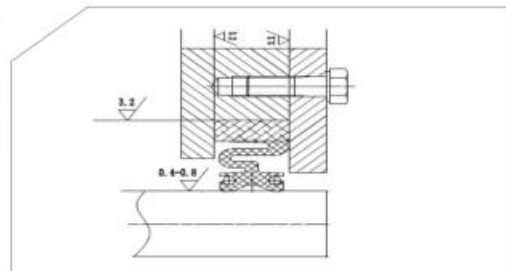
Before installation 2016/6/21



After installation 2017/5/23



After installation 2018/9/18



Install diagram

MAIN SHAFT BEARING SEALS

Model	2MW	Serial No.	18# fan	Location	TongYu wind field in JiLin province	Seal type	Main-vice lips seal (TJRF seal)
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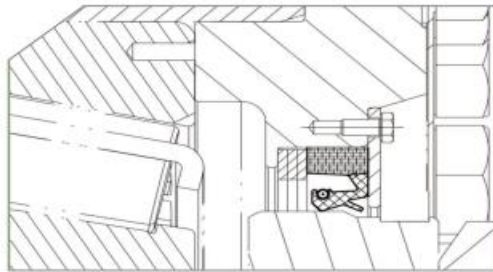
Initial installation 2016/1/10



After installation 2017/2/23



After installation 2018/9/20

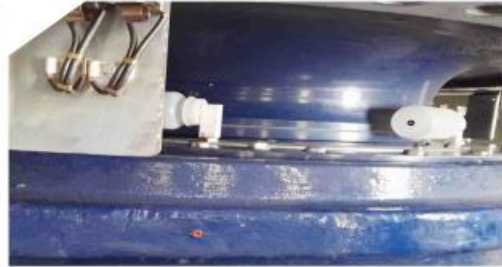


Install diagram

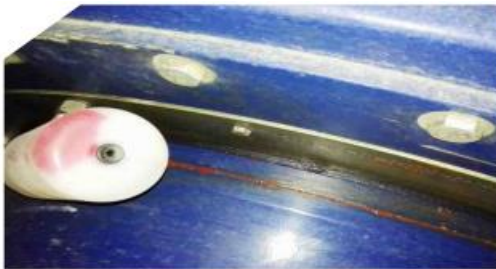
Model	2MW	Serial No.	78# fan	Location	Yi county wind field in JinZhou city	Seal type	Double main lips seal (TJY seal)
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Before installation 2016/4/7



After installation 2016/5/7



After installation 2018/7/14



After installation 2016/9/11