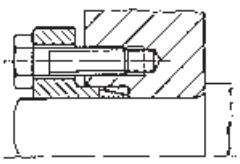
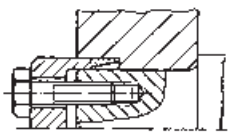
Clamping Elements Type RCK 50

These shaft clamping elements consist of just two conical rings which require the minimum of radial space, so providing compact assemblies, and enabling use within small hub diameters. The design offers the maximum versatility of design, but does require the customer to provide their own thrust ring assembly. Whilst only providing low torque transmission per unit they can be combined (up to 4 units) to increase torque capacity. When fully clamped these units provide excellent gastight sealing. Many designs of thrust rings are possible and sketches to the left are two typical designs. These units do not self centre, so require external means of centring the hub.





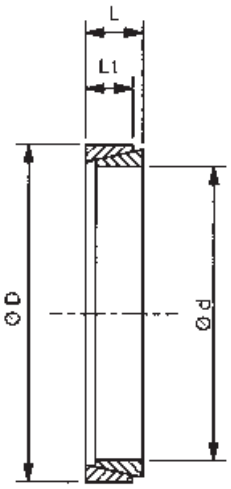
Recommended tolerances for full torque transmission are:-

Up to 38m shaft Ø:-	Shaft	h6
	Hub	H7
40mm and above shaft Ø:-	Shaft	h8
	Hub	H8

Clamping surfaces to be finished to Rz ≤ 15 μm.

Factor for combining elements in one assembly.

Number of Elements	Torque Capacity
2	1.55M Nm
3	1.86M Nm
4	2.03M Nm



Dimensions

Part No. †	Dimensions mm				Torque Cap. M Nm	Axial Force F kN	Surface Pressure		Axial Force necessary to clamp kN	Approx. Weight gms	Min. Hub Dia* mm		
	d	D	L	L_1			Shaft Ps N/mm²	Hub Ph N/mm²			Assy Type A	Assy Type B	Assy Type C
RCK50-6x9	6	9	4.5	3.7	2.4	0.8	115	75	3.8	1.2	11.5	10.9	10.4
RCK50-7x10	7	10	4.5	3.7	3.0	0.9	105	70	3.9	1.4	12.5	12.0	11.5
RCK50-8x11	8	11	4.5	3.7	4.7	1.2	120	90	5.3	1.5	14.7	13.9	13.1
RCK50-9x12	9	12	4.5	3.7	7.9	1.8	140	105	15.6	1.7	16.9	15.8	14.7
RCK50-10x13	10	13	4.5	3.7	9.5	1.9	135	105	15.6	1.8	18.3	17.1	15.9
RCK50-12x15	12	15	4.5	3.7	11.4	1.9	115	90	15.6	2.2	20.1	18.9	17.8
RCK50-13x16	13	16	4.5	3.7	13.1	2.0	110	90	15.6	2.3	21.4	20.2	19.0
RCK50-14x18	14	18	6.3	5.3	22.3	3.2	115	90	25.4	4.9	24.1	22.7	21.4
RCK50-15x19	15	19	6.3	5.3	24.3	3.2	110	85	25.4	5.3	25.0	23.6	22.4
RCK50-16x20	16	20	6.3	5.3	27.3	3.4	105	85	25.4	5.5	26.3	24.9	23.5
RCK50-17x21	17	21	6.3	5.3	29.8	3.5	105	85	25.4	5.8	27.6	26.1	24.7
RCK50-18x22	18	22	6.3	5.3	32.4	3.6	100	80	25.4	6.1	28.5	27.1	25.6
RCK50-19x24	19	24	6.3	5.3	49.0	5.2	140	110	36.0	7.8	34.4	31.9	29.6
RCK50-20x25	20	25	6.3	5.3	53.0	5.3	135	105	36.0	8.2	35.2	32.8	30.6
RCK50-22x26	22	26	6.3	5.3	66.0	6.0	135	115	36.0	7.3	37.9	35.0	32.4
RCK50-24x28	24	28	6.3	5.3	73.0	6.1	130	110	36.0	8.0	40.1	37.2	34.6
RCK50-25x30	25	30	6.3	5.3	72.0	5.8	115	95	36.0	10.1	40.8	38.3	36.0
RCK50-28x32	28	32	6.3	5.3	86.0	6.1	115	100	36.0	9.2	44.3	41.4	38.7
RCK50-30x35	30	35	6.3	5.3	91.0	6.1	100	85	36.0	12.0	46.0	43.5	41.2
RCK50-32x36	32	36	6.3	5.3	131.0	8.2	130	115	45.0	10.0	52.5	48.4	44.9
RCK50-35x40	35	40	7	6.0	171.0	9.8	125	110	54.0	17.0	57.3	53.1	49.4
RCK50-36x42	36	42	7	6.0	169.0	9.4	115	100	54.0	20.0	58.1	54.3	50.8
RCK50-38x44	38	44	7	6.0	181.0	9.5	110	95	54.0	21.0	59.8	56.1	52.7
RCK50-40x45	40	45	8	6.6	231.0	11.6	115	105	66.0	23.0	63.3	58.9	55.0
RCK50-42x48	42	48	8	6.6	235.0	11.2	110	95	66.0	28.0	65.2	61.2	57.5
RCK50-45x52	45	52	10	8.6	390.0	19.0	116	105	110.0	42.0	73.2	68.1	63.5
RCK50-48x55	48	55	10	8.6	572.0	23.8	155	135	132.0	45.0	86.3	78.2	71.3
RCK50-50x57	50	57	10	8.6	602.0	24.1	150	130	132.0	47.0	87.8	79.9	73.1
RCK50-55x62	55	62	10	8.6	670.0	24.4	140	125	132.0	50.0	93.7	85.7	78.8
RCK50-56x24	56	64	12	10.4	790.0	28.2	130	115	158.0	67.0	93.3	86.1	79.7
RCK50-60x68	60	68	12	10.4	860.0	28.7	125	110	158.0	72.0	97.4	90.2	83.9
RCK50-63x71	63	71	12	10.4	945.0	30.0	125	110	160.0	76.0	101.6	94.2	87.6
RCK50-65x73	65	73	12	10.4	1000	30.8	125	110	160	78	104.5	96.9	90.0
RCK50-70x79	70	79	14	12.2	1300	37.1	125	110	200	110	113.1	104.8	97.4
RCK50-71x80	71	80	14	12.2	1340	37.7	125	110	200	114	114.5	106.1	98.7
RCK50-75x84	75	84	14	12.2	1500	40.0	125	110	220	118	120.2	111.4	103.6
RCK50-80x91	80	91	17	14.8	2100	52.5	125	110	300	187	130.3	120.7	112.2

*Minimum outside diameter of hubs manufactured in medium carbon steels with yield strength ≥ 320 N/mm^2.
For hub types, and other materials, refer to page 3.
For assembly and disassembly instructions refer to page 24.

† Clamping Rings for shafts up to 200mm diameter are available to order.

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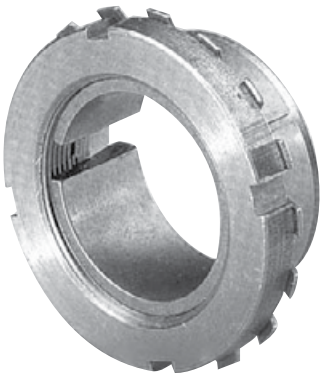
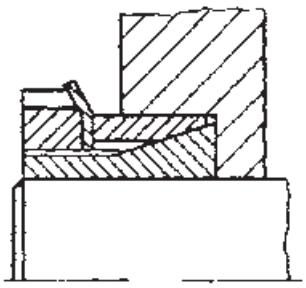
Clamping Elements Types CCE 54 and CCE 55





These clamping elements use a single lock nut to apply the clamping pressure, thereby enabling quick assembly and removal. The lock nut can be secured in postition by bending over a tab of lock washer. The thin walls of the clamping cones, combined with low hub pressures enables use with soft materials, such as aluminium, and small hub diameters.

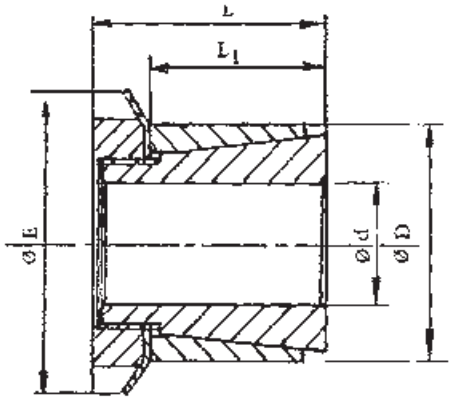
Use type CCE 54 where axial space is restricted and torque is low.

Type CCE 55 is for higher torque transmission.

Recommended tolerances for full torque transmission are:-

Shaft h8
Hub H8

Clamping surfaces to be finished to Rz ≤ 15 μm.



Dimensions

Part No.	Dimensions mm					Torque Cap. M Nm	Axial Force F kN	Surface Pressure		Locking Nut			Min. Hub Dia* mm		
	d	D	D_2	L	L_1			Shaft Ps N/mm²	Hub Ph N/mm²	Type	Thread	Torque Nm	Assy Type A	Assy Type B	Assy Type C
CCE54-14x25	14	25	32	16.5	6.5	52	7	241	135	KM4	M20	95	39	36	32
CCE54-15x25	15	25	32	16.5	6.5	56	7	225	135	KM4	M20	95	39	36	32
CCE54-16x25	16	25	32	16.5	6.5	60	8	211	135	KM4	M20	95	39	36	32
CCE54-17x25	17	25	38	17.5	6.5	63	7	118	80	KM5	M25	160	32	31	29
CCE54-18x30	18	30	38	17.5	6.5	91	10	257	154	KM5	M25	160	51	45	40
CCE54-19x30	19	30	38	17.5	6.5	96	10	243	154	KM5	M25	160	51	45	40
CCE54-20x30	20	30	38	17.5	6.5	102	10	231	154	KM5	M25	160	51	45	40
CCE54-24x35	24	35	45	17.5	6.5	139	12	219	150	KM6	M30	220	58	52	47
CCE54-25x35	25	35	45	17.5	6.5	144	12	210	150	KM6	M30	220	58	52	47
CCE54-28x40	28	40	52	18.5	6.5	215	15	249	174	KM7	M35	340	74	64	56
CCE54-30x40	30	40	52	20.0	8.0	230	15	188	141	KM7	M35	340	64	58	52
CCE54-32x45	32	45	58	22.0	9.0	210	13	113	80	KM8	M40	320	58	55	52
CCE54-35x45	35	45	58	22.0	9.0	331	19	199	155	KM8	M40	480	76	68	61
CCE54-40x50	40	50	65	25.0	10.0	477	24	176	141	KM9	M45	680	80	72	66
CCE54-45x55	45	55	70	26.0	10.0	617	27	180	147	KM10	M50	870	90	81	73
CCE54-48x60	48	60	75	26.0	10.0	669	28	171	137	KM11	M55	970	95	86	78
CCE54-50x60	50	60	75	26.0	10.0	697	28	164	137	KM11	M55	970	95	86	78
CCE54-55x65	55	65	80	28.0	12.0	796	29	129	109	KM12	M60	1100	93	86	80
CCE54-60x70	60	70	85	29.0	12.0	946	32	130	111	KM13	M65	1300	101	93	86
CCE54-70x84	70	84	98	29.5	13.5	1433	41	127	106	KM15	M75	2000	119	110	103
CCE55-14x25	14	25	32	29	17	90	13	143	80	KM4	M20	90	32	31	29
CCE55-15x25	15	25	32	29	17	100	13	133	80	KM4	M20	90	32	31	29
CCE55-16x25	16	25	32	29	17	80	10	94	60	KM4	M20	70	30	29	28
CCE55-17x25	17	25	38	31	18	113	13	103	70	KM5	M25	90	31	30	29
CCE55-18x30	18	30	38	33	20	100	11	75	45	KM5	M25	160	35	34	33
CCE55-19x30	19	30	38	33	20	105	11	71	45	KM5	M25	160	35	34	33
CCE55-20x30	20	30	38	33	20	112	11	68	45	KM5	M25	160	35	34	33
CCE55-24x35	24	35	45	38	25	178	15	66	45	KM6	M30	220	40	39	38
CCE55-25x35	25	35	45	38	25	185	15	63	45	KM6	M30	220	40	39	38
CCE55-28x40	28	40	52	44	30	250	18	57	40	KM7	M35	340	45	44	43
CCE55-30x40	30	40	52	44	30	270	18	53	40	KM7	M35	340	45	44	43
CCE55-32x45	32	45	58	4	28	420	26	98	70	KM8	M40	320	56	54	51
CCE55-35x45	35	45	58	45	30	390	22	58	45	KM8	M40	480	52	50	49
CCE55-40x50	40	50	65	46	30	620	31	56	45	KM9	M45	680	58	56	54
CCE55-45x55	45	55	70	47	30	580	26	61	50	KM10	M50	870	64	62	60
CCE55-50x60	50	60	75	47	30	880	35	60	50	KM11	M55	970	70	68	66
CCE55-55x65	55	65	80	48	30	1030	37	59	50	KM12	M60	1100	76	74	71
CCE55-60x70	60	70	85	50	30	1360	45	64	55	KM13	M65	1300	83	80	78

*Minimum outside diameter of hubs manufactured in medium carbon steels with yield strength ≥ 320 N/mm^2.
For hub types, and other materials, refer to page 3.
For assembly and disassembly instructions refer to page 24.

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Cross Shaft Clamping Elements

In order to make the best selection of a Cross Shaft Clamping Element for your application a number of factors must be taken into consideration. These include the shaft diameter; the outside diameter of the hub of connecting component; the drive torque to be transmitted, and axial thrust loads, and tilting or bending loads, maximum shaft speeds, operating temperature, and general design parameters and space restrictions.

Shaft Diameter:-

The shaft diameter will determine the particular size of clamping element in any series, and by reference to the catalogue details the suitability of that to meet the other parameters can be checked. Also hollow shafts must be checked for any load carrying strength, see below.

Hub Outside Diameter:-

The Hub Diameter has to be sufficient to support the stresses imposed by the shaft clamping element. The catalogue gives maximum hub diameters for medium carbon steel, but for other materials and method of determining refer below. Generally if hub diameter is over 2.5 times shaft diameter all series are suitable, but for smaller ratios consider types RCK 80, ACE 81, CCE 54 and CCE 55, and for very thin walled hubs use types RCK 19, RCK 20 and RCK 25.

Determination of Minimum Hub Diameter and Max. Hollow Shaft Bore:-

The following calculations are for static conditions only, considering only stresses imposed by the clamping element. The hub diameter is controlled by the pressure applied by the outer cone of the clamping element; the shape of the hub bore and total length of hub; and yield stress for permanent elongation of 0.2%.

Minimum Hub Dia. $Dm = D \sqrt{\frac{\sigma + PhC}{\sigma - PhC}}$

Where
- D = Clamping element outside diameter mm
- σ = Yield strength of material N/mm²
- Ph = Surface pressure on hub N/mm²
- C = Constant for Hub shape - see drawings

The tables in the catalogue give minimum hub diameters for hubs manufactured in medium carbon steel (080M40 or C45) or other material where σ = 320 N/mm². Values for σ on other commonly used hub materials are:-

220 Grade Cast Iron	σ =	150 N/mm²
260 Grade Cast Iron	σ =	180 N/mm²
Mild Steels	σ =	220 N/mm²
070M55 (En9)	σ =	350 N/mm²
Stainless Steel	σ =	200 N/mm²
Aluminium	σ =	100 N/mm²

For hollow bored Shafting:-

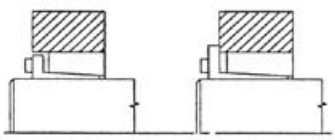
Max. Bore in Shaft $Dm = d \sqrt{\frac{\sigma - 1.6\ Ps}{\sigma}}$

Where
- d = Clamping element bore mm
- Ps = Surface pressure on Shaft N/mm²

For solid shafting yield strength of material σ must be higher than surface pressure Ps.

Hub Assembly Type A

C=1.0



$L_1 \leq Hw < 2L_1$ $L_2 \leq Hw < 2L_2$

Where Hw = Hub Width

For Dimensions L_1 & L_2 ref. Product Pages

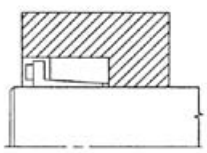
Hub Assembly Type B

C=0.8

$Hw \geq 2L_1$ $Hw \geq 2L_2$

Hub Assembly Type C

C=0.6



$Hw \geq 2L_1$ (All Types)

Maximum Shaft Speed:-

The centrifugal forces generated by high shaft speeds can reduce torque capacity and increase stress loads on hubs. Consult Cross & Morse if speed of shaft results in outer clamping diameter D running above 25M/sec.

Operating Temperature:-

Maximum temperatures should not exceed 100˚C. At temperatures above 70˚C the locking screws should be rechecked after 1 hour operation, whilst assembly is still warm.

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Installation Instructions

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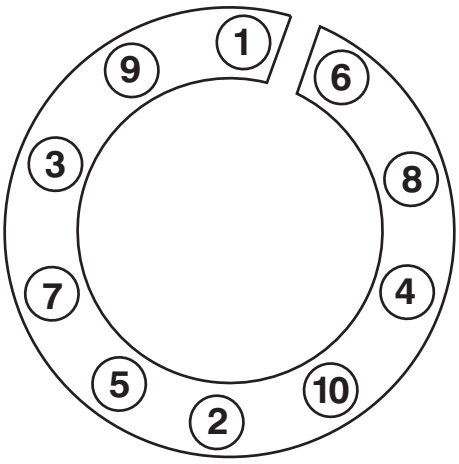
Installation and Removal of Cross Shaft Clamping Elements

Types RCK 10, 11, 12, 13, 15, 16, 61, 70, 71, 80 and ACE81



Installation:-

1. Slacken all screws in element by approx. two turns.
2. Remove two or three screws completely, and fit into equally spaced empty release thread holes. Tighten these screws lightly so as to ensure inner and outer cones are kept apart.
3. Clean all contact surfaces including screw threads, and lightly oil with clean thin unmodified oil.*
4. Insert clamping element into hub and push onto shaft and locate.
5. Remove screws from release holes and replace in original holes.
6. Tighten all screws finger tight and align hub.
7. Tighten all screws evenly in a diametrically opposite sequence (see typical progression in sketch) using a torque wrench, initially at half screw catalogue torque, then 3/4 value, and finally full torque. Check all screws at full torque until no further rotation of screws occurs.

Disassembly:-

1. Slacken all clamping screws by couple of turns, completely removing as many as release holes in element.
2. Fit screws in release holes and tighten in sequence as clamping to force inner and outer cones apart.
3. Carefully remove hub and clamping element from shaft, and take element from hub.

Types RCK 40 and 45

Installation:-

1. Clean all contact surfaces, and lightly oil with clean thin unmodified mineral oil.*
2. Fit hub to shaft and insert clamping element.
3. Tighten all screws finger tight and align hub.
4. Tighten all screws evenly in a diametrically opposite sequence (see typical progression in sketch) using a torque wrench, initially at half catalogue torque for screw, then at 3/4 value, and finally at full torque. Check all screws are at full torque until no further rotation of screws can be achieved.

Disassembly:-

1. Release clamping screws in same sequence as for clamping. Element should now self release. If required lightly tap clamping screws to aid release. If still not released remove light coloured screws completely and replace with next larger metric size and tighten these screws to jack the cones apart.

Type RCK 50

Installation procedure depends detailed design, but following is typical:-

1. Clean all contact surfaces, and lightly oil with clean thin unmodified mineral oil.*
2. Push hub onto shaft and insert spacer sleeves and clamping ring sets according to application drawing.
3. Insert distance ring if fitted and attach clamping flange lightly tightening screws. Align hub.
4. Tighten all screws in a diametrically opposite sequence, in several stages up to max. torque for screw size.

Disassembly:-

The taper of the individual rings is such that the assembly should automatically release when the locking screws are slackened. If not light tapping on the hub circumference should release them.

Types CCE 54 and 55

Installation:-

1. Clean all contact surfaces, and lightly oil with clean unmodified mineral oil.*
2. Turn locking nut anticlockwise until outer sleeve loose on inner cone.
3. Position hub on shaft and insert clamping element.
4. Align hub and tighten locking nut to catalogue torque value, and bend suitable tab on lock washer to prevent further rotation.

Disassembly:-

1. Release bent washertab and undo nut until sleeve loose.
2. Remove clamping element, If tight give end of tab gentle tap to release.

Types RCK 19/20 and 95

Installation:-

1. Clean all contact surfaces, and lightly oil with clean thin unmodified mineral oil.*
2. Slacken all clamping bolts by a couple of turns.
3. (RCK 19/20 only) Fit clamping element on outer diameter of hub, and slide assembly onto shaft and position.
   (RCK 95 only) Fit shaft ends equally into clamping element ensuring small clearance between shafts.
4. Tighten all bolts in a diametrically opposite sequence, in several stages up to max. specified torque.

Disassembly:-

Slacken all bolts and gently tap on bolts to release clamping element.

*WARNING: Never use, lubricant containing Molydenum or E.P. additives, synthetic lubricant, or grease.