



Global Dimensioning and Tolerancing Addendum

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Scope.

General Motors Company has adopted an amended version of the American Society of Mechanical Engineers (ASME) Y14.5-2009 Dimensioning and Tolerancing standard (amended by this addendum) for use on all product engineering documentation.

This addendum was created to address the following areas:

- Select an option from ASME Y14.5-2009
- Clarify a concept from ASME Y14.5-2009
- Discourage/disallow the use of a concept from ASME Y14.5-2009
- Include a concept not covered by ASME Y14.5-2009

1.2 General Motors Authorization.

This standard is authorized by the Global Dimensional Engineering Council (GDEC).

1.3 Application of this Standard.

GMW16812 applies to all new vehicle and Powertrain Engineering drawings for all GM badged vehicles worldwide including vehicles and powertrains supplied to GM by Joint Ventures and Allied Partners.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASME Y14.5-2009

2.2 GM Standards/Specifications.

None

3 Requirements (Body of the GM Global Dimensioning and Tolerancing Addendum)

The paragraph numbering in this addendum is as follows: Paragraphs are generally numbered to coincide with numbers in ASME Y14.5-2009. Paragraph numbers preceded by "GM" are GM specific additions to Y14.5. Unless otherwise noted, paragraphs not preceded by "GM" replace the paragraph in Y14.5 that is identified by the same number. Paragraph references noted in the figures refer to the paragraphs contained in this document.

Note: Figures referenced in the text but not shown in this addendum are found in ASME Y14.5-2009.

Paragraph titles noted as "reference" are for index referencing only and do not reflect changes to Y14.5.

The words **shall/must/required** describe strict requirements. Procedural steps defined by these words must be followed.

The words **should/preferred/recommended** describe preferences. Procedural steps defined by these words must be followed whenever there is no valid reason to do otherwise.

The words **acceptable/allowed/may/might** grant permission. These words do not require or recommend the practice specified; neither do these words forbid or discourage alternative practices.

The figures in this Addendum exhibit the arrow method of view projection per GM Engineering Standards.

The note shown in Figure 1 shall appear on drawings, documents or within databases which are in accordance with the General Motors Global Dimensioning and Tolerancing Addendum – 2013. The note shall be in the title block (or in the general notes). The note invokes this addendum.

THIS DOCUMENT IS IN ACCORDANCE
WITH ASME Y14.5-2009 AS AMENDED BY
THE GM GLOBAL DIMENSIONING AND
TOLERANCING ADDENDUM – 2013.
(GMW16812)

Figure 1: Note to Invoke GM Global Dimensioning and Tolerancing Addendum – 2013

Note: Numbering throughout this Section 3 will be as shown in Figure 1 and will not be in the conventional GMW template format.

1 Scope, Definitions, and General Dimensioning (Reference)

1.2 References. The following revisions of American National Standards form a part of this Standard to the extent specified herein. A more recent revision may be used provided there is no conflict with the text of this Standard. In the event of a conflict between the text of this Standard and the references cited herein, the text of this Standard shall take precedence.

Note: All other standards referenced in ASME Y14.5-2009 have not necessarily been adopted by General Motors, and are not automatically invoked. Current company standards shall take precedence unless otherwise noted.

1.3 Definitions (Reference).

1.3.17.1 Datum Feature Simulator (Theoretical). Datum feature simulator (theoretical). The theoretically perfect boundary used to establish a datum from a specified datum feature or datum targets.

GM 1.3.68 Uniform Thickness/Gap. A condition where two surfaces are nominally equidistant.

GM 1.3.69 Uniform Thickness/Gap Feature. A pair of continuous surfaces or portions thereof that are nominally equidistant and associated with a Uniform Thickness/Gap tolerance. The surface normal vectors directed away from each surface's material side must be in opposite directions.

Note: A Uniform Thickness/Gap feature is not a feature of size.

GM 1.3.70 Free State. The condition where no forces other than gravity are applied.

GM 1.3.71 Restrained: The condition where forces in addition to gravity are applied.

1.4 Fundamental Rules. (Reference).

Note: Fundamental rules (a) through (p) still apply from ASME Y14.5-2009.

(p): Where a coordinate system is shown on the drawing, it shall be right-handed unless otherwise specified. Each axis shall be labeled and the positive direction shall be shown. See Figure 2.

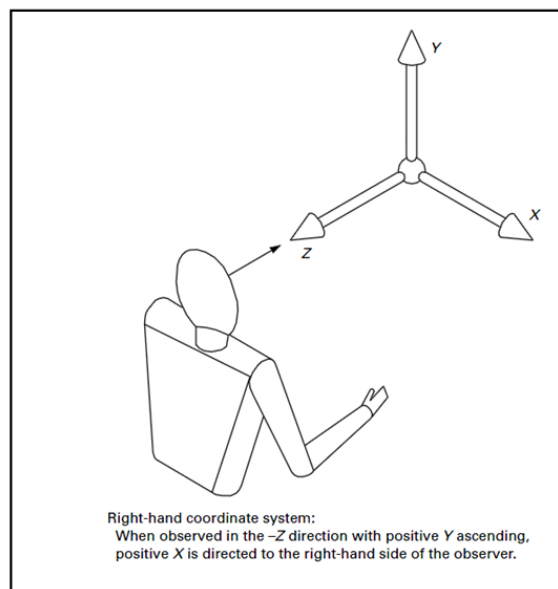


Figure 2: Right Handed Coordinate System, Paragraph 1.4 (p)

GM (q): Direct tolerancing methods as described in Paragraph 2.2 (a) and (b) of ASME Y14.5-2009 shall not be used to locate features or features of size. Angle tolerance as described in Paragraph 2.2 (a) and (b) shall not be used to orient features of size.

Note: Direct tolerancing methods may be used for Uniform thickness/gap, size and depth of counterbores, size and depth of countersinks, size and depth of spotfaces, size of chamfers, size of corner radii, thread depth, and surface intersections. See Figure 3.

GM (r): Unless otherwise specified all dimensions apply after heat treat, and/or subsequent surface treatment.

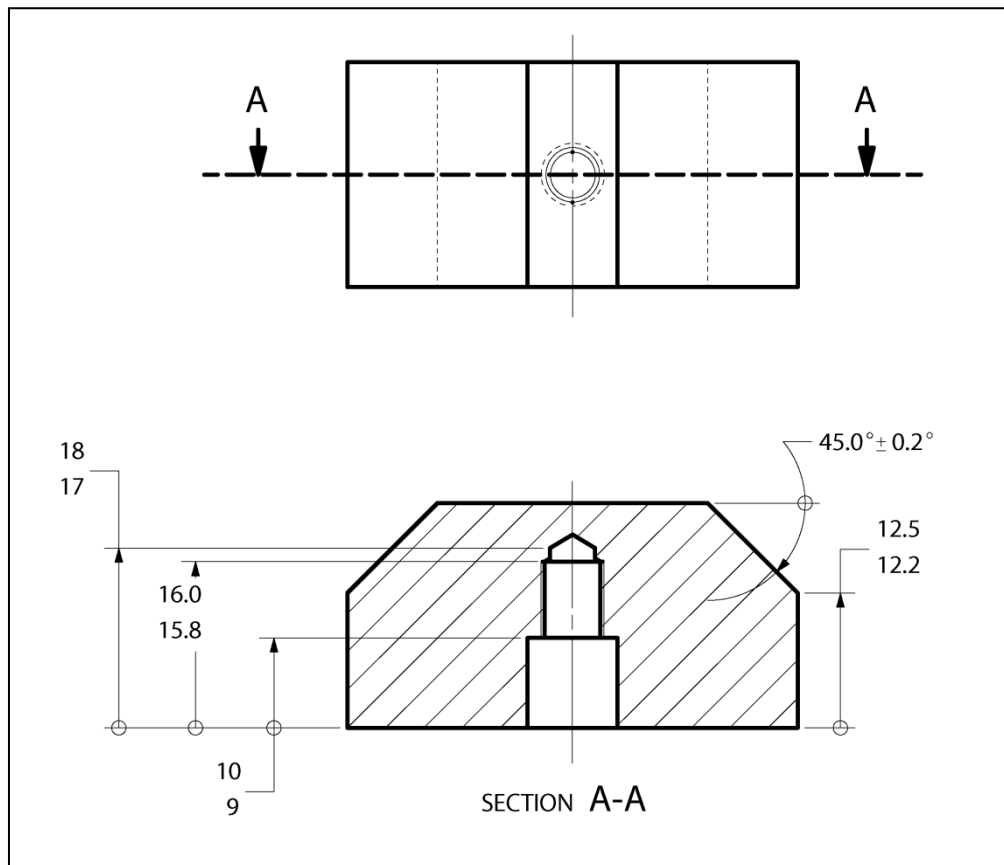


Figure 3: Direct Tolerancing, Paragraphs 1.4 GM (q) and 2.6.1

1.8 Dimensioning Features (Reference).

1.8.14 Spotfaces. Where the diameter of the spotfaced surface is specified, either the depth or the remaining thickness of material may be specified. Where applicable, a fillet radius may be indicated for the spotface. In some cases, such as with a through hole, a notation may be necessary to indicate the surface to be spotfaced. See Figure 1-41 of ASME Y 14.5. A spotface may be specified by note only and need not be shown pictorially.

2 General Tolerancing and Related Principles (Reference)

2.6 Tolerance Accumulation (Reference).

2.6.1 Dimensional Limits Related to an Origin. In certain cases, it is necessary to indicate that a dimension between two features shall originate from one of these features and not the other. The high points of the surface indicated as the origin define a plane for measurement. The dimensions related to the origin are taken from the plane or axis and define a zone within which the other features must lie. This concept does not establish a datum reference frame as described in Section 4 of ASME Y14.5-2009. Such a case is illustrated in Figure 2-5 of ASME Y14.5-2009, where a part having two parallel surfaces of unequal length is to be mounted on the shorter surface. In this example, the dimension origin symbol described in Paragraph 3.3.17 of ASME Y14.5-2009 signifies that the dimension originates from the plane established by the shorter surface and dimensional limits apply to the other surface. Without such indication, the longer surface could have been selected as the origin, thus permitting a greater angular variation between surfaces.

Note: For spotfaces, depth of chamfers, size of corner radii, thread depth, and location of surface intersections, the dimension origin symbol should be used when direct tolerancing is specified. See Figure 3.

2.17 Statistical Tolerancing. Statistical tolerancing as described in Paragraph 2.17 of ASME Y14.5-2009 and associated sub-paragraphs of ASME Y14.5-2009 shall not be used. The statistical tolerance symbol described in Paragraph 3.3.10 and Figure 3-11 of ASME Y14.5-2009 shall not be used.

GM 2.18 Uniform Thickness/Gap Tolerance. A Uniform Thickness/Gap tolerance specifies that the minimum and maximum actual Thickness/Gap value, as defined in (a) and (b), must be within the specified Uniform Thickness/Gap tolerance limits.

(a) For a uniform thickness feature (external), the maximum actual thickness value is the minimum separation between two points a fixed distance apart that the entire uniform thickness feature will pass through. The minimum actual thickness value is the minimum distance between the surfaces of a uniform thickness feature. See Figure 5, Figure 6 and Figure 7.

(b) For a uniform gap feature (internal), the minimum actual gap value is the maximum separation between two points a fixed distance apart that the entire uniform gap feature will pass over. The maximum actual gap value is the maximum distance between the surfaces of a uniform gap feature. See Figure 4.

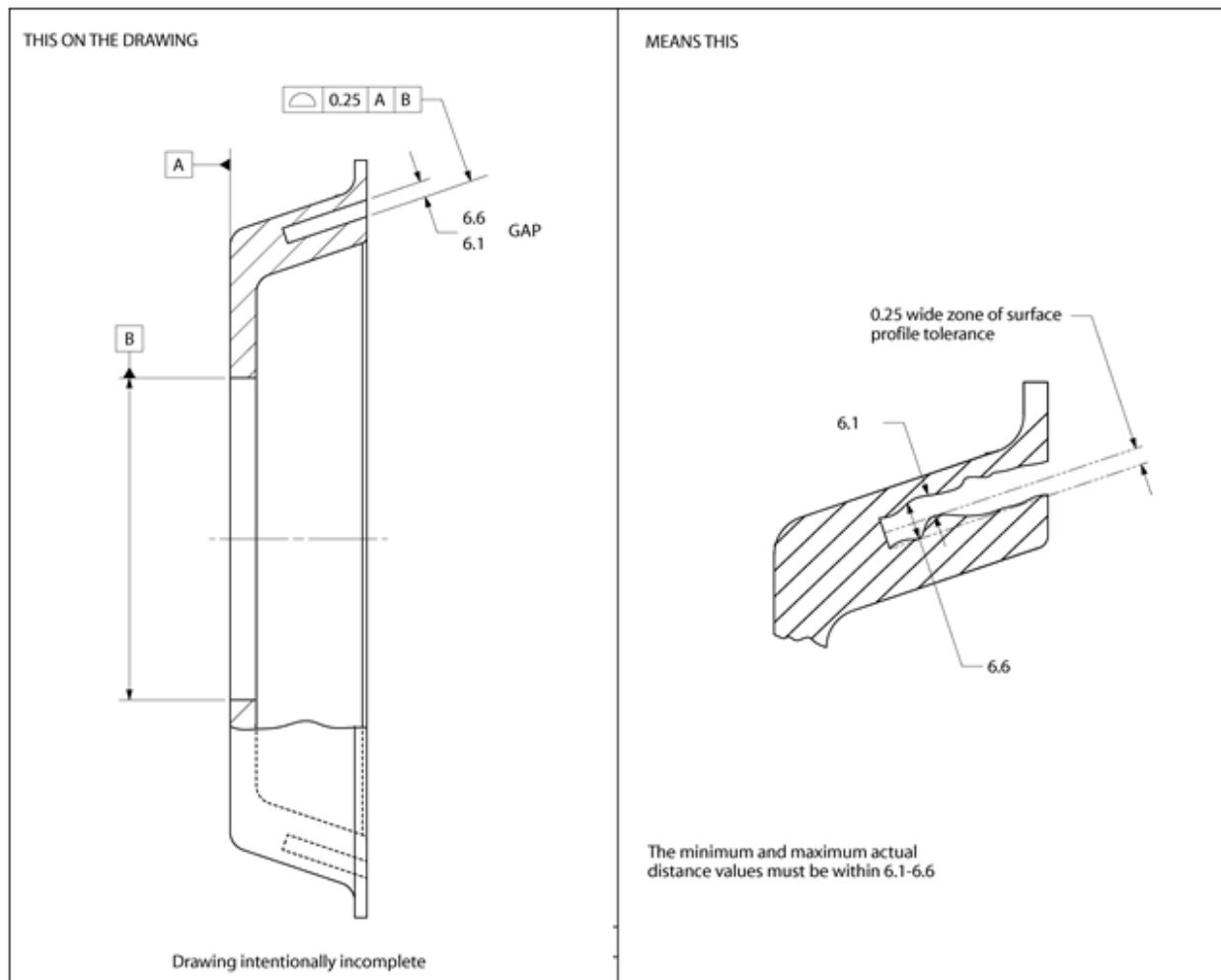


Figure 4: Uniform Gap Tolerancing – Internal Feature, Paragraphs GM 2.18 (b) and GM 3.3.31