



American  
Gear Manufacturers  
Association

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Technical Resources

Identical to ISO/TR 22849:2011

## **AGMA Information Sheet**

# **Design Recommendations for Bevel Gears**

American  
Gear  
Manufacturers  
Association

***Design Recommendations for Bevel Gears***

AGMA ISO 22849-A12

Identical to ISO/TR 22849:2011

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Approved May 7, 2012

**ABSTRACT**

This information sheet discusses the application of bevel and hypoid gears using the geometry in ANSI/AGMA ISO 23509, the capacity as determined by ISO 10300 (all parts), or ANSI/AGMA 2003-C10 and AGMA 932-A05, and the tolerances in ANSI/AGMA ISO 17485. It provides additional information on the application, manufacturing, strength and efficiency of bevel gears for consideration in the design stage of a new bevel gear set.

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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 ISO 22849–A12, *Design Recommendations for Bevel Gears*.]

The U.S. delegation proposed development of a new standard to ISO Technical Committee 60 on bevel gear geometry and associated design recommendations based on ANSI/AGMA 2005–D03, *Design Manual for Bevel Gears*. It was decided to address this project through the preparation of 1) an International Standard focusing strictly on bevel geometry (ISO 23509:2006, *Bevel and hypoid gear geometry*), and 2) a complimentary ISO Technical Report (ISO/TR 22849:2011, *Design recommendations for bevel gears*) which would present other design issues to be considered.

ISO 23509 was adopted as an American National Standard, ANSI/AGMA ISO 23509–A08, in 2008.

Information Sheet AGMA ISO 22849–A12 represents an identical adoption of ISO/TR 22849:2011 with the following revisions/clarifications:

- in 3.2.4, the term “case crushing” was changed to the preferred term “subcase fatigue” and “welding” to the preferred term “scuffing”;
- in 6.2.3.2.2, the numerator of equation (44) was revised to the correct value of 500;
- recommendation to use AGMA documents for load capacity calculations in addition to ISO 10300 was made;
- reference was made to those ISO standards and technical reports that have been adopted by AGMA using their appropriate document numbers.

The first draft of AGMA ISO 22849–A12 was made in May, 2011. It was approved by the AGMA membership on May 7, 2012.

Suggestions for improvement of this document will be welcome. They should be sent to the American Gear Manufacturers Association, 1001 N. Fairfax Street, Suite 500, Alexandria, Virginia 22314.

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# American Gear Manufacturers Association – Design Recommendations for Bevel Gears

## 1 Scope

This information sheet provides information for the application of bevel and hypoid gears using the geometry in ANSI/AGMA ISO 23509, the capacity as determined by ISO 10300 (all parts), or ANSI/AGMA 2003-C10 and AGMA 932-A05, and the tolerances in ANSI/AGMA ISO 17485.

This information sheet provides additional information on the application, manufacturing, strength and efficiency of bevel gears for consideration in the design stage of a new bevel gear set.

The term “bevel gear” is used to mean straight, spiral, zerol bevel and hypoid gear designs. Where this information sheet pertains to one or more, but not all, the specific forms are identified.

The manufacturing process of forming the desired tooth form is not intended to imply any specific process, but rather to be general in nature and applicable to all methods of manufacture.

This information sheet is intended for use by an experienced gear designer capable of selecting reasonable values for the required data based on his/her knowledge and background. It is not intended for use by the engineering public at large.

## 2 Symbols, descriptions and units

The symbols and descriptions used in this information sheet are, wherever possible, consistent with other International Standards on bevel gears. As a result of certain limitations, some symbols and descriptions are different than in similar literature pertaining to spur and helical gearing. See Table 1.

**Table 1 - Symbols, terms and definitions**

Symbol	Description	Units
$A_g$	Arrangement constant	--
$a_v$	Center distance of virtual cylindrical gears	mm
$b_{eff}$	Face width in contact with mating element	mm
$C_1$	A constant	--
$D$	Outside diameter of the considered rotating element	mm
$d_{ae1}, d_{ae2}$	Outside diameter	mm
$d_{v1}, d_{v2}$	Reference diameter of virtual cylindrical gear	mm
$d_{va1}, d_{va2}$	Tip diameter of virtual cylindrical gear	mm
$f_g$	Gear dip factor	--
$h_{am1}, h_{am2}$	Mean addendum	mm
$j_{en}$	Outer normal backlash	mm
$j_{et}$	Outer transverse backlash	mm
$K$	Load intensity for calculating the coefficient of friction	N/mm <sup>2</sup>
$L$	Length of the element of the considered rotating element	mm

(continued)