



American
Gear Manufacturers
Association

ANSI/AGMA ISO 1328-2-A21
(Identical to ISO 1328-2:2020)

American National Standard

Cylindrical Gears — ISO System of Flank Tolerance Classification — Part 2: Definitions and Allowable Values of Double Flank Radial Composite Deviations

ANSI/AGMA ISO 1328-2-A21

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Standard*****Cylindrical Gears — ISO System of Flank Tolerance Classification — Part 2:
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[Identical to ISO 1328-2:2020]

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Approved October 2021

ABSTRACT

This document establishes a gear tooth classification system relevant to double flank radial composite deviations of individual cylindrical involute gears and sector gears. It provides formulae to calculate tolerances for individual product gears when mated in double flank contact with a master gear.

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: 978-1-64353-115-1

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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 ISO 1328-2-A21, *Cylindrical Gears — ISO System of Flank Tolerance Classification — Part 2: Definitions and Allowable Values of Double Flank Radial Composite Deviations*.]

In 2016, the AGMA Gear Accuracy Committee, acting as the US TAG to ISO TC 60/WG 2, proposed ANSI/AGMA 2015-2-B15 as the basis for the revision of ISO 1328-2.

ISO 1328-2:2020 was published by ISO TC 60. The new revised standard replaces the first edition, ISO 1328-2:1997.

The main changes compared to the previous edition are as follows:

- the document title of this part has been revised to correspond to that of part 1 and better reflect the contents of this part;
- the scope of applicability has been expanded to include sector gears;
- revisions have been made to the formulae which define the double flank radial composite tolerances, and the range of classification numbers has been changed to clarify the independence of this classification system from that given in part 1;
- the change in tolerance value between consecutive tolerance classes has been reduced, so two steps in the new system results in the same change as one step of the old system, but approximately the same global range of tolerance values is maintained with additional steps;
- annexes have been added to describe complementary information and examples;
- evaluation of runout, previously handled in this document, has been moved to ISO 1328-1:2013;
- advice on appropriate inspection methods has been removed; the information can be found in ISO/TR 10064-2.

The AGMA Gear Accuracy Committee voted to adopt the new ISO 1328-2:2020 in October 2020. The first draft of ANSI/AGMA ISO 1328-2-A21 was made in January 2021. It was approved by the AGMA membership in May 2021. It was approved as an American National Standard on October 22, 2021.

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

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Cylindrical gears – ISO system of flank tolerance classification – Part 2: Definitions and allowable values of double flank radial composite deviations

1 Scope

This document establishes a gear tooth classification system relevant to double flank radial composite deviations of individual cylindrical involute gears and sector gears. It specifies the appropriate definitions of gear tooth deviations, the structure of the gear tooth flank classification system, and the allowable values of the gear tooth deviations. It provides formulae to calculate tolerances for individual product gears when mated in double flank contact with a master gear. Tolerance tables are not included.

This document is applicable to gears with three or more teeth that have reference diameters of up to 600 mm.

This document does not provide guidance on gear design nor does it recommend tolerances.

2 Normative references

The following documents are referred to in the text in such a way that some or all their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 701, *International gear notation — Symbols for geometrical data*

ISO 1122-1, *Vocabulary of gear terms — Part 1: Definitions related to geometry*

3 Terms, definitions, and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 701 and ISO 1122-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1.1

double flank test

test where a *master gear* (3.1.4) and a *product gear* (3.1.5) are rotated in tight mesh contact, i.e. held together by a spring load so there is no backlash, while measuring the changes in center distance

3.1.2

elemental deviation

deviation, such as profile and helix deviation on individual teeth or pitch deviation between teeth, generally using a single point of contact probe

3.1.3**elemental method**

method to measure *elemental deviations* (3.1.2)

Note 1 to entry: ISO 1328-1 describes elemental methods and deviations.

3.1.4**master gear**

gear with the required precision that is designed to measure double flank radial composite deviation in a double flank contact test with a *product gear* (3.1.5)

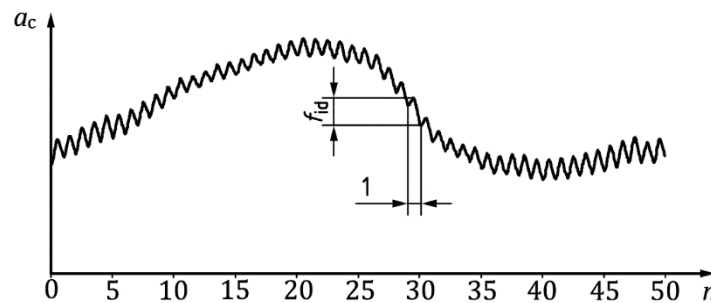
3.1.5**product gear**

gear that is being measured or evaluated

3.1.6**tooth-to-tooth radial composite deviation, f_{id}**

value of the greatest change in center distance within any one pitch, found after evaluating all the teeth of a *product gear* (3.1.5) in a *double flank test* (3.1.1) with a *master gear* (3.1.4)

Note 1 to entry: See Figure 1.

**Key**

- 1 single tooth pitch
- n tooth number
- a_c tight mesh center distance

3.1.7**tooth-to-tooth radial composite tolerance, f_{idT}**

maximum *tooth-to-tooth radial composite deviation* (3.1.6) allowable by specification

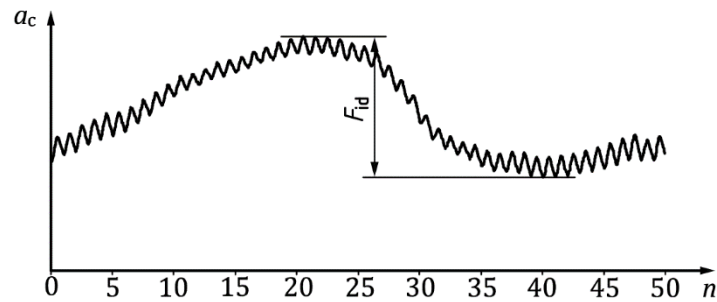
3.1.8**total radial composite deviation, F_{id}**

difference between the maximum and minimum values of center distance found after evaluating all the teeth of a *product gear* (3.1.5) in a *double flank test* (3.1.1) with a *master gear* (3.1.4)

Note 1 to entry: See Figure 2.

3.1.9**total radial composite tolerance, F_{idT}**

maximum *total radial composite deviation* (3.1.8) allowable by specification

**Key**

n tooth number

a_c tight mesh center distance

Figure 2 — Total radial composite deviation**3.2 Symbols**

For the purposes of this document, the symbols given in Table 1 apply. The symbols are based on those given in ISO 701.

Table 1 — Symbols

Symbol	Term	Units	First used
a_c	Tight mesh center distance	mm	3.1.6
F_{id}	Total radial composite deviation	μm	3.1.8
f_{id}	Tooth-to-tooth radial composite deviation	μm	3.1.6
F_{idk}	Radial composite deviation over k teeth	μm	B.3
F_{idkT}	Radial composite tolerance over k teeth	μm	B.4
F_{idT}	Total radial composite tolerance	μm	3.1.9
f_{idT}	Tooth-to-tooth radial composite tolerance	μm	3.1.7
k_{max}	Maximum number of tooth pitches in measurement segment	—	B.4
m_n	Normal module	mm	5.3
n	Tooth number	—	3.1.6
R	Tolerance class number	—	5.3
R_x	Tolerance class modifier based on number of teeth	—	5.3
z	Number of teeth	—	5.2.1
z_c	Number of teeth for calculation	—	5.3
z_k	Number of teeth in the sector	—	5.4.2
β	Helix angle	$^\circ$	5.3