American Gear Manufacturers Association

Technical Resources

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American National Standard

Evaluation of Double Flank Testers for Radial Composite Measurement of Gears

ANSI/AGMA 2116-A05

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[Tables or other self–supporting sections may be referenced. Citations should read: See ANSI/AGMA 2116–A05, *Evaluation of Double Flank Testers for Radial Composite Measurement of Gears,* published by the American Gear Manufacturers Association, 500 Montgomery Street, Suite 350, Alexandria, Virginia 22314, http://www.agma.org.]

Approved December 29, 2005

ABSTRACT

This standard provides the evaluation criteria for double flank testers. Recommended artifact sizes and geometry are provided along with measurement system conditions. Annexes are provided for methods of estimating calibration uncertainty and artifact calibration certificates.

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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 2116–A05, *Evaluation of Double Flank Testers for Radial Composite Measurement of Gears.*]

Between 1994 and 1998, AGMA published three standards on calibration of gear measuring instruments: ANSI/AGMA 2010–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*. The Calibration Committee decided that supplemental information, on measurement system conditions for calibration, accuracy requirements and uncertainty determination, was desirable to have in an Information Sheet, AGMA 931–A02, *Calibration of Gear Measuring Instruments and Their Application to the Inspection of Product Gears*, that was published in 2002.

The material in these AGMA documents was combined and submitted to ISO for the development of ISO 18653:2003, *Gears – Evaluation of instruments for the measurement of gears,* and ISO/TR 10064–5:2005, *Cylindrical gears – Code of inspection practice – Part 5: Recommendations relative to evaluation of gear measuring instruments.*

The Calibration Committee decided that similar standardization and information was needed for the evaluation methods of double flank testers used for radial composite measurement of gears. After a study of existing practices, standards, and literature the information contained herein is a consolidation of the most common methods currently in existence.

The first draft of ANSI/AGMA 2116–A05 was made in August, 2003. It was approved by the AGMA membership in October, 2005. It was approved as an American National Standard on December 29, 2005.

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.

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American National Standard –

Evaluation of Double Flank Testers for Radial Composite Measurement of Gears

1 Scope

This standard provides evaluation methods for double flank testers used for radial composite measurement of gears. Recommendations are given for use of artifacts. Annex A is informative and provides methods for estimating uncertainty. Annex B is normative and provides requirements for artifact calibration certificates.

2 Normative references

The following documents contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions were valid. All publications are subject to revision, and the users of this standard are encouraged to investigate the possibility of applying the most recent editions of the publications listed.

AGMA 915-3-A99, *Inspection Practices - Gear Blanks, Shaft Center Distance and Parallelism*

AGMA 935-A05, *Recommendations Relative to the Evaluation of Radial Composite Gear Double Flank Testers*

ANSI/AGMA 1012-G05, *Gear Nomenclature, Definitions of Terms with Symbols*

ANSI/AGMA 2015-1-A01, *Accuracy Classification System - Tangential Measurements for Cylindrical Gears*

AGMA 2015-2-AXX[1)], *Accuracy Classification System - Radial Measurements for Cylindrical Gears*

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

ISO/TR 10064-5:2005, *Cylindrical gears - Code of inspection practice - Part 5: Recommendations relative to evaluation of gear measuring instruments*

ISO/TS 14253-2:1999, *Geometrical Product Specifications (GPS) - Inspection by measurement of workpieces and measuring equipment - Part 2: Guide to the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification*

ISO 18653:2003, *Gears - Evaluation of instruments for the measurement of individual gears*

3 Definition of terms

The definitions, where applicable, conform to ANSI/AGMA 1012-G05, ANSI/AGMA 2015-1-A01, AGMA 2015-2-AXX[1)] and ISO18653.

4 Application

4.1 General

The purpose of the tests prescribed in this standard is to estimate measurement uncertainty. It is assumed that the double flank tester has been installed on site and a series of acceptance tests have been completed successfully. Prescribed tests may serve as interim checks to verify the measurement process.

The measurement and evaluation procedures may be used as part of acceptance tests for a double flank tester, with prior agreement between customer and supplier. In this situation it is recommended that a series of traceably calibrated artifacts be used to verify the measurement uncertainty at specific points throughout the working volume of the double flank tester; at a minimum to include axis alignment

[1)] presently at the stage of development