Identical to ISO 23509:2006

American
Gear Manufacturers
Association

Technical Resources

American National Standard

Bevel and Hypoid Gear Geometry

ANSI/AGMA ISO 23509–A08

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Approved May 20, 2008

ABSTRACT

This standard specifies the geometry of bevel gears. The term bevel gears is used to mean straight, spiral, zerol bevel and hypoid gear designs. If the text pertains to one or more, but not all, of these, the specific forms are identified. This standard is intended for use by an experienced gear designer capable of selecting reasonable values for the factors based on his knowledge and background. It is not intended for use by the engineering public at large.

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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 23509–A08, *Bevel and Hypoid Gear Geometry.*]

For many decades, information on bevel, and especially hypoid, gear geometry has been developed and published by the gear machine manufacturers. It is clear that the specific formulas for their respective geometries were developed for the mechanical generation methods of their particular machines and tools. In many cases, these formulas could not be used in general for all bevel gear types. This situation changed with the introduction of universal, multi–axis, CNC–machines, which in principle are able to produce nearly all types of gearing. The manufacturers were, therefore, asked to provide CNC programs for the geometries of different bevel gear generation methods on their machines.

This standard integrates straight bevel gears and the three major design generation methods for spiral bevel gears into one complete set of formulas. In only a few places do specific formulas for each method have to be applied. The structure of the formulas is such that they can be programmed directly, allowing the user to compare the different designs.

The formulas of the three methods are developed for the general case of hypoid gears and calculate the specific case of spiral bevel gears by entering zero for the hypoid offset. Additionally, the geometries correspond such that each gear set consists of a generated or non–generated wheel without offset and a pinion which is generated and provided with the total hypoid offset.

An additional objective of this standard is that on the basis of the combined bevel gear geometries an ISO hypoid gear rating system can be established in the future.

ANSI/AGMA ISO 23509–A08 represents an identical adoption of ISO 23509:2006.

The first draft of ANSI/AGMA ISO 23509–A08 was made in July, 2007. It was approved by the AGMA membership in March, 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.

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American National Standard -

Bevel and hypoid gear geometry

1 Scope

This International Standard specifies the geometry of bevel gears.

The term bevel gears is used to mean straight, spiral, zerol bevel and hypoid gear designs. If the text pertains to one or more, but not all, of these, 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.

The geometry for the calculation of factors used in bevel gear rating, such as ISO 10300, is also included.

This International Standard is intended for use by an experienced gear designer capable of selecting reasonable values for the factors based on his knowledge and background. It is not intended for use by the engineering public at large.

Annex A provides a structure for the calculation of the methods provided in this International 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 gear terms — Part 1: Definitions related to geometry*

ISO 10300-1:2001, *Calculation of load capacity of bevel gears — Part 1: Introduction and general influence factors*

ISO 10300-2:2001, *Calculation of load capacity of bevel gears — Part 2: Calculation of surface durability (pitting)*

ISO 10300-3:2001, *Calculation of load capacity of bevel gears — Part 3: Calculation of tooth root strength*

3 Terms, definitions and symbols

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

NOTE 1   The symbols, terms and definitions used in this International Standard are, wherever possible, consistent with other International Standards. It is known, because of certain limitations, that some symbols, their terms and definitions, as used in this document, are different from those used in similar literature pertaining to spur and helical gearing.

NOTE 2   Bevel gear nomenclature used throughout this International Standard is illustrated in Figure 1, the axial section of a bevel gear, and in Figure 2, the mean transverse section. Hypoid nomenclature is illustrated in Figure 3.

Subscript 1 refers to the pinion and subscript 2 to the wheel.