Q501: Electronic Components and Hardware

TABLE OF CONTENTS

1. General Requirements

a. Electrostatic Discharge Control

Contractors are required to have an Electrostatic Discharge (ESD) Control Program in compliance with the requirements of ANSI / ESD S20.20. The following ESD requirements also apply:

i. All personnel who manufacture, inspect, test, or otherwise process electronic hardware, or require unescorted access into ESD protected areas shall be currently certified as having completed the required training, appropriate to their involvement, as defined in ANSI/ESD S20.20 prior to handling any electronic hardware. Yearly recertification is required.
ii. Electronic hardware shall be manufactured, inspected, tested, or otherwise processed only at designated ESD protective work areas. These work areas shall be verified on a regular schedule.

b. Environmental Controls

Environmental controls limits shall be established and maintained to prevent contamination or degradation of parts and materials during receiving inspection, packaging, handling, and storage. Unless otherwise specified (e.g for ESD Control) temperature shall not exceed 22°C ± 10°C (72°F ± 18°F) and relative humidity shall be between 30% and 70%

c. Handling Requirements

Contractors shall establish and maintain procedures for handling parts and materials including receipt of parts and materials, inspections, interim storage, cleaning, kitting, assembly, and testing. Material selected for packaging or protecting ESD sensitive devices shall not leach chemicals, leave residues, or otherwise contaminate parts or assemblies. For example, anti-static polyethylene (pink poly) is well known for outgassing contaminants.

d. Moisture Sensitive Devices

Moisture or process sensitive components (as classified by IPC J-STD-020, IPC J-STD-075 or other documented classification procedure) shall be handled in a manner consistent with IPC J-STD-033 or other documented procedures. All moisture sensitive components should be tracked by contractor procedures to ensure floor life is not exceeded. Rework procedures involving solder reflow shall not be performed on components with moisture sensitivity level 4 (MSL 4) or higher.

e. Coupon Retention

The contractor shall maintain all PCB coupon/cross sections for a minimum of (5) years after purchase order is closed

2. Mechanical Requirements

a. Unconventional Materials

The proposed use of material in an application not intended by the material manufacturer (e.g., use of silicon sealant as an adhesive) shall be considered an unconventional application. The material usage shall be verified for the desired application based on test, similarity, analyses, inspection, existing data, or a combination of those methods. This information shall be provided to the customer for approval.

b. Procurement of Printed Wiring Boards

Printed Wiring Boards (PWB), or Printed Boards, shall be designed to meet the requirements of the applicable IPC-2220 Series, Class 2 standard, for Category E support equipment, and Class 3 standard for Category T hardware. PWBs shall be procured to meet the performance requirements of the applicable IPC-6010 Series, Class 3 standard. Contractor may propose alternate design or performance standards (i.e. MIL-PRF-31032. Alternate standards shall require customer approval and must be accompanied by objective data documenting that mission safety or reliability will not be compromised.

c. Requalification of Parts

All part changes of the types noted below require for consideration of requalification:

i. Parts known to have a change in design, material or processing which may affect system or part performance or reliability (e.g. plating, mold compounds, lead frames, die attach material, die shrink, and test coverage).
ii. Relocation of manufacturing process and/or equipment, or a change in ownership.
iii. Loss of confidence in manufacturer's ability to produce quality parts (e.g., an abnormally high reject rate at receiving inspection, or at other points in the manufacturing, test, or usage of assemblies in which the part is utilized).
iv. Changes to the data sheet affecting a form, fit, or function.

d. Silver Wire

Suppliers utilizing silver wire in their product shall present installation, storage, installation and inspection processes to the customer before beginning production.

3. Procedural and Process Requirements

a. Reuse of parts and Materials

Parts and materials that have been permanently installed in an assembly and are removed from the assembly for any reason shall not be reused without prior customer approval. Approval will be dependent on the submission of evidence that such reuse does not degrade system performance or increase the probability of system failure. Components designed to be removed and reused, such as connectors, reusable fasteners, removable covers, cables, and similar items do not require approval for reuse.

b. Processes and Controls

The manufacture of parts and materials shall be accomplished in accordance with processes and processing controls that ensure the reliability and quality required. These processes and controls shall be accomplished in accordance with fully documented procedures. This documentation shall be in sufficient detail to provide a controlled manufacturing baseline. It will ensure that subsequent production items can be manufactured to be equivalent in performance, quality, dimensions, and reliability to initial production items used for qualification, or for deployed product

4. Testing and Inspection Requirements

a. Through-Hole Solder Inspection

All through-hole component lead soldering and blind solder joints shall meet the requirements of J-STD-001, Sections 6 and 7, for the class referenced on the drawing. If the design prohibits proper visual inspection, X-ray evidence of acceptability for all solder joints, including through-hole and blind solder joints, shall be provided with the shipment. Manufacturers shall include an electronic copy of the X-ray inspection results with the shipment, which will be reviewed as part of the receiving inspection process

5. Documentation and Deliverables

a. Software Systems

If software is deliverable, the Contractor's software system shall be subject to review and approval.

b. Electronics Parts Traceability

EEE parts shall have 100% lot traceability to assembly lot and manufacture location.

The lot definitions and identification requirements for a specific device shall be contained in part specification. Identification data for EEE parts shall be maintained in manufacturing and processing records and contains lot date code, lot and purchase order numbers, manufacturer and supplier of the part.

Markings for small devices shall be recorded in manufacturing and processing records prior to use. Programmable devices shall be marked with programming revision level and traceable to original un-programmed (blank) part. COTS items shall have traceability to manufacturer and date of manufacture.

For tape and reel devices, the reel barcode shall be recorded if lot date code(s) is not available on the reel. Traceability information shall be delivered upon shipment.

Lot/date code information shall be retained for a period of (5) years

c. Unpopulated Printed Circuit Boards (PCB)

All test reports per IPC-6012 should accompany delivery of unpopulated, partial or fully populated PCB's. Test data should include resistive continuity and isolation testing, microsection report, and electroless nickel/immersion gold X-Ray fluorescence report.

d. Populated Printed Circuit Boards (PCB) – Cleaning

Fully populated PCB's should be cleaned in applicable method per IPC-TM-650. Test results should include part number, method of cleaning, test equipment, acceptability limits and results.