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 S	50,000 h	10 years	-	-
RATO S+	50,000 h	10 years	-	-



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Checking the permissible permanent set of a RATO S / RATO S + segment 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



Size S [mm] Size S [mm] G 0310 50 G 3610 52 G 0510 G 3710 60 55 G 0810 G 3810 72 85 G 1210 G 3910 17 56 G 1310 G 4010 19 55 G 1410 20 G 4310 58 G 1510 21 G 4410 57 G 1610 23 G 4510 101 G 1710 25 G 4610 30 G 1810 53 G 4710 77 G 1910 G 4810 26 73 G 2010 G 4910 58 31 G 2110 29 G 5010 76 G 2210 G 5110 78 62 G 2310 30 G 5310 121 G 2410 G 5410 68 32 G 2510 33 G 5510 84 G 2610 72 G 5610 83 G 2710 33 G 5720 90 G 2810 78 G 5810 74 G 2910 G 6010 36 38 G 6210 G 3010 40 91 G 6310 G 3110 41 91 G 3210 44 G 6510 42 G 3310 G 6810 108 42 G 3410 45 G 7010 45 G 3510 G 7310 46 113

PERMISSIBLE PERMANENT SET RATO S

PERMISSIBLE PERMANENT SET RATO S+

Size	S [mm]	Size	S [mm]
G 4J10	73	G 5G10	83
G 5B10	78		

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SERVICE LIFE - RATO S / S+

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). Depending on size, visual shape, age and location of cracks a rework by grinding and coating could be recommended in order to extend the total lifetime. Surface cracks in the flexible element of a RATO S / RATO S+ coupling are permissible, if these cracks occur on all sides of the entire rubber surface up to a depth as mentioned (Figure 3, depth O). With defined cracks predominantly in the outer rubber surface, the segment faces and segment corners the maximum allowed length and depth is mentioned in the table (Figure 4, depth O, O). 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 RATO S

Size	X [mm]	Y [mm]	Z [mm]	Size	X [mm]	Y [mm]	Z [mm]
G 0310	9	16	42	G 3610	14	23	62
G 0510	11	19	49	G 3710	14	23	62
G 0810	13	22	57	G 3810	15	25	67
G 1210	4	7	19	G 3910	15	25	66
G 1310	5	8	21	G 4010	15	25	66
G 1410	5	9	23	G 4310	16	27	72
G 1510	5	9	25	G 4410	16	27	72
G 1610	6	10	27	G 4510	17	29	78
G 1710	6	11	29	G 4610	17	29	78
G 1810	7	12	31	G 4710	17	29	78
G 1910	7	12	31	G 4810	17	29	78
G 2010	7	13	33	G 4910	19	32	84
G 2110	7	13	33	G 5010	19	32	84
G 2210	8	14	36	G 5110	19	32	84
G 2310	8	14	36	G 5310	20	34	91
G 2410	9	15	39	G 5410	20	34	90
G 2510	9	15	39	G 5510	20	34	90
G 2610	9	16	42	G 5610	20	34	90
G 2710	9	16	42	G 5720	21	36	96
G 2810	10	17	45	G 5810	22	37	98
G 2910	10	17	45	G 6010	22	37	98
G 3010	11	19	49	G 6210	23	39	104
G 3110	11	19	49	G 6310	23	39	104
G 3210	12	20	53	G 6510	24	40	106
G 3310	12	20	53	G 6810	25	42	112
G 3410	13	22	57	G 7010	25	43	114
G 3510	13	22	57	G 7310	28	48	126

PERMISSIBLE DEPTHS OF CRACKS RATO S+

Size	X [mm]	Y [mm]	Z [mm]	Size	X [mm]	Y [mm]	Z [mm]
G 4J10	17	29	78	G 5G10	20	34	90
G 5B10	19	32	84				

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SEGMENT INSPECTION SHEET

Vessel:		Coupling:		Size:				
Date:	Location:	Comm-Nr.:		:				
Running Hours:	Running Hours: Engine:			Engine $<$ \bigcirc $>$ Gearbox $<$ \bigcirc $>$ Shaft Generator				
Power:	Speed:	Row 1	Row 2	Row 3	Row 4			
Segm	ent no: /		Segr	ment no: _ /				
	Soo Soo			1 00 1				
Segm	ent no: /		Segr	ment no: _ /				
				100				

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

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