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Standard Guide for Fastener Sampling for Specified Mechanical Properties and Performance Inspection[1]

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INTRODUCTION

Throughout this guide the terms *detection* and *prevention* apply to quality control systems. A brief description of both is provided to assist the purchaser in the application of this guide.

The *detection system* relies on inspection as the primary means of controlling the quality of furnished material. Methods include in-process and final inspection. In-process inspection is typically performed by the individual performing the process and generally includes a first-piece inspection by someone other than the operator. Quality-control inspection may perform audit inspections on the process output during the course of the production run. In addition, a final inspection is performed by quality control inspectors according to a prescribed sample plan. The other sample plans utilize zero defects as their acceptance criteria.

The *prevention system* uses advanced quality planning in addition to many of the techniques used in the detection system. Quality planning incorporates a systems approach to quality control that focuses on defect prevention and continual improvement. In addition, Statistical Process Control (SPC) is usually applied to control the process, thereby reducing the variability of the output.

The ISO 9000 and/or the ANSI/ASQC Q9000 quality system standards are models that may be used in establishing a prevention-based quality systems.

1. Scope

1.1 This guide provides sampling methods for determining how many fasteners to include in a random sample in order to determine the acceptability of a given lot of fasteners.

1.2 This guide is for mechanical properties, physical properties, coating requirements, and other quality requirements specified in the standards of ASTM Committee F-16. Dimensional and thread criteria sampling plans are the responsibility of ASME Committee B18. Therefore, unless otherwise specified in this guide, dimensional and thread fit sampling shall be in accordance with ANSI/ASME B18.18.3M.

1.3 This guide provides for two sampling plans: one designated the "detection process," as described in Terminology F 1789, and one designated the "prevention process," as described in Terminology F 1789.

2. Referenced Documents

2.1 *ASTM Standards:*

F 1789 Terminology for F-16 Mechanical Fasteners

2.2 *ANSI Standards:*

ASME/ANSI B18.18.3M Inspection and Quality Assurance for Special Purpose Fasteners[2]

ASME/ANSI B18.18.5M Inspection and Quality Assurance Plan Requiring In-Process Inspection and Controls[2]

ASME/ANSI B18.18.6M Quality Assurance Plan for Fasteners Produced in Third Party Accreditation System[2]

ASME-FAP-1 Quality Assurance Program Requirements for Fastener Manufacturers and Distributors[2]

ANSI/ASQC Q9000 Quality Management and Quality Assurance Standards—Guidelines for Selection and Use[2]

ANSI/ASQC Q9001 Quality Systems—Model for Quality Assurance in Design/Development, Production, Installation, and Servicing[2]

ANSI/ASQC Q9002 Quality Systems—Model for Quality Assurance in Production and Installation[2]

ANSI/ASQC Q9004 Quality Management and Quality System Elements—Guidelines[2]

QS 9004 Quality System Requirements[3]

2.3 *ISO Standards:*

ISO 9000 Quality Management and Quality Assurance Standards—Guidelines for Selection and Use[2]

[1] This guide is under the jurisdiction of ASTM Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.93 on Quality Assurance Provisions for Fasteners.

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[2] Available from the American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

[3] Available from Automotive Industry Action Group (AIAG), 26200 Lahser Road, Suite 2000, Southfield, MI 48034–9738.

ISO 9001 Quality Systems—Model for Quality Assurance in Design/Development, Production, Installation and Servicing[2]

ISO 9002 Quality Systems—Model for Quality Assurance in Production and Installation[2]

ISO 9004 Quality Management and Quality System Elements—Guidelines[2]

3. Terminology

3.1 Terms shall be defined in accordance with Terminology F 1789.

3.2 *Definitions:*

3.2.1 *material review*—an evaluation by a team of fastener experts to determine the fastener's nonconformance with respect to fitness for general use, fitness for intended use, or fitness for specified use.

3.2.2 *random sampling*—when every fastener in the lot has an equal and independent chance of being chosen as the sample. The sample may be returned to the lot if it has not been altered or destroyed during the inspection/test upon completion of sampling.

3.2.3 *test*—an element of inspection that generally denotes the determination by technical means of the properties or elements of supplies, or components thereof and involves the application of established scientific principles and procedures.

4. Significance and Use

4.1 Sampling shall be selected in a random manner, ensuring that any unit in the lot has an equal chance of being chosen. Sampling should not be localized by selections being taken from the top of a container or from only one container of multicontainer lots.

4.2 The purchaser should be aware of the supplier's quality assurance system. This can be accomplished by auditing the supplier's quality system, if qualified auditors are available, or by third-party assessment certification, such as provided by ASME's Fastener Accreditation Program (FAP), QS 9000, or ISO 9000.

5. Ordering Information

5.1 The purchaser shall specify at the time of order inquiry, the specification number, the issue date and the sampling plan (detection process or prevention process) required from the supplier.

5.2 Guidelines for sampling plan selection are provided in Section 6.

6. Selection of Sampling Plans

6.1 Except as specified in 6.2, the detection process sampling level in accordance with Table 1 shall be applied.

6.2 If the manufacturer's quality system conforms with ASME/ANSI B18.18.5M, B18.18.6M, ASME-FAP-1, QS 9000, ANSI/ASQC Q9001, Q9002, ISO 9001, or ISO 9002, the manufacturer shall be permitted to choose between the Prevention or Detection process for inspection and test purposes. Purchasers shall retain the right to specify the Prevention or Detection process at the time of inquiry or order (see Table 2).

7. Acceptance Criteria

7.1 The acceptance criteria for Table 3 is to accept the lot if zero nonconforming parts are detected, and reject the lot if at least one nonconforming part is detected.

8. Disposition of Nonconforming Lots

8.1 *Supplier's Options*—The supplier has the following options in dispositioning nonconforming lots:

8.1.1 Lots may be scrapped.

8.1.2 Lots may be 100 % sorted and all nonconforming parts removed.

8.1.3 Lots may be reworked or reprocessed to correct the nonconforming characteristic(s), if permitted by specification. See 8.3.

8.1.4 Lots may be "used-as-is" providing the purchaser is informed of the rejectable items and written approval is obtained. This disposition shall be documented with each shipment, including appropriate signatures and dates authorizing the release.

NOTE 1—Caution should be exercised when applying the option to "use-as-is." In the interest of safety and quality, all "use-as-is" conditions should have no effect on the fastener's intended application or end use.

8.2 *Purchaser's Options*—The purchaser has the following options in dispositioning nonconforming lots:

8.2.1 Lots may be rejected and returned to the supplier.

8.2.2 Lots may be accepted. If nonconforming lots are accepted, the responsibility for the lot is borne by the purchaser, provided the purchaser issues a written deviation to the supplier relieving him of responsibility for the nonconforming product.

8.3 *Reinspection*—When rework or reprocessing is performed to correct a nonconforming item, that lot shall be reinspected on completion of all rework or processing, using the same sample plan as used in detecting the nonconformance. The sample shall be inspected for the corrected criteria and any other criteria affected by the rework. The acceptance level shall be in accordance with 7.1.

9. Control of Measuring and Test Equipment

9.1 Control should be maintained over all measuring and test equipment to provide confidence in decisions or actions based on measurement or test data. As a minimum, these controls shall follow the guidelines provided in ISO 9004, or ANSI/ASQC Q9004, on the portion that details the control of measuring and test equipment.

10. Keywords

10.1 detection systems; fasteners; inspection for mechanical properties; performance requirements; prevention systems; quality requirements; sampling plans; selection and size; statistical process control