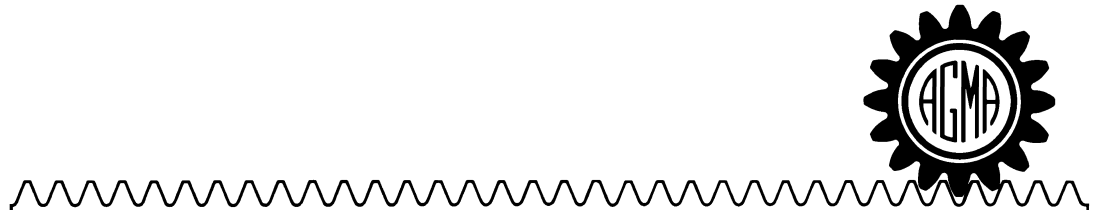
ANSI/AGMA ISO 18653-A06
Identical to ISO 18653:2003

AMERICAN NATIONAL STANDARD

Gears - Evaluation of Instruments for the Measurement of Individual Gears

ANSI/AGMA ISO 18653-A06



AGMA STANDARD

American National Standard

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[Tables or other self-supporting sections may be referenced. Citations should read: See ANSI/AGMA ISO 18653-A06, *Gears - Evaluation of Instruments for the Measurement of Individual Gears*, published by the American Gear Manufacturers Association, 500 Montgomery Street, Suite 350, Alexandria, Virginia 22314, http://www.agma.org.]

Approved September 29, 2006

ABSTRACT

This International Standard describes methods for the determination of instrument suitability for use in making gear measurements of involute, helix, pitch and runout. Includes instruments that measure runout directly, or compute it from index measurements. Of necessity, it contains the estimation of measurement uncertainty with the use of calibrated gear artifacts.

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Foreword

[The foreword, footnotes and annexes, if any, in this document are provided for informational purposes only and are not to be construed as a part of ANSI/AGMA ISO Standard 18653–A06, *Gears – Evaluation of Instruments for the Measurement of Individual Gears*.]

In 1988, The American Gear Manufacturers Association recognized the need for establishment of standards for the calibration of gear measuring instruments. The AGMA Calibration Committee was formed between April 1989 and their first meeting in February 1990. Between 1995 and 1999, this committee, as members of the Committee on Gear Metrology (COGM), was instrumental in the establishment of the Oak Ridge Gear Metrology Laboratory for the purpose of calibrating gear artifacts traceable to the National Institute for Standards and Technology.

The AGMA Calibration Committee, between 1990 and 1998, developed and published three national standards on calibration of gear measuring instruments: ANSI/AGMA 2110–A94, *Measuring Instrument Calibration – Part I, Involute Measurement,* ANSI/AGMA 2113–A97, *Measuring Instrument Calibration, Gear Tooth Alignment Measurement,* and ANSI/AGMA 2114–A98, *Measuring Instrument Calibration, Gear Pitch and Runout Measurements.*

These standards covered elemental measurements specified in the accuracy requirements of ANSI/AGMA 2015–1–A01, *Accuracy Classification System – Tangential Measurements for Cylindrical Gears*.

In 1999, the content of these standards was combined and submitted to ISO as a proposed work item. As a result, ISO TC60/WG2 used this as the basis for development of ISO 18653:2003, *Gears – Evaluation of instruments for the measurement of gears,* and ISO/TR 10064–5:2005, *Code of inspection practice – Part 5: Recommendations relative to evaluation of gear measuring instruments*.

During the ISO development period the Calibration Committee decided that supplemental information, on measurement system conditions for calibration, accuracy requirements and uncertainty determination, was desirable to have in an AGMA Information Sheet. This resulted in the publication of AGMA 931–A02, *Calibration of Gear Measuring Instruments and Their Application to the Inspection of Product Gears,* in 2002.

The ISO documents expanded the AGMA work and included material on the determination of uncertainty of measurement and the introduction of spherical calibration artifacts. The natural evolution, therefore, was the adoption of the two comprehensive ISO documents as national documents in place of the four ANSI/AGMA documents.

ANSI/AGMA ISO 18653–A06 replaces ANSI/AGMA 2010–A94, ANSI/AGMA 2110–A94, ANSI/AGMA 2113–A97, and ANSI/AGMA 2114–A98 for measuring instrument calibration. The measuring methods for those standards can be found in AGMA ISO 10064–5–A06.

This standard is an identical adoption of ISO 18653:2003.

The first draft of ANSI/AGMA ISO 18653–A06 was made in October 2005. It was approved by the AGMA membership in July 2006. It was approved as an American National Standard on September 29, 2006.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Gear Manufacturers Association, 500 Montgomery Street, Suite 350, Alexandria, Virginia 22314.

PERSONNEL of the AGMA Calibration Committee

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American National Standard -

Gears - Evaluation of Instruments for the Measurement of Individual Gears

1 Scope

This standard specifies methods for the evaluation of measuring instruments used for gear measurements of involute, helix, pitch and runout. It is applicable both to instruments that measure runout directly and those that compute it from index measurements. It also gives recommendations for the evaluation of tooth thickness measuring instruments and, of necessity, includes the estimation of measurement uncertainty with the use of calibrated gear artifacts.

This document does not address the calibration of artifacts by laboratories accredited in accordance with ISO 17025; nor are its requirements intended as an acceptance specification of product gears (see ISO 1328-1, ISO 1328-2, ISO/TR 10064-1, and ISO/TR 10064-2). The estimation of product gear measurement uncertainty is beyond the scope of this standard, see AGMA ISO 10064-5-A06 for recommendations.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

AGMA ISO 10064-5-A06, *Code of inspection practice - Part 5: Recommendations relative to evaluation of gear measuring instruments*

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*

ISO/TR 10064-3:1996, *Code of inspection practice - Part 3: Recommendations relative to gear blanks, shaft centre distance and parallelism of axes*

ISO 14253-1:1998, *Geometrical Product Specifications (GPS) - Inspection by measurement of workpieces and measuring equipment - Part 1: Decision rules for proving conformance or non-conformance with specifications*

ISO/IEC 17025:1999, *General requirements for the competence of testing and calibration laboratories.*

3 Terms, definitions and symbols

For the purposes of this document, the following terms, definitions and symbols (see table 1) apply.

NOTE 1: The definitions, when applicable, conform to ISO 1122-1, ISO1328-1, ISO1328-2 and ISO/TR 10064-1.

NOTE 2: The terms, definitions and symbols used in this document may vary from those used in other International Standards. The user needs to be certain of fully understanding them, as they are used.

3.1 Accuracy

The closeness of agreement between a measured value and an accepted reference (or calibrated) value.

3.2 Artifact

An object of specific shape used to determine the accuracy of measuring devices. See Clause 7.

3.3 Bias

The difference between the observed average of measurements and the calibration value. See figure 1.

NOTE: Bias can be affected by systematic errors such as linearity or gain and may be different throughout the operating range of the measurement system.