

# RATO R / RATO R+

## 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.



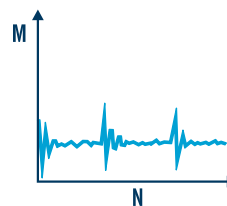
Coupling	Natural Rubber		Silicon	
RATO R	50,000 h	10 years	-	-
RATO R+	50,000 h	10 years	-	-



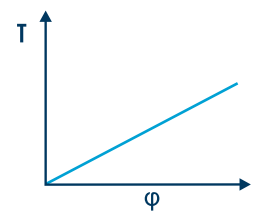
10 years service life



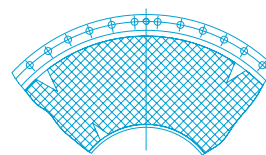
50,000 operation hours



Dynamic characteristic



Static twist angle



Tearing

# RATO R / RATO R+

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Checking the permissible permanent set of a RATO R / RATO R+ element takes place by obtaining **S** at the outer diameter of the rubber element. Therefore, see (Figure 1 and Figure 2). In case the maximum value is reached, the flexible element has to be replaced.

Figure 1

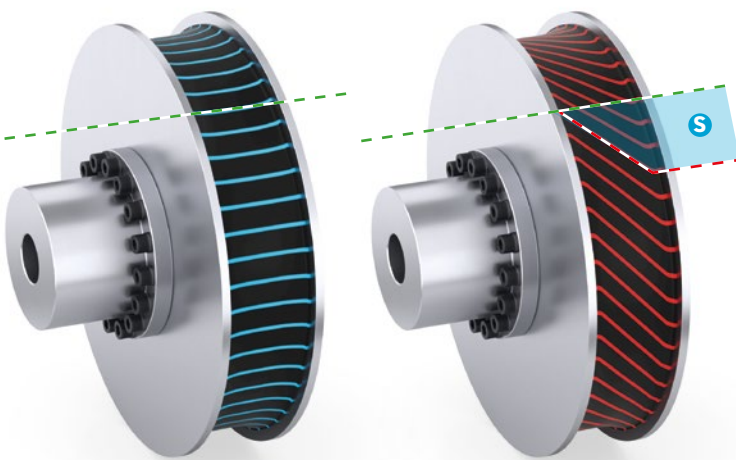
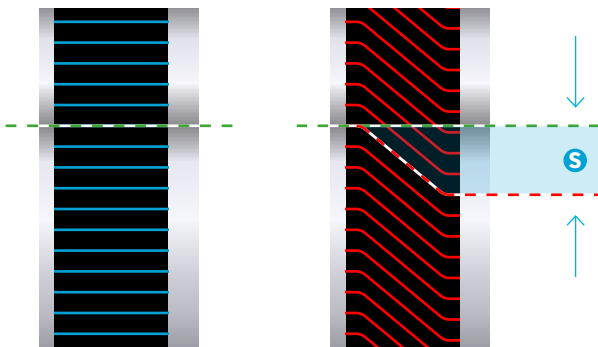


Figure 2



### PERMISSIBLE PERMANENT SET RATO R

Size	S [mm]	Size	S [mm]
G16	24	G31	45
G17	25	G32	54
G19	27	G33	54
G21	30	G33 narrow	32
G23	32	G34 narrow	34
G24 narrow	17	G35	35
G25	35	G38 narrow	41
G26	38	G39	68
G27	38	G40	67
G27 narrow	25	G47	74
G29	26		

### PERMISSIBLE PERMANENT SET RATO R+

Size	S [mm]	Size	S [mm]
G2D	31	G4A	64
G2F	35	G4EP	23
G2G	38	G4E	66
G3B	45	G5BP	27
G3C	53	G5B	74
G3E	34		

# RATO R / RATO R+

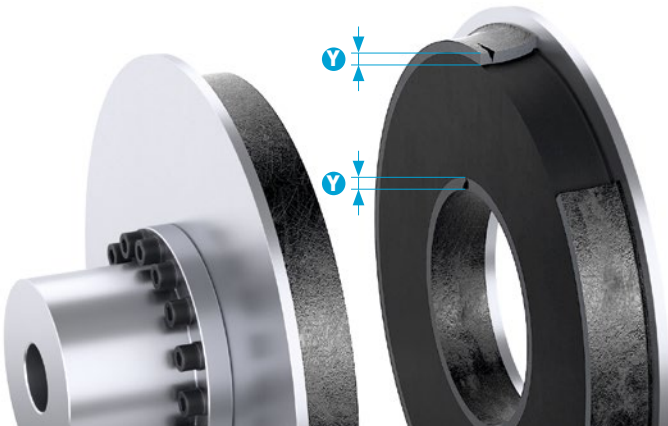
## SERVICE LIFE OF HIGHLY FLEXIBLE COUPLINGS

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 R / RATO R+ coupling are permissible, if these cracks occur on the entire rubber surface up to a depth as mentioned (Figure 4, depth **Y**). With defined cracks predominantly in the outer rubber surface, the maximum allowed length and depth is mentioned in the table (Figure 3, depth **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.

Figure 3



Figure 4



### PERMISSIBLE DEPTHS OF CRACKS RATO R

Size	X [mm]	Y [mm]	Size	X [mm]	Y [mm]
G16	10	6	G31	19	11
G17	11	6	G32	20	12
G19	12	7	G33	20	12
G21	13	7	G33 narrow	20	12
G23	14	8	G34 narrow	23	13
G24 narrow	15	9	G35	22	13
G25	15	9	G38 narrow	26	15
G26	16	9	G39	26	15
G27	16	9	G40	26	15
G27 narrow	16	10	G47	30	18
G29	18	10			

### PERMISSIBLE DEPTHS OF CRACKS RATO R+

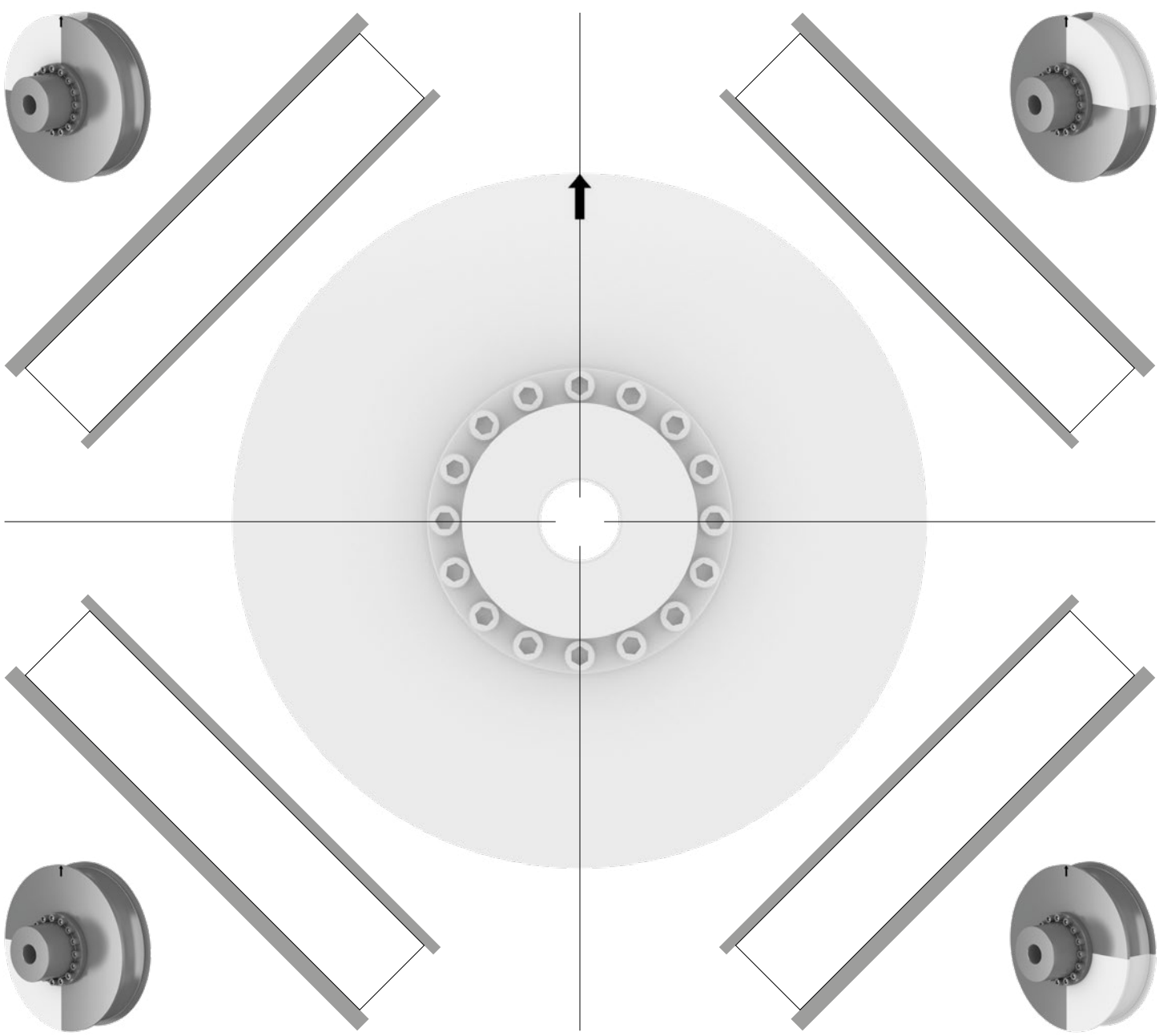
Size	X [mm]	Y [mm]	Size	X [mm]	Y [mm]
G2D	15	9	G4A	28	16
G2F	16	9	G4EP	29	17
G2G	17	10	G4E	28	16
G3B	20	12	G5BP	34	20
G3C	21	12	G5B	32	19
G3E	24	14	G5HP	38	22
			G5H	35	21

# RATO R / RATO R+

## ELEMENT INSPECTION SHEET

Vessel:	
Date:	Location:
Running Hours:	Engine:
Power:	Speed:

Coupling:	Size:		
Comm-Nr.:	Permanent set:		
Engine < <input type="checkbox"/> > Gearbox < <input type="checkbox"/> > Shaft Generator			
<input type="checkbox"/> Row 1	<input type="checkbox"/> Row 2	<input type="checkbox"/> Row 3	<input type="checkbox"/> Row 4



Please define a top position. Make a sketch of the cracks on the shown elements. Use one sheet for one row. Mark the cracks with "length / depth" if possible.