

### Initial Lubrication

We recommend (up to a bearing temperature of 100°C and speed of 250,000mm dn) the use of a good quality lithium based grease with extreme pressure (EP) additives. The permitted axial load on a GR (fixed) bearing is reduced by 50% if an EP grease is not used.

Greases of No.2 consistency can generally be used for most applications and are suitable for most pumped systems.

For extreme temperatures, speeds and high loads it is always advisable to obtain recommendations from our technical department.

### Establishing Grease Quantity

Calculate the speed in 'mm dn' by multiplying the shaft speed in rpm by the bore of the bearing in mm, e.g. 750rpm x 100mm = 75,000mm dn.

For speeds up to 50,000mm dn, the roller bearing and cartridge should be packed full on assembly (full pack grease quantities are given in the table below). As the speed increases, progressively less grease must be used to coat the bearing parts, from a full pack at 50,000mm dn or less to a smear about 1mm thick at speeds of 200,000mm dn or more. Refer to the table below for the proportion of full pack of grease to be used in relation to operating speed.

For speeds over 150,000mm dn, approximately 40% of the lubricant used should be applied to the bearing parts and the remainder applied to the inside of the cartridge. This is to avoid excessive churning of the grease when running at high speed.

Note: refer to the table of screw sizes and tightening torques to determine the 'group size' of a bearing.

Speed (mm dn)	Proportion of Full Pack	Bearing Group Size	Grease Full Pack (kg)
Over -	Up to 50,000	300	0.15
50,000	100,000	307	0.22
100,000	150,000	400	0.36
150,000	200,000	408	0.36
200,000	-	500	0.49
		508	0.64
		600	1.02

All cartridges and seals should be well lubricated on assembly, including the bores of triple labyrinth seals. Felt seals should be soaked in oil before fitting. Blanking plates should be sealed with grease or jointing compound. Never assemble the bearing dry and inject grease only after closing the cartridge. Always coat the swivel seatings with oil or grease.

### Lubrication Points

The 100 Series cartridges are tapped 1/8" NPT and fitted with grease nipples as standard. Special lubricators can be fitted by arrangement. BSP fittings are acceptable, but will screw in further and care must be taken to avoid blocking off the horizontal grease passage. Pipework must be flexible to allow the swivel seating to function correctly.

### Routine Greasing

If it can be done safely, re-grease the bearing as it rotates. It is important that excessive quantities of lubricant are not used. Particularly at high speed, this may lead to excessive churning and overheating. We recommend using a small push-type grease gun for relubricating the smaller sizes as the relubrication quantity is less than one shot from a conventional side-lever gun. (One shot from a conventional side-lever gun is approximately 2ml).

Re-greasing quantities and intervals for normal operating conditions are as follows:

#### 300 and 307 group sizes

1ml every 400 operating hours or weekly.

#### 400 and 408 group sizes

2ml every 400 operating hours or weekly.

#### 500 group size and larger

4ml every 400 operating hours or weekly.

Pumped systems should be metered to be equivalent to the above quantities.

For bearings operating at speeds up to 50,000mm dn which are assembled with a full pack of grease, re-greasing intervals can be increased up to one year, provided that the thrust load on the GR is nominal.

For high temperature, very dirty or submerged applications refer to Cooper Product Catalogue or consult Cooper technical department to establish an appropriate re-greasing routine.

### Screw Sizes and Tightening Torques

Bearing Group Size	300	307	400	408	500	508	600
Bearing Size (Metric)	75mm	85mm	100mm	110mm	120mm 130mm	140mm	150mm
Bearing Size (Imperial)	2 15/16" 3"	3 7/16"	3 15/16" 4"	4 7/16" 4 1/2"	4 15/16" 5"	5 7/16" 5 1/2"	5 15/16" 6"
Clamping Screw Size	M3	M4	M4	M5	M6	M6	M6
Key Size Across Flats (mm)	25	3	3	4	5	5	5
Tightening Torque (Nm)	2	4.5	4.5	8.5	15	15	15
Tightening Torque (lb ft)	1.5	3.3	3.3	6.3	11	11	11
Cartridge Joint Screw Size	M4	M4	M5	M6	M6	M6	M8
Key Size Across Flats (mm)	3	3	4	5	5	5	6
Tightening Torque (Nm)	3.4	3.4	6.4	11	11	11	26
Tightening Torque (lb ft)	2.5	2.5	4.7	8.3	8.3	8.3	19
Cartridge Side Screw Size	M4	M4	M4	M4	M6	M6	M6
Key Size Across Flats (mm)	2	2	2	2	3	3	3
Tightening Torque (Nm)	2.0	2.0	2.0	2.0	7.8	7.8	7.8
Tightening Torque (lb ft)	1.5	1.5	1.5	1.5	5.7	5.7	5.7
Pedestal Joint Screw Size	M10	M12	M16	M16	M20	M20	M20
Key Size Across Flats (mm)	8	10	14	14	17	17	17
Tightening Torque (Nm)	53	90	225	225	420	420	420
Tightening Torque (lb ft)	39	66	166	166	310	310	310

### Shaft Tolerance

Diameter	Over to	-	80	120	Surface Texture Maximum Roughness (um Ra)
	Diameter Tolerance (BS4500)	Diameter Tolerance µm	80	120	
Uni-directional loads at speeds up to 100,000 mmdn	h7	+0	+0	+0	3.2
		-30	-35	-40	
Moderate Loads (Cr/P>10)					
Reciprocating loads Vibratory Loads	h6	+0	+0	+0	1.6
		-19	-22	-25	
Extra fine clearance bearings speeds over 100,000 mmdn					
Heavy loads (Cr/P>10)					
Cylindricity of journal	IT6	19	22	25	

# COOPER

## SPLIT ROLLER BEARINGS



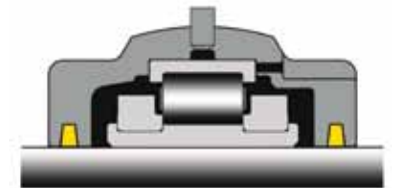
**Caution**  
Some components have sharp edges. Please read instructions before assembly

## 100 Series Bearings Assembly and Lubrication Instructions

### Bearing Types

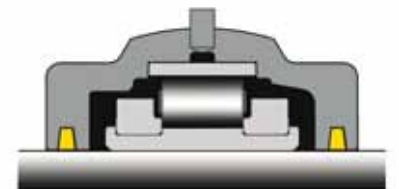
#### Fixed (GR) Bearing

Bearings with grooved inner race assemblies and grooved outer races for radial and axial loads. To be fitted in GR cartridges with side screws. (See diagram 6).



#### Expansion (EX) Bearing

Bearings with grooved inner race assemblies and plain outer races for radial loads. To be fitted in EX cartridges without side screws.



## Preliminary Notes

The GR (fixed) bearing that locates the shaft axially should be fitted first, where possible. EX (expansion) bearings should be fitted to ensure that the rollers will be central on the outer race when in the normal running position. This may require an initial offset to allow for expansion (see Stage 2). Generally, the GR bearing is positioned adjacent to the drive.

The GR (fixed) bearing has guide lips on both the clamping rings and outer race. The EX (expansion) bearing has no guide lips on the outer race.

Unwrap bearing parts. Unclip the cage by carefully prising off the jointing clips with a small flat-bladed screwdriver. Warning – the clips may fly off. Cover the clip when prising it off, in order to catch it, and wear eye protection.

Undo clamping ring screws and remove clamping rings from inner race. Remove the preservative from all parts. Keep the bearing safe from damage. Lightly oil threads and interfaces, including bores of clamping rings.

Complete roller bearings are interchangeable between similar Cooper cartridges. Cartridges are also interchangeable between standard outer castings except where S1 fit has been specified. Individual components should not be interchanged. All 100 Series components apart from the cage and roller assemblies are marked with matching numbers on each half. Ensure that the numbers on each half component are the same and are placed together when assembled. Take care not to mix half cage and roller assemblies – although they are not match marked they should not be interchanged as the rollers are graded into sets.

Before assembling the bearing, clean and inspect the shaft diameter. Refer to the table overleaf for tolerances. Note that before assembly onto the shaft, the inner race measures undersize equivalent to the final gap at the joints. This gap is a feature of the design, to ensure that the inner race grips the shaft.

## Stage 1

Place the pedestal base or flange lower half into position. If the precise location of the housing is predetermined it may be bolted into position. Generally, pedestal bases may require slight movement at a later stage in order to accurately position the shaft. Where access does not prevent it, flange lower halves may be left off until Stage 9.

## Stage 2

Lightly oil the shaft with thin machine oil, then remove the excess with a clean wiper. Place the inner race at the correct position on the shaft. Soft packing on the joint faces, or feeler gauges, should be used to ensure that the joint gaps are approximately equal. Inner races are usually set central with the outer race, but in cases of axial expansion may be offset within  $\pm 10\%$  of the roller length.

## Stage 3

Fit the clamping rings with joints at approximately  $90^\circ$  to the inner race joints, with the lips facing inwards. Note: discolouration on the clamping rings is associated with localised heat treatment to increase wear resistance. Progressively tighten all clamping ring screws equally using the correct hexagon key and torque wrench. There should be equal gaps at both joints of the clamping rings and both joints of the inner race.

## Stage 4

Tap down each half of the inner race and clamping rings all around the shaft using a soft faced hammer, or insert a hardwood block between a steel hammer and the bearing parts. Re-tighten screws. Repeat until all screws are fully tight. The recommended torque values are shown overleaf. Check that there is a gap at both joints of the inner race. Check that the inner races of expansion bearings are central or correctly offset when all parts are finally positioned.

## Stage 5

Coat the bore of the cage and roller assembly with grease and lightly cover the inner race assembly (fitted to shaft) all over with grease for protection. Assemble the cage (complete with rollers) around the shaft. Push the steel 'U' clips on to secure each cage joint. Ensure that the clips are pushed fully home and are seated correctly (they should grip the two halves of the cage tightly together).

## Stage 6

Ensure that the preservative is removed from the outer race seating in the cartridge and lightly oil the seating. Place the half outer race with the lubrication hole in the top half-cartridge and the second half race into the lower half-cartridge, ensuring that the pairing marks match. Ensure that the ends of the outer race project from the cartridge joint face by equal amounts.

All lipped outer races must be clamped axially. Side screws 'A' are fitted to all GR cartridges but side rods 'B' are not required for sizes over 100mm / 4". Fit the side rods (if required) and side screws and very lightly tighten.

All cartridges: Place the half cartridges, complete with half outer races, together and fully tighten the cartridge joint screws 'C'.

Progressively and fully tighten the side screws 'A' (if fitted).

Inject grease to fill the grease passages. Remove screws 'C' from cartridge joints and separate cartridge halves, taking care that the outer race halves stay in position in their respective cartridge halves.

## Stage 7

If the unit is to be fitted with Aluminium Triple Labyrinth ('ATL') seals, fit them onto the shaft as follows:

Separate the ATL seal halves by driving out the two jointing pins. Lubricate the 'O' rings in the bores with grease. Reassemble onto the shaft by compressing the 'O' rings of both halves sufficiently for the jointing pins to be reinserted. Reinsert the jointing pins. Ensure that the halves are assembled the correct way round ('COOPER' and the shaft size are stamped on the same face of opposite halves). Note: ATL seals are able to slide along the shaft once assembled.

Felt seals should be soaked in oil before fitting into the cartridge end bores. Seals other than Triple Labyrinth seals (and some special types) are to be fitted into the cartridge end bores before assembling the cartridge into position.

End bore seals should be left well lubricated on assembly, including the bores of the revolving triple labyrinth seals.

## Stage 8

Coat the cage and rollers and the inside of the cartridge with grease. (See lubrication information overleaf for total grease quantity). Lubricate the spherical seating of the bottom half of the cartridge with grease. If the pedestal base or flange lower half are in position and able to support the cartridge, place the bottom half of the cartridge on top of the bearing and rotate  $180^\circ$  into the pedestal base or flange lower half.

If blanking plates are to be fitted, insert them into the end bores of the lower half of the cartridge. Blanking plates should be sealed with grease or sealing compound.

Place the top half of the cartridge on the bottom half of the cartridge, ensuring that the pairing marks appear on the same side. Close the cartridge around the bearing and fully tighten the joint screws. Lubricate the spherical seating with grease.

## Stage 9

If not already done, tighten the bolts fixing the pedestal base or flange lower half into position. Place the pedestal cap or flange top half into position.

If it is safe to do so, running the shaft for a time without the outer housing joint screws fully tightened will help the bearing to accurately align.

Fully tighten the joint screws.

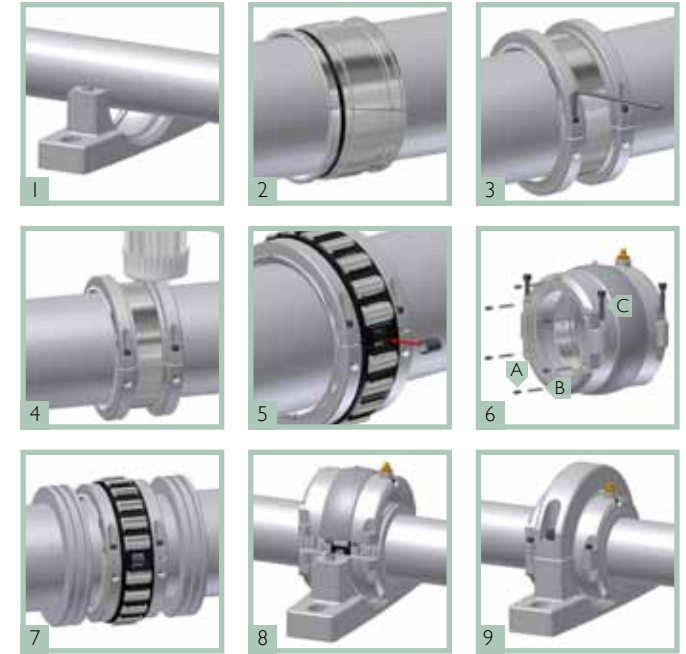
## Check list

- |   |   |
|---|---|
| Shaft size is correct and within tolerance. | Clamping ring screws fully tight.         |
| Gap at each inner race joint.               | Swivel seating lubricated.                |
| Parts not interchanged.                     | Rolling surfaces safeguarded for transit. |
| Match marks coincide.                       | Threads and interfaces lightly oiled.     |
| Cage clips fitted correctly.                |   |

## Technical Support

Please consult our Product Catalogue or consult Cooper technical department in case of doubt regarding suitability for any application or operating conditions.

## Assembly Procedure



## Inspect Shaft before assembly



## Health and Safety at Work

We draw attention to the aspect of health and safety in the fitting and use of bearings. Damage to equipment and personal injury may result if bearings are not installed according to the instructions given here, or operated outside the limits given in the Product Catalogue.

Any significant mist from lubricant should be ducted away.

All threaded lifting holes are marked with the appropriate size, e.g. 'M12'.

Some components may have sharp edges.

**COOPER**  
SPLIT ROLLER BEARINGS

Cooper Roller Bearings Company Limited

Wisbech Road, King's Lynn, Norfolk PE30 5JX, England.

Sales Office Telephone: +44 (0) 1553 767 677 Sales Office Fax: +44 (0) 1553 660 494

Email: [coopersalesuk@kaydon.com](mailto:coopersalesuk@kaydon.com)

Website: [www.CooperBearings.com](http://www.CooperBearings.com)