



DALAIN YINGYU CO., LIMITED


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**SEALING PRODUCTS FOR
SLEWING RING BEARING**



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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

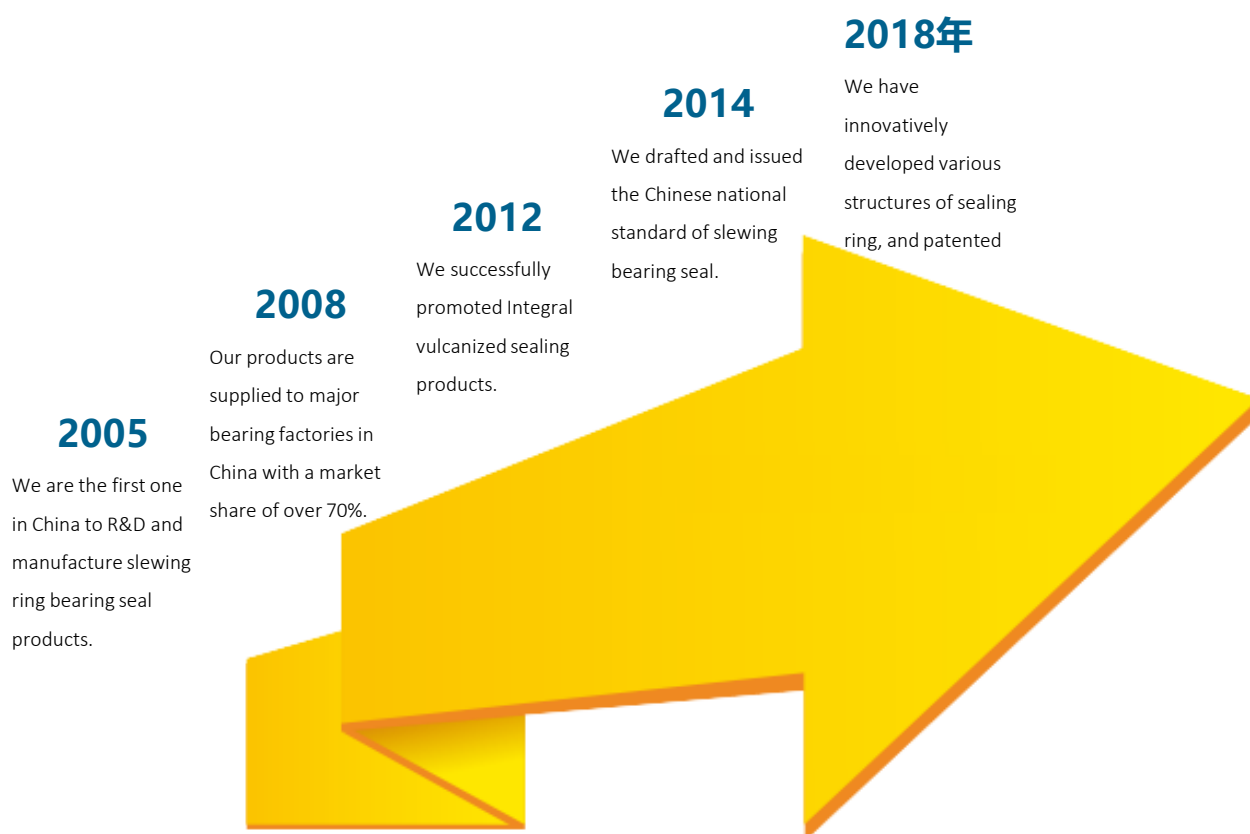
Compound Code	Material	Performance		Application Features
7402	AU	Tensile strength MPA	38	Normally used in the environment that take oil as the medium, the working temperature is from -60 °C to +95 °C
		Break elongation %	373	
		-40°C x 4H Hardness Shore A	98	
		Hot air aging (100°C x 70H) Hardness change	-5	
		Akron abrasion (cm³/1.6km)	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 (cm³/1.6km)	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 (cm³/1.6km)	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 (cm³/1.6km)	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 (cm³/1.6km)		

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.



SLEWING RING BEARING SEALS



CLASSIFICATION

SLEWING RING BEARING SEALS

1. Integral vulcanized seal ring

The integral vulcanized sealing ring process is Closed-loop molded vulcanized sealing ring which is suitable for the initial assembly of bearing. The molded product has the advantage of compact structure and dimensional stability. The products are not having joint which can completely eliminate the defects caused by manual splicing, and it also can reduce the stretching or squeezing under installation and guarantee its lifetime.

2. Sealing strip

We also can supply the sealing as strip which is suitable for the operation and maintenance of wind field and on-site technical improvement.

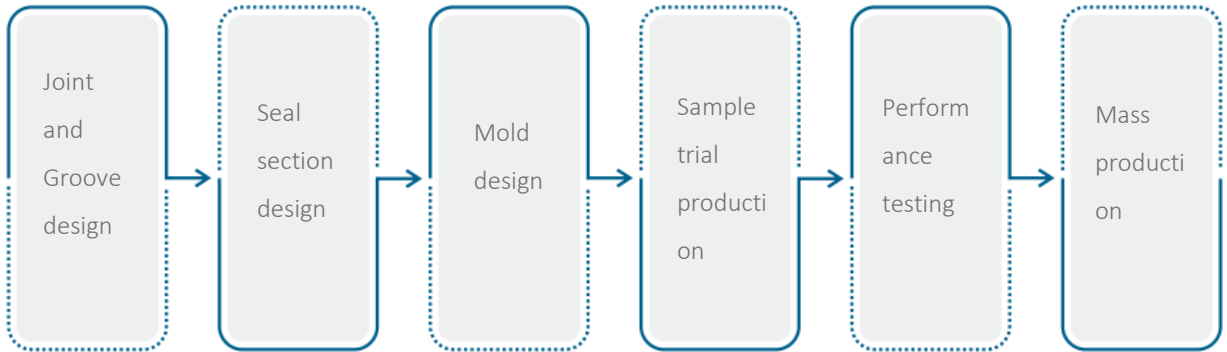
3. Material

NBR: suitable for wind turbine generation system on land.

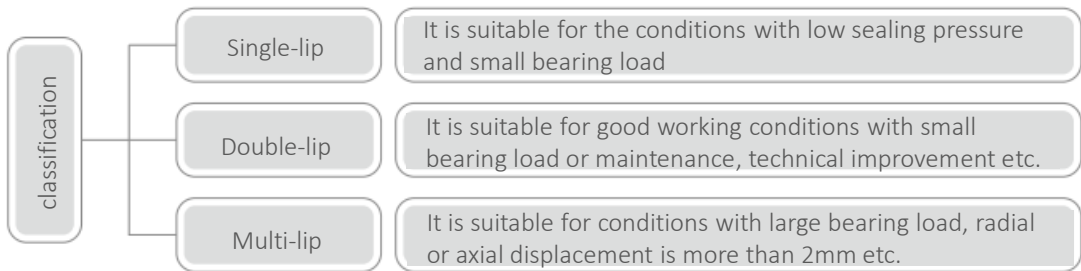
HNBR: suitable for wind turbine generation system offshore.

SLEWING RING BEARING SEALS

R&D PROCESS

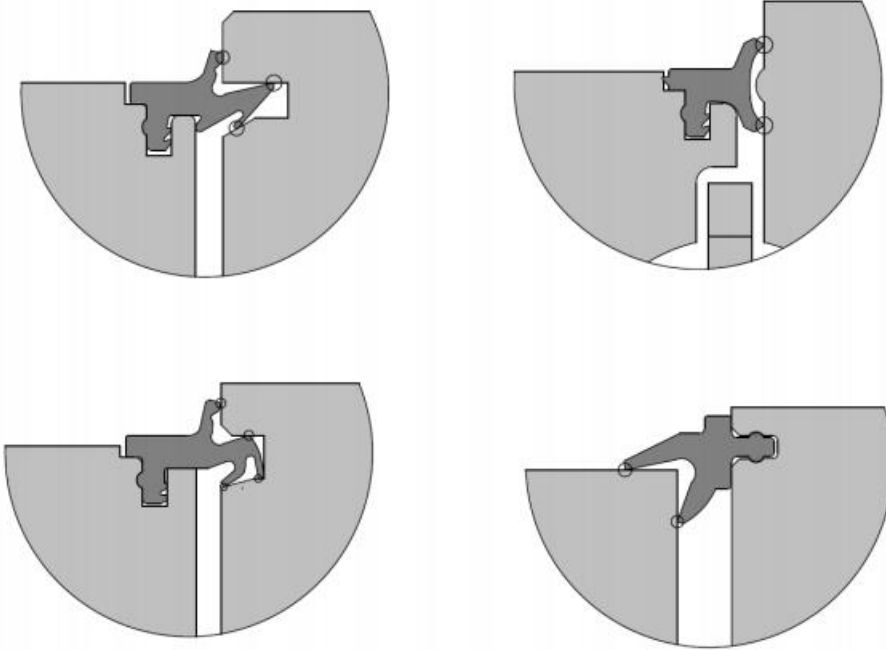


STRUCTURE DESIGN



Multi - lip seal ring meet requirements of larger offset and higher pressure

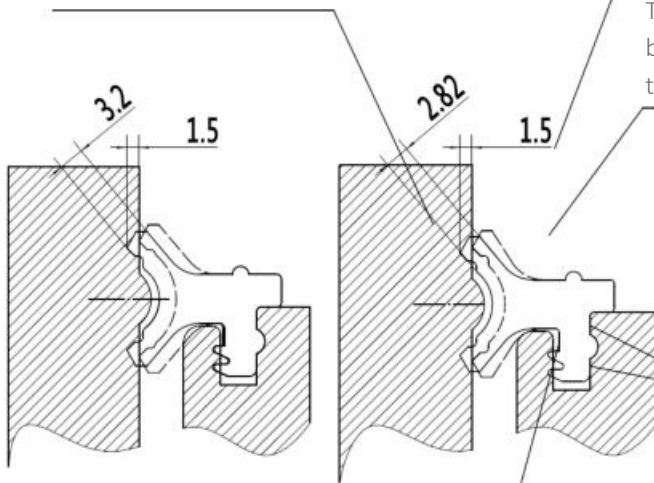
TRS-010	TRS-163	TRS-124	TRS-188	TRS-165
0.2Mpa	0.2Mpa	0.5Mpa	0.3Mpa	0.5Mpa
1.5mm	2.0mm	2.5mm	2.0mm	2.5mm
Double-lip design, easy to installation	Increase interference to compensate for larger radial offset	Multi-lip design, improve the sealing performance by the tension of second-lip	Simple structure, Excellent pressure resistance	Labyrinth seal, excellent sealing effect and ultimate pressure resistance



Double-lip design: the lip interference compensation amount of the seal ring is designed to be over 1.5mm

Increasing the sealing lip angle can increase the sealing contact area

Increasing the interference amount can avoid the impact of the thin sealing lip on the sealing effect



The lip is thinner, then force to relevant parts will be less, then friction will be less when rotating, then torque will decrease correspondingly

The roughness of the assembly position is important, the greater the friction brings better the pressure-resistance

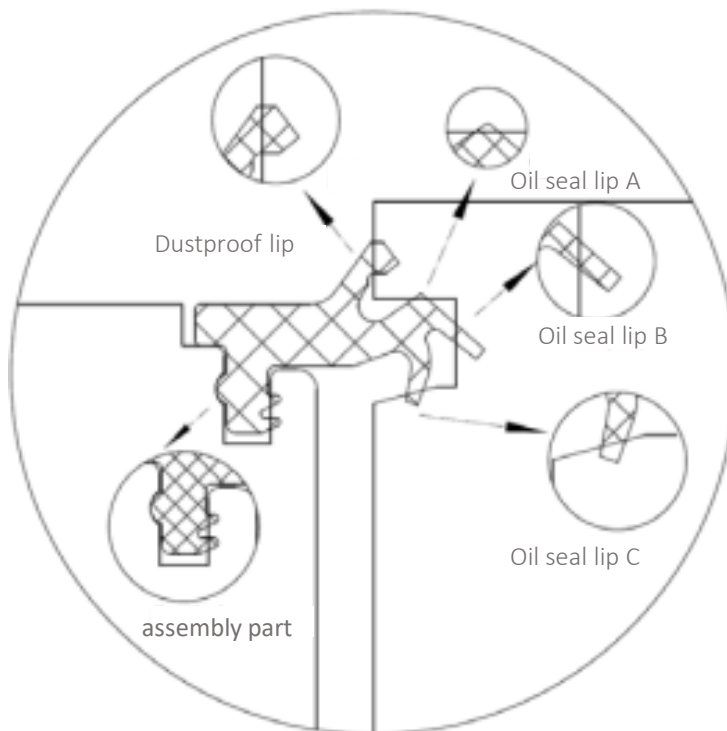
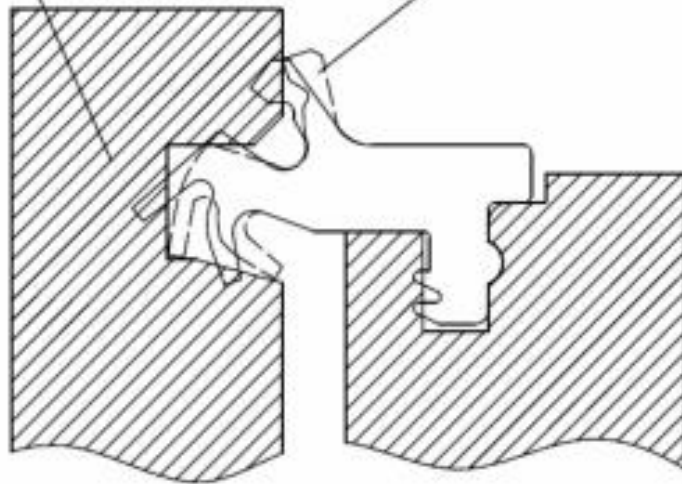
Reasonable section sizes and roughness are critical to the assembly

SLEWING RING BEARING SEALS

Multi-lip design: In order to meet greater radial deviation and axial offset, the new product design changed from the previous contact seal to labyrinth seal to better adapt to the axial and radial displacement of the bearing.

Compensated the radial displacement

Reinforced with labyrinth design



Assembly diagram of multi-lip seal TRS165

Deformation diagram of the inner and outer ring of slewing ring bearing. It shows that the inner and outer ring mainly produces relative separation in radial direction and approximately symmetric deviation in axial direction, after the bearing loaded. Under some extreme working conditions, the axial and radial relative deviation of the bearing can reach about 2mm respectively.

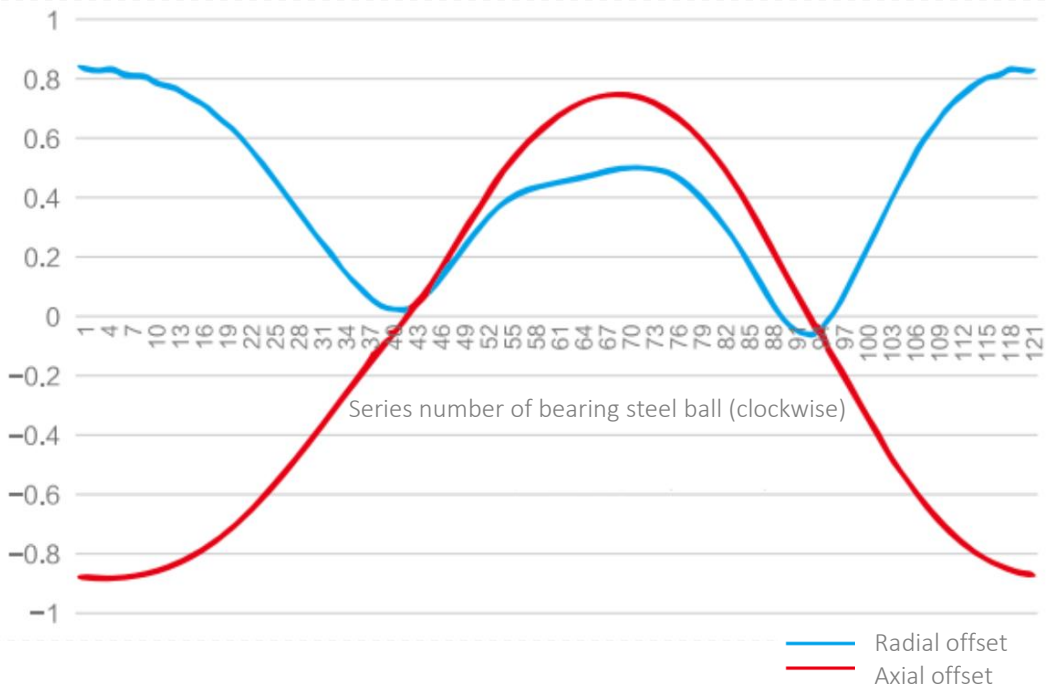
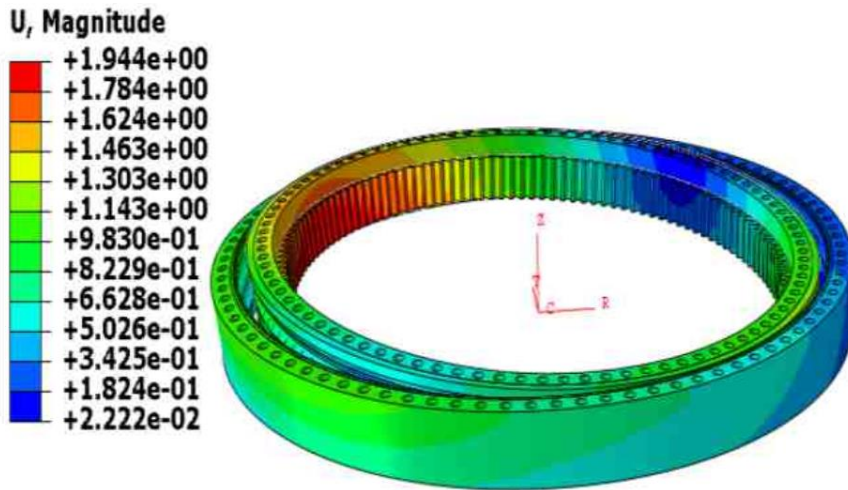
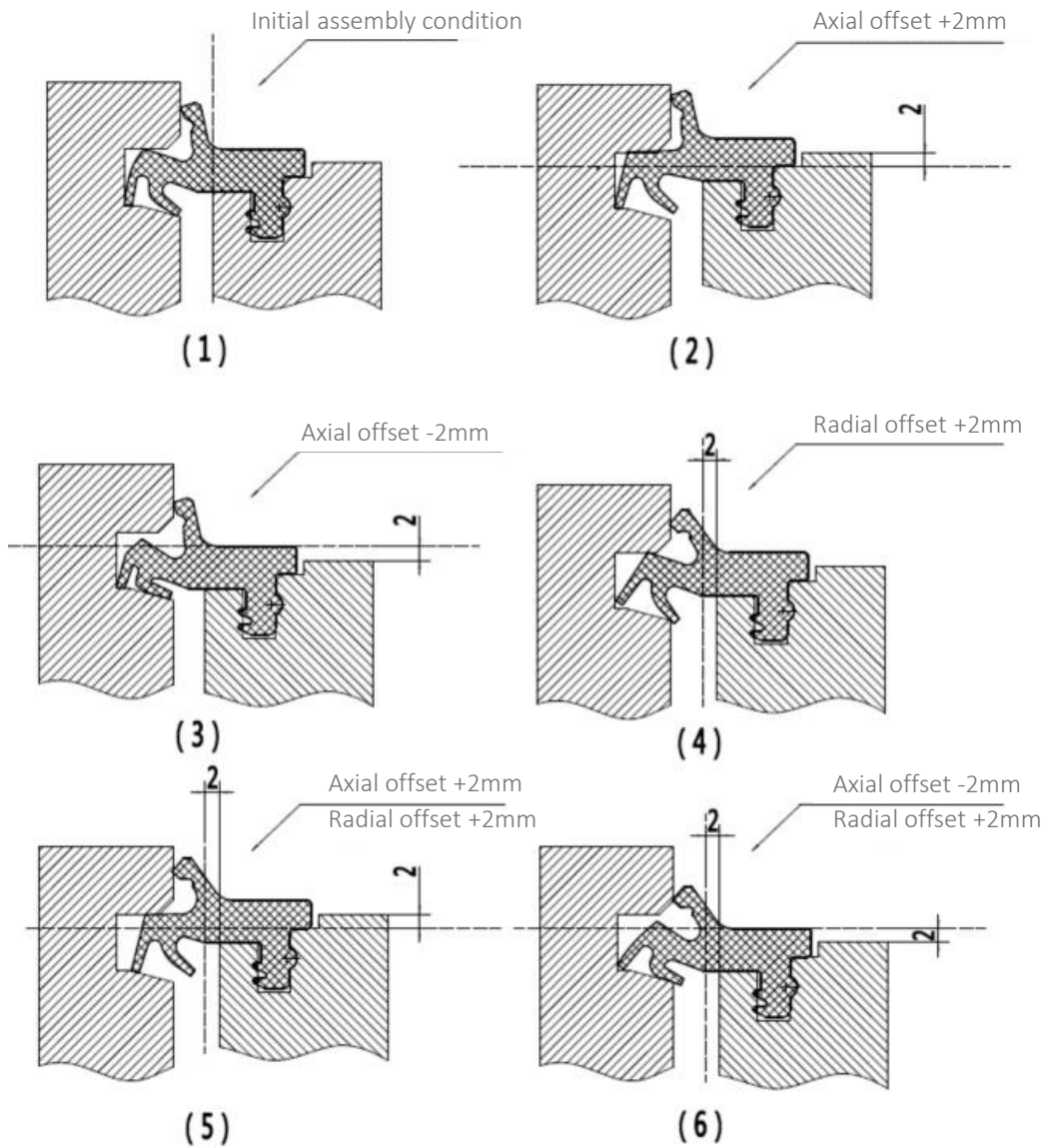


Diagram of relative displacement of inner and outer steel rings of bearing

SLEWING RING BEARING SEALS


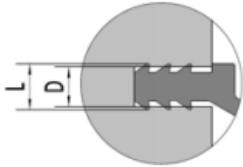


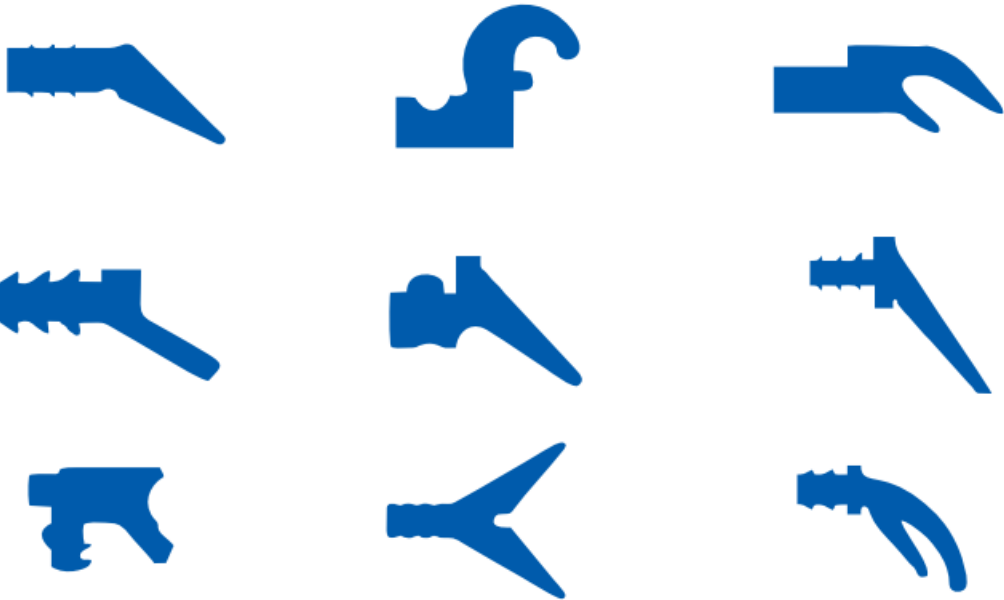
Analysis of working state of TRS-1-165 at offset 2mm

* The above analysis diagram is simulated based on the drawing and it is only for design reference. There will be tolerance in the dimension in practical application.

ASSEMBLY GROOVE DESIGN

The design of assembly form and size often determines the tightness of seal and the difficulty of assembly. The selection of assembly form should be considered the design of seal structure, joint design, and actual assembly condition on site and so on.

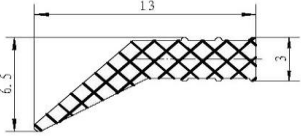
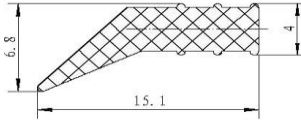
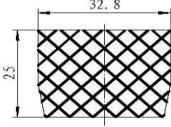
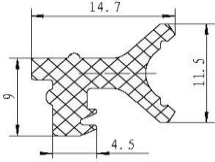
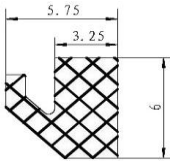
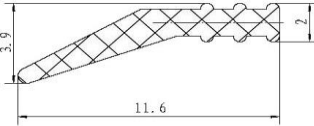
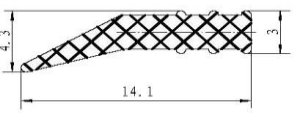
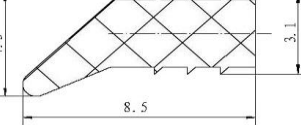
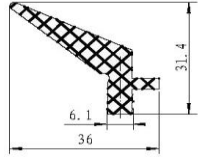
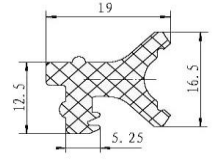
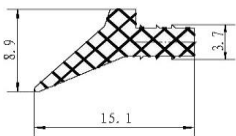
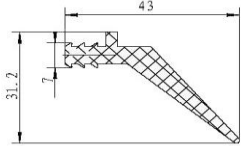
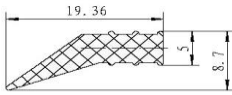
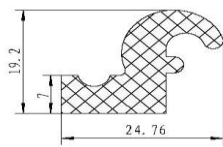
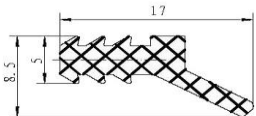
Assembly form Recommended size Groove width		
3.8 ~ 4.0	4.50	4.70
4.0 ~ 4.2	4.70	4.85
4.2 ~ 4.4	4.90	5.00
4.4 ~ 4.6	5.10	5.15
4.6 ~ 4.8	5.25	5.30
4.8 ~ 5.0	5.40	5.45

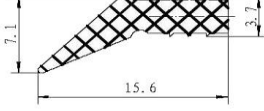
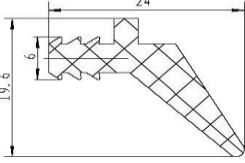
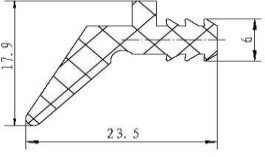
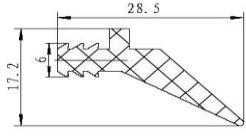
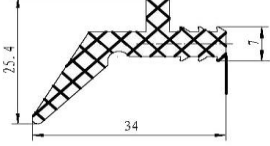
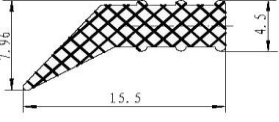
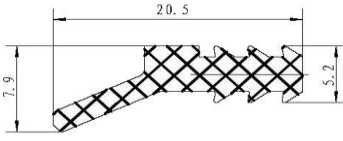
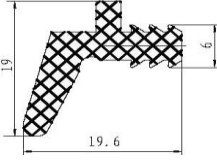
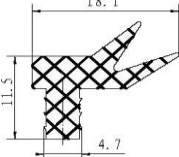
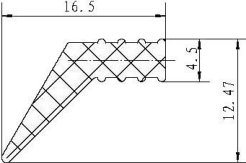
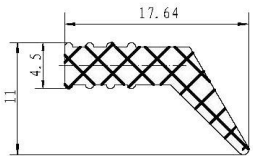
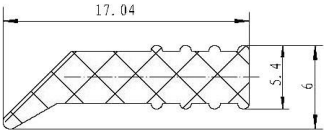
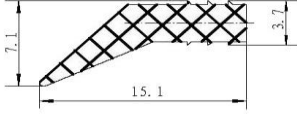
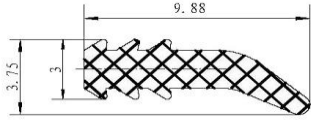
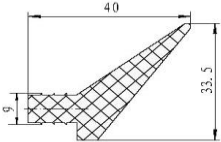


Welcome to consult us for more styles of our products.

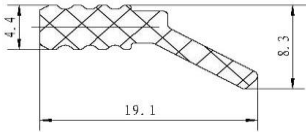
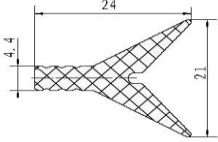
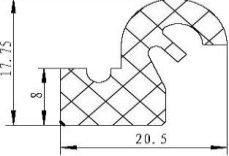
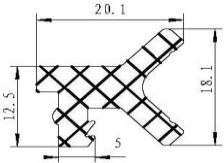
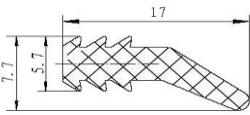
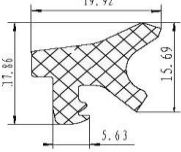
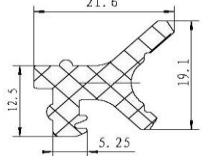
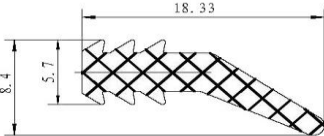
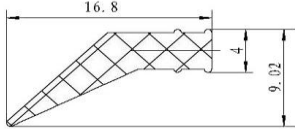
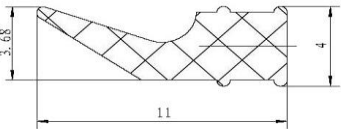
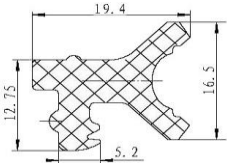
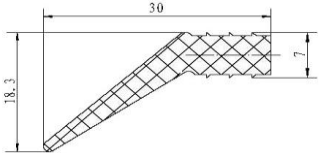
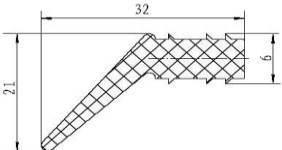
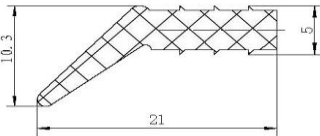
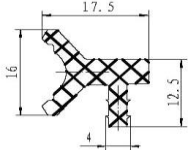
SLEWING RING BEARING SEALS

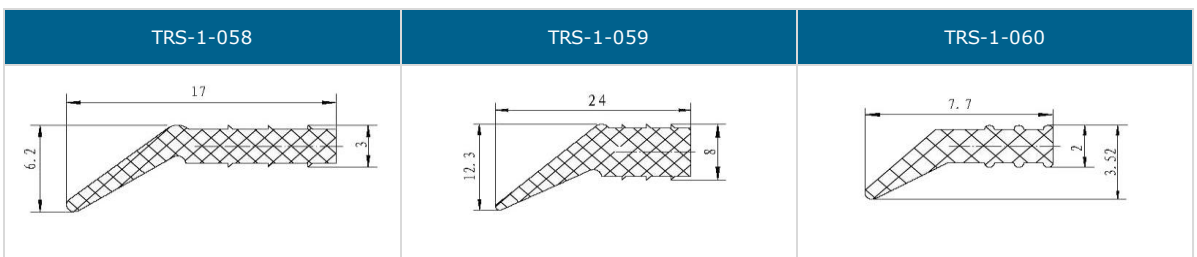
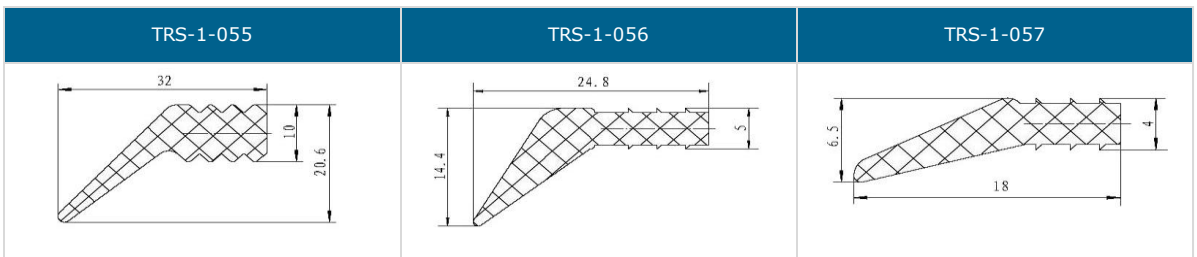
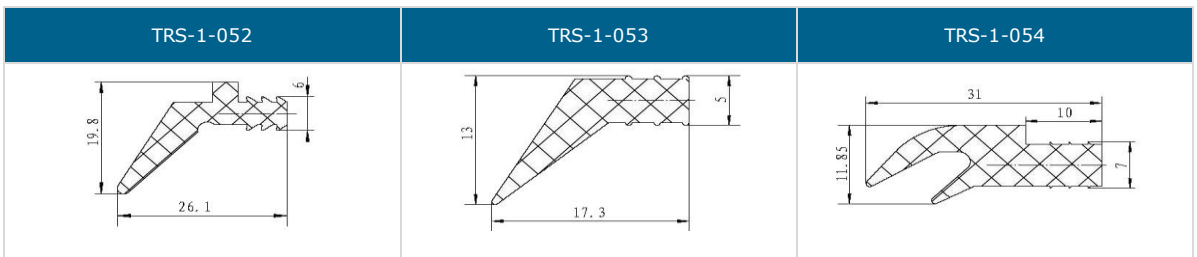
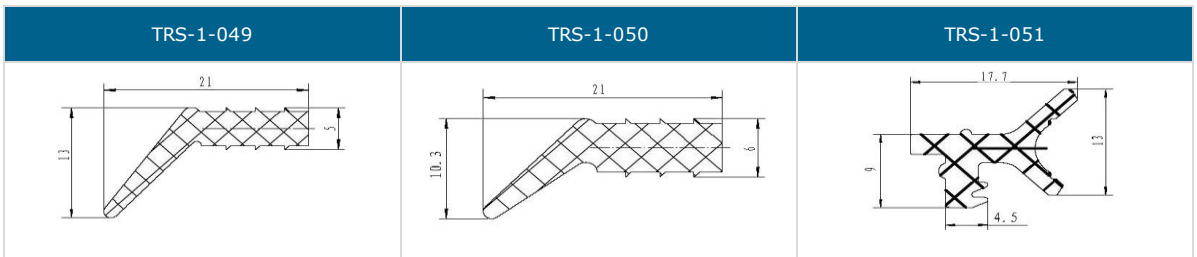
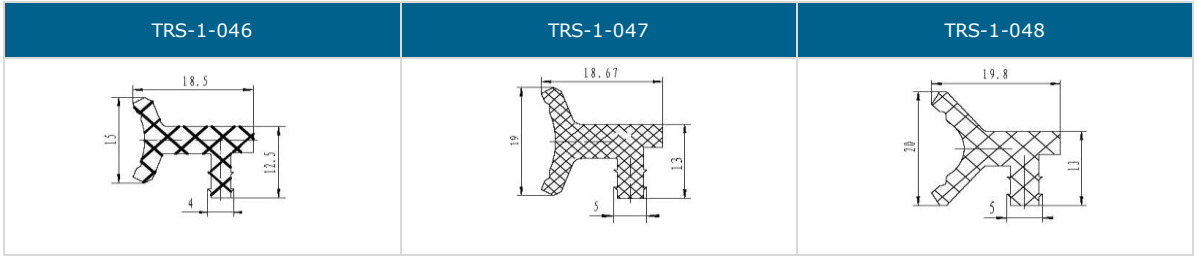
LIST OF SEAL STYLES

<p>TRS-1-001</p> 	<p>TRS-1-002</p> 	<p>TRS-1-003</p> 
<p>TRS-1-004</p> 	<p>TRS-1-005</p> 	<p>TRS-1-006</p> 
<p>TRS-1-007</p> 	<p>TRS-1-008</p> 	<p>TRS-1-009</p> 
<p>TRS-1-010</p> 	<p>TRS-1-011</p> 	<p>TRS-1-012</p> 
<p>TRS-1-013</p> 	<p>TRS-1-014</p> 	<p>TRS-1-015</p> 

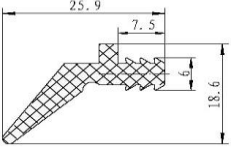
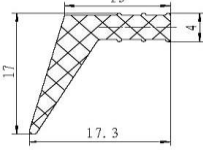
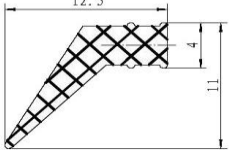
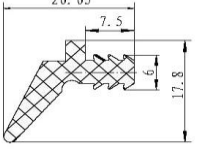
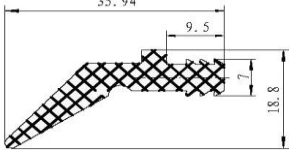
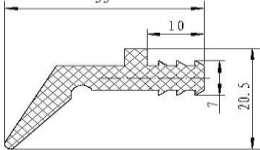
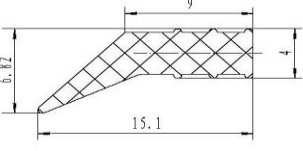
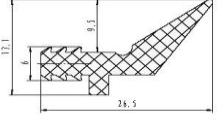
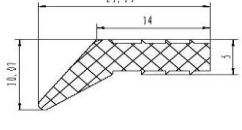
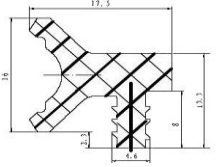
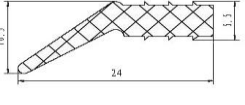
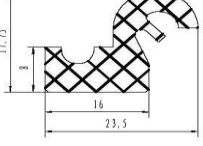
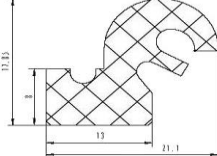
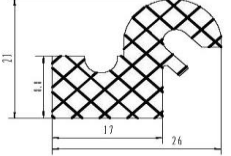
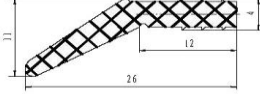
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<p>TRS-1-019</p> 	<p>TRS-1-020</p> 	<p>TRS-1-021</p> 
<p>TRS-1-022</p> 	<p>TRS-1-023</p> 	<p>TRS-1-024</p> 
<p>TRS-1-025</p> 	<p>TRS-1-026</p> 	<p>TRS-1-027</p> 
<p>TRS-1-028</p> 	<p>TRS-1-029</p> 	<p>TRS-1-030</p> 

SLEWING RING BEARING SEALS

<p>TRS-1-031</p> 	<p>TRS-1-032</p> 	<p>TRS-1-033</p> 
<p>TRS-1-034</p> 	<p>TRS-1-035</p> 	<p>TRS-1-036</p> 
<p>TRS-1-037</p> 	<p>TRS-1-038</p> 	<p>TRS-1-039</p> 
<p>TRS-1-040</p> 	<p>TRS-1-041</p> 	<p>TRS-1-042</p> 
<p>TRS-1-043</p> 	<p>TRS-1-044</p> 	<p>TRS-1-045</p> 



SLEWING RING BEARING SEALS

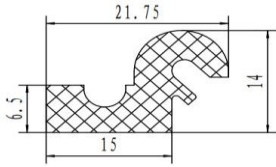
<p>TRS-1-061</p> 	<p>TRS-1-062</p> 	<p>TRS-1-063</p> 
<p>TRS-1-064</p> 	<p>TRS-1-065</p> 	<p>TRS-1-066</p> 
<p>TRS-1-067</p> 	<p>TRS-1-068</p> 	<p>TRS-1-069</p> 
<p>TRS-1-070</p> 	<p>TRS-1-071</p> 	<p>TRS-1-072</p> 
<p>TRS-1-073</p> 	<p>TRS-1-074</p> 	<p>TRS-1-075</p> 

<p>TRS-1-076</p>	<p>TRS-1-077</p>	<p>TRS-1-078</p>
<p>TRS-1-079</p>	<p>TRS-1-080</p>	<p>TRS-1-081</p>
<p>TRS-1-082</p>	<p>TRS-1-083</p>	<p>TRS-1-084</p>
<p>TRS-1-085</p>	<p>TRS-1-086</p>	<p>TRS-1-087</p>
<p>TRS-1-088</p>	<p>TRS-1-089</p>	<p>TRS-1-090</p>

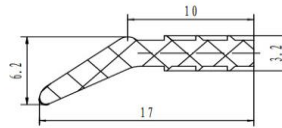
SLEWING RING BEARING SEALS

<p>TRS-1-091</p>	<p>TRS-1-092</p>	<p>TRS-1-093</p>
<p>TRS-1-094</p>	<p>TRS-1-095</p>	<p>TRS-1-096</p>
<p>TRS-1-097</p>	<p>TRS-1-098</p>	<p>TRS-1-099</p>
<p>TRS-1-100</p>	<p>TRS-1-101</p>	<p>TRS-1-102</p>
<p>TRS-1-103</p>	<p>TRS-1-104</p>	<p>TRS-1-105</p>

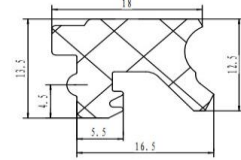
TRS-1-106



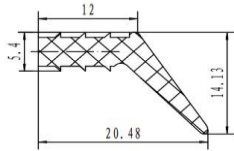
TRS-1-107



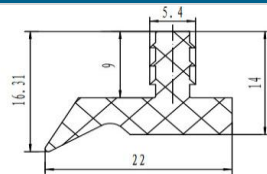
TRS-1-108



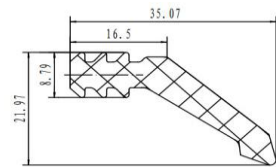
TRS-1-109



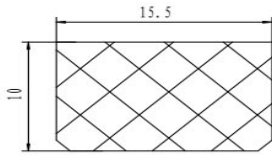
TRS-1-110



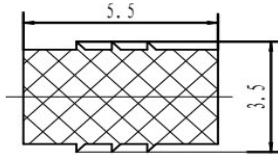
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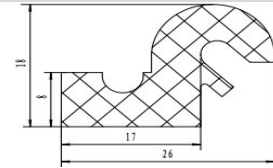
TRS-1-112



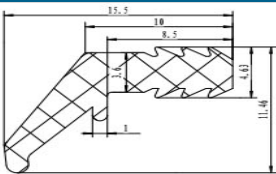
TRS-1-113



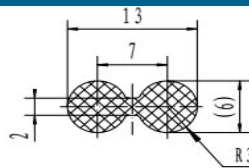
TRS-1-114



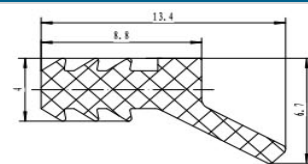
TRS-1-115



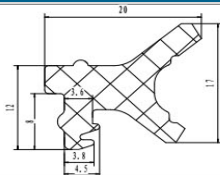
TRS-1-116



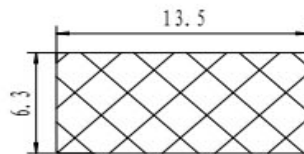
TRS-1-117



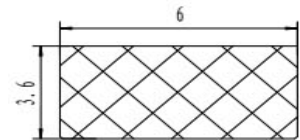
TRS-1-118

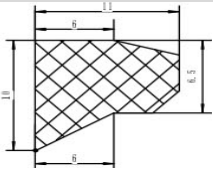
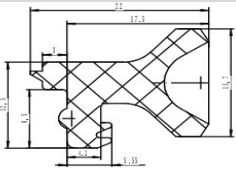
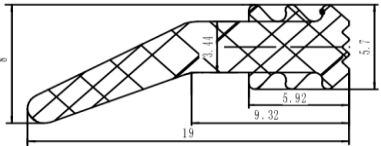
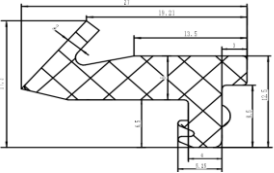
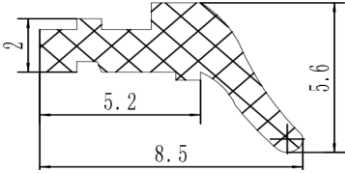
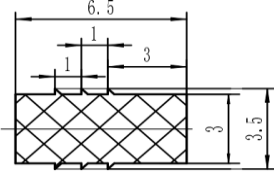
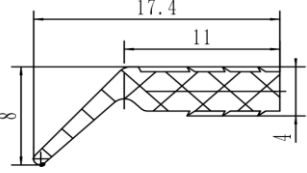
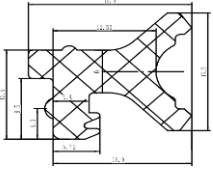
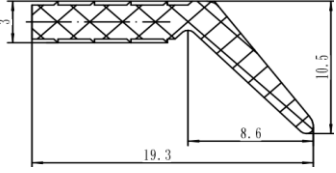
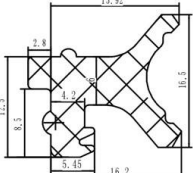
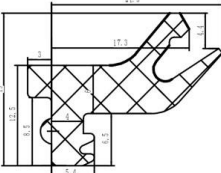
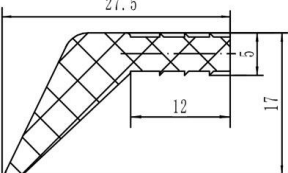
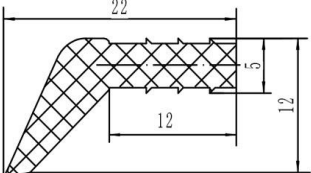
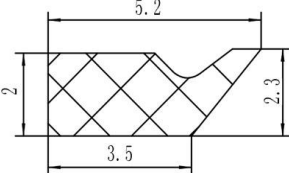
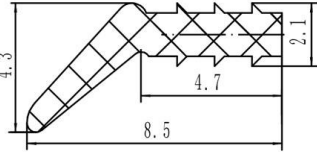


TRS-1-119

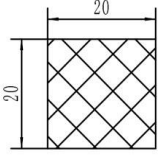
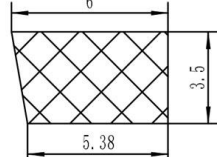
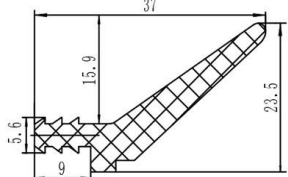
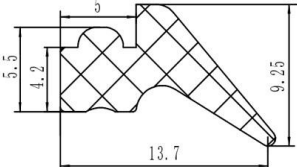
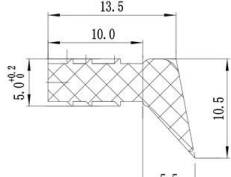
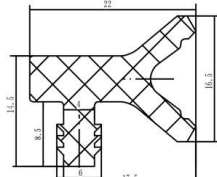
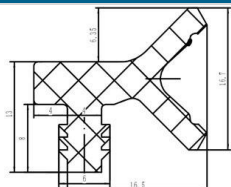
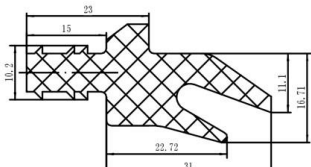
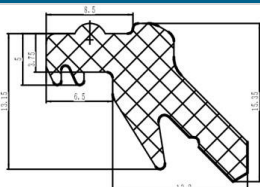
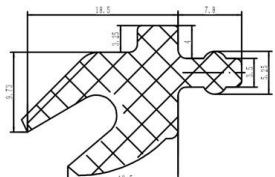
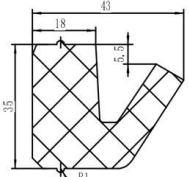
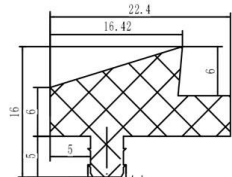
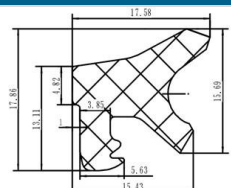
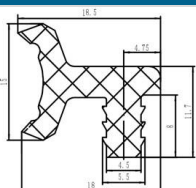
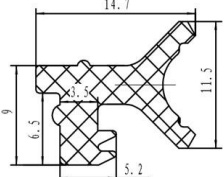


TRS-1-120

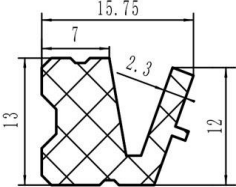
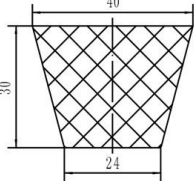
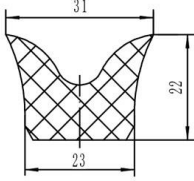
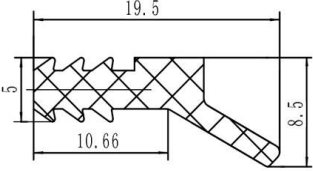
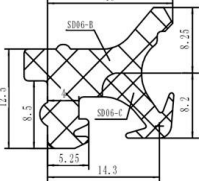
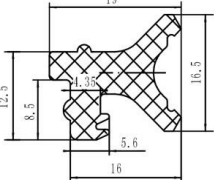
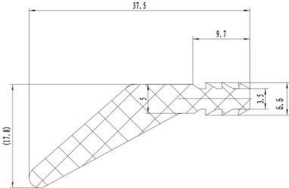
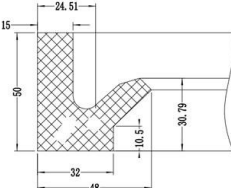
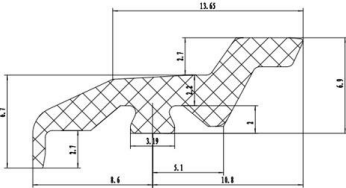
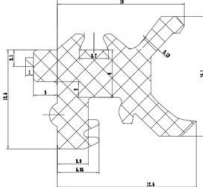
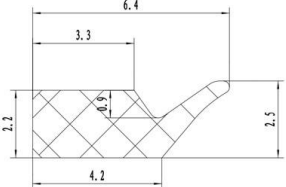
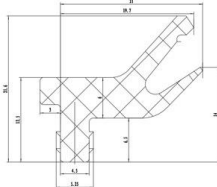
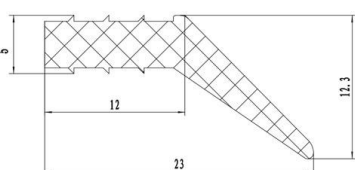
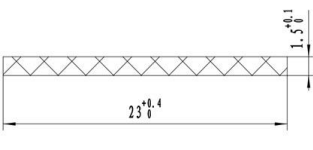
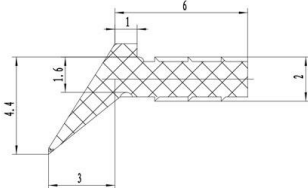


<p>TRS-1-166</p> 	<p>TRS-1-167</p> 	<p>TRS-1-168</p> 
<p>TRS-1-169</p> 	<p>TRS-1-170</p> 	<p>TRS-1-171</p> 
<p>TRS-1-172</p> 	<p>TRS-1-173</p> 	<p>TRS-1-174</p> 
<p>TRS-1-175</p> 	<p>TRS-1-176</p> 	<p>TRS-1-177</p> 
<p>TRS-1-178</p> 	<p>TRS-1-179</p> 	<p>TRS-1-180</p> 

SLEWING RING BEARING SEALS

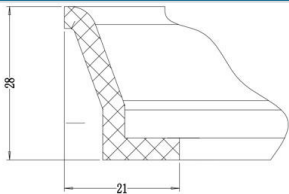
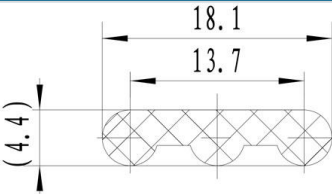
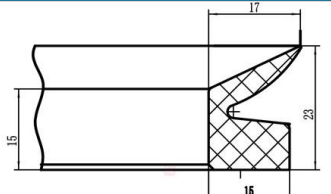
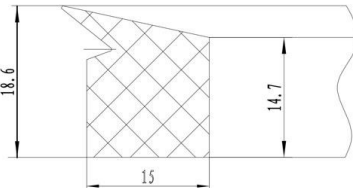
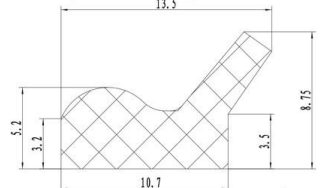
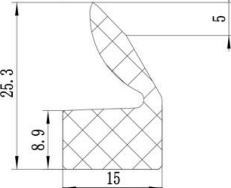
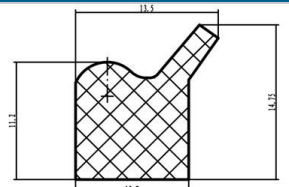
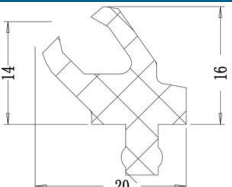
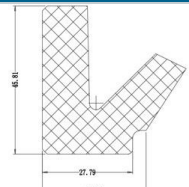
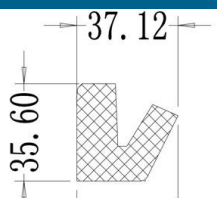
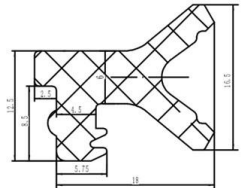
<p>TRS-1-196</p> 	<p>TRS-1-197</p> 	<p>TRS-1-198</p> 
<p>TRS-1-199</p> 	<p>TRS-1-200</p> 	<p>TRS-1-201</p> 
<p>TRS-1-202</p> 	<p>TRS-1-203</p> 	<p>TRS-1-204</p> 
<p>TRS-1-205</p> 	<p>TRS-1-206</p> 	<p>TRS-1-207</p> 
<p>TRS-1-208</p> 	<p>TRS-1-209</p> 	<p>TRS-1-210</p> 

SLEWING RING BEARING SEALS

<p>TRS-1-211</p> 	<p>TRS-1-212</p> 	<p>TRS-1-213</p> 
<p>TRS-1-214</p> 	<p>TRS-1-215</p> 	<p>TRS-1-216</p> 
<p>TRS-1-217</p> 	<p>TRS-1-218</p> 	<p>TRS-1-219</p> 
<p>TRS-1-220</p> 	<p>TRS-1-221</p> 	<p>TRS-1-222</p> 
<p>TRS-1-223</p> 	<p>TRS-1-224</p> 	<p>TRS-1-225</p> 

<p>TRS-1-226</p>	<p>TRS-1-227</p>	<p>TRS-1-228</p>
<p>TRS-1-229</p>	<p>TRS-1-230</p>	<p>TRS-1-231</p>
<p>TRS-1-232</p>	<p>TRS-1-233</p>	<p>TRS-1-234</p>
<p>TRS-1-235</p>	<p>TRS-1-236</p>	<p>TRS-1-237</p>
<p>TRS-1-238</p>	<p>TRS-1-239</p>	<p>TRS-1-240</p>

SLEWING RING BEARING SEALS

<p>TRS-1-241</p> 	<p>TRS-1-242</p> 	<p>TRS-1-243</p> 
<p>TRS-1-244</p> 	<p>TRS-1-245</p> 	<p>TRS-1-246</p> 
<p>TRS-1-247</p> 	<p>TRS-1-248</p> 	<p>TRS-1-249</p> 
<p>TRS-1-250</p> 	<p>TRS-1-251</p> 	<p>TRS-1-252</p> 