INTERNATIONAL STANDARD

ISO 14728-2

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Rolling bearings — Linear motion rolling bearings —

Part 2: Static load ratings

Roulements — Roulements à mouvement linéaire —
Partie 2: Charges statiques de base

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14728-2 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 8, *Load ratings and life*.

ISO 14728 consists of the following parts, under the general title *Rolling bearings — Linear motion rolling bearings*:

— *Part 1: Dynamic load ratings and rating life*

— *Part 2: Static load ratings*

Introduction

It is often impractical to establish the suitability of a linear motion rolling bearing selected for a specific application by testing. The following procedures have proved to be an appropriate and convenient substitute for testing:

— life calculation with dynamic load (ISO 14728-1);

— static load safety factor calculation with static load (ISO 14728-2).

Permanent deformation appears in rolling elements and raceways of rolling bearings under static loads of moderate magnitude and increases gradually with increasing load.

It is often impractical to establish whether the deformation appearing in a bearing in a specific application is permissible by testing the bearing in that application. Other methods are therefore required to establish the suitability of the bearing selected.

Experience shows that a total permanent deformation of 0,000 1 of the rolling element diameter, at the centre of the most heavily-loaded rolling element/raceway contact, can be tolerated in most bearing applications without the subsequent bearing operation being impaired. The basic static load rating is, therefore, given a magnitude such that approximately that degree of deformation occurs when the static equivalent load is equal to the load rating.

Tests in different countries indicate that a load of the magnitude in question may be considered to correspond to a calculated contact stress of

— 5 300 MPa for recirculating linear ball bearings, sleeve type;

— 4 200 to 4 600 MPa for recirculating linear ball bearings, linear guideway type (see 3.9 and Table 1);

— 4 200 to 4 600 MPa for non-recirculating linear ball bearings (see 3.9 and Table 1);

— 4 000 MPa for linear roller bearings,

at the centre of the most heavily-loaded rolling element/raceway contact. The formulae and factors for the calculation of the basic static load ratings are based on these contact stresses.

The permissible static equivalent load may be smaller than, equal to or greater than the basic static load rating, depending on the requirements for smoothness of operation and friction, as well as on actual contact surface geometry. Bearing users without previous experience of these conditions should consult the bearing manufacturers.

Rolling bearings — Linear motion rolling bearings —

Part 2:
Static load ratings

1 Scope

This part of ISO 14728 specifies methods of calculating the basic static load rating, static equivalent load and static safety factor for linear motion rolling bearings manufactured from contemporary, commonly used, high quality, hardened bearing steel in accordance with good manufacturing practice and basically of conventional design as regards the shape of the rolling contact surfaces.

This part of ISO 14728 is not applicable to designs where the rolling elements operate directly on the slide surface of the machine equipment, unless that surface is equivalent in all respects to the raceway of the linear motion rolling bearing component it replaces.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 76:1987, *Rolling bearings — Static load ratings*

ISO 5593:1997, *Rolling bearings — Vocabulary*

ISO 15241:2001, *Rolling bearings — Symbols for quantities*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 76, ISO 5593 and the following apply.

3.1
recirculating linear ball bearing, sleeve type, with or without raceway grooves
basically cylindrical sleeve provided with a number of closed loops of recirculating balls designed to achieve linear rolling motion along a hardened cylindrical shaft

See Figure 1.

NOTE The raceways in the sleeve can be cylindrical in design as well as the steel inserts with raceway grooves parallel to the axis.

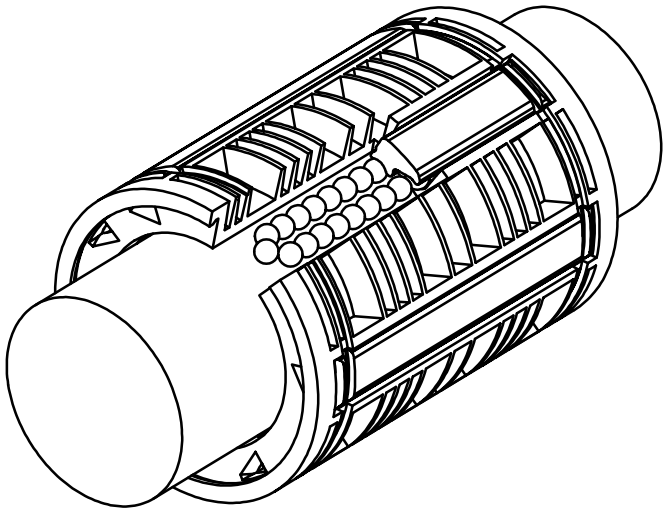

Figure 1 — Recirculating linear ball bearing, sleeve type

3.2
recirculating linear ball [roller] bearing, linear guideway type
linear ball [roller] bearing provided with a number of symmetrically arranged, closed loops of recirculating balls (rollers) designed to achieve linear rolling motion along a hardened guideway furnished with adequate raceways

See Figure 2.

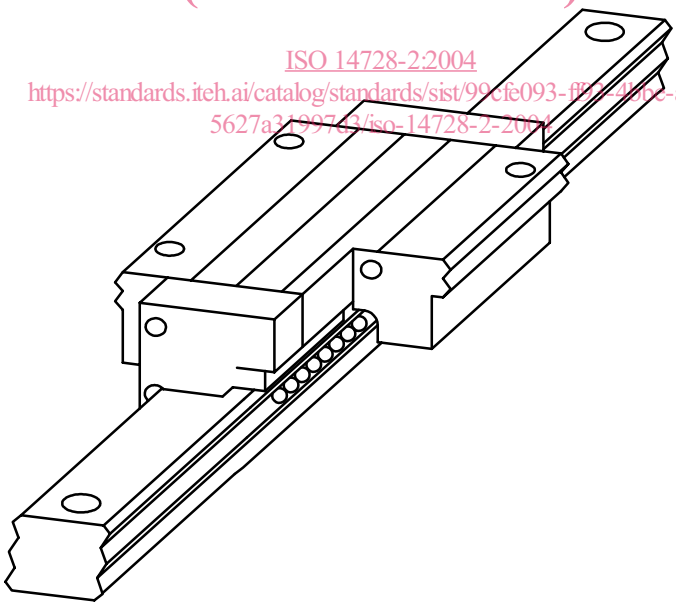

Figure 2 — Recirculating linear ball [roller] bearing, linear guideway type

3.3
non-recirculating linear ball bearing, linear guideway, deep groove type
linear bearing with balls as rolling elements, each ball having two points of contact

See Figure 3.

NOTE The cross-sectional radii of the raceway grooves in the two guideways are equal and may lie between 0,52 D_w and infinity.

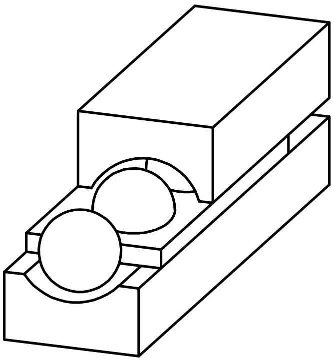

Figure 3 — Non-recirculating linear ball bearing, linear guideway, deep groove type

3.4
non-recirculating linear ball bearing, linear guideway, four-point-contact type
linear bearing with balls as rolling elements, each ball having four points of contact

See Figure 4.

NOTE The cross-sectional radii of the raceway grooves for the four points of contact in the two guideways are equal and may lie between 0,52 D_w and infinity.

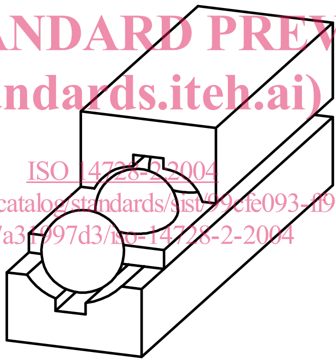

Figure 4 — Non-recirculating linear ball bearing, linear guideway, four-point-contact type

3.5
non-recirculating linear roller bearing, linear guideway, flat type
linear bearing with needle rollers or cylindrical rollers as rolling elements

See Figure 5.

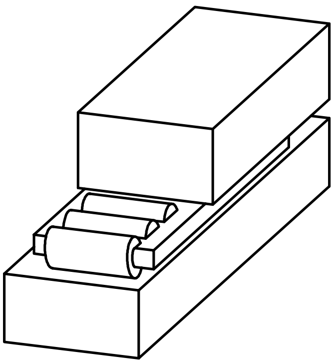

Figure 5 — Non-recirculating linear roller bearing, linear guideway, flat type