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American Gear Manufacturers Association

Technical Resources

ANSI/AGMA 6132-B13
(Metric Edition of ANSI/AGMA 6032-B13)

American National Standard

Standard for Marine Gear Units: Rating and Application for Spur and Helical Gear Teeth (Metric Edition)

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Approved September 23, 2013

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 stress numbers for materials of this standard, as covered in ANSI/AGMA 6133-C08, are included.

Published by

American Gear Manufacturers Association
1001 N. Fairfax Street, Suite 500, Alexandria, Virginia 22314

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Printed in the United States of America

ISBN: 978-1-61481-085-8

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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 6132-B13, *Standard for Marine Gear Units: Rating and Application for Spur and Helical Gear Teeth (Metric Edition)*.]

This standard presents the methodology for determining the ratings of marine reduction and reversing gear systems driven by internal combustion engines, electric motors, and steam or gas turbines. It does not cover separate power generation drives, pump set drives, conveyor drives, deck machinery or the design and application of epicyclic drives.

This standard interprets ANSI/AGMA 2101-D04 for use by the marine industry considering the successful practice of marine gear manufacturers and the incorporation of its predecessor standards into the American Bureau of Shipping (ABS) Rules for Building and Classing Steel Vessels, as they existed, prior to 2000. The ABS Rules were based on AGMA rating Standards 211 and 221 as published in the early 1970's.

The previous version of this standard was based on ANSI/AGMA 2001-A88 and, except where indicated, all changes incorporated in ANSI/AGMA 2101, up to and including the present version, are captured herein. These changes include, but are not limited to, moderate revisions to the allowable stresses, σ_{HP} and σ_{FP}, of some materials and a redefining of the dynamic factor, K_v.

Changes of note to this standard include:

- The separation of the standard into metric and U.S. unit editions;
- The changing of the title to be more indicative of the content of the standard;
- The removal of the basic rating equations which are included in ANSI/AGMA 2101-D04;
- The removal of references relating to rating methods based on K factor and unit load;
- The replacement of the application factor, K_a, with an overload factor, K_o, and service factors, C_{SF} and K_{SF} to be more consistent with current practice in the marine industry;
- The incorporation of the effect of the increased safety factors, historically used for capital ships, into the service factors;
- The specifying of gear rating in terms of allowable transmitted power rather than working stress as was the practice in the previous version;
- The addition of a new annex which addresses derating of the bull gear for astern operation of the vessel.

The overall effect of these changes is a reduction of the allowable transmitted power, for pitting resistance and bending strength, of the gearset. This reduction is essentially due to the inclusion of the service factors, C_{SF} and K_{SF}.

The first draft of ANSI/AGMA 6132-B13 was made in August, 2012. It was approved by the AGMA membership in October, 2013. It was approved as an American National Standard on September 23, 2013.

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

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American National Standard -

Standard for Marine Gear Units: Rating and Application for Spur and Helical Gear Teeth (Metric Edition)

1 Scope

1.1 Application

This standard is applicable to marine reduction and reversing gears including those used in capital ships as follows:

- marine propulsion reduction gears driven by internal combustion engines or electric motors from 1120 to 14 900 kW per prime mover, with rotor speeds not exceeding 3600 rpm;
- marine propulsion reduction gears driven by steam or gas turbines from 1120 to 22 370 kW per prime mover;
- power take-off (PTO) gearing that is integral to the propulsion unit;
- auxiliary propulsion gears;
- combinations of drives listed above.

Although the above referenced power requirements are based on actual operating experience, the design criteria in this standard are also applicable to larger power prime movers. As with any new application, caution should be exercised when extrapolating requirements outside of the current experience range.

In this standard, capital ships are vessels characterized by larger tonnage, higher horsepower, or deep water operation.

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 and controls, lubricating systems, shaft stresses, balance and system vibrations. Gear blank design is not addressed.

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 various factors, based on their knowledge of performance of similar designs and the effects of such items as lubrication, deflection, manufacturing tolerances, metallurgy, residual stress and system dynamics.

The majority of marine gears are of helical or double helical tooth design. Spur gear tooth designs are not generally used except for power take-off drives and reversing sections of marine gear units.

This standard is not intended to assure performance of assembled gear drive systems, and is not intended for use by the engineering public at large.

1.3 Exceptions

This standard does not cover:

- separate power generation drives;
- pump set drives;
- conveyor drives;

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