

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 1757-1 : 2012

(JGMA/JSA)

**Evaluation of instruments for the
measurement of individual gears—
Part 1: Method by gear shape
artifacts**

ICS 17.040.30;21.200

Reference number : **JIS B 1757-1 : 2012 (E)**

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Date of Establishment: 2012-01-20

Date of Public Notice in Official Gazette: 2012-01-20

Investigated by: Japanese Industrial Standards Committee
Standards Board

Technical Committee on Machine Elements

JIS B 1757-1:2012, First English edition published in 2012-09

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,
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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 for establishment of Japanese Industrial Standard submitted by Japan Gear Manufacturers Association (JGMA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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 or utility model right. 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 or the utility model right.

JIS B 1757 series consists of the following 4 parts under the general title “*Evaluation of instruments for the measurement of individual gears*”:

Part 1: Method by gear shape artifacts

Part 2: Tooth form measurement using sphere or cylinder artifacts

Part 3: Helix measurement using plane artifacts (to be established)

Part 4: Pitch measurement using sphere or cylinder artifacts (to be established)

Evaluation of instruments for the measurement of individual gears— Part 1: Method by gear shape artifacts

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 18653** published in 2003 with some modifications of the technical contents to aid the users in understanding this Standard.

The portions given sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with explanations is given in Annex JA.

1 Scope

This Standard specifies the evaluation methods of instruments used for gear measurements of involute, helix, pitch and tooth space runout by using the gear shape artifacts. It is also applicable both to instruments that measure the tooth space runout directly and to those that compute it from index measurements of tooth flank. It also gives recommendations for the evaluation of tooth thickness measurement instruments.

This Standard includes the estimation of measurement uncertainty of instruments. However, it does not address the calibration of artifacts by laboratories accredited in accordance with **JIS Q 17025**, or its requirements are not intended as an acceptance specification of product gears.

The estimation of measurement uncertainty of product gears is beyond the scope.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 18653:2003 *Gears—Evaluation of instruments for the measurement of individual gears* (MOD)

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 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0102 *Vocabulary of gear terms—Definitions related to geometry*

JIS B 1702-1 *Cylindrical gears—ISO system of accuracy—Part 1: Definitions and allowable values of deviations relevant to corresponding flanks of gear teeth*

NOTE : Corresponding International Standard: ISO 1328-1:1995 *Cylindrical gears—ISO system of accuracy—Part 1: Definitions and allowable values of deviations relevant to corresponding flanks of gear teeth* (IDT)

JIS B 1702-2 Cylindrical gears—ISO system of accuracy—Part—2: Definitions and allowable values of deviations relevant to radial composite deviations and runout information

JIS Q 17025 General requirements for the competence of testing and calibration laboratories

NOTE : Corresponding International Standard: ISO/IEC 17025 *General requirements for the competence of testing and calibration laboratories* (IDT)

JIS Z 8103 Glossary of terms used in measurement

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS B 0102**, **JIS B 1702-1**, **JIS B 1702-2** and **JIS Z 8103**, and the following terms and definitions apply.

3.1 accuracy

closeness of agreement between a measured value and a calibration value

3.2 artifact

object of specific shape used to determine the accuracy of instruments for measurement of gears

3.3 bias

difference between the average of measured values and the calibration value (see figure 1)

NOTE : Bias can be affected by linearity, gain, etc. in the measurement system, and can be different throughout the operating range of the measurement system.

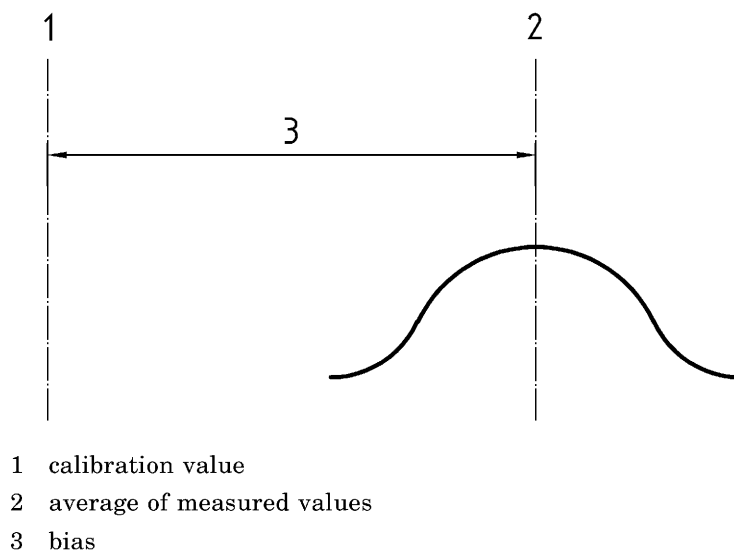


Figure 1 Bias

3.4 repeatability (of measurement results)

closeness of the agreement between results of successive measurements on the same item carried out under the same measurement conditions

3.5 reproducibility (of measurement results)

closeness of the agreement between results of measurements on the same item carried out under the changed measurement conditions

Reproducibility shall be expressed quantitatively in terms of dispersion characteristics of the measurement results.

NOTE 1 A certification of reproducibility requires specification of the conditions changed.

NOTE 2 The changed conditions may include the following.

- measurer
- artifact
- measurement location
- measurement temperature
- measurement date

3.6 uncertainty (of measurement results)

parameter which characterizes the dispersion of values that could be reasonably attributed to the measurand

This shall be appended to the measurement results (see **JIS Z 8103**).

NOTE 1 The parameter can be, for example, a standard deviation (or a multiple thereof), or the half-width of an interval having a stated confidence level.

NOTE 2 Measurement uncertainty comprises, in general, many components. Some of these can be estimated from the statistical distribution of a series of measurement results and characterized by experimental standard deviations. The other components can be estimated from assumed distributions based on experience or other information.

NOTE 3 It is understood that the measurement result is the best estimate of the value of the measurand, and that all components of uncertainty including those arising from systematic effects such as components associated with corrections and reference standards contribute to the dispersion.

4 Symbols and units

Symbols and units used in this Standard are in accordance with table 1.