



American
Gear Manufacturers
Association

Technical Resources

American National Standard

Tolerance Specification for Shaper Cutters

American
National
Standards

Tolerance Specification for Shaper Cutters
ANSI/AGMA 1104-A09

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ABSTRACT

The purpose of this standard is to provide specifications for nomenclature, dimensions, tolerances, and inspection of shaper cutters, and thereby establish a basis for mutual understanding in this respect in the use and manufacture of these tools.

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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 Standard 1104-A09, *Tolerance Specification for Shaper Cutters*]

This standard was developed after intensive study of existing practices, standards and literature. In general, the information in this standard is a consolidation of the most common practices and standards currently in existence.

An effort was made to incorporate ANSI/AGMA 2015-1-A01 gear tolerances in the development of this standard.

The first draft of ANSI/AGMA 1104-A09 was made in April, 2004. It was approved by the AGMA membership in March, 2009. It was approved as an American National Standard on May 14, 2009.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Gear Manufacturers Association, 1001 N. Fairfax Street, 5th Floor, Alexandria, Virginia 22314.

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American National Standard

Tolerance Specification for Shaper Cutters

1 Scope

This standard covers types, sizes, tolerances, marking and nomenclature for finishing and pre-finishing type shaper cutters for generating involute spur and helical gears, splines and serrations.

Also provided are informational annexes containing reference tolerance tables, shaper cutter tool tolerance tables, suggested rack shaper cutter specifications, and gear shaping manufacturing terminology.

1.1 Equations for tolerances

Equations for tolerances and their ranges of validity are provided in clause 6 for the defined accuracy of shaper cutters. In general, these tolerances cover the following ranges:

$$5 \leq z_c \leq 200$$
$$5 \text{ mm} \leq d_T \leq 350 \text{ mm}$$
$$0.5 \leq m_n \leq 35$$
$$4 \text{ mm} \leq b_c \leq 50 \text{ mm}$$
$$\beta \leq 45^\circ$$

where

- d_T is reference diameter, mm;
- m_n is normal module;
- b_c is facewidth (axial);
- z_c is number of teeth in cutter;
- β is helix angle.

2 Normative 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 915-1-A02, *Inspection Practices - Part 1: Cylindrical Gears - Tangential Measurements*

AGMA 915-3-A99, *Inspection Practices - Gear Blanks, Shaft Center Distance and Parallelism*

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

ANSI/AGMA 2015-1-A01, *Accuracy Classification System - Tangential Measurements for Cylindrical Gears*

ANSI/AGMA ISO 18653-A06, *Gears - Evaluation of Instruments for the Measurement of Individual Gears*

ASME B5.10:1994, *Machine Tapers*

DIN 228 P1:1987, *Morse Tapers and Metric Tapers; Taper Shanks*

ISO 286-2:1988, *ISO system of limits and fits - Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

ISO/TR 10064-4:1998, *Code of Inspection Practice - Part 4: Recommendations Relative to Surface Texture and Tooth Contact Pattern Checking*

MIL-STD-105D, *Sampling Procedures and Tables for Inspection by Attributes*

3 Terminology and definitions

3.1 Shaper cutter nomenclature

The terms used in this standard are, wherever possible, consistent with ANSI/AGMA 1012-G05 and other approved AGMA documents. However, some symbols and definitions used in this standard may differ from other AGMA standards. Users should assure themselves that they fully understand the terms and symbols as contained in this standard.

Nomenclature of shaper cutter elements and other terms relating to cutting are presented as follows: