AMERICAN NATIONAL STANDARD

Accuracy Classification System - Radial Measurements for Cylindrical Gears

ANSI/AGMA 2015-2-A06

AGMA STANDARD

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Approved June 22, 2006

ABSTRACT

This standard establishes a classification system relevant to radial (double flank) composite deviations of individual cylindrical involute gears. It serves as a concise means of specifying gear accuracy without the immediate need of supplying individual tolerances. It simplifies discussions of gear accuracy between gear manufacturer and purchaser. It specifies the appropriate definitions of gear tooth accuracy terms, the structure of the gear accuracy system and the tolerances (allowable values of the deviations). Annex A provides information on the accuracy of master gears. Annex B provides information on runout tolerance values.

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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 AGMA Standard 2015-2-A06, *Accuracy Classification System - Radial Measurements for Cylindrical Gears.*]

This standard provides tolerances for different gear accuracy grades from C4 to C12 for unassembled spur and helical gears. Applicable definitions are provided.

The purpose is to provide a common basis for specifying accuracy, and for the procurement of unassembled gears. It is not a design manual for determining the specific quality levels for a given application.

AGMA 390.03 of 1973 was a consolidation of several AGMA publications, including:

AGMA 235.02 (Feb. 1966), *Information Sheet for Master Gears*

AGMA 239.01 (Oct. 1965), *Measuring Methods and Practices Manual for Control of Spur, Helical and Herringbone Gears*

AGMA 239.01A (Sept. 1966), *Measuring Methods and Practices Manual for Control of Bevel and Hypoid Gears,* and parts of

AGMA 236.05 (ASA B6.11, June 1956), *Inspection of Fine-Pitch Gears*

AGMA 390.02 (Sept. 1964), *Gear Classification Manual* originally published as AGMA 390.01 (1961)

Data was added for gear rack and fine-pitch worms and wormgears. The former AGMA 390.02 for coarse pitch and fine pitch spur, helical and herringbone gearing was enhanced to offer a single, compatible classification system. The tolerance identifier "Q" was added to indicate that the tolerances in 390.03 apply. If Q is not used as a prefix in the quality number, tolerances in AGMA 390.01 and 390.02 applied.

ANSI/AGMA 2000-A88 was an update of those sections from AGMA 390.03 for parallel axis gears only. The other material in AGMA 390.03 on bevels and worms was replaced by ANSI/AGMA 2009-A99 and ANSI/AGMA 2011-A98, respectively. ANSI/AGMA 2000 was approved by the AGMA membership in January 1988, and as a American National Standard Institute (ANSI) standard on March 31, 1988.

ANSI/AGMA 2015-2-A06 combines the grading system of ISO 1328-2:1997 with the methods of ANSI/AGMA 2000-A88 and ISO/TR 10064-2:1996. The descriptions and measuring methods that were in ISO 1328:1975 were put in ISO/TR 10064-2 and are included in AGMA 915-2-A05. ANSI/AGMA 2015-2-A06 and AGMA 915-2-A05 are made to work together as a system.

The user of this American National Standard is alerted that numerous differences exist between it and ANSI/AGMA 2000-A88. A major difference is the accuracy grade numbering system has been reversed, such that the smallest number represents the smallest tolerance. The tooth-to-tooth data should be filtered before comparing to the tolerance; previously unfiltered data was used. The user of ANSI/AGMA 2015-2-A06 must be very careful when comparing tolerance values formerly specified using ANSI/AGMA 2000-A88.

The first draft of AGMA 2015-2-A06 was made in April, 1998. It was approved by the AGMA membership in July, 2006. It was approved as an American National Standard on June 22, 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.

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American National Standard -

Accuracy Classification System - Radial Measurements for Cylindrical Gears

1 Scope

This part of ANSI/AGMA 2015 establishes a system of accuracy relevant to radial composite deviations of individual cylindrical involute gears. It specifies the appropriate definitions of gear tooth accuracy terms, the structure of the gear accuracy system and the allowable values of the above mentioned deviations.

The radial measurement accuracy system has different grade ranges than the elemental ranges in ANSI/AGMA 2015-1-A01. The diameter and module ranges for radial composite deviations and runout are also different.

The radial composite accuracy system comprises 9 accuracy grades for total or tooth-to-tooth radial composite deviations of which grade C4 is the most accurate and grade C12 is the least accurate. This standard is for the ranges:

$0.2 \leq m_n \leq 5$

2 mm $\leq d \leq$ 1000 mm

$3 \leq z \leq 1000$

$\beta \leq 45°$

where

m_n is normal module;

d is reference pitch diameter;

z is number of teeth;

β is helix angle.

See clause 7 for tolerances.

Annex A provides information on master gear design and tolerances. Annex B provides information on runout, including an equation for determining the tolerance, for use if agreed upon between manufacturer and purchaser.

There is no correlation between accuracy grades of elemental measurements specified by ANSI/AGMA 2015-1-A01 and radial composite measurements.

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 915-2-A05, *Inspection Practices - Part 2: Cylindrical Gears - Radial Measurements*

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

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

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

ISO 701:1998, *International gear notation - Symbols for geometrical data*

3 Symbols, terminology and definitions

The terminology and definitions pertaining to the tolerances and inspection of spur and helical gear teeth are listed here for use in this standard. For other definitions of geometric terms related to gearing, see ANSI/AGMA 1012-G05.

NOTE: Some of the symbols and terminology contained in this document may differ from those used in other documents and AGMA standards. Users of this standard should assure themselves that they are using the symbols, terminology and definitions in the manner indicated herein.

3.1 Symbols

Symbols are based on those given in ISO 701, see table 1.