
**Rolling bearings, linear motion,
recirculating ball, sleeve type —
Accessories**

Roulements à mouvement linéaire à recirculation de billes, douilles à billes — Accessoires

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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.

International Standard ISO 13012 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 11, *Linear motion rolling bearings*.

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Introduction

The use of linear motion rolling bearings can be facilitated by the selection of bearing housings, shafts, shaft support blocks and shaft support rails. These items, referred to as accessories, can aid in the application of the linear motion rolling bearings to achieve the desired criteria of smooth, accurate, low-friction linear motion free from chatter or stick-slip.

The appropriate selection of bearing housing type, shaft and shaft support should be established between the manufacturer and the user.

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Rolling bearings, linear motion, recirculating ball, sleeve type — Accessories

1 Scope

This International Standard gives the boundary dimensions and other relevant dimensions of accessories for rolling bearings, linear motion, recirculating ball, sleeve type - metric series. The essential dimensions for housings, shaft support rails and shaft support blocks are given and generally without tolerance. This standard was developed to be used with International Standard ISO 10285.

This standard includes the following accessories:

Housings:

- flangeless, closed and adjustable types for series 1
- flanged, closed and adjustable types for series 3
- flanged, open type for series 3
- flangeless, closed and adjustable types for series 3
- flangeless, open and open adjustable types for series 3

- Shaft support rails
- Shaft support rails, low height type
- Shaft support blocks, flanged type
- Shaft support blocks, flangeless type
- Shafts, Solid and tubular for linear motion rolling bearings

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

ISO 468:1982, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

ISO 3754:1976, *Steel — Determination of effective depth of hardening after flame or induction hardening.*

ISO 10285:1992, *Rolling bearings, linear motion, recirculating ball, sleeve type — Metric series.*

3 Symbols

The symbols (except those for tolerances) shown in the figures and the values given in the tables denote nominal dimensions unless specified otherwise.

3.1 Housings, flangeless, closed and adjustable types for series 1 linear motion rolling bearings

See table 1

A	housing width
D_a	seating diameter
F_w	ball complement bore diameter (reference)
H	distance from mounting face to centreline of seating diameter
H_1	height (overall)
J	bolt hole centre distance
L	housing length
	bolt hole diameter
N_1	threaded attachment hole

3.2 Housings, flanged, closed and adjustable types for series 3 linear motion rolling bearings

See table 2

A	base width
A_1	seating width
D_a	seating diameter
F_w	ball complement bore diameter (reference)
H	distance from mounting face to centreline of seating diameter
H_1	feet height
H_2	height (overall)
J	bolt hole centre distance (length)
J_1	bolt hole centre distance (width)
L	base length
N	bolt hole diameter

3.3 Housings, flanged, open type for series 3 linear motion rolling bearings

See table 3

A	housing width
A_1	seating width
D_a	seating diameter
F_w	ball complement bore diameter (reference)
G	width of sector opening (at diameter D_a)
H	distance from mounting face to centreline of seating diameter

N

H_1	feet height
H_2	height (overall)
J	bolt hole centre distance (length)
J_1	bolt hole centre distance (width)
N	bolt hole diameter
L	base length
α	angle of sector opening

3.4 Housings, flangeless, closed and adjustable types for series 3 linear motion rolling bearings

See table 4

A	housing width
D_a	seating diameter
F_w	ball complement bore diameter (reference)
H	distance from mounting face to centreline of seating diameter
H_1	height (overall)
J	bolt hole centre distance (length)
J_1	bolt hole centre distance (width)
L	housing length
L_1	distance from side face to centreline of seating diameter
N	bolt hole diameter
N_1	threaded attachment hole

3.5 Housing, flangeless, open and open adjustable types for series 3 linear motion rolling bearings

See table 5

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A	housing width
D_a	seating diameter
F_w	ball complement bore diameter (reference)
G	width of sector opening (at diameter D_a)
H	distance from mounting face to centreline of seating diameter
H_1	height (overall)
J	bolt hole centre distance (length)
J_1	bolt hole centre distance (width)
N	bolt hole diameter
N_1	threaded attachment hole
L	housing length
L_1	distance from side face to centreline of seating diameter
α	angle of sector opening

3.6 Shaft support rails for linear motion rolling bearings

See table 6

A	base width
d	shaft diameter (reference)
H	distance from mounting face to centreline of shaft
H_1	flange height
J	bolt hole centre distance (length)
J_1	bolt hole centre distance (width)

M	shaft support width
N	bolt hole diameter
N_1	bolt hole diameter (shaft attachment)

3.7 Shaft support rails, low height type for linear motion rolling bearings

See table 7

A	base width
d	shaft diameter (reference)
H	distance from mounting face to centreline of shaft
H_1	flange height
H_2	distance from mounting face to top of attachment screw head
J	bolt hole centre distance (length)
J_1	bolt hole centre distance (width)
M	shaft support width
N	bolt hole diameter
β	shaft support angle

3.8 Shaft support blocks, flanged type

See table 8

A	base width
D_a	seating diameter
H	distance from mounting face to centreline of seating diameter
H_1	feet height
H_2	height (overall)
J	bolt hole centre distance (length)
L	base length
N	bolt hole diameter

3.9 Shaft support blocks, flangeless type

See table 9

A	base width
D_a	seating diameter
H	distance from mounting face to centreline of seating diameter
H_1	height (overall)
J	bolt hole centre distance
L	base length
N	bolt hole diameter
N_1	threaded attachment hole

3.10 Shafts, solid and tubular for linear motion rolling bearings

See table 10

d	shaft outside diameter
d_s	single shaft outside diameter
L	shaft length
L_s	actual shaft length
V_{dp}	variation of shaft outside diameter in a single radial plane
V_{dmp}	variation of mean shaft outside diameter

- Δ_{ds} deviation of a single shaft outside diameter
 ΔL_s deviation of the actual shaft length

4 Housings

To facilitate the design and assembly of linear motion systems, specifically designed housings are available. Included in this International Standard are the boundary dimensions and other related dimensions of closed and adjustable housings for linear motion rolling bearings series 1, and closed, adjustable, open and open adjustable housings for linear motion rolling bearings, series 3, as specified in ISO 10285.

The housings specified in tables 1 to 5, and the respective linear motion rolling bearings should be supplied by the same producer as the fixation of the bearings in the housings will be specified by the producer and is not covered by this International Standard.

4.1 Housings, closed and adjustable types for series 1 linear motion rolling bearings

This International Standard includes the following housing design for series 1 linear motion rolling bearings:

- flangeless, closed and adjustable types (table 1)

4.2 Housings, closed, adjustable, open and open adjustable types for series 3 linear motion rolling bearings

This International Standard includes the following housing designs for series 3 linear motion rolling bearings:

- flanged, closed and adjustable types (table 2)
- flanged, open type (table 3)
- flangeless, closed and adjustable types (table 4)
- flangeless, open and open adjustable types (table 5).

5 Shaft support rails

Shaft support rails are used to support the shaft on which the open type linear motion rolling bearing traverses. This International Standard includes the following shaft support rails for linear motion rolling bearings.

- shaft support rails (table 6)
- shaft support rails, low height type (table 7).

6 Shaft support blocks

Shaft support blocks are used to support the shaft (usually at the ends) on which the closed and adjustable type linear motion rolling bearing traverses. This International Standard gives the essential dimensions of two commonly used types, shaft support blocks, flanged type shaft support blocks (table 8) and flangeless type (table 9).

7 Shafts

7.1 Material

Shafts covered by this International Standard are precision hardened and ground steel shafts in both solid and tubular section. They are manufactured from high quality carbon steel or high quality carbon chrome steel and are either case hardened or through hardened.

7.2 Heat treatment

7.2.1 Case hardened shafts

The cylindrical surface of the shafts is heat treated to provide a basically uniform effective depth of hardening and a surface hardness of not less than 653 HV (58 HRC) over the entire operating length. The effective depth of hardening shall be determined in accordance with ISO 3754. This effective depth of hardening is the distance from the outside surface of the shaft to a material layer at which the hardness is approximately 80% of the specified minimum surface hardness. End faces of shafts may remain unhardened.

7.2.2. Through hardened shafts

The shafts are heat-treated to give a surface hardness of not less than 653 HV (58 HRC) over the entire operating length.

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7.3 Geometrical tolerances

7.3.1 Tolerance classes

The precision hardened and ground solid and tubular shafts are available in two diameter tolerance classes: h6 and h7.

7.3.2 Geometric form

The geometric form of each tolerance class is controlled by the following features.

Circularity (roundness): variation of shaft outside diameter in a single plane.
Cylindricity (taper, concavity, convexity): variation of mean shaft outside diameter.
Straightness (per metre).

These tolerances for classes h6 and h7 are shown in table 10. A method for measuring straightness is illustrated and defined in this table.

7.3.3 Shaft length tolerance

These tolerances are given in table 11.

7.3.4 Chamfers

The shaft ends are provided with chamfers to facilitate entry of shaft into the linear motion rolling bearing. The length of the chamfer is shown in table 10. The ends of shafts with machined end faces are provided with shallow chamfers in the radial direction and usually long in the axial direction. Shafts for use with sealed linear motion rolling bearings shall have this chamfer angle less than 30°.

7.3.5 Surface roughness

The roughness of the cylindrical surface of the steel shaft should be 0,32 μm R_a maximum, in accordance with ISO 468. See table 10.

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