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American Gear Manufacturers Association

Technical Resources

American National Standard

Standard for Marine Gear Units: Rating

ANSI/AGMA 6032-A94

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Approved August 23, 1994
Errata June, 1999
American National Standards Institute, Inc.

Abstract

This document considers rating practices for marine main propulsion, power take–off and auxiliary propulsion service. Practical suggestions are included for various factors. Allowable contact stress numbers and allowable bending stress numbers for materials of this standard covered in ANSI/AGMA 6033–A88 are included.

This standard, ANSI/AGMA 6032–A94, provides the rating practice and recommended allowable according to type of the subject marine gearing.

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Contents

Contents (continued) Page

Contents (concluded)

Page

Figures

Tables

Annexes

Foreword

[The foreword, footnotes, and annexes, if any, are provided for informational purposes only, and should not be construed as a part of American Gear Manufacturers Association 6032-A94, *Standard For Marine Gear Units: Rating.*]

The purpose of ANSI/AGMA 6032-A94 is to provide for rating marine reduction and reversing gears: driven by internal combustion engines or electric motors from 1500 to 20 000 horsepower, driven by steam or gas turbine from 1500 to 30 000 horsepower, power take-off (PTO) gearing that is integral to the propulsion unit, auxiliary propulsion gears and combinations of these drives. It does not cover separate power generation drives, pump set drives, conveyor drives or deck machinery. Nor does it cover the design and application of epicyclic drives.

This standard interprets ANSI/AGMA 2001-A88 for marine practice considering the successful practice of marine gear manufacturers and the existing American Bureau of Shipping Rules for Building and Classing Steel Vessels. These latter requirements are based on AGMA rating Standards 211 and 221 as they were published in the early 1970's.

There are six annexes in this standard. Annex A through Annex F are all informative and are not considered part of this standard.

This standard was approved by the AGMA membership in June, 1994 and as an American National Standard on August 23, 1994.

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

ERRATA June, 1999

The following editorial correction has been made to ANSI/AGMA6032-A94, S*tandard for Marine Gear Units: Rating*, (originally printed August, 1994). This change, discovered after publication, has been made in the second standard printing, as shown below:

PAGE	ITEM	CHANGE
17	Equation 10.5	The change of sign in the third term would bring the equation into agreement with the plot of Figure 2 and with Equation 40 of ANSI/AGMA 2001-C95. The equation should read as follows: $C_{pf} = \frac{F}{10\,d} - 0.1109 + 0.0207F - 2.28 \times 10^{-4}F^2$

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American National Standard -

Standard for Marine Gear Units: Rating

1 Scope

1.1 Application

This standard is applicable to marine reduction and reversing gears as follows:

- marine propulsion reduction gears driven by internal combustion engines or electric motors from 1500 to 20 000 horsepower (1120 to 14 900 kW) per prime mover, when the rotor speeds do not exceed 3600 rpm.
- marine propulsion reduction gears driven by steam or gas turbine from 1500 to 30 000 horsepower (1120 to 22 370 kW) per prime mover.
- power take-off (PTO) gearing that is integral to the propulsion unit.
- auxiliary propulsion gears.
- combination of drives listed above.

The fundamental rating formulas are applicable for rating the pitting resistance and bending strength of external spur, helical, or double helical involute gear teeth. The formulas evaluate gear tooth capacity as influenced by the major factors which affect gear tooth pitting and gear tooth fracture.

This standard also addresses bearings, clutches, lubricating oil systems, shafts and certain aspects of vibrations.

1.2 Intended use

This standard provides a method by which different gear designs can be compared. It is intended for use by the experienced gear designer capable of selecting reasonable values for the factors, based on his knowledge of performance of similar designs and the effects of such items as lubrication, deflection, manufacturing tolerances, metallurgy, residual stress and system dynamics. It is not intended to assure performance of assembled gear drive systems. It is not intended for use by the engineering public at large.

The majority of marine gears are of helical or double helical tooth design. Spur gear tooth designs may also be used, but are generally not, except for power take off (PTO) drives and reversing sections of marine gear units.

This standard assumes adequate support and alignment for the gearing.

1.3 Exceptions

This standard does not cover separate power generation drives, pump set drives, conveyor drives or deck machinery. Nor does it cover the design and application of epicyclic drives or gear blank design. It is beyond the scope of this standard to present a detailed analysis of efficiency.

This standard does not cover the rating of gear drives due to the wear or scoring (scuffing) of gear teeth or components. See ANSI/AGMA 2001-B88, appendix A, for a consideration of scuffing.

1.4 Marine gear performance parameter sheet

It is recognized that marine units may be rated in different manners for the same service. To assist in determining the actual applicability of a gear to its intended service, annex C is included as a marine gear performance parameter sheet.

1.5 Annexes

The annexes are for reference only and are not a part of this standard. The annexes can be used to make a more detailed analysis of certain rating factors.

1.6 References

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

AGMA 908-B89, *Information Sheet - Geometry Factors for Determining the Strength of Spur, Helical, Herringbone and Bevel Gear Teeth.*

ANSI/AGMA 2001-B88, *Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.*