



American
Gear Manufacturers
Association

AGMA 943-A22

AGMA Information Sheet

Tolerances for Spur and Helical Racks

AGMA 943-A22

American Gear Manufacturers Association ***Tolerances for Spur and Helical Racks***
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Approved February 2022

ABSTRACT

This information sheet establishes a tolerance classification system relevant to manufacturing and conformity assessment of tooth flanks of a single piece spur or helical rack. It specifies definitions for rack flank tolerance terms, the structure of the flank tolerance class system, and allowable values.

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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 AGMA 943-A22, *Tolerances for Spur and Helical Racks*.]

This information sheet establishes a tolerance classification system relevant to manufacturing and conformity assessment of tooth flanks of a single piece rack. It specifies definitions for rack flank tolerance terms, the structure of the flank tolerance class system, and allowable values.

AGMA 390.03 was published in 1973 and revised in 1980, and was a consolidation of several AGMA publications, including:

AGMA 235.02 (1966), *Information Sheet for Master Gears*

AGMA 239.01 (1965), *Measuring Methods and Practices Manual for Control of Spur, Helical and Herringbone Gears*

AGMA 239.01A (1966), *Measuring Methods and Practices Manual for Control of Bevel and Hypoid Gears*

and parts of:

AGMA 236.05 (ASA B6.11, June 1956), *Inspection of Fine-Pitch Gears*

AGMA 390.02 (1964), *Gear Classification Manual*, originally published as AGMA 390.01 (1961)

Data was added in AGMA 390.03 for gear rack and fine-pitch worms and worm gears. The former AGMA 390.02 for coarse pitch and fine pitch spur, helical and herringbone gearing was enhanced to offer a single, compatible classification system. The tolerance identifier “Q” was added to indicate that the tolerances in 390.03 apply. If Q is not used as a prefix in the quality number, tolerances in AGMA 390.01 and 390.02 applied.

ANSI/AGMA 2000-A88 was an update of those sections from AGMA 390.03 for parallel axis gears only. The other material in AGMA 390.03 on bevel and hypoid gears, racks and worm gearing were contained in AGMA 390.03a. Subsequently, the other material in AGMA 390.03a on bevel and hypoid gears and worm gearing was replaced by ANSI/AGMA 2009-A99 and ANSI/AGMA 2011-A98, respectively.

This document is an update of AGMA 390.03a for racks. It features a new tolerance classification system *V* for elemental features and uses the existing *R* system for composite measurements.

The first draft of AGMA 943-A22 was created in August 2007. It was approved by the AGMA Gear Accuracy Committee in January 2022. It was approved by the AGMA Technical Division Executive Committee in February 2022.

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

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American Gear Manufacturers Association –

Tolerances for Spur and Helical Racks

1 Scope

This information sheet establishes a tolerance classification system relevant to manufacturing and conformity assessment of tooth flanks of a single piece rack. It specifies definitions for rack flank tolerance terms, the structure of the flank tolerance class system, and allowable values.

This document provides the manufacturer and purchaser with a mutually advantageous reference for uniform rack tolerances. Twelve flank tolerance classes are defined, numbered V3 to V14, in order of increasing tolerance. For composite measurements, twenty tolerance classes are provided, numbered R31 through R50 in order of increasing tolerance. Equations for tolerances are provided in 6.5. These tolerances are applicable to the following ranges:

$$3 \text{ mm} \leq L_R \leq 3500 \text{ mm}$$

$$0.5 \text{ mm} \leq m_n \leq 70 \text{ mm}$$

$$4 \text{ mm} \leq b \leq 300 \text{ mm}$$

$$\beta \leq 45^\circ$$

where

L_R is the rack length;

m_n is the normal module;

b is the face width;

β is the helix angle.

The measurement methods and tolerances are applied to a rack in the fixtured state that replicates the rack application.

1.1 Exclusions

Rack design is beyond the scope of this information sheet.

Surface texture is not considered in this information sheet. For additional information on surface texture, refer to ISO/TR 10064-4 [1].

2 Normative references

The following documents contain provisions that, through reference in this text, constitute provisions of this information sheet. At the time of publication, the editions were valid. All publications are subject to revision, and the users of this information sheet are encouraged to investigate the possibility of applying the most recent editions of the publications listed.

ANSI/AGMA/ISO 1328-1, *Cylindrical Gears – ISO System of Flank Tolerance Classification – Part 1: Definitions and Allowable Values of Deviations Relevant to Flanks of Gear Teeth*

ANSI/AGMA/ISO 1328-2, *Cylindrical gears — ISO system of accuracy — Part 2: Definitions and allowable values of deviations relevant to radial composite deviations and runout information*

ISO/TR 10064-1, *Code of Inspection Practice – Part 1: Measurement of Cylindrical Gear Tooth Flanks*