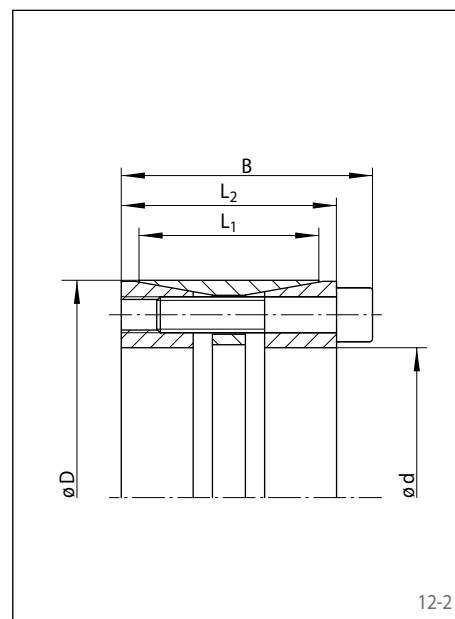


# Cone Clamping Elements RLK 404 TC

for very high bending moments  
premium quality for high centering accuracy



12-1



12-2

Dimensions					Technical Data										Article number			
Size		B mm	L1 mm	L2 mm	Transmissible torque or axial force		Bending moments		Contact pressure at		Pressure at $M_b$ max		Clamping screws		Weight kg			
d mm	D mm				M Nm	F kN	$M_b$ max	$M_{res}$ at $M_b$ max	Shaft $P_W$ N/mm <sup>2</sup>	Hub $P_N$ N/mm <sup>2</sup>	Shaft $P_W$ N/mm <sup>2</sup>	Hub $P_N$ N/mm <sup>2</sup>	Tightening torque $M_S$ Nm	Num-ber			Size	Length mm
100	145	82	60	70	18370	367	11940	13960	199	137	253	175	144	10	M12	60	4,1	4205-100401-TC0000
110	155	82	60	70	20210	367	13140	15360	181	128	235	167	144	10	M12	60	4,5	4205-110401-TC0000
120	165	82	60	70	24250	404	15770	18430	182	133	242	176	144	11	M12	60	5,0	4205-120401-TC0000
130	180	91	65	79	33440	514	21740	25410	198	143	263	190	144	14	M12	65	6,6	4205-130401-TC0000
140	190	91	65	79	38590	551	25080	29320	197	145	267	196	144	15	M12	65	7,1	4205-140401-TC0000
150	200	91	65	79	41340	551	26870	31420	184	138	253	190	144	15	M12	65	7,5	4205-150401-TC0000
160	210	91	65	79	47040	588	30570	35750	184	140	258	197	144	16	M12	65	7,8	4205-160401-TC0000
170	225	106	78	92	64270	756	41770	48840	187	141	253	192	229	15	M14	75	10,8	4205-170401-TC0000
180	235	106	78	92	68050	756	44230	51710	177	135	243	186	229	15	M14	75	11,3	4205-180401-TC0000
190	250	116	88	102	76620	806	49800	58220	154	117	210	159	229	16	M14	80	14,8	4205-190401-TC0000
200	260	116	88	102	90730	907	58970	68950	165	127	227	175	229	18	M14	80	15,7	4205-200401-TC0000
220	285	124	96	108	113900	1035	74030	86550	154	119	214	165	354	15	M16	90	19,9	4205-220401-TC0000
240	305	124	96	108	165670	1381	51340	157510	188	148	226	178	354	20	M16	90	21,5	4205-240401-TC0000
260	325	124	96	108	188450	1450	88820	166200	183	146	243	195	354	21	M16	90	22,8	4205-260401-TC0000
280	355	130	96	110	225260	1609	114000	194280	198	156	270	213	692	15	M20	90	29,0	4205-280401-TC0000
300	375	130	96	110	257440	1716	126000	224500	197	158	272	217	692	15	M20	90	31,2	4205-300401-TC0000
320	405	156	124	136	343250	2145	195160	282370	173	136	238	188	692	20	M20	110	45,9	4205-320401-TC0000
340	425	156	124	136	364700	2145	237060	277150	162	130	237	189	692	20	M20	110	48,3	4205-340401-TC0000
360	455	177	140	155	477330	2652	310270	362740	164	130	236	187	945	20	M22	130	67,9	4205-360401-TC0000
380	475	177	140	155	503850	2652	327500	382890	156	124	228	182	945	20	M22	130	71,4	4205-380401-TC0000
400	495	177	140	155	583410	2917	379220	443350	163	131	242	195	945	22	M22	130	74,5	4205-400401-TC0000
420	515	177	140	155	668270	3182	283650	605080	169	138	225	184	945	24	M22	130	77,8	4205-420401-TC0000
440	535	177	140	155	700090	3182	416560	562680	161	133	240	198	945	24	M22	130	81,4	4205-440401-TC0000
460	555	177	140	155	731910	3182	475740	556200	154	128	241	200	945	24	M22	130	84,1	4205-460401-TC0000
480	575	177	140	155	795560	3315	517110	604570	154	129	244	204	945	25	M22	130	88,0	4205-480401-TC0000
500	595	177	140	155	828700	3315	538660	629760	148	124	238	200	945	25	M22	130	91,6	4205-500401-TC0000
520	615	177	140	155	965270	3713	488260	832680	159	135	238	201	945	28	M22	130	94,1	4205-520401-TC0000
540	635	177	140	155	1002400	3713	589000	811100	153	130	245	208	945	28	M22	130	97,5	4205-540401-TC0000
560	655	177	140	155	1113780	3978	558130	963850	158	135	242	207	945	30	M22	130	100,7	4205-560401-TC0000
580	675	177	140	155	1153560	3978	668750	939930	153	131	249	214	945	30	M22	130	104,2	4205-580401-TC0000
600	695	177	140	155	1193330	3978	759940	920080	148	128	254	219	945	30	M22	130	107,6	4205-600401-TC0000

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

### 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:

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

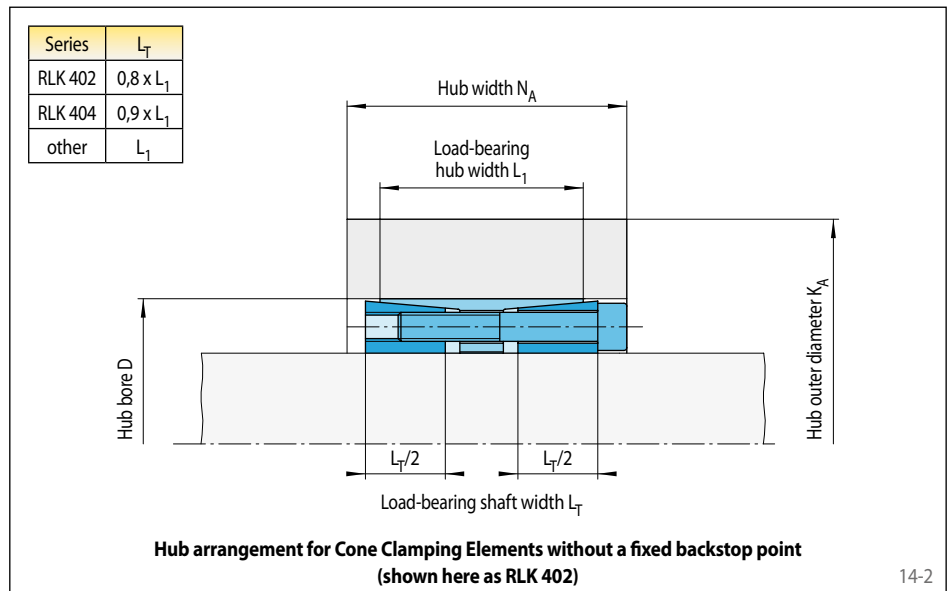
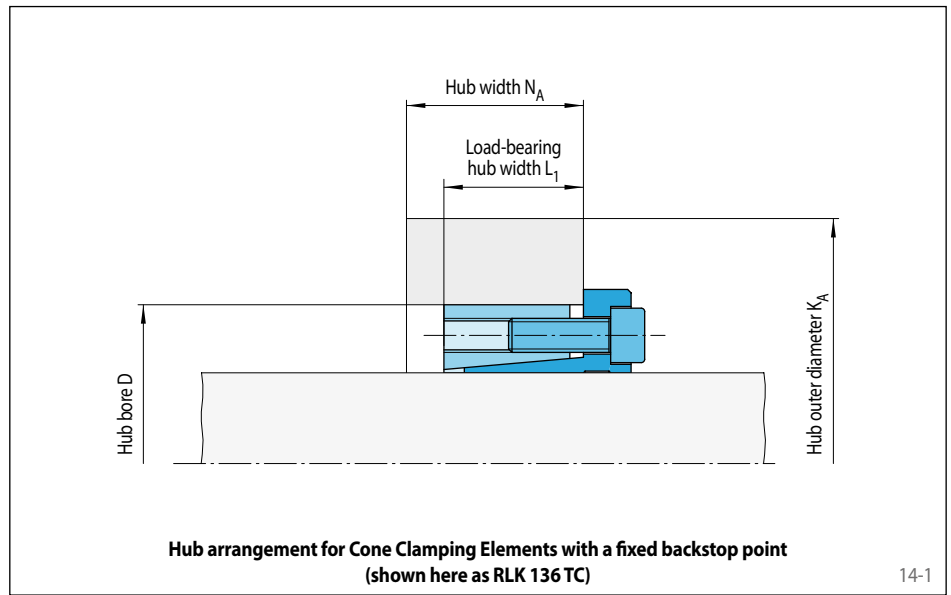
$$\text{with } H = \left( \frac{R_e}{1,27 \cdot P_N} \cdot \frac{N_A}{L_T} \right)^2$$

### 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  $\sigma_v$  in the hub.

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

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



### 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/mm<sup>2</sup>]

$R_e$  = Hub material yield strength [N/mm<sup>2</sup>]

$\sigma_v$  = Equivalent stress in the hub [N/mm<sup>2</sup>]

## 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:  
 $R_z = 10 \dots 25 \mu\text{m}$ .

#### Materials

The following apply to the shaft and the hub:

- E-module  $\geq 170 \text{ kN/mm}^2$

### 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/mm<sup>2</sup>]

$P_W$  = Contact pressure at the shaft according to table [N/mm<sup>2</sup>]