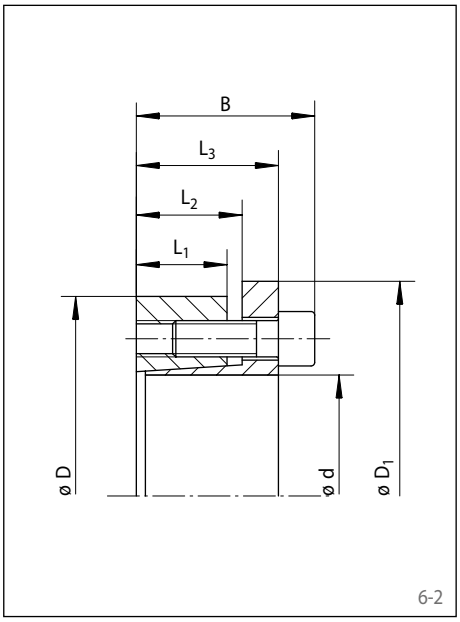
Cone Clamping Elements RLK 133 TC

RINGSPANN®

for medium bending moments
premium quality for high centering accuracy

6-1



6-2

Dimensions							Technical Data												Article number
							Transmissible torque or axial force		Bending moments		Contact pressure at		Pressure at M_b max		Clamping screws				Weight	
Size											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	
130	180	189	64	34	40	52	19500	300	6800	18300	180	130	257	185	144	12	M12	30	5,1	4204-130301-TC0000
140	190	199	68	34	40	54	21700	311	7600	20400	173	128	252	186	229	9	M14	40	5,3	4204-140301-TC0000
150	200	209	68	34	40	54	25900	345	9100	24200	180	135	267	200	229	10	M14	40	5,6	4204-150301-TC0000
160	210	219	68	34	40	54	30400	380	10600	28500	185	141	282	215	229	11	M14	40	6,0	4204-160301-TC0000
170	225	234	78	44	50	64	35200	414	12300	33000	147	111	210	158	229	12	M14	40	8,2	4204-170301-TC0000
180	235	244	78	44	50	64	37300	414	13000	34900	139	106	202	154	229	12	M14	40	8,6	4204-180301-TC0000
190	250	259	78	44	50	64	49200	518	17200	46100	164	125	243	185	229	15	M14	40	10,0	4204-190301-TC0000
200	260	269	78	44	50	64	51800	518	18100	48500	156	120	235	181	229	15	M14	40	10,4	4204-200301-TC0000
220	285	294	88	50	56	72	62100	564	21700	58200	136	105	202	156	354	12	M16	40	13,9	4204-220301-TC0000
240	305	314	88	50	56	72	84700	706	29600	79300	156	123	239	188	354	15	M16	40	14,8	4204-240301-TC0000
260	325	334	88	50	56	72	110100	847	37800	103400	173	138	270	216	354	18	M16	40	16,1	4204-260301-TC0000
280	355	364	102	60	66	84	128900	920	45100	120700	145	115	220	174	492	16	M18	50	23,6	4204-280301-TC0000
300	375	384	102	60	66	84	155300	1035	54400	145500	153	122	237	190	492	18	M18	50	25,7	4204-300301-TC0000
320	405	414	121	74	81	101	210500	1316	73700	197200	147	116	218	172	692	18	M20	50	36,1	4204-320301-TC0000
340	425	434	121	74	81	101	260900	1535	91300	244400	162	129	244	195	692	21	M20	50	38,3	4204-340301-TC0000
360	455	464	138	86	94	116	297100	1651	104000	278300	141	112	207	164	945	18	M22	60	52,5	4204-360301-TC0000
380	475	484	138	86	94	116	365900	1926	128100	342700	156	125	233	186	945	21	M22	60	55,0	4204-380301-TC0000
400	495	504	138	86	94	116	385100	1926	134800	360800	148	120	225	182	945	21	M22	60	60,3	4204-400301-TC0000
420	515	524	138	86	94	116	423700	2017	148300	396800	148	121	228	186	945	22	M22	60	62,9	4204-420301-TC0000
440	535	544	138	86	94	116	443800	2017	155300	415800	141	116	222	182	945	22	M22	60	65,6	4204-440301-TC0000
460	555	564	138	86	94	116	464000	2017	152000	438400	135	112	210	174	945	22	M22	60	68,3	4204-460301-TC0000
480	575	584	138	86	94	116	528200	2201	174000	498700	141	118	224	187	945	24	M22	60	71,0	4204-480301-TC0000
500	595	604	138	86	94	116	550200	2201	181000	519600	136	114	218	183	945	24	M22	60	73,7	4204-500301-TC0000
520	615	624	138	86	94	116	572200	2201	185000	541500	131	110	211	179	945	24	M22	60	75,9	4204-520301-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:

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

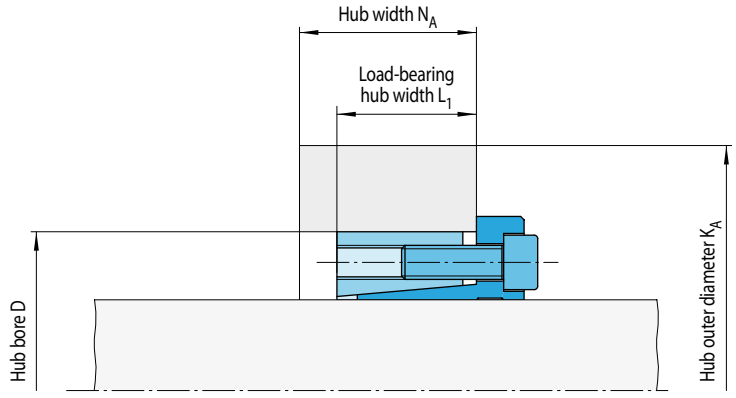
$$\text{with } H = \left(\frac{R_e}{1{,}27 \cdot P_N} \cdot \frac{N_A}{L_T} \right)^2$$

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.

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

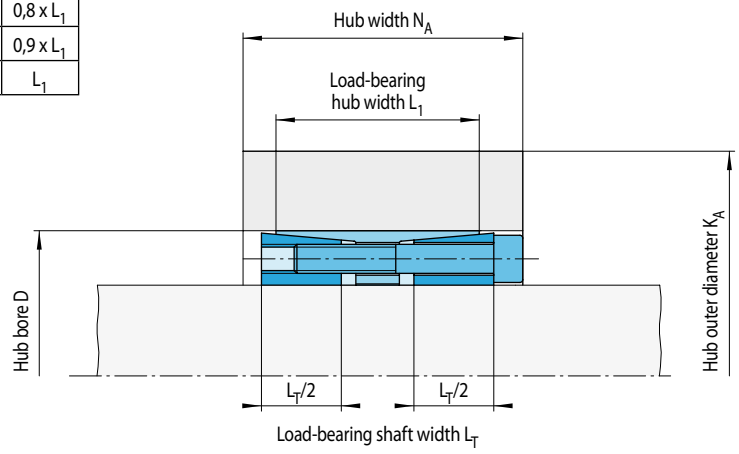
$$\text{with } C_N = \frac{D}{K_A}$$



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]