Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services

ANSI/API STANDARD 613
FIFTH EDITION, FEBRUARY 2003

ERRATA, DECEMBER 5, 2005

REAFFIRMED, AUGUST 2007

AMERICAN PETROLEUM INSTITUTE

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Downstream Segment

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CONTENTS

Tables

Figures

Page

Special Purpose Gear Units for Petroleum, Chemical, and Gas Industry Services

1 General

1.1 SCOPE

This standard covers the minimum requirements for special-purpose, enclosed, precision single- and double-helical one- and two-stage speed increasers and reducers of parallel-shaft design for petroleum, chemical and gas industry services. This standard is primarily intended for gear units that are in continuous service without installed spare equipment. Gear sets furnished to this standard shall be considered matched sets.

Note: The purchase of a spare set of gear rotors or a complete gear unit does not mean that the equipment is spared.

This standard includes related lubricating systems, controls, instrumentation, and other auxiliary equipment. This standard is not intended to apply to gear units in general-purpose service, which are covered by API Std 677; to gears integral with other equipment, such as integrally geared compressors covered by Std 617 or Std 672; or to gears other than helical.

Note: A bullet (●) at the beginning of a paragraph indicates that either a decision is required or further information is to be provided by the purchaser. This information should be indicated on the data sheets (see Appendix A); otherwise, it should be stated in the quotation request or in the order.

1.2 APPLICATIONS

The following gear-driven applications may be covered by this standard:

a. Speed increasers, including those for centrifugal compressors, axial compressors, blowers, rotary positive displacement compressors, separators, and centrifugal pumps.

b. Speed reducers, including those for reciprocating compressors, rotary positive displacement compressors, centrifugal compressors, centrifugal pumps, extruders, generators, and fans.

1.3 ALTERNATIVE DESIGNS

The vendor may offer alternative designs. Any exceptions to the standard including, alternate design differences from this standard, shall be clearly stated in the proposal as required by 5.2.1.

1.4 CONFLICTING REQUIREMENTS

In case of conflict between this standard and the inquiry, the inquiry shall govern. At the time of the order, the order shall govern.

1.5 DEFINITION OF TERMS

Terms used in this standard are defined in 1.5.1 through 1.5.38.

1.5.1 axially (horizontally) split refers to casing joints that are parallel to the shaft centerline.

1.5.2 The **bending stress number (S)** corresponds to the likelihood of fatigue cracking at the tooth root filet. If this stress is excessive, it may lead to failure of the gear teeth.

1.5.3 critical speed is a shaft rotational speed at which the rotor bearing support system is in a state of resonance (see 2.6.1).

1.5.4 The use of the word **design** in any term (such as design horsepower, design pressure, design temperature, or design speed) should be avoided in the purchaser's specifications. This terminology should be used only by the equipment designer and the manufacturer.

1.5.5 gauss levels refers to the magnetic field level of a component measured with a "Hall effect" probe, with no interference from adjacent magnetic part or structures.

1.5.6 gear refers to either the pinion or the gear wheel.

1.5.7 The **gear service factor (SF)** is the factor that is applied to the tooth pitting index and the bending stress number, depending on the characteristics of the driver and the driven equipment, to account for differences in potential overload, shock load, and/or continuous oscillatory torque characteristics.

1.5.8 gear unit is the complete power transmission assembly including the housing, gears, and bearings.

1.5.9 gear unit rated power is the maximum power specified by the purchaser on the data sheet and stamped on the nameplate (see 2.2.1).

1.5.10 gear wheel (bull gear) refers to the lowest speed rotor.

1.5.11 A **hunting tooth combination** exists for mating gears when a tooth on the pinion does not repeat contact with a tooth on the gear wheel until it has contacted all the other gear wheel teeth.

1.5.12 informative element: Describes part of the standard which is provided for information and to assist in the understanding or use of the standard. Compliance with an informative part of the standard is not mandated.

Note: An appendix may be informative or normative as indicated.

1.5.13 lead modification: A calculated machined deviation of the pinion and/or the gear wheel tooth flank from the