

NOTICE OF CHANGE
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NOT MEASUREMENT SENSITIVE
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MIL-STD-790F  
NOTICE 1  
17 August 2001

DEPARTMENT OF DEFENSE  
STANDARD PRACTICE

STANDARD PRACTICE FOR  
ESTABLISHED RELIABILITY AND HIGH RELIABILITY  
QUALIFIED PRODUCTS LIST (QPL) SYSTEMS FOR  
ELECTRICAL, ELECTRONIC, AND FIBER OPTIC  
PARTS SPECIFICATIONS

TO ALL HOLDERS OF MIL-STD-790F:

1. THE FOLLOWING PAGES OF MIL-STD-790F HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
1	17 August 2001	1	1 August 1995
2	17 August 2001	2	1 August 1995
3	17 August 2001	3	1 August 1995
3a	17 August 2001	New page	
4	1 August 1995	4	Reprinted without change

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-790F will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the standard is completely revised or canceled.

Custodians:  
Army - CR  
Navy - EC  
Air Force - 11  
NASA - NA

Preparing activity:  
DLA - CC  
  
(Project 59GP-0175)

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AREA 59GP

## MIL-STD-790F

### 1. SCOPE

1.1 Scope. This standard is for direct reference in established reliability and high reliability electrical, electronic, and fiber optic parts specifications and establishes the criteria for a manufacturer's qualified product system.

### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, and 5 of this standard, whether or not they are listed.

#### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

### STANDARDS

#### FEDERAL

FED-STD-209 - Airborne Particulate Cleanliness Classes in Clean Room and Clear Zones.

(Unless otherwise indicated, copies of the above specification, standards and handbooks are available from the Document Automation and Production Service, Bldg. 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation.

#### AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/EIA 557 - Statistical Process Control Systems.  
ANSI/NCSL-Z540-1 - Calibration Laboratories and Measuring and Test Equipment - General Requirements.  
ISO 10012-1 - Quality Assurance Requirements for Measuring Equipment - Part 1: Meteorological Confirmation System for Measuring Equipment.

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

SUPERSEDES PAGE 1 OF MIL-STD-790F.

## MIL-STD-790F

## 3. DEFINITIONS

3.1 Reliability terms. The definitions of reliability terms used herein are as follows:

- a. Assembly plant. A plant established by a manufacturer or operated by a distributor authorized by the manufacturer to perform specified functions pertaining to the manufacturer's identified qualified products in accordance with specified assembly procedures, test methods, processes, controls, and storage, handling, and packaging techniques.
- b. Burn-in (pre-conditioning). The operation of an item under stress to stabilize its characteristics.
- c. Calibration. A comparison of a measuring device with a known standard.
- d. Corrective action. A documented design, process, procedure, or materials change implemented and validated to correct the cause of failure or design deficiency.
- e. Criticality. A relative measure of the consequence of a failure mode and its frequency of occurrence.
- f. Defect analysis. The process of examining technical or management (nontechnical) data, manufacturing techniques, processes, or materials to determine the cause of variations of electrical, mechanical, optical, or physical characteristics outside the established limitations.
- g. Degradation. A gradual impairment in ability to perform.
- h. Demonstrated. That which has been measured by the use of objective evidence gathered under specified conditions.
- i. Electrical, electronic, and fiber optic parts. Basic circuit elements which cannot be disassembled and still perform their intended function, such as capacitors, connects, filters, resistors, switches, relays, transformers, crystals, electron tubes, semiconductor, and fiber optic devices.
- j. Environmental. The aggregate of all external and internal conditions (such as temperature, humidity, radiation, magnetic and electric fields, and shock vibration) either natural or man made, or self-induced, that influences the form, performance, reliability or survival of an item.
- k. Established reliability. A quantitative maximum failure rate demonstrated under controlled conditions specified in a military specification and usually expressed as percent failures per thousand hours of test.
- l. Failure. The event, or inoperable state, in which any item or part of an item does not, or would not, perform as previously specified.
- m. Failure activating cause. The stresses or forces, thermal, electrical shocks, or vibration, which induce or active a failure mechanism.
- n. Failure analysis. The process of examining electrical, electronic, or fiber optic parts to determine the cause of variation of performance characteristics outside of previously established limits with the end result that failure modes, failure mechanisms, and failure activating causes will be identified.
- o. Failure mechanism. The process of degradation or chain of events which results in a particular failure mode.

SUPERSEDES PAGE 2 OF MIL-STD-790F.

## MIL-STD-790F

- p. Failure mode. The abnormality of an electrical, electronic, or fiber optic parts performance which causes the part to be classified as failed.
- q. Failure rate. The total number of failures within an item population, divided by the total number of life units expended by that population, during a particular measurement interval under stated conditions.
- r. Inspection lot. A group of electrical, electronic, and fiber optic parts offered for inspection at one time and in combinations authorized by the applicable specification.
- s. Item. A non-specific term used to denote any product, including system, material parts, subassemblies, sets, or accessories.
- t. Manufacturer. The actual producer of electrical, electronic, and fiber optic parts.
- u. Production lot. A group of electrical, electronic, or fiber optic parts manufactured during the same period from the same raw materials processes under the same specifications and procedures, produced with the same type equipment, and identified by the documentation defined in the manufacturer's qualified product system through all significant manufacturing operations, including final assembly operations. Final assembly operations shall be considered the last major assembly operations such as casing, hermetic sealing, or lead attachment rather than painting or marking.
- v. Qualification. The entire procedure by which electrical, electronic, and fiber optic parts are processed, examined, and tested to obtain and maintain approval for listing.
- w. Qualifying activity. The military preparing activity or its government agent delegated to administer the qualification program.
- x. Quality assurance. Quality assurance is a planned and systematic pattern of all actions necessary to provide adequate technical requirements are established; products and services conform to established technical requirements; and satisfactory performance is achieved.
- y. Reliability.
  - (1) The duration or probability of failure-free performance under stated conditions.
  - (2) The probability that an item can perform its intended function for a specified interval under stated conditions. (For non-redundant items this is equivalent to definition (1). For redundant items this is equivalent to definition of mission reliability.
- z. Screening. A process for inspecting items to remove those that are unsatisfactory or those likely to exhibit early failure. Inspection includes visual examination, physical dimension measurement and functional performance measurement under specified environmental conditions.
- aa. Sub-assembly facilities. A facility authorized, by both the manufacturer and the qualifying activity, to perform manufacturing steps in accordance with processing contained in the qualified product system.
- bb. Self-assessment. The performance of periodic review by the manufacturer's designated personnel to verify that the requirements of this standard are being met.
- cc. System. General - A composite of equipment and skills, and techniques capable of performing or supporting an operational role, or both. A complete system includes all equipment, related facilities, material, software, services, and personnel required for its operation and support to the degree that it can be considered self-sufficient in its intended operational environment.

SUPERSEDES PAGE 3 OF MIL-STD-790F.

## MIL-STD-790F

- dd. Technology Review Board (TRB). A board established by the manufacturer that is given authority and responsibility to oversee the MIL-STD-790 qualified product system as described herein. The TRB consists of designated manufacturers representatives that have the knowledge and expertise to administer the system.
- ee. Time. The universal measure of duration. The general word "time" will be modified by an additional term when used in reference to operating time, mission time, and test time.
- ff. Traveler. The production and raw material process routing sheet.

### 4. GENERAL REQUIREMENTS

4.1 General. Manufacturers of established reliability and high reliability electrical, electronic, and fiber optic components shall demonstrate to the qualifying activity that a system is in place to integrate all design, planning, manufacturing, inspection, and test functions as described herein.

4.2 Validation. The qualifying activity is responsible for determining if the manufacturer meets the requirements of this standard. Validation is required as part of the qualification and retention of qualification to the individual product specification. The qualifying activity shall perform a review of the manufacturing facility as part of the validation effort. Revalidations are required to maintain qualification and shall be performed within 24 months of the last review. This validation period may be extended by the qualifying activity if the manufacturer can demonstrate adequate controls of the system through Statistical Process Control (SPC), self-assessment, or Technology Review Boards (TRBs).

4.3 Elements. The manufacturer shall demonstrate a system for established reliability and high reliability parts that includes the specific elements as defined in the detailed requirements of this standard (see section 5).

### 5. DETAILED REQUIREMENTS

5.1 General. The detailed requirements for meeting this standard are described in this section. It is not intended that the manufacturer create a military unique system in order to meet these requirements. Manufacturers may use existing internal systems in meeting these requirements provided they are validated by the qualifying activity.

5.1.1 Key personnel and organizations. The responsibility and authority of key personnel and organizations associated with the qualified products shall be identified. The manufacturer shall identify changes affecting key organizations and personnel. The qualifying activity shall be informed of any changes within 30 days after such an occurrence.

5.1.2 Test facilities. The manufacturer shall identify the test facilities and equipment used for qualification and conformance inspection of the electrical, electronic, and fiber optic parts.

5.1.3 GIDEP alerts. The manufacturer shall notify the qualifying activity of all pending GIDEP alerts prior to issuance.

5.1.4 Sub-assembly facilities. Manufacturers validated to this standard may utilize sub-assembly facilities to perform specific manufacturing steps in accordance with the authorized qualification system.

NEW PAGE.

## MIL-STD-790F

5.1.5 Distributors. Manufacturers validated to this standard may authorize distributors to perform additional functions and operations on the qualified products. The manufacturer is responsible for validation of these distributors to the requirements of this standard as applicable. In case of dispute or quality related problems, the qualifying activity reserves the right to perform a validation of the distributor. The controls and requirements shall be such as to assure the product sold by distributor is of the same quality and performance as parts supplied directly from the manufacturer. The manufacturer is responsible for ensuring that all products sold through these distributors meet the requirements of the applicable product specifications. The manufacturer shall identify each distributor and the functions that they are authorized to perform according to the following categories:

- a. Category A distributor. This category of distributor is authorized to store, pack, handle, and distribute qualified products.
- b. Category B distributor. This category of distributor is authorized to perform additional operations, tests, and inspections in addition to responsibilities of a category A distributor. If the distributor is authorized to mark the parts, a code symbol is to be added to the modified part to identify the distributor (in accordance with agreement with original manufacturer) in addition to the original part marking and lot identification by the manufacturer.
- c. Category C distributor. This category is authorized to perform assembly of the qualified products in addition to the responsibilities of a category B distributor including part marking requirements.

5.2 QPL system elements. The manufacturer's system shall address, as a minimum, the elements described herein. This system shall be maintained by the manufacturer such that the qualifying activity can verify and validate these elements (e.g., internal documentation and control system).

5.2.1 Training. The manufacturer shall maintain a training program to cover all phases of their activity involved in producing electrical, electronic, and fiber optic parts. The type and extent of training shall be determined by the manufacturer.

5.2.2 Calibration. Each instrument used to measure or control production process or to measure the acceptability of parts under test shall be calibrated in accordance with ANSI/NCSL Z540-1, ISO 10012-1, or equivalent system as approved by the qualifying activity.

5.2.3 Proprietary processes and procedures. The qualifying activity shall have access to all areas of the manufacturer's plant for the purpose of verifying implementation of this standard.

5.2.4 Failure and defect analysis system. The manufacturer shall maintain a failure and defect analysis system. Failure analysis of parts are required when failures exceed the number allowed by the specification in qualification and conformance inspections or which have failed during field use (either at equipment contractor or military field activities).

5.2.4.1 Failure reporting. The manufacturer shall maintain a failure recording and reporting system for parts which have failed during qualification or conformance inspections or while in use in equipment. The system shall provide for at least the following:

- a. The operating or test conditions under which the part failed, including environmental exposure levels, if known.
- b. The source from which the failed part was received.
- c. Verification of the reported condition of the failed part by the manufacturer's personnel responsible for production, inspection, quality, or engineering.
- d. The length of time the part has been operating if it failed in life testing. Compliance with failure rate levels shall be calculated in accordance with the governing applicable product specification.
- e. For field failures, review and corrective action (as applicable) shall be within 30 days after receipt of parts and supporting information.

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