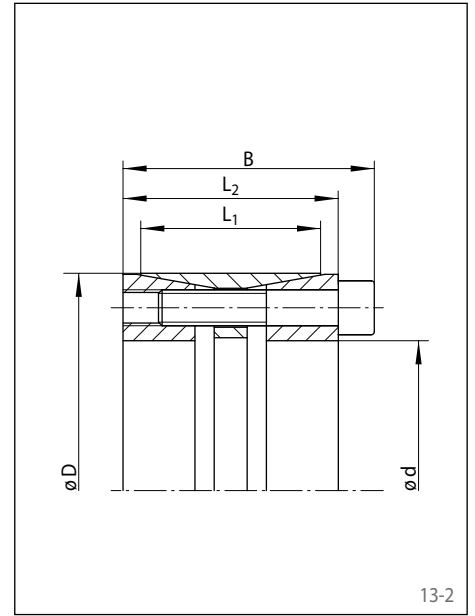


# Cone Clamping Elements RLK 404

for high bending moments



Dimensions					Technical Data										Article number			
Size					Transmissible torque or axial force		Bending moments		Contact pressure at		Pressure at $M_b$ max		Clamping screws		Weight			
d	D	B	L1	L2	M	F	$M_b$ max	$M_t$ res at $M_b$ max	Shaft	Hub	Shaft	Hub	Tightening torque	Number			Size	Length
mm	mm	mm	mm	mm	Nm	kN			$P_W$	$P_N$	$P_W$	$P_N$	$M_5$			mm		
70	110	70	50	60	7060	202	2830	6470	187	119	204	130	83	8	M10	50	2,5	4205-070401-000000
80	120	70	50	60	10090	252	4040	9250	204	136	237	158	83	10	M10	50	2,6	4205-080401-000000
90	130	70	50	60	12490	278	5000	11450	199	138	236	163	83	11	M10	50	2,9	4205-090401-000000
100	145	82	60	70	18370	367	7350	16840	199	137	232	160	144	10	M12	60	4,1	4205-100401-000000
110	155	82	60	70	20210	367	8080	18520	181	128	214	152	144	10	M12	60	4,5	4205-110401-000000
120	165	82	60	70	24250	404	9700	22230	182	133	219	159	144	11	M12	60	5,0	4205-120401-000000
130	180	91	65	79	33440	514	13380	30650	198	143	238	172	144	14	M12	65	6,6	4205-130401-000000
140	190	91	65	79	38590	551	15430	35360	197	145	240	177	144	15	M12	65	7,1	4205-140401-000000
150	200	91	65	79	41340	551	16540	37890	184	138	227	170	144	15	M12	65	7,5	4205-150401-000000
160	210	91	65	79	47040	588	18820	43110	184	140	230	175	144	16	M12	65	7,8	4205-160401-000000
170	225	106	78	92	64270	756	25710	58900	187	141	228	172	229	15	M14	75	10,8	4205-170401-000000
180	235	106	78	92	68050	756	27220	62370	177	135	218	167	229	15	M14	75	11,3	4205-180401-000000
190	250	116	88	102	76620	806	30650	70220	154	117	188	143	229	16	M14	80	14,8	4205-190401-000000
200	260	116	88	102	90730	907	36290	83150	165	127	203	156	229	18	M14	80	15,7	4205-200401-000000
220	285	124	96	108	113900	1035	45560	104390	154	119	191	147	354	15	M16	90	19,9	4205-220401-000000
240	305	124	96	108	165670	1381	51340	157510	188	148	226	178	354	20	M16	90	21,5	4205-240401-000000
260	325	124	96	108	188450	1450	69720	175070	183	146	230	184	354	21	M16	90	22,8	4205-260401-000000
280	355	130	96	110	225260	1609	83350	209270	198	156	251	198	692	15	M20	90	29,0	4205-280401-000000
300	375	130	96	110	257440	1716	95250	239170	197	158	254	203	692	15	M20	90	31,2	4205-300401-000000
320	405	156	124	136	343250	2145	137300	314590	173	136	218	173	692	20	M20	110	45,9	4205-320401-000000
340	425	156	124	136	364700	2145	145880	334260	162	130	208	167	692	20	M20	110	48,3	4205-340401-000000
360	455	177	140	155	477330	2652	190930	437480	164	130	209	165	945	20	M22	130	67,9	4205-360401-000000
380	475	177	140	155	503850	2652	201540	461790	156	124	200	160	945	20	M22	130	71,4	4205-380401-000000
400	495	177	140	155	583410	2917	233360	534700	163	131	211	171	945	22	M22	130	74,5	4205-400401-000000
420	515	177	140	155	668270	3182	267310	612480	169	138	222	181	945	24	M22	130	77,8	4205-420401-000000
440	535	177	140	155	700090	3182	259030	650410	161	133	210	173	945	24	M22	130	81,4	4205-440401-000000
460	555	177	140	155	731910	3182	270810	679970	154	128	203	169	945	24	M22	130	84,1	4205-460401-000000
480	575	177	140	155	795560	3315	294360	739100	154	129	205	171	945	25	M22	130	88,0	4205-480401-000000
500	595	177	140	155	828700	3315	306620	769890	148	124	199	167	945	25	M22	130	91,6	4205-500401-000000
520	615	177	140	155	965270	3713	357150	896770	159	135	217	183	945	28	M22	130	94,1	4205-520401-000000
540	635	177	140	155	1002400	3713	370890	931260	153	130	211	179	945	28	M22	130	97,5	4205-540401-000000
560	655	177	140	155	1113780	3978	412100	1034740	158	135	220	188	945	30	M22	130	100,7	4205-560401-000000
580	675	177	140	155	1153560	3978	426820	1071690	153	131	214	184	945	30	M22	130	104,2	4205-580401-000000
600	695	177	140	155	1193330	3978	441530	1108650	148	128	209	181	945	30	M22	130	107,6	4205-600401-000000

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:

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

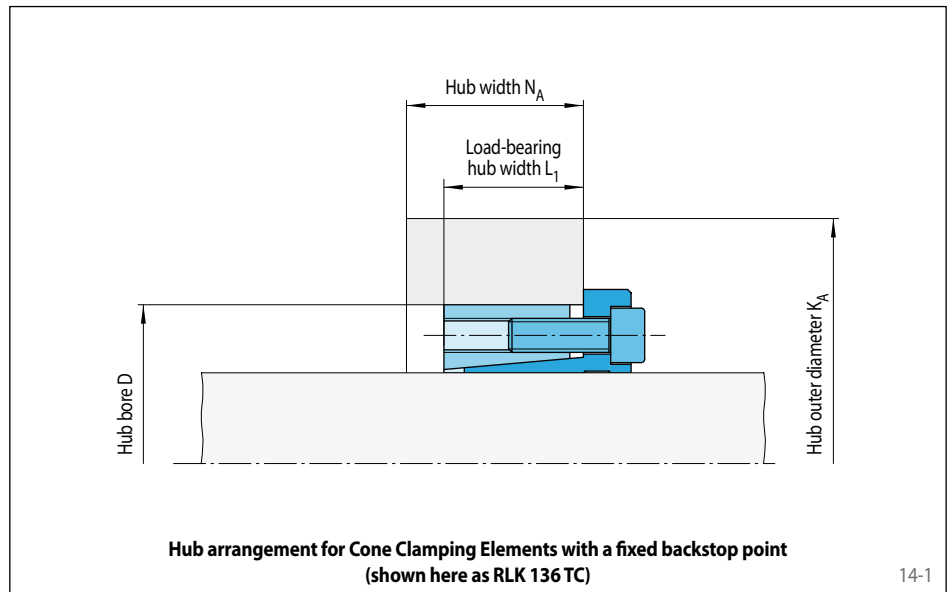
$$\text{with } H = \left( \frac{R_e}{1,27 \cdot P_N} \cdot \frac{N_A}{L_T} \right)^2$$

### Required yield strength of the hub material

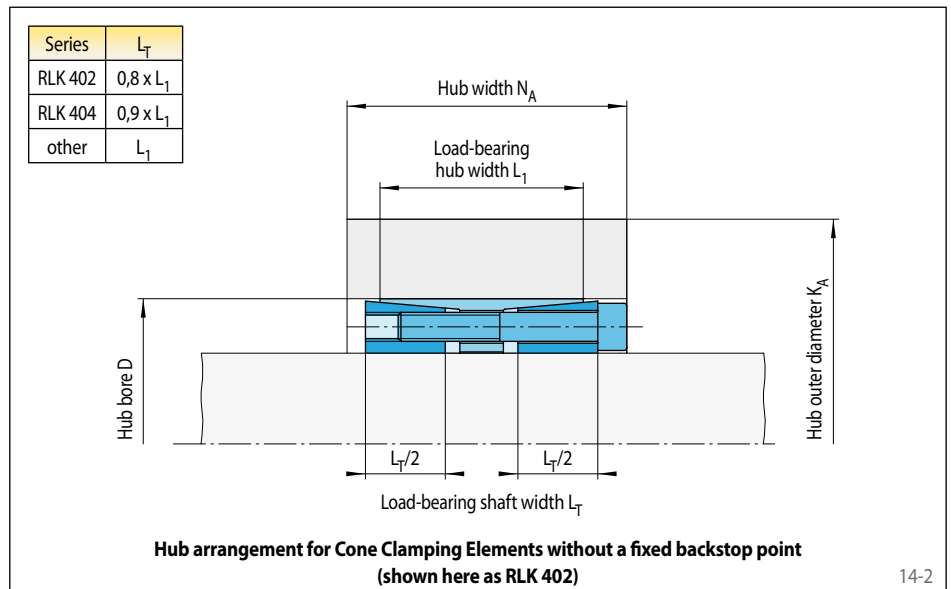
For a given hub width  $N_A$  and a given hub outside diameter  $K_A$ , the yield strength  $R_e$  of the hub material must be greater than the equivalent stress  $\sigma_v$  in the hub.

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

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



14-1



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/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>]

### 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>]