

Glossary of Terms for rolling bearings

[ISO title: Rolling bearings — Vocabulary]

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- Ball and Roller Bearing Manufacturers' Association
- Engineering Equipment and Materials Users' Association
- Institution of Mechanical Engineers
- Institution of Production Engineers
- Machine Tool Industry Research Association
- Ministry of Defence
- National Coal Board
- North East Coast Institution of Engineers and Shipbuilders
- Society of British Aerospace Companies Limited

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National foreword

This British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee and is one of a series implementing corresponding International Standards in the development of which the United Kingdom has played an active part.

This Part of this British Standard is identical with the English text of ISO 5593:1984 “*Rolling bearings — Vocabulary*” prepared by Technical Committee ISO/TC 4, Rolling bearings, of the International Organization for Standardization (ISO).

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

In entry **06.04.01** the comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “British Standard”.

Since only the English text is used in this British Standard, the last sentence of clause 1 is inapplicable.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 59 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope and field of application

This International Standard establishes a vocabulary of terms, with their definitions, applied in the field of rolling bearings and their technology. The terms and definitions are given in English and French.

NOTE Only terms which are particular to the pertinent field, or which in this field are defined in a particular way, are included.

2 Principles and rules followed

2.1 Organization of the Vocabulary

The Vocabulary comprises

- a) terms, with their definition, in systematic order (see clause 3);
- b) figures with index numbers of relevant terms (see clause 4);
- c) alphabetical listings of the terms, with their index numbers.

The Vocabulary can be used in several ways:

- if a term is known in either language, its index number is established in the pertinent alphabetical listing and then the definition of the term, its equivalent in the other language, and references to illustrations may be found in clause 3;
- a bearing, part or dimension may be identified in one of the figures of clause 4, giving the index numbers of the relevant terms in clause 3;
- a required term, with definition, may be established directly by means of a search in clause 3.

2.2 Organization of clause 3 on terms and definitions

The terms and definitions are given in groups and sub-groups, arranged in systematic order.

A two-digit serial number is assigned to each group, beginning with 01 for Bearings.

Each group is divided into sub-groups, to each of which is assigned a 4-digit serial number, the first two digits being those of the group.

Each entry (see 2.2.1) is assigned a 6-digit index number, the first four digits being those of the sub-group.

In order that the various language versions of the Vocabulary shall be conveniently linked, the numbers assigned to groups, sub-groups and entries are the same for both languages.

2.2.1 Organization of an entry

Each entry contains an index number, the term and the text of the definition.

An entry may also include a note and/or reference to one or more figures in clause 4 [for example (Figure 5.)].

The index number and the term are printed in bold typeface. In some entries the term is followed by a qualifier. A qualifier is printed in normal typeface in parentheses and indicates a directive for the use of the term or a particular field of application of the term as defined.

The absence of a generally accepted term for the concept in the language is indicated by a row of dots.

2.2.2 Use of parentheses

In some terms a word or words printed in bold typeface are placed between parentheses. These words are part of the complete term, but they may be omitted when use of the abridged term does not introduce ambiguity.

In some entries the terms are followed by words in parentheses in normal typeface. These words are qualifiers (see 2.2.1) and not part of the term.

2.2.3 Use of [square] brackets

When several closely related terms can be defined by the same texts apart from a few words, the terms and their definitions are grouped in a single entry. The words to be substituted for those which precede them in order to obtain the different meanings are placed in brackets, i.e. [], in the same order in the term and in the definition.

2.2.4 Use of italic typeface

A term printed in italic typeface in a definition or a note is defined in another entry of the Vocabulary. It is only printed in italic typeface the first time it occurs in each entry.

The basic form of each such term is included in the alphabetical index, where the index number of the corresponding entry is shown.

2.3 Organization of clause 4 on figures

The figures are principally arranged in the same order as that in which the terms they illustrate are given in clause 3.

Each figure gives the index numbers of relevant terms. A figure usually shows only one example of the several existing forms of a bearing or part. In most cases the figures are simplified and leave out unnecessary details.

2.4 Organization of the alphabetical indexes

The alphabetical indexes include all terms, in either language, given and defined in clause 3.

Multiple-word terms appear in alphabetical order both by natural order of words and by their key words.

The alphabetical index refers to the index number of the entry in clause 3 where the term is defined.

3 Terms and definitions

01 Bearings

01.01 Rolling bearings — General

01.01.01

rolling bearing

a bearing operating with rolling (rather than sliding) motion between the parts supporting load and moving in relation to each other. It comprises *raceway* members and *rolling elements* with or without means for their spacing and/or guiding. May be designed to support radial, axial or combined radial and axial load (Figure 1 to Figure 33.)

01.01.02

single row (rolling) bearing

a *rolling bearing* with one row of *rolling elements* (Figure 1 to Figure 4, Figure 6, Figure 8 to Figure 15, Figure 17, Figure 18, Figure 21 to Figure 24, Figure 27 to Figure 31.)

01.01.03

double row (rolling) bearing

a *rolling bearing* with two rows of *rolling elements* (Figure 5, Figure 7, Figure 16, Figure 20, Figure 25, Figure 26.)

01.01.04

multi-row (rolling) bearing

a *rolling bearing* with more than two rows of *rolling elements* supporting load in the same direction. It is preferable to specify the number of rows and type of bearing, for example “four row cylindrical roller radial bearing” (Figure 19.)

01.01.05

full complement (rolling) bearing

a *rolling bearing* without a *cage* and in which the sum of the clearances between the *rolling elements* in each row is less than the diameter of the rolling elements and small enough to give satisfactory function of the bearing (Figure 14, Figure 22, Figure 23.)

01.01.06

angular contact (rolling) bearing

a *rolling bearing* with a *nominal contact angle* greater than 0° but less than 90° (Figure 4, Figure 5, Figure 7, Figure 10, Figure 12, Figure 16, Figure 17, Figure 20, Figure 21, Figure 27, Figure 29, Figure 31.)

01.01.07

rigid (rolling) bearing

a *rolling bearing* which resists misalignment between the axes of its *raceways* (Figure 1 to Figure 6, Figure 8 to Figure 14, Figure 17 to Figure 30.)

01.01.08

self-aligning (rolling) bearing

a *rolling bearing* which can accommodate angular misalignment and angular motion between the axes of its *raceways* due to one raceway being *spherical* (Figure 7, Figure 15, Figure 16, Figure 31.)

01.01.09

external aligning (rolling) bearing

a *rolling bearing* which can accommodate angular misalignment between its *axis* and the axis of its *housing* by means of a spherical form on one *ring* or *washer* surface, which mates with a complementary seat surface in an *aligning housing ring*, in an *aligning seat washer* or in the housing (Figure 8.)

01.01.10

separable (rolling) bearing

a *rolling bearing* with separable *sub-units*. (Figure 6, Figure 9 to Figure 14, Figure 19 to Figure 21, Figure 24 to Figure 26, Figure 28 to Figure 31.)

01.01.11

non-separable (rolling) bearing

a *rolling bearing* from which, after final manufacturing assembly, neither *bearing ring* can be freely separated (Figure 1 to Figure 5, Figure 7, Figure 8, Figure 15 to Figure 17, Figure 22, Figure 23, Figure 27.)

01.01.12

split (rolling) bearing

a *rolling bearing* with both *rings* and the *cage*, if used, divided into two semicircular pieces to facilitate mounting (Figure 18.)

NOTE For a bearing with parts divided in a different manner, for example, a bearing with a *two-piece ring* (02.01.08), there is no established short term.

01.01.13

metric (rolling) bearing

a *rolling bearing* originally designed with *boundary dimensions* and tolerances primarily in round metric units

01.01.14

metric series (rolling) bearing

a *rolling bearing* which conforms to a metric series of an ISO *dimension plan*

01.01.15

inch (rolling) bearing

a *rolling bearing* originally designed with *boundary dimensions* and tolerances in imperial (inch) units

01.01.16

inch series (rolling) bearing

a *rolling bearing* which conforms to an inch series of an ISO *dimension plan*

01.01.17**open (rolling) bearing**

a *rolling bearing* with neither *seals* nor *shields* (Figure 1, Figure 4 to Figure 7, Figure 9 to Figure 19, Figure 21, Figure 24 to Figure 31.)

01.01.18**sealed (rolling) bearing**

a *rolling bearing* which is fitted with a *seal* on one or both sides (Figure 2, Figure 8, Figure 20.)

01.01.19**shielded (rolling) bearing**

a *rolling bearing* which is fitted with a *shield* on one or both sides (Figure 3.)

01.01.20**capped (rolling) bearing**

a *rolling bearing* which is fitted with one or two *seals*, one or two *shields* or with one seal and one shield (Figure 2, Figure 3, Figure 8, Figure 20.)

01.01.21**prelubricated (rolling) bearing**

a *rolling bearing* which has been charged with lubricant by the manufacturer

01.01.22**airframe (rolling) bearing**

a *rolling bearing* which, by reason of design or execution, is intended for use in the general structure of an aircraft, including its control systems

01.01.23**instrument precision (rolling) bearing**

a *rolling bearing* which, by reason of design or execution, is intended for use in instruments

01.01.24**railway axlebox (rolling) bearing**

a *rolling bearing* which, by reason of design or execution, is intended for use in railway axleboxes. The most common type is *radial roller bearing* (Figure 20.)

01.01.25**matched (rolling) bearing**

one of the *rolling bearings* in a *matched pair* or a *matched stack*

01.02 Radial bearings**01.02.01****radial (rolling) bearing**

a *rolling bearing* designed to support primarily *radial load*, having a *nominal contact angle* between 0° and 45° inclusive. Principal parts are *inner ring*, *outer ring* and *rolling elements* with or without a *cage* (Figure 1 to Figure 23.)

01.02.02**radial contact (rolling) bearing**

a *radial rolling bearing* with a *nominal contact angle* of 0° (Figure 1 to Figure 3, Figure 6, Figure 8, Figure 11, Figure 13 to Figure 15, Figure 18, Figure 19, Figure 22, Figure 23.)

01.02.03**angular contact radial (rolling) bearing**

a *radial rolling bearing* with a *nominal contact angle* greater than 0° up to and including 45° (Figure 4, Figure 5, Figure 7, Figure 10, Figure 12, Figure 16, Figure 17, Figure 20, Figure 21.)

01.02.04**insert (rolling) bearing**

a *radial rolling bearing* with a *spherical outside surface* and an *extended inner ring* with a locking device. Primarily intended for use in a simple type of housing (Figure 8.)

01.02.05**tapered bore (rolling) bearing**

a *radial rolling bearing* with an *inner ring* with *tapered bore* (Figure 7, Figure 19.)

01.02.06**flanged (rolling) bearing**

a *radial rolling bearing* with an external radial flange on one of its rings, usually the *outer ring* or *cup* (Figure 21.)

01.02.07**track roller (rolling bearing)**

a *radial rolling bearing* with a heavy section *outer ring*, intended for use as a roller to roll on a track, for example a cam track (Figure 22, Figure 23.)

01.02.08**yoke type track roller (rolling bearing)**

a *track roller rolling bearing* intended for mounting in a yoke (Figure 22.)

01.02.09**stud type track roller (rolling bearing)**

a *track roller rolling bearing* in which the inner member is extended on one side in the form of a shaft for cantilever mounting of the bearing. (Figure 23.)

01.02.10**universal matching (rolling) bearing**

a *radial rolling bearing* which, when used together with one or more similar bearing(s), selected at random, yields predetermined characteristics in a *paired* or *stack mounting*

01.03 Thrust bearings**01.03.01****thrust (rolling) bearing**

a *rolling bearing* designed to support primarily *axial load*, having a *nominal contact angle* greater than 45° up to and including 90° . Principal parts are *shaft washer*, *housing washer* and *rolling elements* with or without a *cage* (Figure 24 to Figure 31.)

01.03.02**axial contact (rolling) bearing**

a *thrust rolling bearing* with a *nominal contact angle* of 90° (Figure 24 to Figure 26, Figure 28, Figure 30.)

01.03.03**angular contact thrust (rolling) bearing**

a *thrust rolling bearing* with a *nominal contact angle* greater than 45° and smaller than 90° (Figure 27, Figure 29, Figure 31.)

01.03.04**single-direction thrust (rolling) bearing**

a *thrust rolling bearing* intended to support *axial load* in one direction only (Figure 24, Figure 26, Figure 28 to Figure 31.)

01.03.05**double-direction thrust (rolling) bearing**

a *thrust rolling bearing* intended to support *axial load* in both directions (Figure 25, Figure 27.)

01.03.06**double row double-direction thrust (rolling) bearing**

a *double-direction thrust rolling bearing* having two rows of *rolling elements*, each supporting *axial load* in one direction only (Figure 25.)

01.04 Linear bearings**01.04.01****linear (motion) (rolling) bearing**

a *rolling bearing* designed for linear relative motion between its *raceways* in the direction of rolling (Figure 32, Figure 33.)

01.04.02**recirculating ball [roller] linear bearing**

A *linear motion rolling bearing* with means for the recirculation of the *balls* [rollers] (Figure 33.)

01.05 Ball bearings**01.05.01****ball bearing**

a *rolling bearing* with *balls* as *rolling elements* (Figure 1 to Figure 10, Figure 24 to Figure 27, Figure 33.)

01.05.02**radial ball bearing**

a *radial rolling bearing* with *balls* as *rolling elements* (Figure 1 to Figure 10.)

01.05.03**groove ball bearing**

a *radial ball bearing* the *raceways* of which are grooves generally with a cross-section of an arc of a circle with a radius slightly larger than half the *ball diameter* (Figure 1 to Figure 6, Figure 8 to Figure 10.)

01.05.04**deep groove ball bearing**

a *radial ball bearing* in which each ring has uninterrupted *raceway grooves* with a cross-section matching about $1/3$ of the ball circumference (Figure 1 to Figure 3, Figure 8.)

01.05.05**filling slot (ball) bearing**

a *groove ball bearing* having a *filling slot* in one *shoulder* of each ring to permit the insertion of a larger number of balls than in a *deep groove ball bearing* (Figure 5.)

01.05.06**counterbored ball bearing**

a *groove ball bearing* with one *outer ring shoulder* completely or partly removed (Figure 6.)

01.05.07**magneto (ball) bearing**

a *radial contact groove ball bearing* with one *outer ring shoulder* completely removed, making this ring separable (Figure 6.)

01.05.08**three point contact (ball) bearing**

a *single row radial ball bearing* in which, when under purely *radial load*, each loaded ball makes contact with one of the *raceways* at two points and with the other raceway at one point. Under pure *axial load* on the bearing, each ball makes contact with each raceway at only one point (Figure 9.)

01.05.09**four point contact (ball) bearing**

a *single row angular contact ball bearing* in which, when under purely *radial load*, each loaded ball makes contact with each of the two *raceways* at two points. Under pure *axial load* on the bearing, each ball makes contact with each raceway at only one point (Figure 10, Figure 27.)

01.05.10**thrust ball bearing**

A *thrust rolling bearing* with *balls* as *rolling elements* (Figure 24 to Figure 27.)

01.05.11**single row double-direction thrust ball bearing**

a *four point contact ball bearing* having contact angles greater than 45° (Figure 27.)

01.05.12**double row single-direction thrust ball bearing**

a *single-direction thrust rolling bearing* having two concentric rows of balls, both supporting load in the same direction (Figure 26.)

01.06 Roller bearings**01.06.01****roller bearing**

a *rolling bearing* with *rollers* as *rolling elements* (Figure 11 to Figure 23, Figure 28 to Figure 32.)

01.06.02**radial roller bearing**

a *radial rolling bearing* with *rollers* as *rolling elements* (Figure 11 to Figure 23.)

01.06.03**cylindrical roller (radial) bearing**

a *radial rolling bearing* with *cylindrical rollers* as *rolling elements* (Figure 11, Figure 17 to Figure 19.)

01.06.04**tapered roller (radial) bearing**

a *radial rolling bearing* with *tapered rollers* as *rolling elements* (Figure 12, Figure 20, Figure 21.)

01.06.05**needle roller (radial) bearing**

a *radial rolling bearing* with *needle rollers* as *rolling elements* (Figure 13, Figure 14, Figure 22, Figure 23.)

01.06.06**drawn cup needle roller bearing**

a *needle roller radial bearing* with a thin pressed steel outer ring (*drawn cup*), which may have one closed end or both ends open. Usually employed without inner ring (Figure 14.)

01.06.07**convex roller (radial) bearing**

a *radial rolling bearing* with *convex rollers* as *rolling elements* (Figure 16.)

01.06.08**concave roller (radial) bearing**

a *radial rolling bearing* with *concave rollers* as *rolling elements* (Figure 15.)

01.06.09**spherical (radial) roller bearing**

a *self-aligning, radial rolling bearing* with *convex rollers* or *concave rollers* as *rolling elements*. With convex rollers the *outer ring* has a *spherical raceway*, with concave rollers the *inner ring* has a *spherical raceway* (Figure 15, Figure 16.)

01.06.10**crossed roller bearing**

an *angular contact rolling bearing* with one row of *rollers*, each roller positioned crosswise in relation to the adjacent rollers, such that an *axial load* in one direction is supported by half the *roller set* (every second roller) whilst an axial load in the opposite direction is carried by the other half of the *roller set* (Figure 17.)

01.06.11**thrust roller bearing**

a *thrust rolling bearing* with *rollers* as *rolling elements* (Figure 28 to Figure 31.)

01.06.12**cylindrical roller thrust bearing**

a *thrust rolling bearing* with *cylindrical rollers* as *rolling elements* (Figure 28.)

01.06.13**tapered roller thrust bearing**

a *thrust rolling bearing* with *tapered rollers* as *rolling elements* (Figure 29.)

01.06.14**needle roller thrust bearing**

a *thrust rolling bearing* with *needle rollers* as *rolling elements* (Figure 30.)

01.06.15**spherical thrust roller bearing**

a *self-aligning, thrust rolling bearing* with *convex rollers* or *concave rollers* as *rolling elements*. With convex rollers the *housing washer* has a *spherical raceway*, with concave rollers the *shaft washer* has a *spherical raceway* (Figure 31.)

02 Bearing parts**02.01 Bearing parts — General****02.01.01****(rolling) bearing part**

one of the individual parts comprising a *rolling bearing* but excluding all accessories

02.01.02**(rolling) bearing ring**

an annular part of a *radial rolling bearing* incorporating one or more *raceways* (Figure 34, Figure 35.)

02.01.03**(rolling) bearing washer**

an annular part of a *thrust rolling bearing* incorporating one or more raceways (Figure 36.)

02.01.04**separable bearing ring [bearing washer]**

a *bearing ring* [*bearing washer*] which may be independently and freely separated from a complete *rolling bearing* (Figure 36, Figure 40, Figure 41.)

02.01.05**interchangeable bearing ring [bearing washer]**

a *separable bearing ring* [*bearing washer*] which can be replaced by another ring [another washer] of a similar group without impairing the function of the bearing (Figure 35.)

02.01.06**single-split bearing ring**

a *bearing ring* which is split or fractured across its *raceway(s)*, in one place only, to facilitate manufacturing assembly (Figure 37.)

02.01.07**double-split bearing ring**

a *bearing ring* which is split or fractured across its *raceway(s)*, in two places, to facilitate manufacturing assembly and/or mounting. The two splits are generally diametrically opposite one another (Figure 38.)

02.01.08**two-piece bearing ring [bearing washer]**

a *bearing ring* [*bearing washer*] divided into two annular pieces in a plane perpendicular to its *axis*. Each piece incorporates at least part of a *raceway* (Figure 39.)

02.01.09**loose rib**

a separable basically flat washer the outer or inner part of which serves as an *inner ring rib* or *outer ring rib* for a *cylindrical roller radial bearing* (Figure 40.)

02.01.10**(separate) thrust collar**

a separable ring having an L-shaped section, the outer part of which serves as an *inner ring rib* for a *cylindrical roller radial bearing* (Figure 41.)

02.01.11**guide ring**

a separate ring in a *roller bearing* with two or more rows of *rollers*, used to separate the rows and to guide the rollers (Figure 42.)

02.01.12**locating snap ring**

a single-split ring of constant section, used in a *snap ring groove* to locate axially a *rolling bearing* in its *housing* or on its shaft (Figure 34.)

02.01.13**retaining snap ring**

a single-split ring of constant section, used in a *snap ring groove* to serve as a *rib* retaining the *rollers* or the *cage* (with *rolling elements*) in a *rolling bearing*

02.01.14**(ring) spacer**

an annular part used between two *bearing rings* or *bearing washers* or the two parts of a *two-piece bearing ring* or *two-piece bearing washer* to maintain a specified *axial distance* between them (Figure 43, Figure 56.)

02.01.15**(bearing) seal**

a circular closure comprising one or several parts, affixed to one *bearing ring* or *bearing washer* and extending towards the other ring or washer, with which it makes contact or forms a narrow labyrinth-shaped gap, for the purpose of preventing leakage of lubricant or ingress of foreign substances (Figure 44.)

02.01.16**(bearing) shield**

a circular closure, usually of pressed sheet metal, affixed to one *bearing ring* or *bearing washer* and extending towards the other ring or washer, covering the interspace but not making contact with the other ring or washer (Figure 45.)

02.01.17**flinger**

a component part attached to an *inner ring* or *shaft washer* to supplement, by centrifugal action, the protection of a *rolling bearing* against ingress of foreign substances (Figure 46.)

02.01.18**rolling element**

a *ball* or *roller* which rolls between *raceways* (Figure 34 to Figure 36, Figure 47, Figure 62 to Figure 69.)

02.01.19**(rolling bearing) cage**

a *bearing part* which partly surrounds all or several of the *rolling elements* and moves with them. Its purpose is to space the rolling elements and generally also to guide and/or retain them in the bearing (Figure 34 to Figure 36, Figure 70 to Figure 76.)

02.01.20**(rolling element) separator**

a *bearing part* which is placed between adjacent *rolling elements* and moves with them, the main purpose being to space the rolling elements. (Figure 47.)

02.02 Features of bearing parts — General**02.02.01****raceway**

a surface of a load supporting part of a *rolling bearing*, suitably prepared as a rolling track for the *rolling elements* (Figure 48 to Figure 50.)

02.02.02**straight raceway**

a *raceway* the generatrix of which, in a plane perpendicular to the direction of rolling, is a straight line (Figure 49.)

02.02.03**crowned raceway**

a basically cylindrical or conical raceway which has a continuous slightly convex curvature in a plane perpendicular to the direction of rolling to prevent stress concentration at the ends of contacts between *rollers* and the raceway

02.02.04**spherical raceway**

a *raceway* having the form of part of the surface of a sphere (Figure 52.)

02.02.05**raceway groove**

a *raceway* of a *ball bearing* in the form of a groove, generally with a cross-section of an arc of a circle with a radius slightly larger than half the *ball diameter* (Figure 48, Figure 60.)

02.02.06**(groove) shoulder**

a flank of a *raceway groove* (Figure 48.)

02.02.07**rib**

a narrow ridge parallel to the direction of rolling, projecting from a *raceway* surface, generally for the purpose of supporting and/or guiding and/or retaining the *rolling elements* in a *rolling bearing* (Figure 49, Figure 50.)

02.02.08**cage riding land**

a cylindrical surface of a *bearing ring* or a *bearing washer* intended to guide a *cage* radially (Figure 49, Figure 50.)

02.02.09**filling slot**

a slot in a *rib* or a *shoulder* of a *bearing ring* or *bearing washer* to permit the insertion of *rolling elements* (Figure 51.)

02.02.10**face (of a ring [a washer] [. . .])**

a surface of a ring [a washer] [. . .] perpendicular to the axis of the ring [the washer] [. . .] (Figure 48 to Figure 52.)

02.02.11**bearing bore**

the bore of the *inner ring* or *shaft washer* of a *rolling bearing* (Figure 49 to Figure 51, Figure 60.)

02.02.12**cylindrical bore**

a *bearing bore* or a bore of a *bearing part* whose generatrix is a basically straight line parallel to the *bearing axis* or the axis of the bearing part. (Figure 49, Figure 51.)

02.02.13**tapered bore**

a *bearing bore* or a bore of a *bearing part* whose generatrix is a basically straight line intersecting the *bearing axis* or the axis of the bearing part (Figure 50.)

02.02.14**bearing outside surface**

the outside surface of the *outer ring* or the *housing washer* of a *rolling bearing* (Figure 48, Figure 51, Figure 52, Figure 60.)

02.02.15**ring [washer] chamfer**

a surface of a *bearing ring* [*bearing washer*] joining the bore or outside surface with one of the *faces* of the ring [the washer] (Figure 48, Figure 49, Figure 52.)

02.02.16**grinding undercut**

a groove or slot at the root of a *rib* or flange of a *bearing ring* or *bearing washer* to facilitate grinding (Figure 49, Figure 50.)

02.02.17**sealing (contact) surface**

a surface with which a seal is intended to make sliding contact (Figure 44.)

02.02.18**seal [shield] groove**

a groove intended for the retention of a *bearing seal* [*bearing shield*] (Figure 44, Figure 45.)

02.02.19**snap ring groove**

a groove to accommodate a *locating snap ring* or a *retaining snap ring* (Figure 48.)

02.02.20**lubrication groove**

a groove in a *bearing part* for conveying lubricant (Figure 42, Figure 43.)

02.02.21**lubrication hole**

a hole in a *bearing part* for conveying lubricant to the *rolling elements* (Figure 42, Figure 43.)

02.03 Bearing rings**02.03.01****(bearing) inner ring**

a *bearing ring* incorporating the *raceway(s)* on its outside surface (Figure 34, Figure 49.)

02.03.02**(bearing) outer ring**

a *bearing ring* incorporating the *raceway(s)* on its inside surface (Figure 34, Figure 48.)

02.03.03**(bearing) cone**

an *inner ring* of a *tapered roller bearing* (Figure 35, Figure 54, Figure 56.)

02.03.04**(bearing) cup**

an *outer ring* of a *tapered roller bearing* (Figure 35, Figure 54.)

02.03.05**double cone**

a *bearing cone* having two *raceways* (Figure 43.)

02.03.06**double cup**

a *bearing cup* having two *raceways* (Figure 56.)

02.03.07**extended inner ring**

a *bearing inner ring* extended on one or both sides in order to improve the guidance of a shaft in its bore and/or to permit the fixing of a locking device and/or to provide additional space for sealing devices (Figure 46.)

02.03.08**stepped inner ring**

an *inner ring* of a *groove ball bearing* with one *shoulder* completely or partly removed (Figure 53.)

02.03.09**counterbored outer ring**

an *outer ring* of a *groove ball bearing* with one *shoulder* completely or partly removed (Figure 53.)

02.03.10**(bearing) drawn cup**

a *bearing outer ring*, commonly of a *needle roller radial bearing*, made of sheet metal drawn to shape with one end closed (closed end drawn cup) or both ends open (Figure 57.)

02.03.11**flanged outer ring**

a *bearing outer ring* with a flange (*outer ring flange*) (Figure 55.)

02.03.12**aligning outer ring**

a *bearing outer ring* having a *spherical outside surface* to accommodate permanent angular misalignment between its axis and the axis of its *housing* (Figure 58.)

02.03.13**aligning housing ring**

a ring used between an *aligning outer ring* and a *housing* bore, having a spherical inside surface matching the *spherical outside surface* of the outer ring (Figure 58.)

02.03.14**spherical outside surface**

an outside surface, for example of a *bearing outer ring*, having the form of part of the surface of a sphere (Figure 46, Figure 58.)

02.03.15**back face (of a bearing ring)**

that *face* of a *bearing ring* which is intended to support *axial load* (Figure 53, Figure 54.)

02.03.16**front face (of a bearing ring)**

that *face* of a *bearing ring* which is not intended to support *axial load* (Figure 53, Figure 54.)

02.03.17**outer ring flange**

a flange on the outside of a *bearing outer ring* for the purposes of axially locating the bearing in its *housing* and to support *axial load* (Figure 55.)

02.03.18**(outer ring) flange back face**

that side of an *outer ring flange* which is intended to support *axial load* (Figure 55.)

02.03.19**cone back face rib**

a *rib* on the *back face* side of the *raceway* of a *cone*, intended to guide the *rollers* and support *roller large end face thrust* (Figure 54.)

02.03.20**cone front face rib**

a *rib* on the *front face* side of the *raceway* of a *cone*, intended to retain the *rollers* and, in the case of a bearing with a *cup front face rib*, to support *roller small end face thrust* (Figure 54, Figure 59.)

02.03.21**cup front face rib**

a *rib* on the *front face* side of the *raceway* of a *cup*, intended to guide the *rollers* and support *roller large end face thrust* (Figure 59.)

02.03.22**centre rib**

a central integral *rib* of a *bearing ring* with two *raceways*, for example, a *double cone* (Figure 50.)

02.03.23**inner ring back face [front face] chamfer**

a surface joining the *back face* [*front face*] of a *bearing inner ring* with the bore of the ring. (Figure 53, Figure 56.)

02.03.24**outer ring back face [front face] chamfer**

a surface joining the *back face* [*front face*] of a *bearing outer ring* with the outside surface of the ring (Figure 53, Figure 56.)

02.04 Bearing washers**02.04.01****shaft washer**

a *bearing washer* which is intended to be mounted on a shaft (Figure 36, Figure 60.)

02.04.02**housing washer**

a *bearing washer* which is intended to be mounted in a *housing* (Figure 36, Figure 52, Figure 60.)

02.04.03**central washer**

a *bearing washer* having a *raceway* on each *face*, used between the two rows of *rolling elements* of a *double row, double-direction thrust rolling bearing* (Figure 61.)

02.04.04**aligning housing washer**

a *housing washer* having a *spherical back face* to accommodate permanent angular misalignment between its *axis* and the axis of its *housing*. (Figure 61.)

02.04.05**aligning seat washer**

a washer used between an *aligning housing washer* and the thrust supporting surface of a *housing*, one *face* of which has a concave spherical surface matching the *spherical back face* of the aligning housing washer (Figure 61.)

02.04.06**spherical back face**

a *housing washer back face* which, or a zone of which, is convex with a spherical form (Figure 61.)

02.04.07**shaft washer [housing washer] back face**

a *face* of a *shaft washer* [a *housing washer*] intended to support *axial load*, generally opposite a *raceway face* (Figure 52, Figure 60.)

02.04.08**shaft washer back face chamfer**

a surface joining the *shaft washer back face* with the bore of the washer (Figure 60.)

02.04.09**housing washer back face chamfer**

a surface joining the *housing washer back face* with the outside surface of the washer (Figure 52, Figure 60.)

02.05 Rolling elements**02.05.01****ball**

a spherical *rolling element*

02.05.02**roller**

a *rolling element* having an axis of symmetry and being circular in cross-section in any plane perpendicular to that axis (Figure 62 to Figure 69.)

02.05.03**ball [roller] complement**

all of the *balls* [the *rollers*] in a particular *rolling bearing*

02.05.04**ball [roller] set**

the *balls* [the *rollers*] in one row of a *rolling bearing*

02.05.05**cylindrical roller**

a *roller* the generatrix of the outside surface of which is a basically straight line parallel with the roller axis (Figure 62, Figure 68.)

02.05.06**needle roller**

a *cylindrical roller* of small diameter with a large ratio of length to diameter. It is generally accepted that the length is between three and ten times the diameter, which does not usually exceed 5 mm. The ends of a needle roller may be one of several shapes (Figure 63.)

02.05.07**tapered roller**

a *roller* the generatrix of the outside surface of which is a basically straight line intersecting the roller axis. The general shape is that of a truncated cone (Figure 64.)

02.05.08**convex roller**

a *roller* the outside surface of which has a convex curvature in a plane containing its axis (Figure 66, Figure 67.)

02.05.09**concave roller**

a *roller* the outside surface of which has a concave curvature in a plane containing its axis (Figure 65.)

02.05.10**convex symmetrical roller**

a *convex roller* the outside surface of which is symmetrical about the plane perpendicular to the roller axis through the middle of the roller (Figure 66.)

02.05.11**convex asymmetrical roller**

a *convex roller* the outside surface of which is asymmetrical about the plane perpendicular to the roller axis through the middle of the roller (Figure 67.)

02.05.12**crowned roller**

a basically *cylindrical roller* or basically *tapered roller* the outside surface of which has a continuous slightly convex curvature in a plane containing the roller axis to prevent stress concentration at the ends of the contacts between the roller and the *raceways*

02.05.13**relieved end roller**

a *roller* with a slight modification of diameter at the ends of its outside surface to prevent stress concentration at the ends of the contacts between the roller and the *raceways* (Figure 68.)

02.05.14**spiral wound roller**

a *roller* made by winding steel strip in helical form (Figure 69.)

02.05.15**roller end face**

a surface at the end of a *roller*, basically perpendicular to the roller axis (Figure 62.)

02.05.16**roller large end face**

the *face* at the large end of a *tapered roller* or a *convex asymmetrical roller* (Figure 64, Figure 67.)

02.05.17**roller small end face**

the *face* at the small end of a *tapered roller* or a *convex asymmetrical roller* (Figure 64, Figure 67.)

02.05.18**roller recess**

an indentation, dimple or undercut about the centre of a *roller end face* (Figure 64.)

02.05.19**roller chamfer**

a surface joining the outside surface of a *roller* with one of the *roller end faces* (Figure 62, Figure 64, Figure 67.)

02.06 Cages**02.06.01****ribbon cage**

a *rolling bearing cage* comprising one or two corrugated annular parts (Figure 70.)

02.06.02**snap cage**

a *rolling bearing cage* with *cage prongs* the form of which permits the assembling of the cage with the *rolling elements* by elastic deformation (Figure 71.)

02.06.03**window type cage**

a one-piece *rolling bearing cage* having *cage pockets* surrounding the *rolling elements* (Figure 72.)

02.06.04**prong type cage**

a one-piece *rolling bearing cage* with *cage prongs* (Figure 73.)

02.06.05**pin type cage**

a *two-piece cage* with *cage pins* joining the two cage parts together (Figure 74.)

02.06.06**two-piece cage**

a *rolling bearing cage* comprising two annular parts joined together, generally by rivets, *cage pins* or *cage stays* (Figure 70, Figure 75, Figure 76.)

02.06.07**double-split cage**

a *rolling bearing cage* which is split in two places to facilitate assembly. The two splits are generally diametrically opposite one another

02.06.08**cage pocket**

an aperture or gap in a *rolling bearing cage* to accommodate one or more *rolling elements* (Figure 70 to Figure 73, Figure 75, Figure 76.)

02.06.09**cage bar**

a portion of a *rolling bearing cage* separating adjacent *cage pockets* (Figure 72, Figure 75.)

02.06.10**cage prong**

a cantilever *cage bar* projecting from the annular body of a *rolling bearing cage* or from one part of a *two-piece cage* (Figure 71, Figure 73.)

02.06.11**cage pin**

a *cage stay* which is basically cylindrical and may pass through an axial hole in a *roller* (Figure 74.)

02.06.12**cage stay**

one of several parts used to join the two annular parts of a *two-piece cage* together and to maintain them at a specified distance from each other (Figure 76.)

02.06.13**land riding cage**

a *rolling bearing cage* radially guided (centred) by a land on a *bearing ring* or *bearing washer* (*cage riding land*)

03 Bearing arrangement and sub-units**03.01 Bearing arrangements****03.01.01****paired mounting**

an arrangement of two *rolling bearings* mounted side-by-side on the same shaft such that they operate as a unit. The bearings may be mounted in *back-to-back*, *face-to-face* or *tandem arrangement* (Figure 77 to Figure 79.)

03.01.02**stack mounting**

an arrangement of three or more *rolling bearings* mounted side-by-side on the same shaft such that they operate as a unit (Figure 80.)

03.01.03**back-to-back arrangement**

an arrangement of two *rolling bearings* mounted side-by-side with the *back faces* of their *outer rings* adjacent (Figure 77.)

03.01.04**face-to-face arrangement**

an arrangement of two *rolling bearings* mounted side-by-side with the *front faces* of their *outer rings* adjacent (Figure 78.)

03.01.05**tandem arrangement**

an arrangement of two or more *rolling bearings* mounted side-by-side with the *back face* of the *outer ring* of one bearing adjacent to the *front face* of the *outer ring* of the next bearing (Figure 79.)

03.01.06**matched pair**

two *rolling bearings* which have been selected or manufactured to have predetermined characteristics, usually preload or clearance, when mounted together in a specified way

03.01.07**matched stack**

three or more *rolling bearings* which have been selected or manufactured to have predetermined characteristics, usually preload or clearance, when mounted together in a specified way

03.02 Sub-units**03.02.01****sub-unit**

a *bearing ring* or *bearing washer*, with or without *rolling elements* or with *cage* and rolling elements, which can be freely separated from the bearing. A *rolling element and cage assembly* which can be freely separated from the bearing (Figure 81 to Figure 92.)

03.02.02**interchangeable sub-unit**

a *sub-unit* which can be replaced by another sub-unit of a similar group without impairing the function of the *bearing*

03.02.03**inner ring, cage and ball [roller] assembly**

a *sub-unit* consisting of an *inner ring*, *balls* [rollers] and *cage* (Figure 81, Figure 82.)

03.02.04**cone assembly**

a *sub-unit* consisting of a *bearing cone*, *tapered rollers* and a *cage* (Figure 83.)

03.02.05**outer ring, cage and ball [roller] assembly**

a *sub-unit* consisting of an *outer ring*, *balls [rollers]* and *cage* (See also **03.02.06.**) (Figure 84, Figure 85.)

03.02.06**needle roller bearing without inner ring**

an assembly consisting of an *outer ring* and *needle rollers* of a *full complement bearing* or an *outer ring* with *needle rollers* and *cage*. As required, additional description of the bearing can be included in the term, for example “needle roller bearing, full complement, drawn cup, without inner ring” or “needle roller bearing, with cage, machined ring, without inner ring” (Figure 86, Figure 87.)

03.03 Rolling element and cage assemblies**03.03.01****rolling element and cage assembly**

a *sub-unit* consisting of *rolling elements* and *cage* of a *rolling bearing* (Figure 88 to Figure 92.)

03.03.02**ball [roller] and cage assembly**

a *sub-unit* consisting of *rolling elements* and *cage* of a *ball [a roller] bearing*. Used when there is no need to specify whether the assembly is for a *radial bearing* or a *thrust bearing* (Figure 88 to Figure 92.)

03.03.03**ball and cage radial [thrust] assembly**

a *ball and cage assembly* of a *radial [a thrust] ball bearing* (Figure 88, Figure 89.)

03.03.04**roller and cage radial [thrust] assembly**

a *roller and cage assembly* of a *radial [a thrust] roller bearing*. As required, a description of the type of roller can be added to the term, for example “needle roller and cage thrust assembly” or “cylindrical roller and cage radial assembly” (Figure 90 to Figure 92.)

04 Dimensions**04.01 Dimension plans and series****04.01.01****dimension plan**

a system or table covering the *boundary dimensions* of *rolling bearings*

04.01.02**bearing series**

a group of *rolling bearings* of a specific type, with gradually increasing dimensions and in most cases with the same *contact angle* and a certain relationship between *boundary dimensions*

04.01.03**dimension series**

a combination of a *width series* or a *height series* with a *diameter series* and, for *tapered roller bearings*, an *angle series*

04.01.04**diameter series**

part of the ISO *dimension plans*. A progressive series of *bearing outside diameters*, one for each standard *bearing bore diameter*, often with a specific relationship between the two diameters

04.01.05**width series**

part of the ISO *dimension plans* for *radial bearings*. A progressive series of *bearing widths*, one for each *bearing bore diameter* of each *diameter series*

04.01.06**height series**

part of the ISO *dimension plans* for *thrust bearings*. A progressive series of *bearing heights*, one for each *bearing bore diameter* of each *diameter series*

04.01.07**angle series**

part of the ISO *dimension plans* for *tapered roller bearings*. A specified range of *contact angles*

04.02 Axes, planes, directions**04.02.01****bearing axis**

the theoretical axis of rotation of a *rolling bearing*. For a *radial bearing* this is the *inner ring axis* and for a *thrust bearing* the *shaft washer axis*

04.02.02**inner ring [shaft washer] axis**

the axis of the cylinder or cone inscribed in the basically cylindrical or tapered bore of an *inner ring* [a *shaft washer*]

04.02.03**outer ring [housing washer] axis**

the axis of the cylinder circumscribed around the outside surface of an *outer ring* [a *housing washer*], if this surface is basically cylindrical, or the line perpendicular to the *reference face* of an *outer ring*, through the centre of the sphere circumscribed around the outside surface of the ring, if this surface is basically spherical

04.02.04**(bearing) cone [cup] axis**

the *inner ring axis* [*outer ring axis* of a *tapered roller bearing*]

04.02.05**radial plane**

a plane perpendicular to an axis. For a *bearing ring* or a *bearing washer* it is, however, generally acceptable to consider a radial plane as being parallel with the plane tangential to the *reference face* of the ring or the *back face* of the washer

04.02.06**radial direction**

direction through an axis and in a *radial plane*

04.02.07**axial plane**

a plane containing an axis

04.02.08**axial direction**

direction parallel with an axis. For a *bearing ring* or a *bearing washer* it is, however, generally acceptable to consider an axial direction as being perpendicular to the plane tangential to the *reference face* of the ring or the *back face* of the washer

04.02.09**radial [axial] distance**

a distance measured in a *radial* [an *axial*] direction

04.02.10**contact angle [nominal contact angle]**

the angle between a plane perpendicular to a *bearing axis* (a *radial plane*) and the line of action [the nominal line of action] of the resultant of the forces transmitted by a *bearing ring* or *washer* to a *rolling element* (See also **04.04.04.**) (Figure 93, Figure 94.)

04.02.11**load centre**

the point at which the resultants of the forces transmitted by a *bearing ring* or *washer* to the *rolling elements* in one row intersect the *bearing axis* (This applies only if the *contact angle* is less than 90° and equal for all the rolling elements.) (Figure 93, Figure 94.)

04.02.12**nominal contact point**

point on a *raceway* surface where a *rolling element* is intended to make contact when the bearing parts are in normal relative positions (Figure 93, Figure 94.)

04.02.13**reference face of a ring [a washer]**

a *face of a ring* [a *washer*] designated as reference face by the manufacturer of the bearing and which may be the datum for measurements

04.03 Boundary dimensions**04.03.01****(bearing) boundary dimension**

one of the dimensions defining the boundaries of a *bearing*. The principal boundary dimensions are the bore diameter, the outside diameter, the width (or height) and the chamfer dimensions

04.03.02**bearing bore diameter**

the *inner ring* bore diameter of a *radial bearing* or the *shaft washer* bore diameter of a *thrust bearing* (See also **05.01.01**, **05.01.02** and **05.01.05.**) (Figure 93, Figure 94, Figure 96.)

04.03.03**bearing outside diameter**

the *outer ring* outside diameter of a *radial bearing* or the *housing washer* outside diameter of a *thrust bearing* (See also **05.01.01**, **05.01.02** and **05.01.05.**) (Figure 93, Figure 94, Figure 96.)

04.03.04**bearing width**

the *axial distance* between the two *ring faces* designated to bound the width of a *radial bearing*. For a *single row tapered roller bearing* this is the axial distance between the *back face* of the *cup* and that of the *cone* (See also **05.02.06** and **05.02.07.**) (Figure 93, Figure 94.)

04.03.05**bearing height**

the *axial distance* between the two *washer back faces* designated to bound the height of a *thrust bearing* (See also **05.02.06** and **05.02.09.**) (Figure 96.)

04.03.06**ring [washer] chamfer dimension**

extension in a *radial* or *axial direction* of the surface of a *ring* [a *washer*] *chamfer* (See also **04.03.07**, **04.03.08**, **05.03.01**, **05.03.02** and **05.03.03.**) (Figure 93.)

04.03.07**radial chamfer dimension**

the distance between the imaginary sharp corner of a *ring* or *washer* and the intersection of a chamfer surface and the *face* of the ring or washer (See also **05.03.02.**) (Figure 93.)