



American
Gear Manufacturers
Association

ANSI/AGMA 6001-F19
Revision of ANSI/AGMA 6001-E08

American National Standard

Design and Selection of Components for Enclosed Gear Drives

**American
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Standard**

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ANSI/AGMA 6001-F19

(Revision of ANSI/AGMA 6001-E08)

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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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Contents

Foreword	v
1 Scope.....	1
1.1 Exceptions.....	1
1.2 Intended use.....	1
2 Normative references	1
3 Symbols and definitions.....	2
3.1 Definitions.....	2
3.2 Symbols.....	2
4 Design conditions	5
4.1 Load spectrum analysis	5
4.2 Momentary peak loads.....	6
4.3 System analysis	6
5 Shafts.....	6
5.1 Design criteria	6
5.2 Fatigue safety factor.....	7
5.3 Peak load safety factor.....	7
5.3.1 Allowable stress to yield strength factor, F_{ya}	8
5.3.2 Peak load factor, F_p	8
5.4 Calculated stresses	8
5.4.1 The general case.....	10
5.4.2 The simplified case.....	12
5.5 Material requirements	14
5.5.1 Estimated properties of steel.....	14
5.6 Modified fatigue strength.....	15
5.6.1 Surface finish factor, k_a	16
5.6.2 Size factor, k_b	16
5.6.3 Reliability factor, k_c	17
5.6.4 Temperature factor, k_d	17
5.6.5 Life factor, k_e	18
5.6.6 Modifying factor for stress concentration, k_f	18
5.6.7 Miscellaneous effects factor, k_g	22
5.6.8 Permissible number of peak load cycles	23
5.7 Deflection	23
5.7.1 Permissible deflection.....	24
6 Keys and interference fits	25
6.1 Size and tolerances.....	25
6.2 Limitations	25
6.3 Keyed interference fit	26
6.4 Allowable compressive stress.....	26
6.5 Allowable shear stress	27
6.6 Allowable torque based on compressive stress calculation.....	27
6.7 Allowable torque based on shear stress calculation.....	27
6.8 Allowable torque.....	27
6.9 Keyless interference fit.....	27

6.10	Reversing loads	28
7	Bearings.....	29
7.1	Roller and ball bearing selection criteria	29
7.1.1	Reliability	29
7.1.2	Life adjustment factors	29
7.2	Sleeve bearing selection criteria	29
7.2.1	Boundary and mixed film regimes	30
7.2.2	Hydrodynamic regime.....	30
8	Housings.....	31
8.1	Housing construction and styles	31
8.2	Housing materials	32
8.3	Housing rigidity and strength.....	32
8.4	Housing accessory provisions.....	33
8.4.1	Inspection covers.....	33
8.4.2	Fill, vent, and drain provisions	33
8.4.3	Lifting provisions.....	33
9	Threaded fasteners	33
9.1	Fastener preload tensile stress, σ_M	34
9.2	Fastener torque, T_f	35
9.3	Allowable fastener tensile stress, σ_{fa}	35
9.3.1	Allowable tensile load, F_A	36
9.4	Engagement length	36
9.5	Locking devices for fasteners.....	36
10	Miscellaneous components	36
10.1	Shims	36
10.2	Gaskets	37
10.3	Oil seals.....	37
10.4	Breathers.....	37
10.5	Expansion chambers.....	38
10.6	Oil level indicators	38
10.7	Bearing retainers	38
10.8	Grease retainers	38
10.9	Dowels and pins	38
10.9.1	Dowels and pins used for positive location	38
10.9.2	Dowels and pins used to prevent movement	38
10.10	Spacers	39
10.11	Seal retainers	39
10.12	Special tools	39
10.13	Monitoring.....	39
10.13.1	Temperatures; sump, inlet, bearing race(s)	39
10.13.2	Pressures; inlet.....	39
10.13.3	Oil level.....	39
10.13.4	Chip or ferrous debris monitor	39
10.13.5	Flow	40
10.13.6	Vibration.....	40

Annexes

Annex A (informative) Allowable stresses for typical key materials	41
Annex B (informative) Material properties for typical threaded fasteners	43
Annex C (informative) Previous method – shaft design	45
Annex D (informative) Sample problems – transmission shaft design	48
Annex E (informative) Shaft deflection	55
Annex F (informative) Sample problems – keys	60
Annex G Bibliography	66

Figures

Figure 1 – Design criteria	7
Figure 2 – Cyclic loading	10
Figure 3 – Stress convention showing orbiting element	11
Figure 4 – Surface finish factor, k_a [2]	16
Figure 5 – Size factor, k_b [2]	16
Figure 6 – Reliability factor, k_c [1] [2]	17
Figure 7 – Notch sensitivity – through hardened steel, q [2]	19
Figure 8 – Theoretical stress concentration factor in bending for a circular shaft with a square shoulder, K_t (nominal stress is calculated at diameter d_{she}) [7]	20
Figure 9 – Theoretical stress concentration factor in bending for a circular shaft with a u-notch, K_t (nominal stress is calculated at diameter d_{she}) [7]	21
Figure 10 – Theoretical stress concentration factor in bending for a circular shaft with a radial hole, K_t (based on full section without considering hole) [7]	22
Figure 11 – Key nomenclature	26
Figure 12 – Variation of coefficient of friction versus the bearing parameter	30
Figure 13 – Cast housings	31
Figure 14 – Fabricated housings	32
Figure 15 – Fastener grip requirement	34

Tables

Table 1 – Symbols used in equations	2
Table 2 – Modifying factor for stress concentration, k_f – typical values for keyways in solid round steel shafts ¹⁾ [8]	22
Table 3 – Typical allowable misalignment per bearing type	24
Table 4 – Joint stiffness factor, K_J	36

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 6001-F19, *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 ANSI/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.

ANSI/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 L_{10} .

During the preparation of ANSI/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 [1].

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

ANSI/AGMA 6001-D97 was expanded to include more recent theories on shaft design and analysis. Also, equations for shaft deformation were added. ANSI/AGMA 6001-D97 was approved by the membership in October 1996 and approved as an American National Standard on August 7, 1997.

ANSI/AGMA 6001-E08 was updated as required by ANSI practices. In the process, several improvements and simplifications were included. Minimum material requirements were added for shaft material and the shaft deflection clause was moved to an annex. Also, the clauses on keys and fasteners were revised to reflect current practices with higher allowable stresses in some cases.

The first draft of ANSI/AGMA 6001-E08 was made in August 2002. It was approved by the AGMA membership in September 2008. It was approved as an American National Standard on December 19, 2008.

ANSI/AGMA 6001-F19 was reviewed and updated in accordance with ANSI practices, with general updates and corrections that accumulated since publication of E08. In particular, Clause 8, Housings, was expanded to include graphics and discussion of stress analysis. Also, Clause 10, Miscellaneous components, was significantly upgraded in content.

The first draft of ANSI/AGMA 6001-F19 was made in April 2018. It was approved by the AGMA membership in December 2018. It was approved as an American National Standard on January 18, 2019.

Suggestions for improvement of this standard will be welcome. They should be sent to tech@agma.org.

PERSONNEL of the AGMA Enclosed Drives for Industrial Applications Committee

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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, double helical, or bevel gearing in single or multiple stages. Bevel gear drives may include shaft angles other than 90 degrees.

1.1 Exceptions

The equations in this standard are not applicable when gear drives are subjected to conditions that introduce vibrations of a sufficient level to affect the performance of the gear drive and may result in 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. This standard 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 Normative references

The following documents contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI B17.1, *Keys and Keyseats*

ANSI B17.2, *Woodruff Keys and Keyseats*

AGMA 927-A01, *Load Distribution Factors – Analytical Methods for Cylindrical Gears*

AGMA 938-A05, *Shot Peening of Gears*

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

ANSI/AGMA 2001-D04, *Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth*

ANSI/AGMA 9003-C17, *Flexible Couplings – Keyless Fits*

ANSI/AGMA 9005-F16, *Industrial Gear Lubrication*