

Appendix A: Synopsis of ASTM Standards F1469, F1503, F2282, and F2688

Designation: F1469–99 (Reapproved 2004)

Synopsis: Standard Guide for Conducting a Repeatability and Reproducibility Study on Test Equipment for Nondestructive Testing

This guide describes the steps required to conduct a complete repeatability and reproducibility (R&R) study on non-destructive test equipment. This guide is a manual (use of calculator) method. Other methods may utilize the application of computer driven software.

This guide can be used to evaluate all test equipment that provides variable measuring data.

A wide range of test equipment may be evaluated using this guide, and may include hardness testing machines, universal testing machines, torque wrenches, dial indicators, micrometers, dial indicators, optical comparators microscopes, magnetic and coulometric testers, x-ray spectrometers, and others that provide variable test results and do not render the test piece altered as a result of the test.

This guide is recommended for the purpose of evaluating test equipment that may be utilized in statistical process control, testing laboratories, and for in-process control of manufacturing operations.

The guide is easy to follow and provides reliable data and conclusions to assist in determining if test equipment is suitable for use in controlling output quality during manufacturing.

Designation: F1503–02 (Reapproved 2007)

Synopsis: Standard Practice for Machine/Process Capability Study Procedure

A machine/process capability (MPC) study is conducted to provide a level of confidence in the ability of a machine/process to meet engineering specification requirements. This is accomplished through statistical process control techniques as defined in this practice.

This practice covers provision of a proper method for determining process capability for new or existing machines and/or processes. It is recommended that available statistical software be used for the calculation of the descriptive statistics required for decision making when using this practice. Where software is not available, Section 8 and Tables 1 and 2 are provided for manual calculations.

This practice is limited to bilateral specifications whose distributions can be expected to approximate a normal curve. This practice should not be applied to unilateral specifications (flatness, concentricity, minimum tensile, maximum hardness, etc.).

It is essential that all gaging systems used to evaluate product involved in the study have documentation for meeting requirements of a gage repeatability and reproducibility study in accordance with Guide F1469 or equivalent, before the machine/capability study is conducted.

Designation: F2282–03

Synopsis: Standard Specification for Quality Assurance Requirements for Carbon and Alloy Steel Wire, Rods, and Bars for Mechanical Fasteners

This specification establishes quality assurance requirements for the physical, mechanical, and metallurgical requirements for carbon and alloy steel wire, rods, and bars in coils intended for the manufacture of mechanical fasteners, which includes: bolts, nuts, rivets, screws, washers, and special parts manufactured through cold heading. (Note—The Steel Industry uses the term “quality” to designate characteristics of a material which make it particularly well suited to a specific fabrication and/or application and does not imply “quality” in the usual sense.)

Wire size range includes 0.062–1.375 in. Rod size range includes 7/32 in. (0.219) to 47/64 in. (0.734) and generally offered in 1/64 increments (0.0156). Bar size range includes 3/8 in. (0.375) to 1 1/2 in. (1.500). Sizes for wire, rod, and bar outside the ranges of this specification may be ordered by agreement between the purchaser and supplier.

Material is furnished in many application variations. The purchaser should advise the supplier regarding the manufacturing process and finished product application as appropriate. Five application variations are Cold Heading, Recessed Head, Socket Head, Scrap-less Nut, and Tubular Rivet.

Wire is furnished for all five application variations. Rod and bar are furnished only for cold heading applications.

Common terms used in the fastener cold forming industry are clearly defined and include carbon steel, alloy steel, annealing, spheroidizing, wire, rod, and bar, to name a few.

Metallurgical properties are defined, and limits are established for such properties as decarburization, hardenability, and mechanical requirements.

Designation: F2688–08

Synopsis: Standard Guide for System-Based, Customer-Centered Quality Plan for Manufacturers

This guide establishes recommended system-based procedures and customer-centered applications to assist manufacturers and alteration distributors in the development of process controls which are intended to produce quality products in a cost effective manner. These recommended system-based procedures/customer-centered applications allow an organization to continually improve operational effectiveness in a cost effective manner.

It is organized in such a fashion to enable the user to develop a quality manual along the sectional topics presented in the standard.

This guide uses principles from the Baldrige National Quality Award Criteria for Excellence as well as ISO 9001:2008 to provide guidance in establishing a quality control plan that may be used effectively by almost any industry.