ASME B18.18-2017
(Revision of ASME B18.18-2011)

Quality Assurance for Fasteners

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: June 16, 2017

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The American Society of Mechanical Engineers
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FOREWORD

This Standard is intended to be used as part of a contractual agreement between sellers and buyers of fasteners. It provides minimum criteria for four categories of metric and inch fasteners of any material type. It is to be used in concert with the specifications that apply to a given part. This Standard is intended to be a part within a larger quality assurance structure that addresses highly specific elements of quality planning, material control, human resources, gaging and testing, procedures, blueprint and standards control, and ongoing improvements that are necessary to permit the effective realization of the fastener itself. Such structures shall ideally be internationally recognized, but can be buyer specific.

This Standard also provides minimum criteria for manufacturing inspection and final inspection and allows for the necessary measure of flexibility and ingenuity of manufacturing approaches that suppliers may use as they comply with the standard's requirements and end objectives. It provides reference material to enable buyers and sellers to make modifications to their plans should they find that necessary in meeting the requirements of this Standard and those of their buyers.

In the implementation of this Standard, buyers must become cognizant of the source of supply manufacturing quality plan and use a means of their own to ensure that it is effective and that it is conscientiously and continuously being developed and improved. Nonconformity prevention and continuous improvement must be an ongoing cultural element that is applied by all members of the supply chain.

Historically, the fastener industry has been served by the standards ASME B18.18.1, B18.18.2, B18.18.3M, B18.18.4M, B18.18.5M, B18.18.6M, and B18.18.7M. These very standards have been replaced by this document but may still be referenced throughout the industry. The B18 Standards Committee and related Subcommittees are committed to replacing references to the aforementioned documents with a reference to this document.

This revision was undertaken based on feedback from fastener manufacturers. The main concern expressed was regarding the final inspection of Category 3 fasteners. It was never intended that in-process inspection completed by high quality fastener manufacturers would have to be duplicated by a laboratory. As more users requested Category 3 quality requirements, it became apparent that a revision was needed to clarify that fasteners supplied to Category 3 are manufactured by an ISO 9001 (or similarly recognized) registered factory, and that any necessary final inspection would be completed by an accredited test facility. The Nonmandatory Appendix regarding test report contents was removed because it had not been widely accepted. Other minor changes were made in the interests of clarity and conciseness.

This revision was approved by the American National Standards Institute on April 6, 2017.

ASME B18 COMMITTEE
Standardization of Bolts, Nuts, Rivets, Screws, Washers, and Similar Fasteners

(The following is the roster of the Committee at the time of approval of this Standard.)

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General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B18 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard 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 periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee Web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Interpretations. Upon request, the B18 Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B18 Standards Committee.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the B18 Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a “yes” or “no” reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of “Yes” or “No,” with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B18 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B18 Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at go.asme.org/B18committee.

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QUALITY ASSURANCE FOR FASTENERS

1 GENERAL INFORMATION

1.1 Scope

This quality-focused Standard establishes in-process and final inspection requirements for fastener products as well as a receiving inspection plan for fastener purchasers. This Standard identifies four categories, recognizing that fastener users have widely varying requirements. The four categories covered are as follows:

(a) Category 1 — a receiving inspection plan for purchasers

(b) Categories 2 and 3 — utilizes documented and verifiable in-process controls structured at the producer's discretion

(c) Category 4 — includes all of the requirements of Category 2 plus 100% inspection for a specific feature or features

In the preparation of this Standard, it was recognized that its function must enable it to be a part of the various regimens in use today that attain certain quality levels of products. This Standard was written to encompass frameworks that enable the users of this Standard to pinpoint which category they wish to use in meeting their own objectives.

1.2 References

The following is a list of publications referenced in this Standard. Unless otherwise specified, the latest edition shall apply:

ASME B1.3M, Screw Thread Gaging Systems for Dimensional Acceptability — Inch Metric Screw Threads (UN, UNR, UNJ, M, and MJ)

ASME B18.6.3, Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)

ASME B18.12, Glossary of Terms for Mechanical Fasteners

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM F1470, Standard Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

ASTM F1941, Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P. O. Box C700, West Conshohocken, PA 19428-2959 (www.astm.org)

ISO 9001, Quality management systems — Requirements

ISO/IEC 17011, Conformity assessment — General requirements for accreditation bodies accrediting conformity assessment bodies

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories

ISO/TS 16949, Quality management systems — Particular requirements for the application of ISO 9001:2000 for automotive production and relevant service part organizations

Publisher: International Organization for Standardization (ISO) Central Secretariat, Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland (www.iso.org)

1.3 Measuring and Testing Equipment

All inspection and testing equipment that is used for the acceptance of Categories 2, 3, and 4 fasteners shall be calibrated by a laboratory that has been accredited to ISO/IEC 17025 by an accreditation body that operates in accordance with ISO/IEC 17011. Calibration may also be conducted by an organization authorized by the original equipment manufacturer. Calibration shall be traceable to the National Institute of Standards and Technology (NIST) Standard or an equivalent national or international standard.

1.4 Terminology

For definitions of terminology not specifically defined in this Standard, refer to ASME B18.12.

1.4.1 Lot. The definition of *lot* is provided in ASME B18.12. In the case of fastener assemblies, such as screw and washer assemblies, the manufacturer shall maintain lot traceability for all components. A finished fastener assembly lot shall comprise a single lot of each component that makes up the final assembly.

1.5 Designation of Final Inspection Category

Procurement documents should indicate which category (2, 3, or 4) of final inspection is required. Examples of designation are provided under the appropriate inspection category sections of this document.

2 BASIC PLAN REQUIREMENTS

2.1 Understanding the Basic Requirements

2.1.1 Sampling Acceptance Criterion. The acceptance criterion for final inspection is zero nonconformities (C = 0) for all inspections. However, it should be

recognized that zero nonconformities (C = 0) in a sampling plan does not mean that the population is entirely free of defects.

2.2 In-Process Inspection

2.2.1 Fabricating Operations. General inspection procedures shall be established on the basis of engineering and manufacturing experience with regard to the effort of setup, tooling, operator, machine setup, and operation on each characteristic at each processing station. The minimum in-process requirements at each machine or processing station shall be as follows:

(a) Five pieces shall be visually examined for gross defects and surface discontinuities as required by the applicable standards. Three pieces shall be verified for part characteristics imparted to it by that machine or processing station in accordance with Table 1 at the following times:

(1) at the start of each production run

(2) at the start of each new shift

(3) when a tool is changed or when an adjustment in machine setup is made

(4) at the completion of each manufacturing operation

NOTE: When tungsten carbide dies are used, it is only necessary to verify a single piece for formed dimensions.

(b) During the production run, on a frequency of not less than one part per every 2 hr, parts shall be inspected for all designated part characteristics imparted to it by that machine or processing station in accordance with Table 1.

2.2.2 Heat Treatment. All heat-treating processes and heat-treatment equipment shall be regularly monitored to ensure process control and proper functioning of equipment. Monitoring equipment shall be calibrated by an accredited organization or an organization authorized by the original equipment manufacturer (see para. 1.3).

2.2.3 Finishing Operations. All plating, coating, and post lubrication processes and equipment shall be regularly monitored to ensure process control and proper functioning of equipment per applicable standards and specifications.

NOTE: Records of in-process inspections are not required for any category. If process records are maintained for Category 3 products, the lower final inspection sample sizes shown in Table 2 may be used instead of the sample sizes indicated in Table 3.

2.3 Final Inspection

Every lot of fasteners shall be subjected to a final inspection in accordance with the specified final inspection category. The final inspection is intended to verify lot identification and to inspect designated characteristics for conformance to related standards, specifications, and engineering drawings. Final inspection of any characteristic may be conducted at any point after which that characteristic will not be altered. Records of final inspection shall be maintained in accordance with para. 2.6.

2.4 Acceptance and Rejection

2.4.1 Raw Material. All raw material (rod, wire, bar, or sheet) shall meet the applicable requirements. Nonconforming raw materials shall not be used for the production of fasteners and shall be quarantined until disposition.

2.4.2 Manufactured Products. All parts shall conform to the applicable requirements during in-process inspection at all fabricating, heat treatment, or finishing operations. When nonconforming parts are found, all parts produced since the last inspection of the characteristic(s) found nonconforming shall be removed from further processing, quarantined, and held for disposition.

2.5 Disposition of Nonconforming Materials or Parts

2.5.1 Supplier's Options. The supplier has the choice of the following options in the disposition of nonconforming materials or parts:

(a) They may be scrapped.

(b) They may be 100% sorted and all nonconforming parts removed.

(c) They may be reworked or reprocessed to correct the nonconforming characteristic(s).

(d) They may be returned to the manufacturer if the supplier is not the manufacturer.

(e) A request for deviation may be made to the end user.

If the end user considers that the degree to which the characteristic(s) deviates from specified requirements will have no significant effect on the performance of the parts in their service application, the customer may authorize the deviation and release of the parts or materials for completion of production or for shipment as applicable.

NOTE: If the supplier is not the manufacturer, the supplier shall come to an agreement with the manufacturer if option (a) or (c) is selected by the supplier.

2.5.2 Purchaser's Options. The purchaser shall come to an agreement with the supplier on one of the following options for the disposition of nonconforming lots or parts that have been found after receipt:

(a) They may be scrapped.

(b) They may be 100% sorted and all nonconforming parts removed.

(c) They may be reworked or reprocessed to correct the nonconforming characteristic(s).

(d) If the purchaser considers that the degree to which the characteristic(s) vary from specified requirements will have no significant effect on the performance of the