ASME Y14.49-2025

Supplemental Dimensioning and Tolerancing Specification

Engineering Product Definition and Related Documentation Practices

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: December 2, 2025

This Standard will be revised when the Society approves the issuance of a new edition.

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FOREWORD

This Standard shows methods that are new to The American Society of Mechanical Engineers (ASME) to specify geometric tolerancing requirements needed for controlling function.

ASME has recognized that the requirements of geometric tolerancing are made more functionally accurate when the requirements are specifically defined in a way that reflects the functional needs of a product or workpiece. This Standard recognizes that these functional requirements are often more diverse than simply a need to fit into an assembly.

As stated as a fundamental rule in ASME Y14.5, tolerances and dimensions shall be selected and arranged to suit the function and mating relationship of a part. ASME Y14.5 defines these requirements. In practice, assumptions are made about how to ensure the requirements are met. Demonstration of compliance with a requirement is typically done through various inspection processes. To ensure that the design is communicated correctly to others, e.g., manufacturers and inspectors, unambiguous information is necessary. This Standard supports this communication by providing the format and definitions of this information and by providing application examples to help convey the functional requirement.

(a) Major concepts in this Standard include the following:

(1) use of symbols instead of notes to standardize communication of requirements.

(2) clarification of a part's functional requirements by applying the specification to the filtered shape of the surface. This can be a wavelength band or a frequency band defining the limits of variation.

(3) specification of the requirement as a refinement of ASME Y14.5 based on maximizing tolerances in manufacturing. This includes the capability of specifying minimum values as well as maximum values. Sometimes specifying minimum limits of variation is important to the function of the part feature.

(b) The benefits of implementing these concepts include the following:

(1) a more complete definition of the part function at the part surface level

(2) improvement of interoperability through a machine-readable format supporting the digital thread

(3) a specification that is not subject to limitations of language by conveying engineering requirements in notes

(4) a way for the specification of looser (larger) tolerances on less critical geometric characteristics and more restrictive (smaller) tolerances on critical characteristics, as supplemental specification frame (SSF) methods provide a more specific definition of controlled geometry than traditional geometric dimensioning and tolerancing (GD&T)

(5) a more complete way of specifying surface texture requirements and of providing an alternative to the ASME Y14.36 method of specifying surface texture

(6) a way to better specify and control other functions beyond mating (e.g., sliding, sealing, contact stress, lubrication, adhesion, noise, and vibration)

An additional benefit of the SSF defined in this Standard is that it permits unification of form and roughness (surface finish) controls and moves the detailed specification of those controls from metrology standards squarely into design specification standards.

Teams from the product definition (ASME Y14 Committee), dimensional metrology (ASME B89 Committee), and surface texture (ASME B46 Committee) disciplines worked together to write this Standard, and this Standard provides very specific ways to define design specifications for optimal product functionality. This Standard improves the ability to describe what manufacturing must achieve to provide functional products. Similarly, metrology professionals have had to make many assumptions on how to measure ambiguous requirements to determine if a product will properly function. Providing more functional detail in design specifications will serve the purpose of improving product quality, while reducing costs by imposing tight tolerances only on those aspects of the product that are required for function.

The development of this Standard is attributed to the commitment of the committee members and the support of their sponsoring companies. The commitment of the members' time and contributed expertise are gratefully acknowledged. Special acknowledgment for their contribution goes to the late Tom Charlton, Alex Krulikowski, and Steven Phillips.

This first edition of ASME Y14.49 was approved by the American National Standards Institute on March 3, 2025.

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Revisions and Errata. The committee processes revisions to this Standard on a periodic basis to incorporate changes that appear necessary or desirable as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published in the next edition of the Standard.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive email notifications of posted errata.

This Standard is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Standard

(4) to permit the use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Standard.

(c) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Standard and the paragraph, figure, or table number

(4) the editions of the Standard to which the proposed case applies

(d) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

Interpretations. The committee does not issue interpretations for this Standard.

Committee Meetings. The Y14 Standards Committee regularly holds meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the committee. Information on future committee meetings can be found on the committee web page at https://go.asme.org/Y14committee.

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Section 1
General

1.1 SCOPE

This Standard provides syntax, definitions, requirements, and recommended practices to supplement the design specification controls of ASME Y14.5.

NOTE: This Standard is limited to form tolerances applied to a surface. The supplemental specifications defined in this Standard may be used with other tolerances. It is anticipated that future releases of this Standard will expand the rules and application examples to support the application to controls other than form tolerances applied to surfaces. See Nonmandatory Appendix A, para. A-6 for an extension of the principle to profile tolerance.

1.2 STRUCTURE OF THE STANDARD

Sections 1 and 2 include the scope and references. Section 3 includes an introduction to the supplemental specification written in conceptual language. Section 4 includes definitions. Section 5 includes an illustration of the supplemental specification introduced in Section 3. Section 6 includes definition of rules and symbols for applying the supplemental specification in product definitions. The supplemental specification frame (SSF) is defined in Section 6, and the SSF concepts are developed in Sections 3 through 5.

1.3 ASME Y14 SERIES CONVENTIONS

The conventions in paras. 1.3.1 through 1.3.12 are used in this and other ASME Y14 standards.

1.3.1 Mandatory, Recommended, Guidance, and Optional Words

(a) The word “shall” establishes a requirement.
(b) The word “will” establishes a declaration of purpose on the part of the design activity.
(c) The word “should” establishes a recommended practice.
(d) The word “may” establishes an allowed practice.
(e) The words “typical,” “example,” and “for reference” and the Latin abbreviation “e.g.” indicate suggestions given for guidance only.
(f) The word “or” indicates that there are two or more options for complying with a list of options. When the word “or” is used without a qualifying word such as “all,” “both,” or “any” in a list, it is exclusive, meaning that only one option from the list is acceptable at a time, e.g., “Select option A or option B.” When the word “or” is used with a qualifying word such as “all,” “both,” or “any” in a list, it is inclusive, meaning that multiple options from the list are acceptable at a time, e.g., “Select option A, option B, or both.”
(g) The phrase “unless otherwise specified” or the abbreviation “UOS” indicates a default requirement if an exception is provided in this Standard.

1.3.2 Cross-Reference of Standards

Cross-reference of standards in text with or without a date following the standard designator shall be interpreted as follows:
(a) Reference to other ASME Y14 standards in the text without a date following the standard designator indicates that the issue of the standard identified in the References section (Section 2) shall be used to meet the requirement.
(b) Reference to other ASME Y14 standards in the text with a date following the standard designator indicates that only that issue of the standard shall be used to meet the requirement.