Cone Clamping Elements RLK 136 TC

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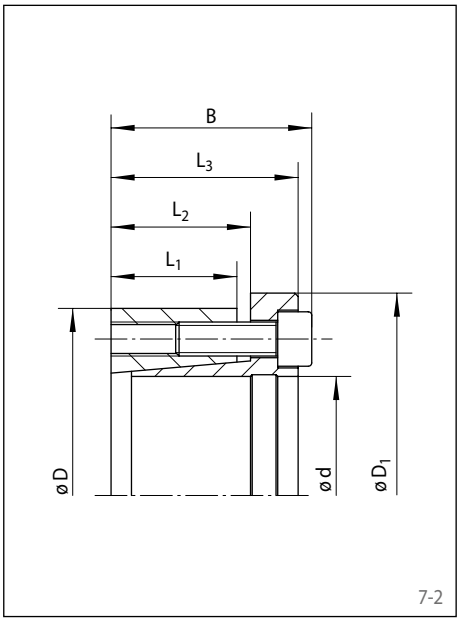
for high bending moments
premium quality for high centering accuracy

7-1



7-2

Dimensions							Technical Data												Article number
Size							Transmissible torque or axial force		Bending moments		Contact pressure at		Pressure at M_b max		Clamping screws				Weight	
											Shaft	Hub	Shaft	Hub	Tightening torque	Number	Size	Length		
d	D	D_1	B	L_1	L_2	L_3	M	F	M_b max	M_t res at M_b max	P_W	P_N	P_W	P_N	M_S					
mm	mm	mm	mm	mm	mm	mm	Nm	kN			N/mm²	N/mm²	N/mm²	N/mm²	Nm			mm	kg	
70	110	119	61	37	43	57	6800	195	3100	6100	200	127	254	162	83	12	M10	30	2,5	4204-070601-TC0000
75	115	124	61	37	43	57	7300	195	3300	6500	187	122	241	157	83	12	M10	30	2,6	4204-075601-TC0000
90	130	139	61	37	43	57	10300	228	4600	9200	181	126	244	169	83	14	M10	30	3,0	4204-090601-TC0000
100	150	159	69	40	46	64	16500	331	7400	14700	219	146	297	198	144	14	M12	40	4,7	4204-100601-TC0000
110	160	169	69	40	46	64	18200	331	8200	16200	199	137	277	191	144	14	M12	40	5,1	4204-110601-TC0000
120	170	179	69	40	46	64	22700	378	10200	20300	209	147	298	210	144	16	M12	40	5,4	4204-120601-TC0000
130	185	194	82	48	55	75	33800	521	15200	30200	221	156	307	216	229	16	M14	40	7,5	4204-130601-TC0000
140	195	204	82	48	55	75	36400	521	16400	32500	206	148	291	209	229	16	M14	40	8,8	4204-140601-TC0000
150	205	214	82	48	55	75	43900	586	19500	39300	216	158	311	227	229	18	M14	40	8,6	4204-150601-TC0000
160	215	224	82	48	55	75	46900	586	21100	41900	202	151	298	222	229	18	M14	40	8,9	4204-160601-TC0000
170	230	239	99	64	71	93	67900	798	30500	60700	195	144	268	198	354	18	M16	50	12,7	4204-170601-TC0000
180	240	249	99	64	71	93	71800	798	32300	64100	184	138	257	193	354	18	M16	50	13,3	4204-180601-TC0000
190	250	259	99	64	71	93	84300	887	37900	75300	193	147	275	209	354	20	M16	50	13,9	4204-190601-TC0000
200	260	269	99	64	71	93	88700	887	39900	79200	184	141	266	204	354	20	M16	50	14,6	4204-200601-TC0000
220	285	294	102	66	74	96	97600	887	43900	87200	162	125	239	184	354	20	M16	50	17,8	4204-220601-TC0000
240	305	314	102	66	74	96	127700	1064	57500	114000	178	140	271	213	354	24	M16	50	19,2	4204-240601-TC0000
260	325	334	102	66	74	96	149900	1153	67500	133800	178	143	278	223	354	26	M16	50	19,5	4204-260601-TC0000
280	355	364	120	77	87	112	182200	1302	82000	162700	160	126	243	192	492	24	M18	60	19,7	4204-280601-TC0000
300	375	384	120	77	87	112	211500	1410	95200	188900	162	130	252	201	492	26	M18	60	30,6	4204-300601-TC0000
320	405	414	130	84	94	122	264600	1654	119100	236300	163	129	252	199	692	24	M20	60	42,7	4204-320601-TC0000
340	425	434	130	84	94	122	328000	1930	147600	292900	179	143	283	226	692	28	M20	60	44,9	4204-340601-TC0000
360	445	454	141	91	101	133	372100	2067	167500	332300	167	135	262	212	692	30	M20	60	52,4	4204-360601-TC0000
380	465	474	141	91	101	133	419000	2205	188600	374200	169	138	270	221	692	32	M20	60	54,0	4204-380601-TC0000
400	485	494	141	90	101	133	468600	2343	189800	428400	173	142	271	224	692	34	M20	60	56,2	4204-400601-TC0000
420	505	514	141	90	101	133	492100	2343	221400	439500	164	137	274	228	692	34	M20	60	59,2	4204-420601-TC0000
440	525	534	155	103	115	147	545800	2481	245600	487400	145	122	234	196	692	36	M20	60	70,6	4204-440601-TC0000
460	545	554	155	103	115	147	602300	2619	271000	537900	147	124	240	203	692	38	M20	60	71,2	4204-460601-TC0000
480	565	574	155	103	115	147	628500	2619	282800	561300	141	119	234	199	692	38	M20	60	75,1	4204-480601-TC0000
500	585	594	160	107	120	152	689200	2757	310100	615500	137	117	228	195	692	40	M20	60	79,9	4204-500601-TC0000
520	605	614	160	107	120	152	716700	2757	322500	640000	131	113	222	191	692	40	M20	60	80,5	4204-520601-TC0000
540	625	634	160	107	120	152	781500	2894	340000	703700	133	115	225	195	692	42	M20	60	82,8	4204-540601-TC0000
560	645	654	160	107	120	152	849000	3032	360000	768900	134	117	229	198	692	44	M20	60	85,7	4204-560601-TC0000
580	665	674	160	107	120	152	919300	3170	379000	837500	135	118	231	202	692	46	M20	60	89,0	4204-580601-TC0000
600	685	694	160	107	120	152	992400	3308	395000	910400	137	120	233	204	692	48	M20	60	91,3	4204-600601-TC0000

The technical data provided are based on theoretical calculations and the specified screw tightening torques.

Hub design

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Hub arrangement

For Cone Clamping Elements with a fixed backstop point, the hub must be positioned as shown in figure 14-1.

For Cone Clamping Elements without a fixed backstop point, the hub must be positioned as shown in figure 14-2. In this case, it is assumed for practical purposes that the screw heads of the Cone Clamping Element are flush with the hub on one side

Required hub width

The hub width N_A used in the application must not be smaller than the load-bearing hub width L_1.

Required hub outer diameter

The hub outer diameter K_A used in the application must not be smaller than the required hub outer diameter K_{min}. The required hub outer diameter K_{min} can be calculated approximately using the hub width N_A used in the application and the corresponding yield strength R_e of the hub material as follows:

$$K_{min} = 1{,}2 \cdot D \cdot \frac{H - 1{,}25}{H - 3}$$

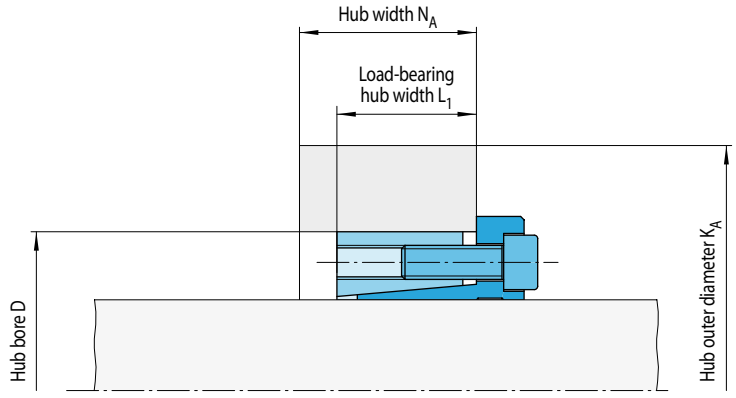
$$\text{with } H = \left(\frac{R_e}{1{,}27 \cdot P_N} \cdot \frac{N_A}{L_T} \right)^2$$

Required yield strength of the hub material

For a given hub width N_A and a given hub outside diameter K_A, the yield strength R_e of the hub material must be greater than the equivalent stress σ_v in the hub.

$$\sigma_v = 1{,}27 \cdot P_N \cdot \frac{L_T}{N_A} \cdot \sqrt{\frac{3 + C_N^4}{1 - C_N^2}}$$

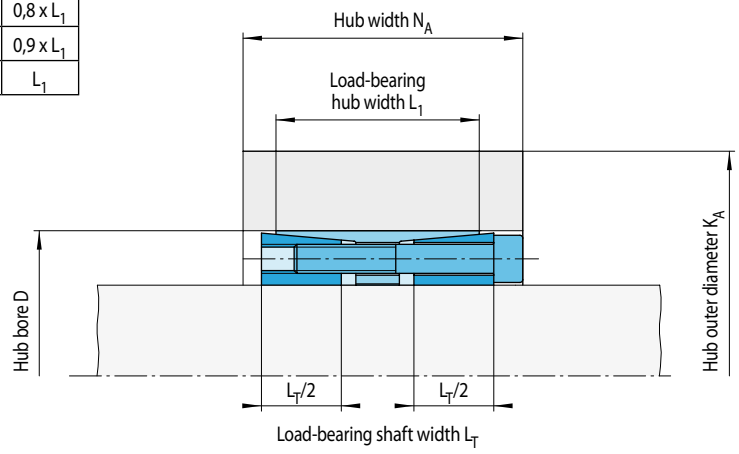
$$\text{with } C_N = \frac{D}{K_A}$$



Hub arrangement for Cone Clamping Elements with a fixed backstop point (shown here as RLK 136 TC)

14-1

Series	L_T
RLK 402	0,8 x L_1
RLK 404	0,9 x L_1
other	L_1



Hub arrangement for Cone Clamping Elements without a fixed backstop point (shown here as RLK 402)

14-2

Formula symbols

C_N = Auxiliary value without unit

D = Hub bore according to table [mm]

H = Auxiliary value without unit

K_A = Hub outer diameter used in the application [mm]

K_{min} = Required hub outer diameter according to calculation [mm]

L_1 = Load-bearing axial hub width according to table [mm]

L_T = Load-bearing shaft width [mm]

N_A = Hub width used in the application [mm]

P_N = Contact pressure at the hub according to table [N/mm²]

R_e = Hub material yield strength [N/mm²]

σ_v = Equivalent stress in the hub [N/mm²]

Torques and axial forces

Clamping screw tightening torque

The tightening torque M_S listed in the tables must be achieved during assembly and must not be exceeded by more than 10%. If the indicated tightening torque M_S is not achieved, the transmissible torque or axial force, as well as the contact pressures at the shaft and at the hub will be proportionally reduced compared to the values listed in the tables for M or F as well as for P_W and P_N. When the indicated tightening torque M_S is undercut by more than 30%, please contact us.

Simultaneous transmission of torque and axial force

The transmissible torques M which are shown in the tables apply for axial forces F = 0 kN and conversely, the indicated axial forces F apply to torques M = 0 Nm. If torque and axial force are to be transmitted simultaneously, the transmissible torque and the transmissible axial force are reduced compared to the values listed in the tables for M and F.

For a given axial force F_A, the reduced torque M_{red} is calculated as:

$$M_{red} = \sqrt{M^2 - (F_A \cdot \frac{d}{2})^2}$$

For a given torque M_A, the reduced axial force F_{red} is calculated as:

$$F_{red} = \frac{2}{d} \sqrt{M^2 - M_A{}^2}$$

Design of shaft and hub

The transmissible torques or axial forces listed are subject to the following tolerances, surface characteristics and material requirements. Please contact us in the case of deviations.

Tolerances

- h8 for shaft diameter d
- H8 for hub bore D

Surfaces

Average surface roughness at the contact surfaces between the shaft and the hub bore: R_z = 10 … 25 µm.

Materials

The following apply to the shaft and the hub:

- E-module ≥ 170 kN/mm²

Installation

Please request our installation and operating instructions Cone Clamping Elements.

Formula symbols

d	=	Shaft diameter according to table [mm]
F	=	Transmissible axial force according to table [kN]
F_A	=	Maximum actual application axial force [kN]
F_{red}	=	Reduced axial force [kN]
M	=	Transmissible torque according to table [Nm]
M_A	=	Maximum actual application torque [Nm]
M_{red}	=	Reduced torque [Nm]
M_S	=	Screw tightening torque according to table [Nm]
P_N	=	Contact pressure at the hub according to table [N/mm²]
P_W	=	Contact pressure at the shaft according to table [N/mm²]