

Instructions for Assembling and Disassembling Sleeves under Self-aligning Bearings with Tapered Bore



**Video 10: ASSEMBLING of HYDRAULIC WITHDRAWAL SLEEVE under
self-aligning ROLLER BEARING with HYDRAULIC NUT**

See the step-by-step procedure at www.bgl.com.br/en/treinamento.htm
Technical Videos - **Video 10**

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INITIAL ARRANGEMENTS

01

Keep the workplace dry and dust-free.



02

Select the adequate tools.



03

It is important that, before unpacking the parts, you compare the designation of the package with your needs.



04

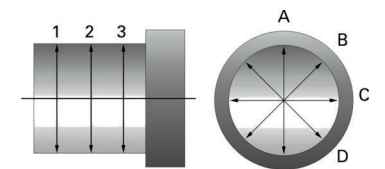
The shaft may show contact corrosion or abrasion and it must be carefully cleaned.



05

Next, check the dimensional precision and the shape of the shaft that will be in contact with the Sleeve. The shaft dimension must be within the tolerance of maximum h10 and cylindricity IT5/2 or—at low rotations—IT7/2.

ATTENTION
The shaft diameter must be checked using a micrometer in four positions in two or three planes.



Assembling Procedures

06

Remove the package from the bearing, remove the protective oil from the bore and also from the external diameter.



Atenção: Rolamentos novos devem ser retirados de sua embalagem somente no momento da montagem

07

With a feeler gauge, measure the initial clearance between the external ring and the bearing roller which shows to be the most free and write it down for usage with the clearance reduction table.
Note: Being the bearing sustained by the outer ring, measure the clearance in the uppermost roller.

Nominal measure of the internal diameter d (bore bearing)		Bearing Radial Clearance Before Assembly							
		Clearance Group							
		C2		Normal		C3		C4	
Greater than	Up to including	max.	min.	max.	min.	max.	min.	max.	min.
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
24	30	0,020	0,030	0,030	0,040	0,040	0,055	0,055	0,075
30	40	0,025	0,035	0,035	0,050	0,050	0,065	0,065	0,085
40	50	0,030	0,045	0,045	0,060	0,060	0,080	0,080	0,100
50	65	0,040	0,055	0,055	0,075	0,075	0,095	0,095	0,120
65	80	0,050	0,070	0,070	0,095	0,095	0,120	0,120	0,150
80	100	0,055	0,080	0,080	0,110	0,110	0,140	0,140	0,180
100	120	0,065	0,100	0,100	0,135	0,135	0,170	0,170	0,220
120	140	0,080	0,120	0,120	0,160	0,160	0,200	0,200	0,260
140	160	0,090	0,130	0,130	0,180	0,180	0,230	0,230	0,300



Quando o rolamento estiver apoiado sobre o anel externo, medir a folga no rolo que esteja mais acima.

Radial Clearance Reduction Calculation Example:

Bearing: **22232 K/C3** with **160 mm bore**

Initial Clearance: **0.18 mm**

08

Put the bearing on the shaft.

Note: The shaft needs to be scaled.



09

Unpack and clean the Sleeve.



10

Put the Sleeve on the shaft and then move it under the bearing until getting a firm contact.

Note: The assembling of the Withdrawal Sleeve under the self-aligning bearing with internal diameter above 50 mm gets extremely easier when you use the Hydraulic Nut and the comparator dial.



In this example Withdrawal Sleeves AOH 3132 were used with the Hydraulic Nut HMV 30E.



11

Insert and screw the Hydraulic Nut in the shaft thread, with the plunger turned to the Withdrawal Sleeve.



12

Use a straight pin spanner, to get a proper contact between the bearing, the Sleeve and the shaft.

Note: Starting point for Clearance Reduction (Zero Point).



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Perform the online calculation of clearance reduction accessing:

www.bgl.com.br/en/catalogo

Step 1

The screenshot shows the BGL website interface. At the top, there are logos for BGL, 100% BRAZILIAN, since 1957, and TUV ISO 9001. Below this is a navigation bar with links for Home, Company, Products, Application engineering, Training and videos, Downloads, Quotation, News, and Contact. A search bar is also present. The main content area features a banner for 'BGL | SLEEVES FOR...' with an 'ON LINE CALCULATION' button. Below the banner are icons for various products: ADAPTER SLEEVES, WITHDRAWAL SLEEVES, LOCKNUTS, WASHERS AND LOCKING DEVICES, PRECISION NUTS, HOOK SPANNER, HYDRAULIC ADAPTER SLEEVES, HYDRAULIC NUTS, HYDRAULIC PUMPS, EXTENSION TUBE, and KIT TR. At the bottom, there are sections for 'BGL' (company description), 'TRAINING AND VIDEOS', 'ELECTRONIC CATALOG', 'ON-LINE CALCULATION OF BEARING CLEARANCE', and 'THE BEST TIPS' (listing tips 040, 039, 037, and 036).

Step 2

This screenshot shows the online calculation tool. It includes a title 'Table for calculating the reduction of axial clearance' and a subtitle 'For assembling of spherical Roller bearing with tapered bore mounted on the adapter or withdrawal sleeve'. A 'New Calculation' section shows 'Bearing: 22232K', 'Clearance group: C3', and 'Initial clearance: 0.18 mm'. Below this is a table with columns for 'Nominal measure of the internal diameter of the bearing d', 'Radial clearance before the assembling', 'Reduction of the radial clearance', and 'Axial displacement'. The table has rows for 'greater as mm' and 'including until mm' for clearance groups C2, Normal, C3, C4, and C5. The value 0.18 is highlighted in green in the C3 column. A 'Calculation' button is on the right.

greater as mm	including until mm	Radial clearance before the assembling										Reduction of the radial clearance		Axial ^(1) 2) displacement taper 1:12		Axial ^(1) 2) displacement taper 1:30			
		C2					C3							C4		C5		Sleeve	
		min. mm	max. mm	min. mm	max. mm	min. mm	max. mm	min. mm	max. mm	min. mm	max. mm	min. mm	max. mm	min. mm	max. mm	min. mm	max. mm	min. mm	max. mm
140	160	0.09	0.13	0.13	0.18	0.18	0.23	0.23	0.3	0.3	0.3	0.38	0.07	0.085	1.05	1.3	2.65	3.2	

Valid only for solid and hollow steel shafts in general applications.
1) The values listed must be used only as a reference. The final checking must be done using feeler gauge.
2) The axial displacement is slightly different from one series of bearings to another.

Step 3

This screenshot shows the final result of the calculation. The 'Final clearance after the assembling' is highlighted in yellow and shows a value of 0.11 mm. A red circle highlights the 'Theoretical axial displacement with taper 1:12' value of 1.05 mm in the table. Below the table, there are 'TIPS' for sleeves above 32 mm, including instructions to use a hydraulic sleeve (OH, H, or AOH) and a hydraulic nut. A red arrow points from the tip to the final clearance value.

greater as mm	including until mm	C3		Theoretical ^(1) 2) axial displacement with taper 1:12	Final clearance after the assembling
		min. mm	max. mm		
		140	160	0.18	0.23

TIPS:
For sleeves above of 32 mm (140 mm of hole/shaft). Always use the hydraulic sleeve OH, H, or AOH. Dismounting process can be made so very rapid, with security and in an economic form.
The use of the tool "hydraulic nut" for mounting or dismounting sleeves can reduce until 10 times the total assembling time compared to hand toolings.
More informations about Hydraulic Adapter and Withdrawal Sleeves, Hydraulic nuts, Hydraulic pumps, Extension tubes.
For more informations, please access: Latest tips

"The BGL main point with this application is to instruct the professionals of the maintenance activities to perform their works with efficiency, security, quickness and certainly with lower costs"

In this example, we are using the axial displacement value (1.05 mm) related to the use of Hydraulic Nut and Comparator Dial for assembling.

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You can also consult the Printed **Table of Radial Clearance Reduction** to assemble Self-Aligning **Roller Bearings** with Tapered Bore. Order yours from BGL.

Radial Clearance Reduction Calculation

Example:

Bearing: **2232 K/C3** with **160 mm** bore

Initial Clearance: **0.18 mm**

Reduction: **0.07 mm**

Final Clearance: **0.11 mm**

Axial Displacement: **1.05 mm**

Nominal measure of the internal diameter d (bore bearing)		Bearing Radial Clearance Before Assembly										Reduction of Bearing Radial Clearance		Axial Taper "S" ⁽¹⁾⁽²⁾			
		Clearance Group												Axial Displacement Taper 1:12		Axial Displacement Taper 1:30	
		C2		Normal		C3		C4		C5							
Greater than	Up to including	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.
24	30	0.020	0.030	0.030	0.040	0.040	0.055	0.055	0.075	-	-	0.010	0.015	0.250	0.290	-	-
30	40	0.025	0.035	0.035	0.050	0.050	0.065	0.065	0.085	0.085	0.105	0.015	0.020	0.300	0.350	-	-
40	50	0.030	0.045	0.045	0.060	0.060	0.080	0.080	0.100	0.100	0.130	0.020	0.025	0.370	0.440	-	-
50	65	0.040	0.055	0.055	0.075	0.075	0.095	0.095	0.120	0.120	0.160	0.025	0.035	0.450	0.540	1.150	1.350
65	80	0.050	0.070	0.070	0.095	0.095	0.120	0.120	0.150	0.150	0.200	0.035	0.040	0.550	0.650	1.4	1.65
80	100	0.055	0.080	0.080	0.110	0.110	0.140	0.140	0.180	0.180	0.230	0.040	0.050	0.660	0.790	1.650	2.000
100	120	0.065	0.100	0.100	0.135	0.135	0.170	0.170	0.220	0.220	0.280	0.050	0.060	0.790	0.950	2	2.35
120	140	0.080	0.120	0.120	0.160	0.160	0.200	0.200	0.260	0.260	0.330	0.060	0.075	0.930	1.100	2.300	2.800
140	160	0.090	0.130	0.130	0.180	0.180	0.230	0.230	0.300	0.300	0.380	0.070	0.085	1.050	1.300	2.65	3.2
160	180	0.100	0.140	0.140	0.200	0.200	0.260	0.260	0.340	0.340	0.430	0.080	0.095	1.200	1.450	3.000	3.600
180	200	0.110	0.160	0.160	0.220	0.220	0.290	0.290	0.370	0.370	0.470	0.090	0.105	1.300	1.600	3.3	4
200	225	0.120	0.180	0.180	0.250	0.250	0.320	0.320	0.410	0.410	0.520	0.100	0.120	1.450	1.800	3.700	4.450
225	250	0.140	0.200	0.200	0.270	0.270	0.350	0.350	0.450	0.450	0.570	0.110	0.130	1.600	1.950	4	4.85
250	280	0.150	0.220	0.220	0.300	0.300	0.390	0.390	0.490	0.490	0.620	0.120	0.150	1.800	2.150	4.500	5.400
280	315	0.170	0.240	0.240	0.330	0.330	0.430	0.430	0.540	0.540	0.680	0.135	0.165	2.000	2.400	4.95	6
315	355	0.190	0.270	0.270	0.360	0.360	0.470	0.470	0.590	0.590	0.740	0.150	0.180	2.150	2.650	5.400	6.600
355	400	0.210	0.300	0.300	0.400	0.400	0.520	0.520	0.650	0.650	0.820	0.170	0.210	2.500	3.000	6.2	7.6
400	450	0.230	0.330	0.330	0.440	0.440	0.570	0.570	0.720	0.720	0.910	0.195	0.235	2.800	3.400	7.000	8.500
450	500	0.260	0.370	0.370	0.490	0.490	0.630	0.630	0.790	0.790	1.000	0.215	0.265	3.100	3.800	7.8	9.5
500	560	0.290	0.410	0.410	0.540	0.540	0.680	0.680	0.870	0.870	1.100	0.245	0.300	3.400	4.100	8.400	10.300
560	630	0.320	0.460	0.460	0.600	0.600	0.760	0.760	0.980	0.980	1.230	0.275	0.340	3.800	4.650	9.5	11.6
630	710	0.350	0.510	0.510	0.670	0.670	0.850	0.850	1.090	1.090	1.360	0.310	0.380	4.250	5.200	10.600	13.000
710	800	0.390	0.570	0.570	0.750	0.750	0.960	0.960	1.220	1.220	1.500	0.350	0.425	4.750	5.800	11.9	14.5
800	900	0.440	0.640	0.640	0.840	0.840	1.070	1.070	1.370	1.370	1.690	0.395	0.480	5.400	6.600	13.500	16.400
900	1000	0.490	0.710	0.710	0.930	0.930	1.190	1.190	1.520	1.520	1.860	0.440	0.535	6.000	7.300	15	18.3
1.000	1.120	0.530	0.770	0.770	1.030	1.030	1.300	1.300	1.670	1.670	2.050	0.490	0.600	6.400	7.800	16.000	19.500
1.120	1.250	0.570	0.830	0.830	1.120	1.120	1.420	1.420	1.830	1.830	2.250	0.550	0.670	7.100	8.700	17.8	21.7
1.250	1.400	0.620	0.910	0.910	1.230	1.230	1.560	1.560	2.000	2.000	2.450	0.610	0.750	8.000	9.700	19.900	24.300
1.400	1.600	0.680	1.000	1.000	1.350	1.350	1.720	1.720	2.200	2.200	2.700	0.700	0.850	9.100	11.100	22.7	27.7
1.600	1.800	0.750	1.110	1.110	1.500	1.500	1.920	1.920	2.400	2.400	2.950	0.790	0.960	10.200	12.500	25.700	31.200

15

Next, insert the comparator dial into the Hydraulic Nut and tie it with the nylon screw.



16

Tie the Pump hose to the quick coupling of the Hydraulic Nut.



17

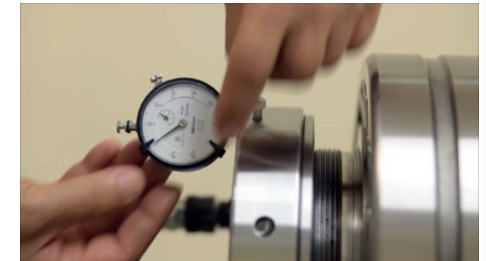
Set the comparator dial indicator to zero (0).



18

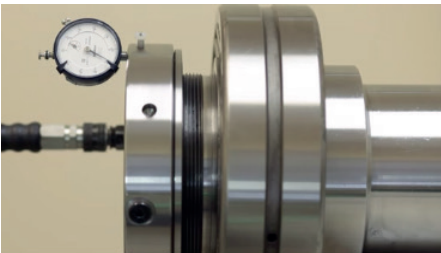
After that, consult the Axial Displacement Table to know the amount to be displaced and set the second marker to the figure in the table.

Axial Displacement: 1.05 mm



19

Pump the oil to the Hydraulic Nut, displacing the plunger, observing on the comparator dial the clearance reduction by axial displacement.



20

Upon reaching the desired axial displacement, check with a feeler gauge the final radial clearance comparing it to the table.

Note: Being the bearing sustained by the shaft, measure the radial clearance in the lowest roller.

In this example, the radial clearance will be 0.11 mm.



21

Relieve the Pump pressure and remove the comparator dial.



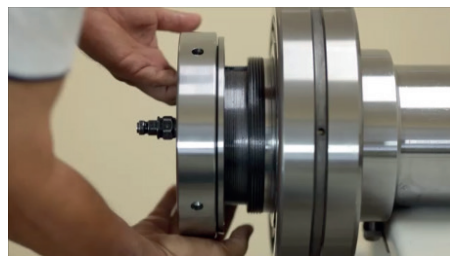
22

With the pin spanner (chave de pino - CPR), tighten the Hydraulic Nut moving back the plunger for the oil to return to the Pump.



23

Disconnect the Pump and remove the Hydraulic Nut.



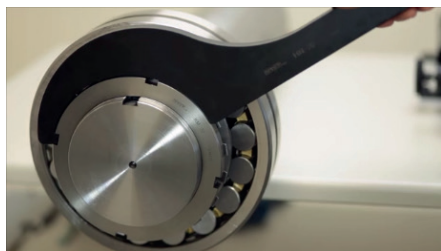
24

Put the Lockwasher and the Locknut.



25

With an HN Hook Spanner screw the Locknut.



26

Align the nearest notch of the Nut with the external jut of the Washer and, with the help of a pricker, bend it.



27

To finish, make sure the bearing can be turned easily with your hands.



To disassemble, see **Video 16** at www.bgl.com.br/en/treinamento.htm

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Online Reduction Calculation:
www.bgl.com.br/en/calculo_reducao

Catalog Download:
www.bgl.com.br/en/catalogos-folders.htm

Reference Technical Standards:
ABNT NBR 16535-1: SLEEVES FOR BEARINGS
ABNT NBR 16535-2: LOCKNUTS AND LOCKWASHERS

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