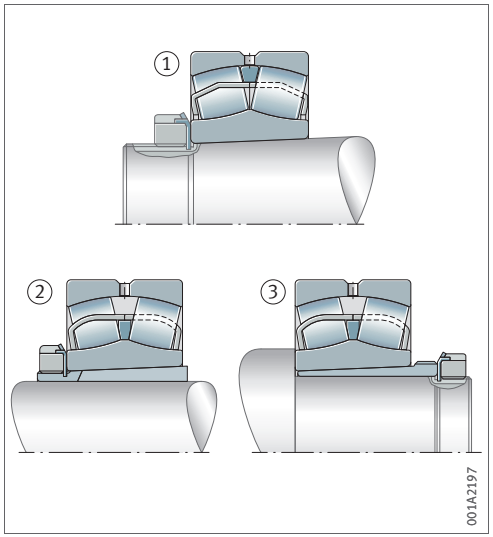
Reduction in radial internal clearance Mounting of Schaeffler spherical roller bearings

Mounting manual

Mounting of Schaeffler spherical roller bearings with tapered bore (taper 1:12 and taper 1:30)

A Schaeffler spherical roller bearing with tapered bore is either fitted directly on the tapered seat of a shaft ①, an adapter sleeve ② or a withdrawal sleeve ③ ➤ 1. An adapter sleeve or withdrawal sleeve is used with a cylindrical shaft.

1

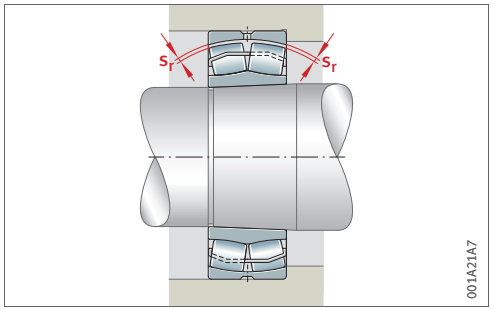


The radial internal clearance is measured over both rows of rollers using a feeler gauge, prior to mounting the spherical roller bearing ➤ 2.
It is important that the outer and inner ring are centred relative to each other during the measurement and the rollers within the spherical roller bearing are correctly aligned. This can be achieved, for example, by rotating the spherical roller bearing several times.

2

The value for the radial internal clearance s_r ➤ 3 must be documented after the measurement.

3



The bore and seating surfaces on the shaft, adapter sleeve or withdrawal sleeve must then be cleaned. Mounting paste or lubricant must not be used.

By sliding the spherical roller bearing onto the tapered seat of the shaft, adapter sleeve or withdrawal sleeve, a tight fit is first achieved and then the inner ring is expanded. Expanding the inner ring reduces the radial internal clearance. Hydraulic nuts are suitable for sliding larger spherical roller bearings into place.

During fitting, one of 2 measurement methods is used. With the first method, the radial internal clearance is measured using a feeler gauge. With the second method, the drive-up distance on the shaft, adapter sleeve or withdrawal sleeve is measured. The second method must be used if the radial internal clearance cannot be measured during fitting.

With the first method, the spherical roller bearing is slid into place in steps. The radial internal clearance is measured after each step. The sliding process is terminated when the required radial internal clearance is achieved. Once the spherical roller bearing has been slid into place, the measured radial internal clearance must not be less than the table value for Radial internal clearance after mounting ➤ 2.

With the second method, the spherical roller bearing is also slid into place in steps. The axial displacement is measured after each step. The sliding process is terminated when the required axial drive-up distance is achieved.

If the value for the measured radial internal clearance is closer to the minimum table value for Radial internal clearance prior to mounting (min.), the spherical roller bearing is moved by the value of the smaller drive-up distance (min.).

If the value for the measured radial internal clearance is closer to the maximum table value for Radial internal clearance prior to mounting (max.), the spherical roller bearing is moved by the value of the larger drive-up distance (max.).

The values for the drive-up distance apply only to solid shafts made of steel and to hollow shafts with a bore no larger than half the shaft diameter. For shafts made of materials other than steel and for thin-walled hollow shafts, please contact us.

1 Example:
Spherical roller bearing 22338-BE-XL-K
Internal clearance group Group N
Bore diameter d = 38 · 5 = 190 mm
Taper 1:12

Reduction in radial internal clearance		Drive-up distance on the				Smallest radial internal clearance after mounting
		shaft		sleeve		
mm		mm		mm		mm
from	up to	from	up to	from	up to	
0,09	0,13	1,4	2	1,5	2,2	0,07

Procedure for measuring the radial internal clearance while sliding the bearing into place:

- Measure the radial internal clearance over both rows of rollers using a feeler gauge prior to fitting.
- » The value should be between 0,16 mm and 0,22 mm.
- Slide the bearing onto the shaft until the inner ring is in clearance-free contact.
- Fit a nut or a hydraulic nut.
- Slide the spherical roller bearing in steps onto the tapered seat and check the radial internal clearance with each step.
- Terminate the sliding process when the radial internal clearance has been reduced by 0,09 mm to 0,13 mm.
- Ensure that the radial internal clearance is not less than 0,07 mm.

2

Nominal bore diameter d mm		Radial internal clearance prior to mounting internal clearance group						Reduction in radial internal clearance	
		Group N mm		Group 3 mm		Group 4 mm		mm	
over	up to	min.	max.	min.	max.	min.	max.	min.	max.
24	30	0,03	0,04	0,04	0,055	0,055	0,075	0,015	0,02
30	40	0,035	0,05	0,05	0,065	0,065	0,085	0,02	0,025
40	50	0,045	0,06	0,06	0,08	0,08	0,1	0,025	0,03
50	65	0,055	0,075	0,075	0,095	0,095	0,12	0,03	0,04
65	80	0,07	0,095	0,095	0,12	0,12	0,15	0,04	0,05
80	100	0,08	0,11	0,11	0,14	0,14	0,18	0,045	0,06
100	120	0,1	0,135	0,135	0,17	0,17	0,22	0,05	0,07
120	140	0,12	0,16	0,16	0,2	0,2	0,26	0,065	0,09
140	160	0,13	0,18	0,18	0,23	0,23	0,3	0,075	0,1
160	180	0,14	0,2	0,2	0,26	0,26	0,34	0,08	0,11
180	200	0,16	0,22	0,22	0,29	0,29	0,37	0,09	0,13
200	225	0,18	0,25	0,25	0,32	0,32	0,41	0,1	0,14
225	250	0,2	0,27	0,27	0,35	0,35	0,45	0,11	0,15
250	280	0,22	0,3	0,3	0,39	0,39	0,49	0,12	0,17
280	315	0,24	0,33	0,33	0,43	0,43	0,54	0,13	0,19
315	355	0,27	0,36	0,36	0,47	0,47	0,59	0,15	0,21
355	400	0,3	0,4	0,4	0,52	0,52	0,65	0,17	0,23
400	450	0,33	0,44	0,44	0,57	0,57	0,72	0,2	0,26
450	500	0,37	0,49	0,49	0,63	0,63	0,79	0,21	0,28
500	560	0,41	0,54	0,54	0,68	0,68	0,87	0,24	0,32
560	630	0,46	0,6	0,6	0,76	0,76	0,98	0,26	0,35
630	710	0,51	0,67	0,67	0,85	0,85	1,09	0,3	0,4
710	800	0,57	0,75	0,75	0,96	0,96	1,22	0,34	0,45
800	900	0,64	0,84	0,84	1,07	1,07	1,37	0,37	0,5
900	1 000	0,71	0,93	0,93	1,19	1,19	1,52	0,41	0,55
1 000	1 120	0,78	1,02	1,02	1,3	1,3	1,65	0,45	0,6
1 120	1 250	0,86	1,12	1,12	1,42	1,42	1,8	0,49	0,65
1 250	1 400	0,94	1,22	1,22	1,55	1,55	1,96	0,55	0,72
1 400	1 600	1,06	1,38	1,38	1,75	1,75	2,2	0,62	0,81
1 600	1 800	1,18	1,54	1,54	1,95	1,95	2,5	0,69	0,93
1 800	2 000	1,31	1,71	1,71	2,15	2,15	2,75	0,77	1,04
2 000	2 250	1,45	1,9	1,9	2,4	2,4	3,05	0,85	1,15
2 250	2 500	1,6	2,1	2,1	2,65	2,65	3,35	0,95	1,28

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Drive-up distance on								Radial internal clearance after mounting		
1:12 taper				1:30 taper				Internal clearance group		
Shaft mm		Sleeve mm		Shaft mm		Sleeve mm		Group N mm	Group 3 mm	Group 4 mm
min.	max.	min.	max.	min.	max.	min.	max.	min.	min.	min.
0,3	0,35	0,3	0,4	–	–	–	–	0,015	0,02	0,035
0,35	0,4	0,35	0,45	–	–	–	–	0,015	0,025	0,04
0,4	0,45	0,45	0,5	–	–	–	–	0,02	0,03	0,05
0,45	0,6	0,5	0,7	–	–	–	–	0,025	0,035	0,055
0,6	0,75	0,7	0,85	–	–	–	–	0,025	0,04	0,07
0,7	0,9	0,75	1	1,7	2,2	1,8	2,4	0,035	0,05	0,08
0,7	1,1	0,8	1,2	1,9	2,7	2	2,8	0,05	0,065	0,1
1,1	1,4	1,2	1,5	2,7	3,5	2,8	3,6	0,055	0,08	0,11
1,2	1,6	1,3	1,7	3	4	3,1	4,2	0,055	0,09	0,13
1,3	1,7	1,4	1,9	3,2	4,2	3,3	4,6	0,06	0,1	0,15
1,4	2	1,5	2,2	3,5	4,5	3,6	5	0,07	0,1	0,16
1,6	2,2	1,7	2,4	4	5,5	4,2	5,7	0,08	0,12	0,18
1,7	2,4	1,8	2,6	4,2	6	4,6	6,2	0,09	0,13	0,2
1,9	2,6	2	2,9	4,7	6,7	4,8	6,9	0,1	0,14	0,22
2,0	3	2,2	3,2	5	7,5	5,2	7,7	0,11	0,15	0,24
2,4	3,4	2,6	3,6	6	8,2	6,2	8,4	0,12	0,17	0,26
2,6	3,6	2,9	3,9	6,5	9	6,8	9,2	0,13	0,19	0,29
3,1	4,1	3,4	4,4	7,7	10	8	10,4	0,13	0,2	0,31
3,3	4,4	3,6	4,8	8,2	11	8,4	11,2	0,16	0,23	0,35
3,7	5	4,1	5,4	9,2	12,5	9,6	12,8	0,17	0,25	0,36
4,0	5,4	4,4	5,9	10	13,5	10,4	14	0,2	0,29	0,41
4,6	6,2	5,1	6,8	11,5	15,5	12	16	0,21	0,31	0,45
5,3	7	5,8	7,6	13,3	17,5	13,6	18	0,23	0,35	0,51
5,7	7,8	6,3	8,5	14,3	19,5	14,8	20	0,27	0,39	0,57
6,3	8,5	7	9,4	15,8	21	16,4	22	0,3	0,43	0,64
6,8	9	7,6	10,2	17	23	18	24	0,32	0,48	0,7
7,4	9,8	8,3	11	18,5	25	19,6	26	0,34	0,54	0,77
8,3	10,8	9,3	12,1	21	27	22,2	28,3	0,36	0,59	0,84
9,3	12,2	10,6	13,8	23,6	30,8	24,8	32,4	0,44	0,66	0,94
10,4	14	11,7	15,8	26,2	35,3	27,6	37,2	0,48	0,73	1,02
11,6	15,6	13,1	17,7	29,3	39,5	30,8	41,6	0,54	0,81	1,11
12,7	17,2	14,5	19,5	32,4	43,9	34	46	0,6	0,95	1,55
14,3	19,2	16,2	21,8	36,2	48,8	38	51,2	0,65	1,15	1,7

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