5. Computation of the Rotary Stroke Bearing

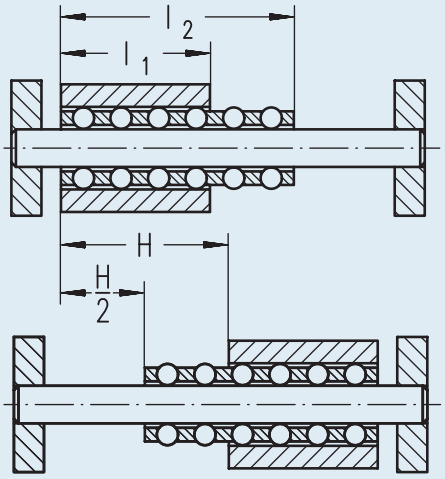

Fig. 19

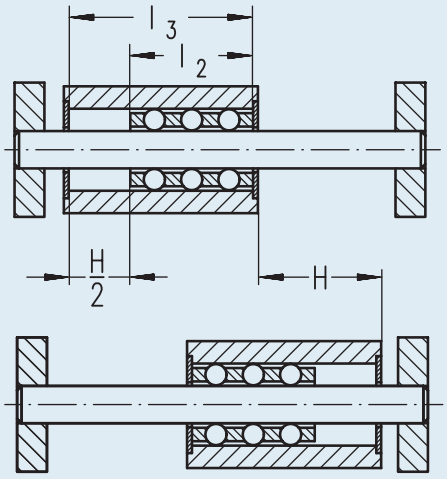

Fig. 20

d_w [mm]	E [mm]		
	N 500	**N 501**	**N 502**
3	-	-	5
4 - 5	-	10	8
6 - 8	-	12	10
10 - 12	12	15	12
14 - 16	-	18	15
18 - 20	12	18	15
25	12	20	-
32 - 40	15	22	-
50 - 63	-	30	-
80 -100	-	45	-

Fig. 21

The computation formulae are intended to assist the designer in determining the rotary stroke bearing which is suited for a given design task.

Computation of the rotary stroke bearings is based in principle on the laws governing ball bearings. However, they differ essentially from the latter in that they allow movement in two degrees of freedom, so that length dimensions and acceleration values must be taken into account. Furthermore, the internal osculating conditions differ substantially from those of most ball bearings.

The following features and characteristics are of primary importance in determining a suitable rotary stroke bearing:
- Freedom from backlash
- Guiding accuracy
- Smooth running
- Loading capacity
- Stroke and rotary frequency
- Service life
- Dimensions

The following variables are to be determined:
- Shaft diameter d_w
- Bush length l_1, l_3
- Cage length l_2

Nominal diameter dw and the cage type determine specific loading capacity C_{10}.
The lengths of the guide bush and ball cage determine the contact length of the rotary stroke bearing. These values are used to calculate the operational loading capacity of the rotary stroke bearing.

5.1 Stroke path and contact lengths

The ball contact lengths are determined by the mutual positions of guide bush, ball cage and guide shaft at the end of the stroke. The dimensions l_1 and l_2 lead to a distinction between different operating modes.

Open rotary stroke bearing (Fig. 19)
Cage length l_2 equal to or greater than bush length l_1.
Stroke: $\mathbf{H = 2\ (l_2 - l_1)}$

Closed rotary stroke bearing (Fig. 20)
Bush length l_3 greater than cage length l_2, ball cage remains within the bush.
Stroke: $\mathbf{H = 2\ (l_3 - l_2)}$

A contact length E which remains constant across the entire stroke (in every stroke position) is desirable for both operating modes. This is always fulfilled for closed rotary stroke bearings. In the case of open rotary stroke bearings, the bush should be flush with the cage in the end stroke positions. If the bush extends beyond the end of the cage, this shortens the contact length and thus reduces the loading capacity of the rotary stroke bearing in this stroke position.

The minimum permissible contact length E must be determined by calculating the loading capacity. The loading capacities of the ball cages can be taken as guideline values.

Reference contact length e
In order to compute a rotary stroke bearing, it is necessary to determine the reference contact lengths e = contact length with unfavorable load distribution.
(see Fig. 23 and Fig. 24)

With a small load
The table (Fig. 21) shows the recommended minimum contact length E depending on d_w for accurate guiding using the rotary stroke bearing without significant load.