INTERNATIONAL STANDARD

ISO 10285

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Rolling bearings, linear motion, recirculating ball, sleeve type — Metric series

Roulements linéaires à recirculation de billes, type manchon — Série métrique

INTERNATIONAL ISO

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Introduction

Linear motion rolling bearings provide for rectilinear motion as opposed to rotational motion. The type of bearing described in this International Standard uses balls which circulate in a number of closed loops in the cylindrical bearing body which surrounds the shaft.

Linear motion rolling bearings are typically applied to meet one or more of the following criteria:

a) smooth antifriction motion, free from stick-slip or chatter;

b) low force required to produce relative linear motion between the bearing and shaft.

These requirements, as well as others, can be met by appropriate use of the various linear motion rolling bearing types (closed type, adjustable type, open type). The appropriate selection of bearing type and specification should be established between the manufacturer and user.

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Rolling bearings, linear motion, recirculating ball, sleeve type — Metric series

1 Scope

This International Standard specifies the general boundary dimensions, tolerances and definitions for linear motion, recirculating-ball, sleeve-type rolling bearings of the metric series.

It applies only to the size range covered by table 1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 286-1:1988, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits.*

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

ISO 1132:1980, *Rolling bearings — Tolerances — Definitions.*

ISO 5593:1984, *Rolling bearings — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 1132 and ISO 5593 and the following definitions apply.

3.1 linear motion, recirculating-ball, sleeve-type rolling bearing: A basically cylindrical sleeve with a number of closed loops of circulating balls which is designed to achieve linear rolling motion along a shaft.

3.2 shaft: Hardened cylindrical rod along which a linear motion rolling bearing traverses.

3.3 nominal outside diameter: Diameter of the cylinder containing the theoretical surface of a basically cylindrical outside surface.

3.4 nominal ball complement bore diameter: Diameter of the cylinder inscribed inside the inner balls.

3.5 nominal bearing width: Distance between two theoretical end faces designated to bound the width of the linear motion rolling bearing.

3.6 radial runout: Difference between the largest and the smallest radial distance between the outside surface of the cylindrical sleeve and the centre-line of the ball complement bore diameter.

3.7 closed-type bearing: That type of bearing in which the outer sleeve is continuous or virtually continuous, whereby adjustment of clearance between the ball complement bore diameter and the shaft is achieved, in most cases, by selection of the housing fit, shaft tolerance and the bearing.

3.8 adjustable-type bearing: That type of bearing which has elastic features which permit mechanical adjustment of the clearance between the ball complement bore and the shaft.

3.9 open-type bearing: That type of bearing in which a longitudinal section is removed to provide clearance over the shaft-support rails.

4 Symbols

See figures 1 to 3.

F_w	Nominal ball complement bore diameter
F_{ws}	Single diameter of the ball complement bore
ΔF_{ws}	Deviation of a single diameter of the ball complement bore from the nominal ball complement bore diameter (difference between F_{ws} and F_w)
D	Nominal outside diameter
D_{mp}	Single-plane mean outside diameter
ΔD_{mp}	Deviation of the single-plane mean outside diameter from the nominal outside diameter (difference between D_{mp} and D)
D_1	Snap ring groove diameter
$D_{1\,max}$	Largest snap ring groove diameter
C	Nominal bearing width
C_s	Single bearing width
ΔC_s	Deviation of a single bearing width from the nominal bearing width (difference between C_s and C)
C_1	Nominal distance between the outer faces of the snap ring grooves
C_{1s}	Single distance between the outer faces of the snap ring grooves
ΔC_{1s}	Deviation of a single distance between the outer faces of the snap ring grooves from the nominal snap ring groove distance (difference between C_{1s} and C_1)
C_2	Nominal snap ring groove width
$C_{2\,min}$	Smallest snap ring groove width
E	Width of the sector opening at diameter F_w in the open-type bearing
E_{min}	Smallest width of the sector opening at diameter F_w in the open-type bearing
K_{ea}	Radial runout of assembled bearing
α	Included angle of the sector opening in an open-type bearing
α_{min}	Smallest included angle of the sector opening in an open-type bearing

5 Boundary dimensions

The boundary dimensions are given in table 1 which specifies the dimensional series 1, 2, 3 and 4. (See figures 1 to 3.)

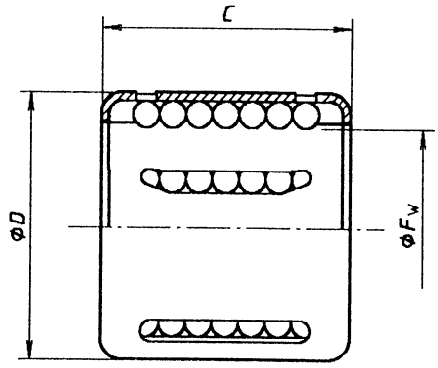

Figure 1 — Symbols for boundary dimensions — Bearing without snap ring grooves (mainly series 1 and 2)

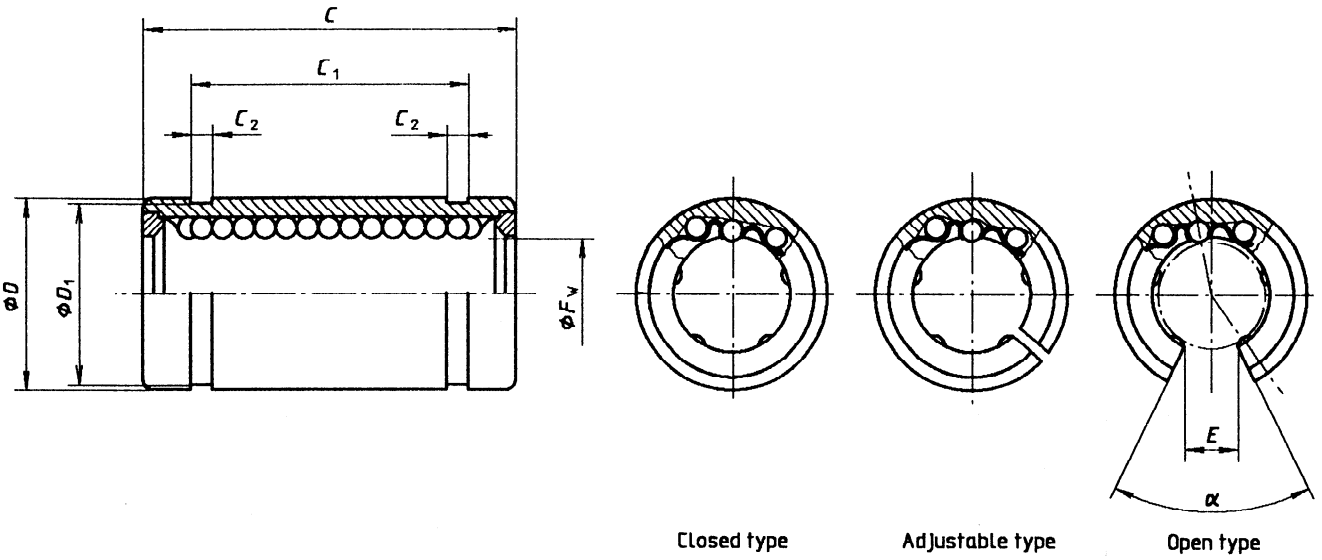

Figure 2 — Symbols for boundary dimensions — Bearings with snap ring grooves (mainly series 3)

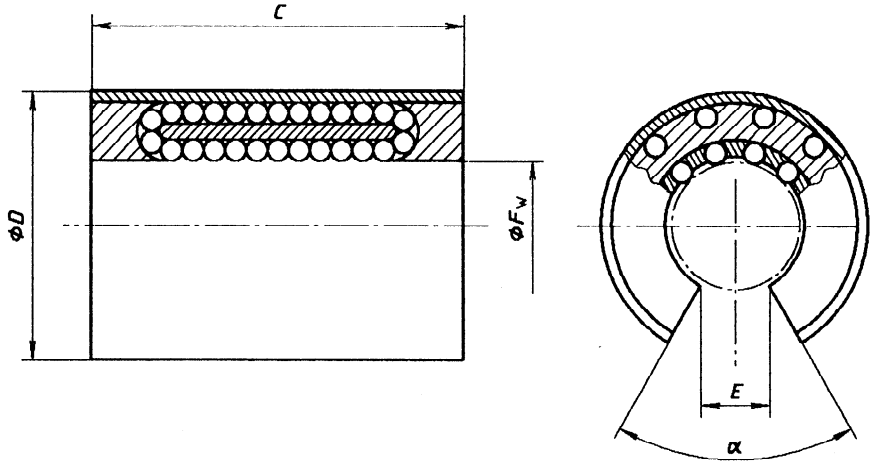

Figure 3 — Symbols for boundary dimensions, series 4

Table 1 — Boundary dimensions

Dimensions in millimetres, angles in degrees

F_w	Series 1		Series 2		Series 3							Series 4			
	D	C	D	C	D	C	C_1	$C_{2\ min}$	$D_{1\ max}$	E_{min}	$\alpha_{\ min}$	D	C	$E_{\ min}$	$\alpha_{\ min}$
3	7	10	—	—	—	—	—	—	—	—	—	—	—	—	—
4	8	12	—	—	—	—	—	—	—	—	—	—	—	—	—
5	10	15	—	—	12	22	14,2	1,1	11,5	—	—	—	—	—	—
6	12	19	—	—	13	22	14,2	1,1	12,4	—	—	—	—	—	—
8	15	24	—	—	16	25	16,2	1,1	15,2	—	—	—	—	—	—
10	17	26	—	—	19	29	21,6	1,3	18	6	65	—	—	—	—
12	19	28	20	24	22	32	22,6	1,3	21	6,5	65	—	—	—	—
16	24	30	25	28	26	36	24,6	1,3	24,9	9	50	—	—	—	—
20	28	30	30	30	32	45	31,2	1,6	30,5	9	50	—	—	—	—
25	35	40	37	37	40	58	43,7	1,85	38,5	11	50	—	—	—	—
30	40	50	44	44	47	68	51,7	1,85	44,5	12,5	50	60	75	14	72
35	—	—	—	—	52	70	49,2	2,15	49	15	50	—	—	—	—
40	52	60	56	56	62	80	60,3	2,15	59	16,5	50	75	100	19,5	72
50	62	70	—	—	75	100	77,3	2,65	72	21	50	90	125	24,5	72
60	75	85	—	—	90	125	101,3	3,15	86,5	26	50	110	150	29	72
80	—	—	—	—	120	165	133,3	4,15	116	36	50	145	200	39	72
100	—	—	—	—	150	175	143,3	4,15	145	45	50	—	—	—	—

NOTE — For the open and adjustable types in series 3 and the open type in series 4, D and $D_{1\ max}$ dimensions apply after the sleeves are split and fitted into a thick-section ring gauge of diameter D with zero deviation.

6 Tolerances

6.1 Classes

The classes of precision to which linear motion rolling bearings are manufactured are known as L9, L7, L7A, L6, L6A and L6M. The tolerances are tabulated in tables 3 to 8. They conform to the system of limits as found in ISO 286-1 and ISO 286-2 and use the plan given in table 2.

Tables 3 to 8 have been established on the basis of listing all the linear motion rolling bearing tolerances for a given nominal ball complement bore diameter (F_w).

6.2 Applicability

Tolerance class L9 shall be applicable to series 1 and 2, closed and adjustable types of bearing.

Tolerance classes L7 and L6 shall be applicable to series 1, 2 and 3, closed-type bearings.

Tolerance classes L7A and L6A shall be applicable to series 3, open and adjustable types of bearing.

Tolerance class L6M shall be applicable to series 4, open-type bearings.

Table 2 — Tolerance classes

Symbol	L9	L7	L7A	L6	L6A	L6M
ΔF_{ws}	JS9	H7	H8	H6	H7	M7
ΔD_{mp}	1)	h6 2)	1)	h5 2)	1)	1)
ΔC_s	js14	h14	h14	h14	h14	h14
ΔC_{1s}	1)	H13	H13	H13	H13	1)
K_{ea}	1)	1)	1)	IT7 3)	1)	1)

1) Tolerance not defined.

2) Applicable to linear motion rolling bearings with a solid cylindrical outer sleeve.

3) Based on D dimension.

Table 3 — Tolerance class L9 for use with series 1 and 2, closed and adjustable types of bearing

Tolerance values in micrometres

F_w mm		ΔF_{ws} 1)		ΔC_s	
over	incl.	high	low	high	low
—	3	+ 12,5	− 12,5	+ 180	− 180
3	5	+ 15	− 15	+ 215	− 215
5	6	+ 15	− 15	+ 260	− 260
6	10	+ 18	− 18	+ 260	− 260
10	18	+ 21,5	− 21,5	+ 260	− 260
18	20	+ 26	− 26	+ 260	− 260
20	30	+ 26	− 26	+ 310	− 310
30	50	+ 31	− 31	+ 370	− 370
50	80	+ 37	− 37	+ 435	− 435

1) ΔF_{ws} values apply only when the bearing is fitted into a thick-section ring gauge of diameter D with zero deviation.