Clamping Elements Type RCK 80

Available for shaft diameters down to 6mm, these shaft clamping elements are designed to fit into small diameter hubs, being particularly suited to light duty, light torque applications. A spacer ring prevents axial movement during clamping; and design ensures good levels of concentricity. For correct operation of these units, the hub diameter should not be less than the flange diameter D1, even though with many materials stress limits would allow selection of smaller hub diameters.

**Recommended tolerances for full torque transmission arc:-**

**Shaft** h8  
**Hub** H8

Clamping surfaces to be finished to Rz ≤ 15 µm.

**X** = Distance required to remove screws, additional clearance for alan key may be required.

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**Dimensions**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Dimensions mm</th>
<th>Torque Cap. M Nm</th>
<th>Axial Force F kN</th>
<th>Surface Pressure N/mm²</th>
<th>Hub Ph N/mm²</th>
<th>Clamping Screws Ph M/m²</th>
<th>Approx Weight Nm/kg</th>
<th>Assy Type A</th>
<th>Assy Type B</th>
<th>Assy Type C</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCK80-5x4</td>
<td>6 14 23 25 25.5 10 19 23 10 12 4 187 80 M3 2.2 0.04 18 18 17</td>
<td>2.20 4 187 80 M3 2.2 0.04 18 18 17</td>
<td>2.20 4 187 80 M3 2.2 0.04 18 18 17</td>
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</tr>
</tbody>
</table>

For the unit to function correctly, hub diameter should not be less than the flange outside diameter D1.

*Minimum outside diameter of hubs manufactured in medium carbon steels with yield strength ≥ 320 N/mm².*

For hub types, and other materials, refer to page 3.

For assembly and disassembly instructions refer to page 24.
For hub types, and other materials, refer to page 3.

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**Clamping Elements Type ACE 81**

Available for shaft diameters down to 11mm, these shaft clamping elements are designed to fit into very small diameter hubs, being particularly suited to Timing pulley and overload clutch applications. A spacer ring prevents axial movement during clamping; and design ensures good levels of concentricity. For correct operation of these units, the hub diameter should not be less than the flange diameter Df, even though with many materials stress limits would allow selection of smaller hub diameters.

Recommended tolerances for full torque transmission are:-

- Clamping surfaces to be finished to \( R_z \leq 15 \) \( \mu m \).

**Dimensions**

For the unit to function correctly hub diameter should not be less than the flange outside diameter Df.  
*Minimum outside diameter of hubs manufactured in medium carbon steels with yield strength \( \geq 320 \) N/mm².*

For hub types, and other materials, refer to page 3.

For assembly and disassembly instructions refer to page 24.

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<table>
<thead>
<tr>
<th>Dimensions</th>
<th>mm</th>
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<tbody>
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<td>X</td>
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<tr>
<td>Torque Cap.</td>
<td>M Nm</td>
</tr>
<tr>
<td>Axial Force</td>
<td>F kN</td>
</tr>
<tr>
<td>Surface Pressure (Shat/Phub N/mm²)</td>
<td></td>
</tr>
<tr>
<td>Clamping Screw Size</td>
<td>Torque (Nm)</td>
</tr>
<tr>
<td>Min. Hub Dia*</td>
<td>mm</td>
</tr>
</tbody>
</table>

For 110 mm and larger hub diameters the above recommendations for clamping force and screw size apply.

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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. \( D_m = D \sqrt{\frac{\sigma + PhC}{\sigma - PhC}} \)

Where \( D = \) Clamping element outside diameter mm
\( \sigma = \) Yield strength of material N/mm\(^2\)
\( Ph = \) Surface pressure on hub N/mm\(^2\)
\( C = \) 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 \( \sigma = 320\) N/mm\(^2\). Values for \( \sigma \) on other commonly used hub materials are:

- 220 Grade Cast Iron \( \sigma = 150\) N/mm\(^2\)
- 260 Grade Cast Iron \( \sigma = 180\) N/mm\(^2\)
- Mild Steels \( \sigma = 220\) N/mm\(^2\)
- 070M55 (En9) \( \sigma = 350\) N/mm\(^2\)
- Stainless Steel \( \sigma = 200\) N/mm\(^2\)
- Aluminium \( \sigma = 100\) N/mm\(^2\)

For hollow bored Shafting:-

Max. Bore in Shaft \( D_m = d \sqrt{\frac{\sigma - 1.6 Ps}{\sigma}} \)

Where \( d = \) Clamping element bore mm
\( Ps = \) Surface pressure on Shaft N/mm\(^2\)

For solid shafting yield strength of material \( \sigma \) must be higher than surface pressure \( Ps \).

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.
**Installation Instructions**

*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. 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 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.