American Gear Manufacturers Association

Technical Resources

Identical to ISO 17485:2006
Reaffirmed March 2014

American National Standard

Bevel Gears – ISO System of Accuracy

ANSI/AGMA ISO 17485-A08

American National Standard

Bevel Gears – ISO System of Accuracy
ANSI/AGMA ISO 17485–A08

Approved May 20, 2008

ABSTRACT

This International Standard establishes a classification system that can be used to communicate geometrical accuracy specifications of unassembled bevel gears, hypoid gears and gear pairs. It defines gear tooth accuracy terms, specifies the structure of the gear accuracy grade system, and provides allowable values. The standard provides the gear manufacturer and the gear buyer with a mutually advantageous reference for uniform tolerances. Ten grades are defined, numbered 2 to 11 in order of decreasing precision. Equations for tolerances and their ranges of validity are provided for bevel and hypoid gearing.

Published by

American Gear Manufacturers Association
500 Montgomery Street, Suite 350, Alexandria, Virginia 22314

Printed in the United States of America

ISBN: 978–1–55589–926–4

Contents

Annexes

Figures

Tables

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 17485-A08, *Bevel Gears - ISO System of Accuracy.*]

The measurement and tolerance specification of bevel gears are very complex subjects that were in need of international standardization. For these and other reasons, ISO/TC 60 approved the project based on a proposed document, ANSI/AGMA 2009-B01, *Bevel Gear Classification, Tolerances, and Measuring Methods*.

At an early stage it was decided to develop two documents; this standard with accuracy grades and definitions, and a separate Technical Report, ISO/TR 10064-6, containing inspection practice and measuring methods. These practices and measuring methods included topics such as manufacturing considerations, CMM measurements, contact pattern checking, and advance topics such as bevel gear flank form analysis.

Prior to the development of ISO 17485, the accuracy grades described in ISO 1328, for cylindrical gears, were often used for bevel gears. However, this use was not always consistent with the specific requirements and general practices followed within the bevel gear industry. ISO 17485 contains items that are distinctly different from ISO 1328-1:1995:

- The definitions, tolerance diameter and measuring directions are specifically for bevel gears;
- Accuracy grade tolerances are based on equations and not on tables;
- There is approximately one grade difference in tolerance level between bevel and cylindrical gears, similar to that used by the DIN system of tolerances.

The use of the definitions and accuracy grades within this standard should improve the consistent application of bevel gear geometrical tolerances for the general benefit of industry.

ANSI/AGMA ISO 17485-A08 represents an identical adoption of ISO 17485:2006.

The first draft of ANSI/AGMA ISO 17485-A08 was made in June, 2007. It was approved by the AGMA membership on March 8, 2008 and approved as an American National Standard on May 20, 2008.

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 Gear Accuracy Committee

Chairman: .... Edward Lawson, Gleason-M&M Precision Systems Corporation
Vice Chairman: .... Steve Lindley, Rexnord Industries Gear Operations

ACTIVE MEMBERS

W.A. Bradley .... Consultant
B.L. Cox .... BWXT Y-12, LLC
S. Doubler .... General Motors Corporation
R. Frazer .... University of Newcastle-Upon-Tyne
D. Hoying .... Gleason-M&M Precision Systems Corporation
T. Klaves .... Milwaukee Gear Company
I. Laskin .... Consultant
R. Layland .... Precision Gage Company, Inc.
M. May .... Gleason Works
R.W. Ott .... Caterpillar, Inc.
E. Reiter .... Web Gear Services Ltd.
J.M. Rinaldo .... Atlas Copco Comptec LLC
R.E. Smith .... R.E. Smith & Co., Inc.
T. Thompson .... General Motors Corporation

(This page is intentionally blank)

American National Standard –

Bevel Gears – ISO System of Accuracy

1 Scope

This standard establishes a classification system, which can be used to communicate geometrical accuracy specifications of unassembled bevel gears, hypoid gears, and gear pairs. It defines gear tooth accuracy terms and specifies the structure of the gear accuracy grade system and allowable values.

This standard provides the gear manufacturer and the gear buyer with a mutually advantageous reference for uniform tolerances. Ten accuracy grades are defined, numbered 2 to 11, in order of decreasing precision. Equations for tolerances and their ranges of validity are provided in 5.4 for the defined accuracy of gearing. In general, these tolerances cover the following ranges:

$1.0 \text{ mm} \leq m_{mn} \leq 50 \text{ mm}$

$5 \leq z \leq 400$

$5 \text{ mm} \leq d_T \leq 2500 \text{ mm}$

where

d_T is tolerance diameter;

m_{mn} is mean normal module;

z is number of teeth.

See clause 6 for required and optional measuring methods. As tolerances are calculated from the actual dimensions of a bevel gear, tolerance tables are not provided. In order to get an overview, example values of tolerances and graphs are given in annex A.

This standard does not apply to enclosed gear unit assemblies, including speed reducers or increasers, gear motors, shaft mounted reducers, high speed units, or other enclosed gear units which are manufactured for a given power, speed, ratio or application.

Gear design is beyond the scope of this Standard. The use of the accuracy grades for the determination of gear performance requires extensive experience with specific applications. Therefore, the users of this standard are cautioned against the direct application of tolerance values to a projected performance of unassembled (loose) gears when they are assembled.

Tolerance values for gears outside the limits stated in this standard will need to be established by determining the specific application requirements. This could require the setting of a tolerance other than calculated by the formulas in this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1122-1:1998, *Vocabulary of gears terms – Part 1: Definitions relating to geometry*

ISO 23509:2006, *Bevel and hypoid gear geometry*

3 Terms, definitions and symbols

3.1 Definitions

For the purposes of this document, the terms and definitions given in ISO 1122-1, ISO 23509 and the following terms, definitions and symbols apply.

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

3.1.1 Index deviation, F_x

Displacement of any tooth flank from its theoretical position, relative to a datum tooth flank.