



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 1515-1 : 2006

(ISO 1132-1 : 2000)

(JBIA)

**Rolling bearings—Tolerances—
Part 1 : Terms and definitions**

ICS 01.040.21; 21.100.20

Reference number : JIS B 1515-1 : 2006 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from The Japan Bearing Industrial Association (JBIA), with a draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

Consequently, **JIS B 1515**:1988 is withdrawn and replaced with this Standard and **JIS B 1515-2**.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS B 1515 series consists of the following two parts under the general title “*Rolling bearings—Tolerances*”:

Part 1 : Terms and definitions

Part 2 : Measuring and gauging principles and methods

Date of Establishment: 2006-09-20

Date of Public Notice in Official Gazette: 2006-09-20

Investigated by: Japanese Industrial Standards Committee

Standards Board

Technical Committee on Machine Elements

JIS B 1515-1:2006, First English edition published in 2007-02

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Printed in Japan

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Rolling bearings—Tolerances— Part 1 : Terms and definitions

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 1132-1** *Rolling bearings—Tolerances—Part 1 : Terms and definitions* published in 2000 without modifying the technical contents.

1 Scope This part of **JIS B 1515** specifies terms, definitions and symbols related to the tolerances on boundary dimensions, geometrical accuracy, running accuracy and internal clearance for rolling bearings.

NOTES 1 General vocabulary of terms relating to rolling bearings is specified in **JIS B 0104**.

2 The International Standard corresponding to this part of **JIS B 1515** is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO 1132-1:2000 *Rolling bearings—Tolerances—Part 1 : Terms and definitions* (IDT)

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this part of **JIS B 1515**. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0026 *Technical drawings—Dimensioning and tolerancing—Non-rigid parts*

NOTE : **ISO 10579**:1993 *Technical drawings—Dimensioning and tolerancing—Non-rigid parts* is identical with the said standard.

JIS B 0104 *Rolling bearings—Vocabulary*

NOTE : **ISO 5593**:1997 *Rolling bearings—Vocabulary* is equivalent to the said standard.

JIS B 0401-1 *ISO system of limits and fits—Part 1 : Bases of tolerances, deviations and fits*

NOTE : **ISO 286-1**:1988 *ISO system of limits and fits—Part 1 : Bases of tolerances, deviations and fits* is identical with the said standard.

ISO 1 *Geometrical Product Specifications (GPS)—Standard reference temperature for geometrical product specification and verification*

3 General General matters related to the tolerances on boundary dimensions, geometrical accuracy, running accuracy and internal clearance for rolling bearings are as follows.

- a) A boundary dimension of a bearing or bearing part should not deviate from the nominal dimension by more than the tolerance to be applied, when measured at a temperature of 20 °C in accordance with **ISO 1**, with the bearing parts completely unstressed by external forces, including measuring loads and the effects of gravitational force on the part itself.
- b) The exception to this rule is non-rigid parts, according to the definition in **JIS B 0026**, where restraining of features is required during verification of the dimensions and tolerances specified, e.g. drawn cup needle roller bearings.
- c) Only the low deviation of a bore diameter tolerance and the high deviation of an outside diameter tolerance apply to the entire width of the bore and outside surfaces of bearing rings. In other respects, the definitions given in bore diameter (**5.1**), outside diameter (**5.2**) and form (**6.1**) only concern the surfaces between the ring chamfers.

Unless there is an indication to the contrary, the terms “ring”, “inner ring” and “outer ring” as used in this part of **JIS B 1515**, include washer, shaft washer and housing washer respectively.

- d) For tapered roller bearings the term “cone” has previously been used to define “inner ring” or “inner subunit” and “cup” to define “outer ring”.
- e) The term “single” has been used in rolling bearing technology for a long time (single bore, single outside diameter, etc.), but it refers to the same feature as “actual local” defined in **JIS B 0401-1**.
- f) The subscripts in the symbols have the meanings as given in table 1.

Table 1 Subscripts and their meanings

Symbol	Meaning
a	an assembled bearing, or internal clearance in the axial direction
e	an outer ring
i	an inner ring
m	arithmetical mean of measurements
p	plane in which measurement is made
r	applies to internal clearance in the radial direction
s	single or actual measurement
w	rolling elements
1, 2	identification number when there are more than one diameter or width applied to a ring or assembly

4 Axes, directions, planes, positions and surfaces Terms and definitions related to axes, directions, planes, positions and surfaces are given in table 2.

Table 2 Axes, directions, planes, positions and surfaces

No.	Term (Japanese character)	Reading	Definition	English equivalent (informative)
4.1	軸受中心軸	ZIKUKE TYÛSIN ZIKU	theoretical axis of rotation of a rolling bearing	bearing axis
4.2	内輪中心軸	NAIRIN TYÛSIN ZIKU	axis of the cylinder or cone inscribed in the basically cylindrical or tapered bore of an inner ring	inner ring axis
4.3	外輪中心軸	GAIRIN TYÛSIN ZIKU	axis of the cylinder circumscribed around the basically cylindrical outside surface of an outer ring	outer ring axis
4.4	軌道輪の基準側面	KIDÔRIN NO KIZYUN SOKUMEN	face of a ring designated as the reference face by the manufacturer of the bearing and which may be the datum for measurements NOTE: For bearings designed to support axial loads this is generally the back face.	reference face of a ring
4.5	ラジアル平面	RAZIARU HEIMEN	plane perpendicular to an axis NOTE: For a bearing ring it is generally acceptable to consider a radial plane as being parallel with the plane tangential to the reference face of the ring.	radial plane
4.6	ラジアル方向	RAZIARU HÔKÔ	direction through an axis and in a radial plane	radial direction
4.7	アキシアル平面	AKISIARU HEIMEN	plane containing an axis	axial plane
4.8	アキシアル方向	AKISIARU HÔKÔ	direction parallel with an axis NOTE: For a bearing ring it is, however, generally acceptable to consider an axial direction as being perpendicular to the plane tangential to the reference face of the ring.	axial direction
4.9	実測平面	ZISSOKU HEIMEN	any radial or axial plane in which measurements can be taken	single plane

Table 2 (concluded)

No.	Term (Japanese character)	Reading	Definition	English equivalent (informative)
4.10	実測寸法	ZISSOKU SUNPÔ	any individual distance measured between any two opposite points NOTE: This feature is also referred to as “actual local dimension” (see JIS B 0401-1). Examples: Diameter, width, etc.	single dimension
4.11	実寸法	ZISSUNPÔ	the size of a feature, obtained by measurement	actual dimension
4.12	円筒	ENTÔ	surface generated by rotation of a straight line parallel to the axis	cylinder
4.13	円すい	ENSUI	surface generated by rotation of a straight line intersecting the axis	cone
4.14	軌道接触直径	KIDÔ SESSYOKU TYOKKEI	diameter of the circle through the nominal contact points on a raceway NOTE: For roller bearings, the nominal contact points are generally at the middle of the roller length.	raceway contact diameter
4.15	軌道中央	KIDÔ TYÛÔ	point or line on a raceway surface, halfway between the two edges of the raceway	middle of raceway

5 Boundary dimensions Symbols, terms and definitions related to boundary dimensions are given in tables 3 to 6.

NOTE : Diameter (width) variations and mean diameters (widths) defined in this clause, are the differences and arithmetical means of the actual largest and actual smallest single dimensions and not of the permissible limits of size for the single dimensions. Further explanations related to the dimensional tolerances on diameters are given in Annex A (informative).

5.1 Bore diameter Symbols, terms and definitions related to bore diameter are given in table 3.

Table 3 Bore diameter

No.	Symbol	Term (Japanese character)	Reading	Definition	English equivalent (informative)
5.1.1	d	呼び内径	YOBI NAIKEI	a) <basically cylindrical bore> diameter of the cylinder containing the theoretical bore surface b) <basically tapered bore> diameter, in a designated radial plane, of the cone containing the theoretical bore surface NOTE: For rolling bearings, the nominal bore diameter is generally the reference value (basic diameter) for measurement of deviations of the actual bore surface.	nominal bore diameter
5.1.2	d_s	実測内径	ZISSOKU NAIKEI	distance between two parallel tangents to the line of intersection of the actual bore surface and any radial plane	single bore diameter
5.1.3	d_{sp}	平面内実測内径	HEIMENNAI ZISSOKU NAIKEI	single bore diameter related to a specific radial plane	single bore diameter in a single plane
5.1.4	Δ_{ds}	実測内径の寸法差	ZISSOKU NAIKEI NO SUNPÔSA	difference between a single bore diameter and the nominal bore diameter, $\Delta_{ds} = d_s - d$	deviation of a single bore diameter

Table 3 (continued)

No.	Symbol	Term (Japanese character)	Reading	Definition	English equivalent (informative)
5.1.5	V_{ds}	内径不同	NAIKEI HUDÔ	(basically cylindrical bore) difference between the largest and the smallest of the single bore diameters of an individual ring, $V_{ds} = d_{s \max} - d_{s \min}$	variation of bore diameter
5.1.6	d_m	平均内径	HEIKIN NAIKEI	(basically cylindrical bore) arithmetical mean of the largest and the smallest of the single bore diameters of an individual ring, $d_m = (d_{s \max} + d_{s \min})/2$	mean bore diameter
5.1.7	Δ_{dm}	平均内径の寸法差	HEIKIN NAIKEI NO SUNPÔSA	(basically cylindrical bore) difference between the mean bore diameter and the nominal bore diameter, $\Delta_{dm} = d_m - d$	deviation of mean bore diameter
5.1.8	d_{mp}	平面内平均内径	HEIMENNAI HEIKIN NAIKEI	arithmetical mean of the largest and the smallest of the single bore diameters in a single radial plane, $d_{mp} = (d_{sp \max} + d_{sp \min})/2$	mean bore diameter in a single plane
5.1.9	Δ_{dmp}	平面内平均内径の寸法差	HEIMENNAI HEIKIN NAIKEI NO SUNPÔSA	difference between the mean bore diameter and the nominal bore diameter in a single radial plane, $\Delta_{dmp} = d_{mp} - d$	deviation of mean bore diameter in a single plane
5.1.10	V_{dsp}	平面内内径不同	HEIMENNAI NAIKEI HUDÔ	difference between the largest and the smallest of the single bore diameters in a single radial plane, $V_{dsp} = d_{sp \max} - d_{sp \min}$	variation of bore diameter in a single plane
5.1.11	V_{dmp}	平面内平均内径の不同	HEIMENNAI HEIKIN NAIKEI NO HUDÔ	(basically cylindrical bore) difference between the largest and the smallest of the mean bore diameters in a single radial plane of an individual ring, $V_{dmp} = d_{mp \max} - d_{mp \min}$	variation of mean bore diameter

Table 3 (concluded)

No.	Symbol	Term (Japanese character)	Reading	Definition	English equivalent (informative)
5.1.12	F_w	転動体コンプリメン トの呼び内接円径	TENDÔTAI KONPURIMENTO NO YOBI NAISSETU ENKEI	⟨radial bearing without inner ring⟩ diameter of the theo- retical cylinder inscribed inside all of the rolling ele- ments	nominal bore diameter of rolling element complement
5.1.13	F_{ws}	転動体コンプリメン トの実測内接円径	TENDÔTAI KONPURIMENTO NO ZISSOKU NAISSETU ENKEI	⟨radial bearing without inner ring⟩ distance between two parallel tangents to the line of intersection of the enve- lope profile inscribed inside the rolling element comple- ment and a radial plane	single bore diameter of rolling element complement
5.1.14	$F_{ws \min}$	転動体コンプリメン トの最小実測内接円 径	TENDÔTAI KONPURIMENTO NO SAISYÔ ZISSOKU NAISSETU ENKEI	⟨radial bearing without inner ring⟩ the smallest of the single bore diameters of the rolling element complement NOTE: The smallest single bore diameter of the roll- ing element complement is the diameter of the cylinder which, when placed in the rolling ele- ment complement bore, results in zero radial clearance in at least one radial direction.	smallest single bore diameter of rolling element complement
5.1.15	F_{wm}	転動体コンプリメン トの平均内接円径	TENDÔTAI KONPURIMENTO NO HEIKIN NAISSETU ENKEI	⟨radial bearing without inner ring⟩ arithmetical mean of the largest and the smallest of the single bore diameters of the rolling element complement, $F_{wm} = (F_{ws \max} + F_{ws \min})/2$	mean bore diameter of rolling element complement
5.1.16	ΔF_{wm}	転動体コンプリメン トの平均内接円径の 寸法差	TENDÔTAI KONPURIMENTO NO HEIKIN NAISSETU ENKEI NO SUNPÔSA	⟨radial bearing without inner ring⟩ difference between the mean bore diameter of the rolling element comple- ment and the nominal bore diameter of the rolling ele- ment complement, $\Delta F_{wm} = F_{wm} - F_w$	deviation of mean bore diameter of rolling element complement

5.2 Outside diameter Symbols, terms and definitions related to outside diameter are given in table 4.

Table 4 Outside diameter

No.	Symbol	Term (Japanese character)	Reading	Definition	English equivalent (informative)
5.2.1	D	呼び外径	YOBI GAIKEI	(basically cylindrical outside surface) diameter of the cylinder containing the theoretical outside surface NOTE: For rolling bearings, the nominal outside diameter is generally the reference value (basic diameter) for deviations of the actual outside surface.	nominal outside diameter
5.2.2	D_s	実測外径	ZISSOKU GAIKEI	distance between two parallel tangents to the line of intersection of the actual outside surface and any radial plane	single outside diameter
5.2.3	D_{sp}	平面内実測外径	HEIMENNAI ZISSOKU GAIKEI	single outside diameter related to a specific radial plane	single outside diameter in a single plane
5.2.4	Δ_{Ds}	実測外径の寸法差	ZISSOKU GAIKEI NO SUNPÔSA	(basically cylindrical outside surface) difference between a single outside diameter and the nominal outside diameter, $\Delta_{Ds} = D_s - D$	deviation of a single outside diameter
5.2.5	V_{Ds}	外径不同	GAIKEI HUDÔ	(basically cylindrical outside surface) difference between the largest and the smallest of the single outside diameters of an individual ring, $V_{Ds} = D_{s \max} - D_{s \min}$	variation of outside diameter
5.2.6	D_m	平均外径	HEIKIN GAIKEI	(basically cylindrical outside surface) arithmetical mean of the largest and the smallest of the single outside diameters of an individual ring, $D_m = (D_{s \max} + D_{s \min})/2$	mean outside diameter