

# RATO DS / RATO DS+

## SERVICE LIFE OF HIGHLY FLEXIBLE COUPLINGS

### THEORETICAL EXPECTED LIFETIME

VULKAN couplings are produced and tested under the most stringent quality controls. As a result, apart from a high level of functional safety across several hours of operation, they even offer the user a long service life of several years. The expected service life of the flexible elements is depending on the individual operating or storage conditions. Even with optimal operating or storing condition, the elastomer of the coupling ages and wears out. This results in changes in the dynamic characteristic and functional performance of the coupling over the lifetime.

Impermissible or excessively high element stresses caused by the connected machinery reduces the expected service life. The alignment of the connected parts has also an influence on the total lifetime. Hence, we recommend that you regularly inspect the elements at least twice a year. The inspection procedure should include the operating hours, the visual shape, permanent set, cracks and other signs of damage and wear. This inspection can be completed on-site by the crew referring to the data on the attached tables or by a VULKAN Technician. Additionally, we recommend to check the alignment between the connected machinery, especially with elastic mounted systems in regular terms.

Normal ageing of natural rubber causes a certain hardening and changing of dynamic properties. After 10 years, the stiffness and damping of highly flexible rubber couplings has changed significantly.

In case of changes in dynamic properties of the rubber elements we recommend, to replace them in order to ensure the function and the dynamic behavior of the drive line.

In case of impermissible cracks, the flexible elements have to be replaced. Permissible lengths and depths of cracks, permissible permanent set and the theoretical expected lifetime may be selected from the tables enclosed. For cracks in the bonding zone between rubber and metal parts the same values in the tables are valid.

VULKAN Service is also pleased to provide support in the inspection and assessment of couplings that have been installed.



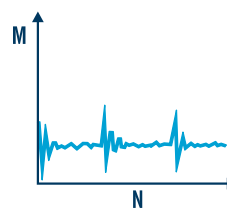
Coupling	Natural Rubber		Silicon	
RATO DS	50,000 h	10 years	-	-
RATO DS+	50,000 h	10 years	-	-



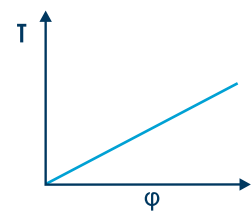
10 years service life



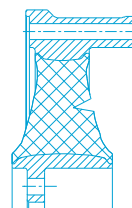
50,000 operation hours



Dynamic characteristic



Static twist angle



Tearing

# RATO DS / RATO DS+

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Checking the permissible permanent set of a RATO DS / RATO DS+ element takes place by obtaining **S** measurement of the distance from inner to the outer metal part as shown in the Figure 1 and Figure 2. In case the maximum value is reached, the flexible element has to be replaced.

Figure 1

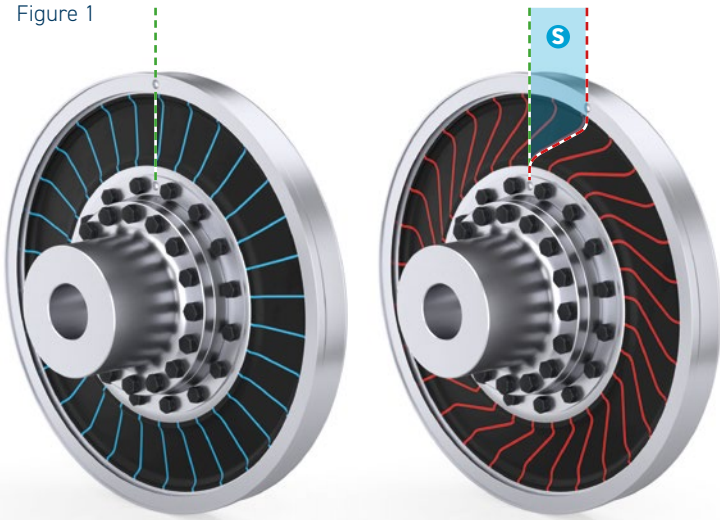
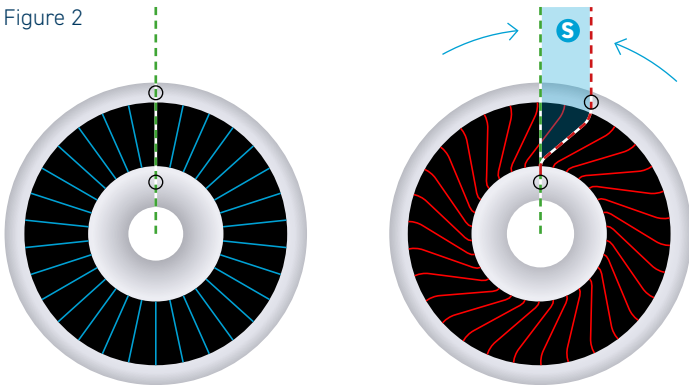


Figure 2



### PERMISSIBLE PERMANENT SET

Size	S [mm]	Size	S [mm]
A21	34	A2B	34
A23	38	A2D	38
A25	40	A2F	40
A27	44	A2H	44
A29	48	A2K	48
A31	50	A3B	50
A33	56	A3D	56
A34	60	A3E	60
A39	68	A3K	68

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As a result of the deformation, aging and load of the flexible element during normal operation, cracks may get formed that are permissible in our natural rubber elements up to a certain limit (Figure 3 and Figure 4). Surface cracks in the flexible element of a RATO DS / RATO DS+ coupling are permissible, if these cracks occur on both sides of the entire rubber surface up to a depth as mentioned (Figure 4, depth **Y**). With defined cracks predominantly on one side of the entire rubber surface up to a depth as mentioned (Figure 3 **X**). If the permissible influenced area as a combination of the mentioned cracks is exceeded, it is recommended to replace the flexible element as soon as possible.

### PERMISSIBLE DEPTHS OF CRACKS

Size	X [mm]	Y [mm]	Size	X [mm]	Y [mm]
A21	4	2	A2B	4	2
A23	4	2	A2D	4	2
A25	6	3	A2F	6	3
A27	6	3	A2H	6	3
A29	6	3	A2K	6	3
A31	6	3	A3B	6	3
A33	6	3	A3D	6	3
A34	8	4	A3E	8	4
A39	8	4	A3K	8	4

Figure 3



Figure 4

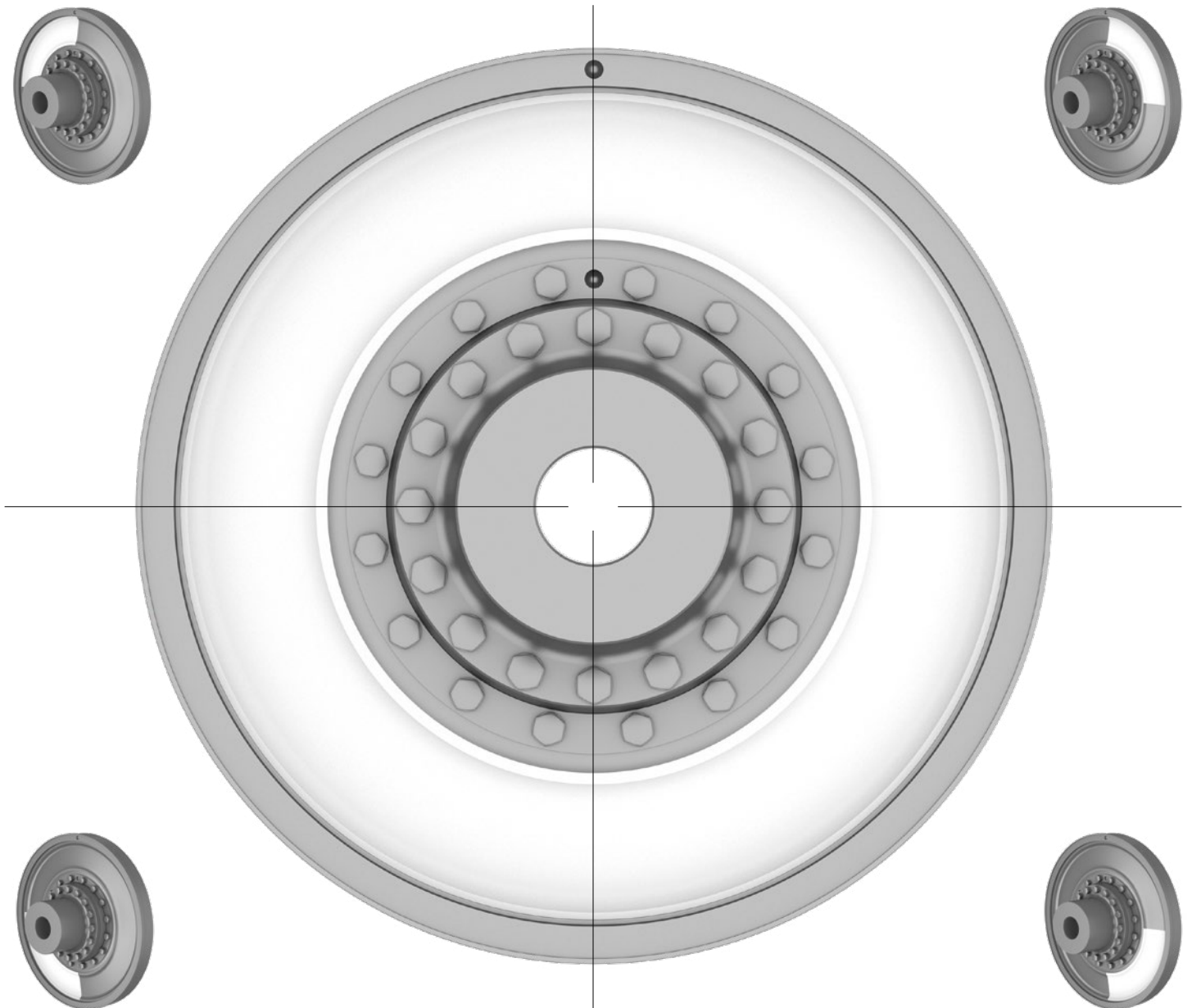


# RATO DS / RATO DS+

## ELEMENT INSPECTION SHEET

Vessel:		Coupling:		Size:	
Date:	Location:	Comm-Nr.:		Permanent set:	
Running Hours:	Engine:	Engine < <input type="checkbox"/> > Gearbox < <input type="checkbox"/> > Shaft Generator			
Power:	Speed:	<input type="checkbox"/> Row 1	<input type="checkbox"/> Row 2	<input type="checkbox"/> Row 3	<input type="checkbox"/> Row 4

FRONT SIDE



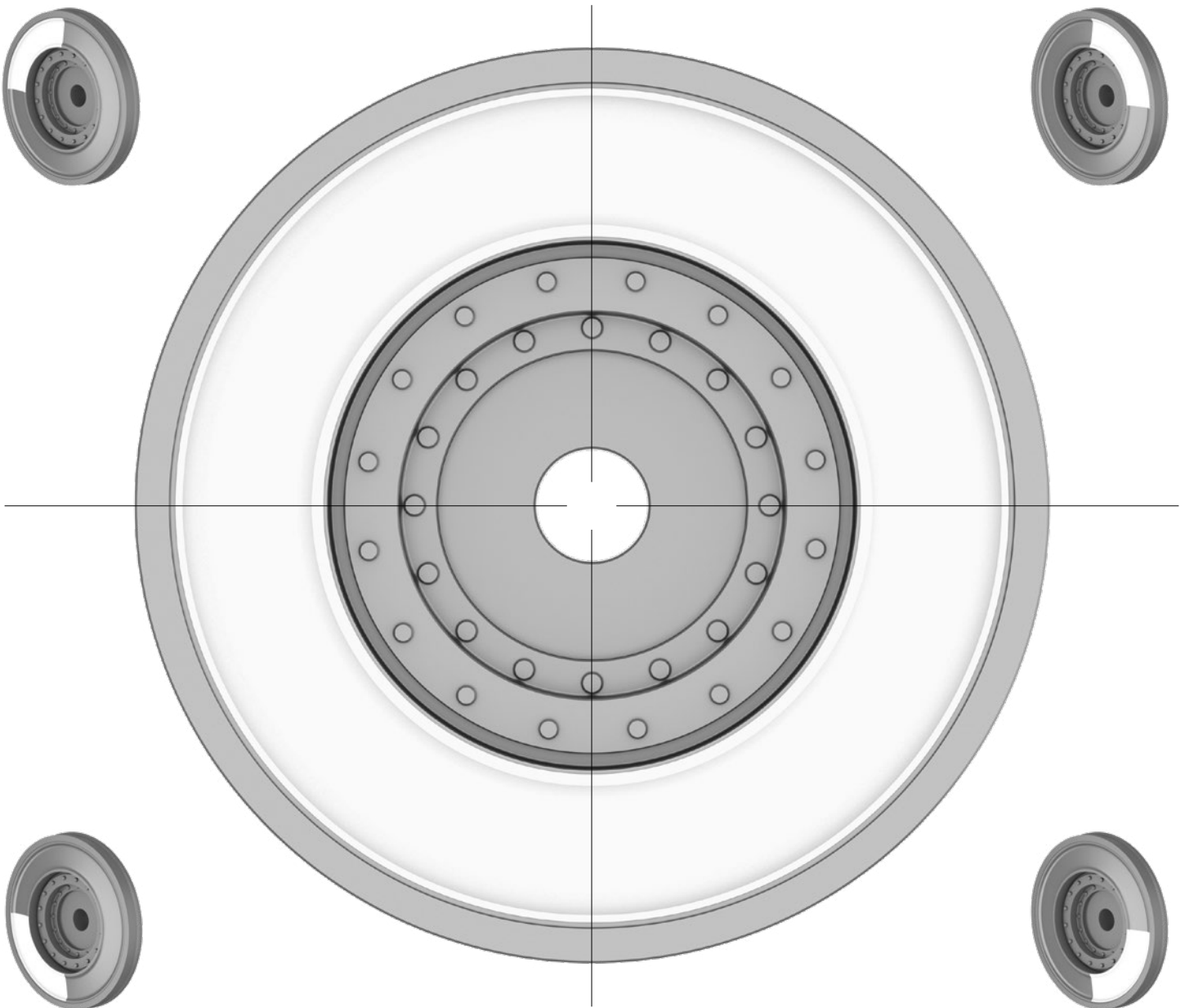
Please make a sketch of the cracks on the shown segments. Use one sheet for one element side. Mark the cracks with "length / depth" if possible.

# RATO DS / RATO DS+

## ELEMENT INSPECTION SHEET

Vessel:		Coupling:	Size:
Date:	Location:	Comm-Nr.:	Permanent set:
Running Hours:	Engine:	Engine < <input type="checkbox"/> > Gearbox < <input type="checkbox"/> > Shaft Generator	
Power:	Speed:	<input type="checkbox"/> Row 1	<input type="checkbox"/> Row 2 <input type="checkbox"/> Row 3 <input type="checkbox"/> Row 4

### BACK SIDE



Please make a sketch of the cracks on the shown segments. Use one sheet for one element side. Mark the cracks with "length / depth" if possible.