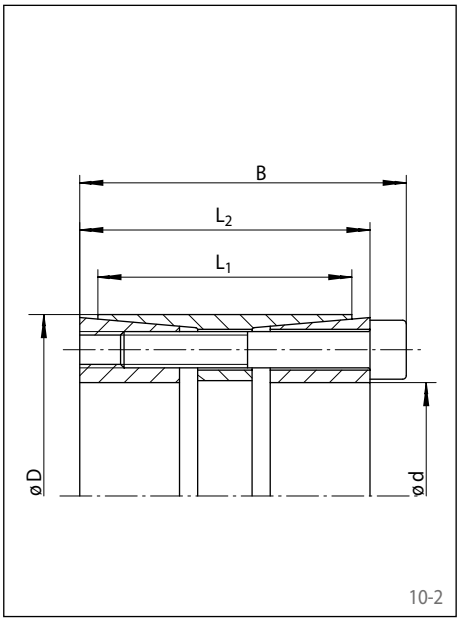
Cone Clamping Elements RLK 402 TC

RINGSPANN®

for highest bending moments
premium quality for high centering accuracy

10-1



10-2

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	B	L1	L2	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	Nm	kN			N/mm²	N/mm²	N/mm²	N/mm²	Nm			mm	kg	
130	180	130	104	116	50980	784	33140	38740	170	123	206	149	229	12	M14	90	9,7	4205-130201-TC0000
140	190	130	104	116	64050	915	41630	48670	184	136	226	167	229	14	M14	90	10,2	4205-140201-TC0000
150	200	130	104	116	78430	1046	50980	59600	197	148	245	183	229	15	M14	90	10,2	4205-150201-TC0000
160	210	130	104	116	83660	1046	54380	63570	184	141	232	177	229	16	M14	90	11,4	4205-160201-TC0000
170	225	162	134	146	106510	1253	69230	80940	166	125	202	152	354	14	M16	110	17,1	4205-170201-TC0000
180	235	162	134	146	128890	1432	83780	97940	179	137	220	169	354	15	M16	110	18,0	4205-180201-TC0000
190	250	162	134	146	136050	1432	88430	103390	167	127	208	158	354	16	M16	110	20,8	4205-190201-TC0000
200	260	162	134	146	143210	1432	93080	108830	158	122	200	153	354	16	M16	110	21,9	4205-200201-TC0000
220	285	162	134	146	196910	1790	127990	149640	180	139	231	179	354	18	M16	110	25,5	4205-220201-TC0000
240	305	162	134	146	236290	1969	153600	179570	181	143	238	187	354	20	M16	110	27,9	4205-240201-TC0000
260	325	162	134	146	255980	1969	166400	194530	167	134	224	179	354	20	M16	110	30,3	4205-260201-TC0000
280	355	197	165	177	350500	2504	227800	266350	164	129	213	168	692	18	M20	140	45,6	4205-280201-TC0000
300	375	197	165	177	417260	2782	271200	317090	170	136	224	179	692	20	M20	140	50,7	4205-300201-TC0000
320	405	197	165	177	467330	2921	256800	390430	167	132	215	170	692	21	M20	140	66,5	4205-320201-TC0000
340	425	197	165	177	520180	3060	320700	409580	165	132	221	177	692	22	M20	140	63,8	4205-340201-TC0000
360	455	224	190	202	659610	3665	428700	501260	161	128	216	171	945	21	M22	160	79,8	4205-360201-TC0000
380	475	224	190	202	729410	3839	474100	554310	160	128	217	174	945	22	M22	160	79,8	4205-380201-TC0000
400	495	224	190	202	837600	4188	412300	729110	166	134	213	172	945	24	M22	160	91,0	4205-400201-TC0000
420	515	224	190	202	879480	4188	571700	668350	158	129	220	179	945	24	M22	160	92,1	4205-420201-TC0000
440	535	224	190	202	921360	4188	598900	700180	151	124	213	175	945	24	M22	160	96,6	4205-440201-TC0000
460	555	224	190	202	963240	4188	626100	732000	144	120	206	171	945	24	M22	160	103,2	4205-460201-TC0000
480	575	224	190	202	1172650	4886	612400	1000040	161	135	219	183	945	28	M22	160	108,4	4205-480201-TC0000
500	595	224	190	202	1221510	4886	794000	928260	155	130	227	191	945	28	M22	160	112,5	4205-500201-TC0000
520	615	224	190	202	1361110	5235	708100	1162440	160	135	222	187	945	30	M22	160	117,3	4205-520201-TC0000
540	635	224	190	202	1413460	5235	918700	1074130	154	131	231	197	945	30	M22	160	121,1	4205-540201-TC0000
560	655	224	190	202	1563530	5584	802200	1342020	158	135	223	191	945	32	M22	160	125,6	4205-560201-TC0000
580	675	224	190	202	1669970	5759	848900	1438090	158	135	224	192	945	33	M22	160	134,1	4205-580201-TC0000
600	695	224	190	202	1727560	5759	1122900	1312830	152	131	237	205	945	33	M22	160	132,9	4205-600201-TC0000

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

Hub design

RINGSPANN®

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:

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

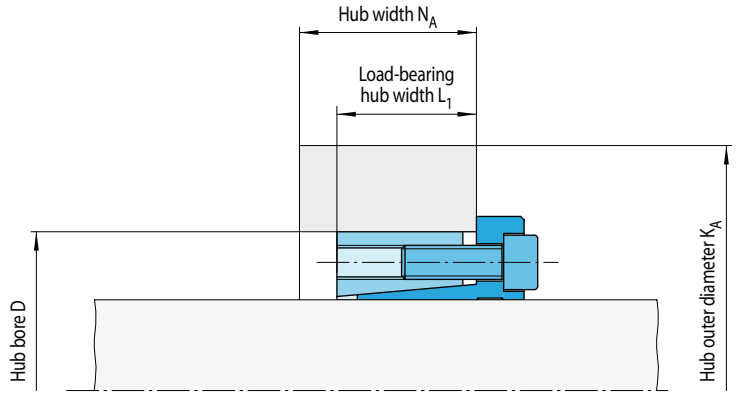
$$\text{with } H = \left(\frac{R_e}{1{,}27 \cdot P_N} \cdot \frac{N_A}{L_T} \right)^2$$

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.

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

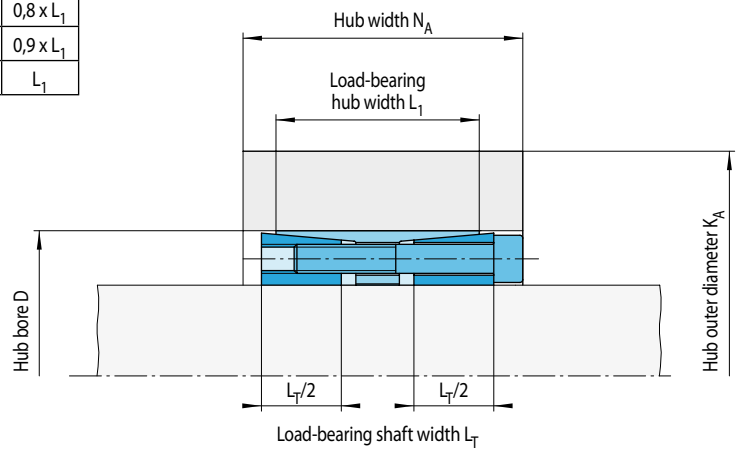
$$\text{with } C_N = \frac{D}{K_A}$$



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]