(Revision of ANSI/AGMA 6001-C88)

AMERICAN NATIONAL STANDARD

Design and Selection of Components for Enclosed Gear Drives

ANSI/AGMA 6001-D97

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Design and Selection of Components for Enclosed Gear Drives
ANSI/AGMA 6001–D97
[Revision of ANSI/AGMA 6001–C88]

Approved August 7, 1997

ABSTRACT

This standard outlines the basic practices for the design and selection of components, other than gearing, for use in commercial and industrial enclosed gear drives.

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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 Standard 6001-D97, *Design and Selection of Components for Enclosed Gear Drives*.]

AGMA 260.02 was approved by the AGMA membership on February 1, 1973, and issued in January of 1974. It consolidated with minor revision, information contained in the following superseded AGMA Standards:

AGMA 255.02 (November 1964), *Bolting (Allowable Tensile Stress) for Gear Drives;*

AGMA 260.01 (March 1953), *Shafting – Allowable Torsional and Bending Stresses;*

AGMA 260.02 also incorporated allowable stresses for keys;

AGMA 265.01 *Bearings – Allowable Loads and Speeds.*

The purpose of AGMA 6001-C88, as a replacement for AGMA 260.02, was to establish a common base for the design and selection of components for the different types of commercial and industrial gear drives.

AGMA 6001-C88 was expanded to include a generalized shaft stress equation which included hollow shafting, miscellaneous components, housings, and keyway stress calculations. All design considerations were revised to allow for 200 percent peak load for helical, spiral bevel, spur and herringbone gearing, and 300 percent peak load for wormgearing. The bearing section was updated to include consideration of life adjustment factors, bearing lives other than 5000 hours and reliability levels other than L10.

During the preparation of AGMA 6001-C88, a considerable amount of time was spent on the shaft design section in an effort to include the most recent theories on shaft stresses and material characteristics. The standard included the existing practice for shaft design, and for reference purposes, appendix C included a description of, and excerpts from, ANSI/ASME B106.1M, *Design of Transmission Shafting*, published in 1985.

AGMA 6001-C88 was approved by the membership in May 1988 and approved as an American National Standard on June 24, 1988.

This revision, AGMA 6001-D97, has been expanded to include more recent theories on shaft design and analysis. Also, equations for shaft deformation were added.

AGMA 6001-D97 was approved by the membership in October 1996 and approved as an American National Standard on August 7, 1997.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Gear Manufacturers Association, 1500 King Street, Suite 201, Alexandria, Virginia 22314.

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American National Standard –

Design and Selection of Components for Enclosed Gear Drives

1 Scope

This standard provides an acceptable practice for the design and selection of components for enclosed gear drives. Fundamental equations provide for the proper sizing of shafts, keys, and fasteners based on stated allowable stresses. Other components are discussed in a manner to provide an awareness of their function or specific requirements. This standard applies to the following types of commercial and industrial enclosed gear drives, individually or in combination: spur, helical, herringbone, bevel and worm.

1.1 Exceptions

The equations in this standard are not applicable when gear drives are subjected to vibratory conditions where there may be unpredictable fatigue failure.

The procedure for design or selection of the specific gear components is varied and complex and is beyond the scope of this standard. Designers must refer to the specific rating or enclosed drive standards for this aspect of drive design.

1.2 Intended use

The equations and values presented provide a general approach to design. Deviations from the methods and values stated in this standard may be made when justified by experience, testing, or more specific analysis. It is intended for use by experienced gear designers capable of selecting reasonable values based on their knowledge of the performance of similar designs and the effect of such items as lubrication, deflection, manufacturing tolerances, metallurgy, residual stresses, and system dynamics. It is not intended for use by the engineering public at large.

2 Definitions and symbols

The symbols and definitions used in this standard may differ from those in other AGMA standards. The user should not assume that familiar symbols can be used without a careful study of the applicable section(s) and equation(s).

2.1 Definitions

The terms used, wherever applicable, conform to the following standards:

AGMA 904–C96, *Metric Usage*

ANSI Y10.3–1968, *Letter Symbols for Quantities Used in Mechanics of Solids*

ANSI/AGMA 1012–F90, *Gear Nomenclature, Definitions of Terms with Symbols*

2.2 Symbols

The symbols used in this standard are shown in table 1.

SI units of measure are shown in parentheses in table 1 and in the text. Where equations require a different format or constant for use with SI units, a second expression is shown after the first, indented, in smaller type, and with "M" included in the equation number.

Example:

$$s_{te} = \frac{W_f \, F_p}{0.785 \left(D - \frac{0.97}{n} \right)^2} \qquad \text{...(70)}$$

$$s_{te} = \frac{W_f F_p}{0.785 \left(D - 0.9382 P \right)^2} \qquad \text{...(70M)}$$

The second expression uses SI units.

3 Design conditions

This standard should be used in conjunction with appropriate current AGMA standards. When the