AGMA 910-C90
(Revision of AGMA 114.02)

June 1990



# AMERICAN GEAR MANUFACTURERS ASSOCIATION

# Formats for Fine-Pitch Gear Specification Data

## AGMA INFORMATION SHEET

(This Information Sheet is NOT an AGMA Standard)

## Formats for Fine-Pitch Gear Specification Data

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## ABSTRACT

*Formats for Fine-Pitch Gear Specification Data* consists of a series of printed forms for gear drawings that contain the appropriate data to be tabulated by the gear designer for the gear manufacturer. Also included are a series of definitions of the various tabulated items. For an appendix, there are blank, pre-printed forms that can easily be copied for the user's drawings.



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## FOREWORD

[The foreword, footnotes, and appendices, if any, are provided for informational purposes only, and should not be construed as a part of American Gear Manufacturers Association 910–C90, *Formats for Fine–Pitch Gear Specification Data.*]

Gathering of data for this Information Sheet, including questionnaires and surveys, was begun in the spring of 1953. The committee recognized at that time the need for standardized fine–pitch gear drawing format data. Individual sections on spur, helical, straight bevel, spiral and Zerol bevel gears; worm and wormgears; face gears and pinions; and spur and helical racks were first prepared by the Task Committee on Drawing Formats.

Each section was carefully reviewed by the Fine–Pitch Gearing Committee. Certain sections were reworked to bring them in line with the work being done by the Aerospace Gearing Committee in the field of angular accuracy specification, The formats for spur and helical gears were published as Appendix C of AGMA Standard 207.04 in June, 1956. The formats for worm and wormgears were published as Appendix B of AGMA Standard 374.03 in July, 1956. The early development work, continued review and revision, and field testing has resulted in this Information Sheet which the committee feels is based on sound gear engineering and one which can be easily understood by both the shopman and inspector.

The first complete draft of this Information Sheet was prepared in September, 1957. It was approved by the AGMA membership in February, 1961. Printing of the Information Sheet was held up in order to make it conform to AGMA 390.03, *AGMA Gear Handbook, Volume 1, Gear Classification, Materials and Measuring Methods for Unassembled Gears*.

AGMA 114.02 was a revision of 114.01 which was approved by the AGMA membership in July, 1972.

AGMA 910–C90 is a revision of AGMA 114.02 which updates the style and formats for spur gears, helical gears, bevel gears, wormgearing, face gears and racks. It was approved by the members of the Fine–Pitch Gearing Committee on February 27, 1990. It was recommended by the Technical Devision Execitive Committee for publication and approved by the members on June 10, 1990.

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## 1. Scope

The formats supplied are intended as guides in the preparation of fine–pitch (20 diametral pitch or finer) gear drawings. They show the proper data to be placed on drawings of gears which are to be used for general purpose light loads or control gear applications. In each case the data shown indicates the minimum or basic number of items that should be specified for each type of gearing.

## 2. Definitions of Terms

**Addendum, $a$.** Addendum is the height by which a tooth projects beyond (outside for external, or inside for internal) the standard pitch circle or pitch line; also the radial distance between the pitch circle and the addendum circle.

Addendum is a reference dimension shown on drawings as an engineering convenience.

In a bevel gear, addendum is the height by which a tooth projects beyond the pitch cone and is measured at the outer end of the teeth.

In wormgearing, addendum is the radial distance between the standard pitch cylinder and the outside circle of the worm and wormgear. Its actual value is dependent on the specification of outside diameter of the worm. In the case of throated wormgears the addendum is the radial distance from the pitch cylinder to the deepest portion of the throat.

**Backlash, $B$.** Backlash is the amount by which the width of a tooth space exceeds the thickness of the engaging tooth on the operating pitch circles.

As actually indicated by measuring devices, backlash may be determined variously in the transverse, normal, or axial planes, and either in the direction of the pitch circles, or on the line of action. Such measurements may be converted to corresponding values on transverse pitch circles for general comparisons.

Backlash can also be determined from measurements made on a variable center distance fixture.

**Chordal Addendum, $a_c$.** Chordal addendum is the height from the top of the tooth to the chord subtending the circular thickness arc. This dimension is required when making chordal tooth thickness measurements of the gears.

**Chordal Thickness, $t_c$.** Chordal Thickness is the length of the chord subtending a circular thickness arc. It is generally difficult to make chordal tooth measurements on gears of diametral pitches finer than 48 or worms finer than 0.065 circular pitch. Other means of specifying gear tooth thickness may be required for very fine diametral pitch gears.

**Composite Action Test (Double Flank).** The composite action test is a method of inspection in which the work gear is rolled in tight double flank contact with a master or a specified gear, in order to determine composite variations. The composite action test must be made on a variable center distance composite action test device.

**Composite Tolerance, Tooth–to–Tooth (Double Flank), $V_{qT}$.** The permissible amount of tooth–to–tooth composite variation.

**Composite Tolerance, Total (Double Flank), $V_{cqT}$.** The permissible amount of total composite variation.

**Composite Variation (Double Flank).** Composite variation is the total change in center distance when a gear is inspected by a composite action test.

**Composite Variation, Tooth–to–Tooth (Double Flank), $V_q$ .** The greatest change in center distance while the gear being tested is rotated through 360 degree/$N$ during a double flank composite action test.

**Composite Variation, Total (Double Flank), $V_{cq}$.** The total change in center distance while the gear being tested is rotated one complete revolution during a double flank composite action test.

**Control Gear Part Number.** Control gear part number is a reference to the specific gear to be used to control the tooth thickness of the gear under consideration. Since master gears are not commonly available for bevel gears, it is customary to use a control gear, which is obtained