QE-STD-2

TITLE
Critical Safety Items
Critical Characteristics
Maintenance & Overhaul

APPLICABLE TO: ALL ARMY AVIATION WEAPON SYSTEMS
END ITEM: ALL ARMY AVIATION WEAPON SYSTEMS
CAGE CODE: 81996

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REVISIONS

SYM	DESCRIPTION OF CHANGES
D	Administrative changes to QE-STD-2 (organization name updates and 10 U.S.C. 2319 updated to 10 U.S.C. 3243)

Critical Safety Items
Critical Characteristics
Maintenance & Overhaul
QE-STD-2

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1.0 Purpose

To establish the minimum level of activity that is required for the Maintenance and Overhaul (M&O) for Critical Safety Items (CSI) wherein the M&O process involves CSIs, parts designated by Systems Readiness Directorate (SRD) as containing CSIs, or involves the Critical Characteristics (CC) associated with the CSI. Requirements established herein are intended to establish and maintain the integrity of all CCs throughout the M&O process. For the purpose of this document, SRD is also the Engineering Support Activity (ESA) and the Design Control Activity (DCA).

2.0 Scope

This standard is intended to be used in conjunction with other contractually specified quality requirements and is intended to define the quality requirements for CSIs in addition to a higher-level quality program (i.e., ISO 9001, AS9100). This standard shall apply to all aspects involved in the M&O of CSIs; however, this standard does not apply to CSIs without defined depot or installation CCs. In the event of conflicts between standards, the more stringent requirements shall apply.

3.0 References

a. ISO 10012, Measurement management systems - Requirements for measurement processes and measuring equipment
b. DA Pam 95-9, Management of Aviation Critical Safety Items
c. JACG Aviation Critical Safety Item Management Handbook
d. Joint Publication 1-02, Department of Defense Military and Associated Terms

e. Public Law 108-136, Section 802, Quality Control in Procurement of Aviation Critical Safety Items and Related Services.
f. ISO 9001, Quality Management Systems – Requirements
g. AS9100, Quality Management Systems
h. AS9110, Quality Management Systems - Requirements for Aviation Maintenance Organizations
i. NATO-AQAP-110, NATO Quality Assurance Requirements for Design, Development, and Production

4.0 Definitions

The following definitions should be used for REFERENCE ONLY and are provided as a guideline for clarification purposes. The terms defined below are intended to aid in the understanding and interpretation of CSI management described in this standard. The roles of the contractor, ESA, and others are specified in some of the definitions, but primarily in the sections that follow.

a. ***Administrative contracting officer (ACO)*** - A contracting officer that administers the contract after award. *See Contracting Officer.*

b. ***Approved Source -*** A contractor or supplier who has satisfied, prior to contract award, all source approval requirements to include, if applicable, engineering testing requirements (fatigue, endurance, and/or interchangeability). CSIs shall only be purchased from, manufactured, or overhauled/repaired by sources approved by the ESA in accordance with United States Code Title 10, Section 3243. The objective is to achieve competition among approved CSI suppliers and their products and to ensure that potentially new CSI suppliers and their products are effectively evaluated prior to delivery of CSIs to the Services.

c. ***Commercial items*** - Articles of supply readily available from established commercial distribution services which the Department of Defense or inventory managers in the Military Services have designated to be obtained directly or indirectly from such sources.

d. ***Common use item*** - A common use item may be a standard part or one that is utilized by multiple aviation systems and/ or Military Services. The term "common use item" refers to a part, assembly, subsystem, or store that is used in:

(1) multiple aviation systems/platforms (e.g., the same item used in an H-60 and an H-47);
(2) across multiple Military Services (e.g., Army, Navy, and Air Force H-60s; Air Force and Marine Corps C-130s);
(3) or both.

e. ***Contractor*** - Any company or Government owned and operated depot performing M&O for AMCOM, DLA, or any other DoD organization for an Army CSI.

f. ***Contracting officer -*** The Service member or Department of Defense civilian with the legal authority to enter into, administer, modify, and/or terminate contracts.

g. ***Critical application item (CAI)*** - An item that is essential to weapon system performance or operation, or the preservation of life or safety of operating personnel, as determined by the military services. The subset of CAIs whose failure could have catastrophic or critical safety consequences (Category I or II as defined by MIL-STD-882) is called CSIs.

h. ***Critical characteristic (CC) -*** Any feature throughout the life cycle of a CSI, such as dimension, finish, material or assembly, manufacturing or inspection process, installation, operation, field maintenance, or depot overhaul requirement which if nonconforming, missing or degraded could cause the failure or malfunction of the CSI. Critical Characteristics are further sub-divided into manufacturing, depot, or installation critical, as follows:

(1) ***Manufacturing critical characteristic -*** Any feature established at new manufacture, such as dimension, finish, material or assembly, manufacturing or inspection process, special process (i.e. heat treat, brazing/welding, plasma, shot peening, non-destructive testing, chemical cleaning, grit blast, plating, and paint), assembly, or operation (acceptance test), which if nonconforming, missing or degraded, could cause the failure or malfunction of the CSI.

(2) ***Depot critical characteristic*** - Any feature during maintenance/overhaul/repair such as dimension, finish, material, assembly, inspection process, special process (i.e., heat treat, brazing/welding, plasma, shot peening, non-destructive testing, chemical cleaning, grit blast, plating and paint), assembly, operation (acceptance test), or depot overhaul/repair requirement which, if nonconforming, missing or degraded during maintenance/overhaul/repair could cause the failure or malfunction of the CSI.

(3) ***Installation critical characteristics*** - Any feature such as proper assembly, installation sequence or technique, use of special tools/fixtures, hardware, safety wire, orientation, or torque which if nonconforming, missing or degraded could cause the failure or malfunction of the CSI. Installation Critical does not imply that the part simply must be installed.

i. ***Critical safety item (CSI) -*** A part, assembly, installation equipment, launch equipment, recovery equipment, or support equipment for an aircraft or aviation weapon system that contains a characteristic any failure, malfunction, or absence of which could cause a catastrophic or critical failure resulting in loss or serious damage to the aircraft or weapons system, an unacceptable risk of personal injury or loss of life, or an un-commanded engine shutdown that jeopardizes safety. (*Note: For the purpose of this standard "Critical Safety Item," "Flight Safety Critical Aircraft Part," "Flight Safety Part," "Safety of Flight Item," and similar terms are synonymous. The term Critical Safety Item shall be the encompassing term used throughout this standard.*)

j. ***Depot Maintenance Work Requirement (DMWR)*** – A maintenance serviceability standard for depot-level reparables designated for repair and return to AWCF stock. It prescribes the scope of work to be performed on an item by organic depot maintenance facilities or contractors, and/or qualified below-depot sources of repair; types and kinds of materiel to be used, and quality of workmanship.

k. ***Deviation*** **-** A written authorization to depart from or make a change to a Depot Maintenance Work Requirement (DMWR) requirement or other ESA approved overhaul requirement. Deviations are intended only as one-time departures from established requirements for specified items and are not intended to be repeatedly used in place of formal engineering process changes.

l. ***Engineering support activity*** **(*ESA*) -** The Military Service organization assigned responsibility and authority to perform and approve engineering and quality assurance actions necessary to evolve detail design disclosures for systems, subsystems, equipment, and components exhibiting attributes essential for products to meet specific military requirements. During the operational phase, it includes any engineering activity, the results of which would add or alter the design of equipment in such a manner, or to such an extent, as to change its operational capabilities or its design attributes of performance, reliability, maintainability and parts interchangeability, or to render it capable of alternative or additional use. For the purpose of this standard, the ESA is the Service's Aircraft Airworthiness Authority and Design Control Activity, which for the Army is the Combat Capabilities Development Command (DEVCOM) Aviation and Missile Center (AvMC) Systems Readiness Directorate (SRD).

m. ***Flight safety critical aircraft part*** **(*FSCAP*) -** Refer to definition of "Critical Safety Item." For the purpose of this instruction "Critical Safety Item, "Flight Safety Critical Aircraft Part", "Flight Safety Part", "Safety of Flight Item", and similar terms are synonymous. The term Critical Safety Item shall be the encompassing term used throughout this instruction.

n. ***Frozen process plan*** **-** The documentation, such as a shop traveler or router, by which contractors will control manufacturing, repair, and/or overhaul processes to achieve consistent quality results in the processing of CSI designated features/characteristics of parts and assemblies.

o. ***Maintenance Engineering Order (MEO)*** – A change to authorized maintenance practice(s) to ensure continuous airworthiness and serves as a publication change document. It is used to update, correct, or change the current prescribed technical and/or maintenance procedures, inspection criteria, and processes in the appropriate technical manual (hard copy and electronic media, all versions) for the end item.

p. ***Materiel review board*** **(*MRB*) -** The formal contractor-government board established for the purpose of reviewing, evaluating, and disposing of specific nonconforming supplies or services, and for assuring the initiation and accomplishment of corrective action to preclude recurrence.

q. ***Mishap severity category I, catastrophic*** **-** A mishap that could result in one or more of the following: death, permanent total disability, irreversible significant environmental impact, or monetary loss equal to or exceeding $10M.

r. ***Mishap severity category II, critical*** **-** A mishap that could result in one or more of the following: permanent partial disability, injuries or occupational illness that may result in hospitalization of at least 3 personnel, reversible significant environmental impact, or monetary loss equal to or exceeding $1M but less than $10M.

s. ***Nonconformance*** **-** The failure of an item to meet a defined characteristic or process parameter or a programmatic failure that could lead to this type of failure of an item.

(1) ***Nonconformance, critical*** **-** A nonconformance that is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the supplies or services or one that is likely to prevent performance of a vital agency mission. Critical nonconformance includes departures from specified requirements in any critical characteristic or process or departures from unspecified requirements where the consequences would be catastrophic or critical.

(2) ***Nonconformance, major*** - A nonconformance, other than critical, that is likely to result in failure or to materially reduce the usability of the supplies or services for their intended purpose. Major nonconformances involve items which depart from contract requirements and typically affect one or more of the following major areas: performance, durability, interchangeability, effective use or operations, weight or appearance (where a factor), health or safety.

(3) ***Nonconformance, minor*** - A nonconformance that is not likely to materially reduce the usability of the supplies or services for their intended purpose or is a departure from established standards having little bearing on the effective use or operation of the supplies or services. Minor nonconformances are departures from contract requirements and do not affect any of the criteria specified as major Nonconformances.

t. ***Organic*** **-** Assigned to and forming an essential part of the military organization. Organic parts of a unit are those listed in its table of organization for the Army, Air Force, and Marine Corps, and are assigned to the administrative organizations of the operating forces for the Navy. Organic facilities are government owned facilities.

u. ***Original equipment manufacturer*** **(*OEM*) -** An OEM is the individual, activity or organization that performs the physical fabrication processes that produce the deliverable part or other items of supply for the prime contractor. The OEM is granted design responsibility by the prime contractor for preparation and updates to drawings and technical data.

v. ***Overhaul*** **-** The process of disassembly sufficient to inspect all the operating components and the basic end article. It includes the repair, replacement, or servicing as necessary, followed by the reassembly and bench check or flight test. Upon completion of the overhaul process, the component or end article will be capable of performing its intended service life or service tour.

w. ***Process planning control board (PPCB) -*** A high level control board composed of personnel from quality, manufacturing, field service, engineering, safety, and other appropriate departments. This board is responsible for controlling the contractor's CSI program. This board will formulate CSI requirements, review, and formally approve all aspects of the CSI program. The responsibilities of the board shall be clearly defined, and a single organizational element shall be assigned overall responsibility for the program. This can also be known as a Contractor's Control Board (CCB) for commercial suppliers.

x. ***Procurement contracting officer (PCO) -*** A contracting officer who initiates and signs the contract. *See Contracting Officer*.

y. ***Product Verification Audit (PVA)*** - The physical examination, functional testing, disassembly, inspection, re-assembly, and re-setting to a serviceable condition of an item so that full determination of conformance to specifications can be verified. The audit will also include correction of defect(s) noted during the audit. PVAs are management tools used for the validation and evaluation of the conformance of items to procedural and technical requirements. The PVA is not intended to be used as a routine means of sampling or evaluating normal quality control inspections.

z. ***Restricted source subcomponent –***Subcomponents to an assembly that must be purchased from ESA approved sources.

aa. ***Waiver -*** A written authorization granted after contract award to accept an item that during production, or after having been submitted for inspection or acceptance, is found to depart from contract or specified configuration requirements. Waivers are intended only as one-time departures from an established configuration for specified items or lots and are not intended to be repeatedly used in place of formal engineering changes.

5.0 Policy

U. S. Army will only allow M&O on CSIs by approved sources, per Public Law 108-136 and DoD policy. To maintain the integrity and quality of CSI components, sub-assemblies, and assemblies undergoing M&O, contractors providing such services are required to adhere to the requirements of this document in its entirety. If a contractor has difficulty in maintaining process control as evident through such things as adverse internal management audits, customer audits, the receipt of quality deficiency reports or other findings, then the contractor shall take immediate corrective action for the current contract (commercial) or statement of work or equivalent (organic). Failure to take effective corrective action could affect future awards to that contractor.

5.1 Critical safety item determination

The SRD, as the ESA for the US Army Aviation, is the sole authority for determining CSIs and their associated CCs. This standard applies to CSIs and CCs identified by the ESA and as flowed down to the contractor via contract, DMWR, statement of work, or M&O Requirement Data Package.

6.0 Requirements

All requirements of this document shall be complied with by a contractor receiving a contract or statement of work for M&O of a CSI. If the process or processes that involve a CC is subcontracted, this document must be imposed, in its entirety, on the subcontractor performing the work. If, during M&O replacement parts are required that are not identified on the repair parts lists, the contractor will contact the PCO (or ESA for Organic facilities) for instructions on how to procure these parts. All requests by the commercial contractor for ESA approval, when required by this standard, shall be submitted and received through the Contracting Officer, if the contractor is on an active contract.

6.1 Overhaul planning

6.1.1 General requirements

All CSI assemblies, CSI components, and non-CSI subcomponents shall have revision-controlled planning including processes to be performed during the overhaul of the item. Processes include all steps performed during overhaul, including disassembly, assembly, inspections, and repair instructions. All procedures shall be clearly defined and the values of characteristics recorded as applicable per DMWR or ESA authorized M&O procedure. Values may be recorded on process sheets, routers, or separate inspection sheets. Process plans shall clearly identify all processes performed by subcontractors and the subcontractors performing the process.

6.1.2 Plan content for processes affecting critical characteristics

In addition to the requirements of 6.1.1, these requirements apply to planning affecting CCs. Any M&O process that has the potential to directly affect CCs must be controlled by detailed procedures. These procedures shall outline each step or parameter of the process along with any required materials, tooling, equipment, or operator certification. CCs are identified in the DMWR or other ESA authorized M&O procedure. Processes include all steps performed during overhaul, including disassembly, assembly, inspections, and rework instructions. When a current preexisting industry specification, called out in a DMWR or TM, exists, applicable portions of that specification may be referenced, and any deviations shall be annotated in the plan. Plans shall clearly identify all CCs and will include identification, in accordance with contractor procedures, as to its particular revision. Process plans

shall clearly identify any subcontractors that perform critical processes, clearly define sequence of operation, define machine type needed to execute the process or operation, identify the specific machine or test measurement and diagnostic equipment (serial number) used to execute process or operation (must be recorded in the operation affected in order to maintain traceability), and define accept/reject limits for the specific process or operation. Critical processes that cannot be objectively verified (e.g., disassembly or destructive testing is required to verify the process) shall clearly define process-operating parameters with tolerances. Plans shall also reference process plans (for processes such as shot peening and NDI).

6.1.3 Plan content requirements

a. Sequential operations. All disassembly, repair/overhaul, assembly, and inspection points shall be controlled by detailed sequential procedures outlining each step or parameter of the process along with any materials, tooling, computer numeric controlled software or tape numbers, equipment, machine type, environmental control, operator certification required that leads to the specific production of an end item.

b. Location specific: Identify the place of overhaul at the top of every page, preferably, or at a minimum on the first page of the planning. The identification shall include the contractor's name, address, and CAGE code.

c. Detailed procedures. Clearly define operating parameters with tolerances of any processes not verified by subsequent non-destructive inspection. Exposures to heat, such as stress relief, hydrogen embrittlement bake relief, cure cycles, use of heat lamps, drying ovens, etc., shall be identified as separate operations. Surface treatments, such as shot peening, plating, painting, bond surface preparation, etc., shall also be identified as separate operations. Processes that require unique "process/technique" sheets shall reflect the requirements in the applicable process specifications. For example, stating "shot peening per SAE AMS 2430" is not considered a detailed procedure and shall be further elaborated upon with process/technique sheets showing set-up and control requirements. De- burring and breaking sharp edges shall be identified as separate operations. In addition, the accept/reject limits for the specific process, operation, and/or inspection should be clearly defined.

d. Traceable inspections. In-process and final inspections shall be traceable to specific serial numbers (S/N) or lot numbers when authorized by the ESA.

e. Identification of critical characteristics. Clearly identify all CCs so as to draw attention to them (any method is acceptable, but stars are preferred) and inspect/verify all CCs prior to moving to a subsequent operation.

f. Actual critical characteristic values measures. A location shall be included on the planning router/traveler to document the measured/inspected value of each CC and any other DMWR required inspections by S/N (or lot number); e.g. hardness, critical dimension, torque, and the S/N of tool, machine, or fixture used. If CCs are recorded on separate inspection method sheets, those sheets shall be included with the planning and conform to all CSI planning requirements. Measurement values of "pass/fail" for CCs are not permitted, unless authorized by the ESA.

g. Subcontracted special process affecting critical characteristics. The source and planning of any subcontracted special process that affects a CC shall be included. Outside sources performing any operations shall be identified by CAGE Code, name and address. Only one subcontractor shall be listed per outsourced operation unless otherwise approved by the Government. If operations affecting CCs are being performed by an outside contractor, then the subcontractor planning is considered part of the planning that must be approved by the Government prior to FAT, PVA, or start of production, as applicable.

h. Planning revision. Planning date and planning revision shall be listed on the first page of the Contractor's planning at a minimum, but it is preferred to be on every page of the planning. In addition, the planning shall identify, where applicable, the revision(s) of the Depot Maintenance Work Requirement (DMWR), Maintenance Engineering Orders (MEOs), etc., used in its generation. The planning shall clearly show on each page a sequential page number, and state that the item is a CSI and reference QE-STD-2, or an ESA approved equivalent CSI program, if applicable.

i. Purchased subcomponents or M&O services. Manufacturing and M&O sources by CAGE code for restricted source subcomponents not manufactured/overhauled in-house shall be provided as part of the planning package in the form of a Bill of Material (BOM), a separate Approved Vendors List (AVL) or equivalent documentation, or listed in the applicable operational step where the subcomponent is incorporated into the assembly. If a separate AVL or an equivalent type of list is provided, then additional traceability and document control data demonstrating how the contractor controls the suppliers on the list may be required during Government planning reviews. All restricted source parts must be overhauled or purchased from Army approved sources. If there are CSI subcomponents purchased to overhaul an assembly, then the planning shall have a place to record the S/N and CAGE code for the purchased CSI(s); if the CSI is not serialized, then lot number is required in lieu of S/N. Where New Source Testing (NST) is required for a part, only approved and tested sources may be used.

j. Revision history. All changes to the planning, since original Government approval, shall be documented in a Revision Block which shall clearly state the reason for revision, date of revision, and what operations or steps were affected.

k. Approved process sources. The supplier of any process outsourced by the Contractor that affects a CC shall be approved by the ESA.

l. Subcontractor planning. Any subcontracted suppliers shall meet the planning requirements listed above.

6.1.4 Frozen planning requirements

a. Management of frozen planning. The contractor is responsible for developing M&O planning. Effective management of frozen planning revisions assures process traceability and validity. Revision controls, enabled by frozen planning, allow the identification of repair and overhaul methods in effect during a specific period of time. Review and control of these plans will be the responsibility of the PPCB composed of personnel from quality, manufacturing, field service, engineering, safety, and other appropriate departments, and equipped with adequate resources to assure the development of complete, reliable, and traceable documentation. All processes shall have written process sheets approved through the contractor's PPCB.

b. When planning is considered frozen. Parts maintained and overhauled utilizing these plans shall meet all contractual requirements. Plans developed for the M&O of a CSI shall be approved by the ESA and shall be frozen at the time the PVA is approved by the Government, or when a PVA is not required, prior to induction of the first M&O asset. Although a Government run PVA is the preferred method, any ESA authorized method of reviewing, verifying, and approving a frozen process plan, in its entirety, may be used instead. Process parameter plans/technique sheets affecting a CC shall also be frozen and require ESA approval.

c. Continuity of frozen planning. Once frozen, plans shall remain frozen throughout the existing contract and all subsequent contracts for M&O of the item unless changes to the planning are made in accordance with this standard. In addition, all plans shall be made available to the Government at any time upon request. For future contracts, verification of the currency of this planning will also be required at the time of bid submission by resubmitting the plan through the Contracting Officer or designated representative.

d. Unauthorized planning submittal. Standard Army Aviation Forms (or other military forms) shall not be used as a contractor's frozen planning process.

6.1.5 Changes to frozen planning

Any changes to a frozen M&O plan require approval from the contractor's PPCB. Changes to or affecting a CC shall also be approved by the ESA prior to implementation. Commercial facilities must get this approval through their Procurement Contracting Officer (PCO). Organic facilities may forward changes directly to the ESA or through a coordinating office as appropriate. Changes that do not affect a CC may be implemented by the PPCB without ESA approval. All changes to frozen planning affecting CCs will be reviewed by the PPCB and evaluated for potential risks or impact to upstream and downstream overhaul processes. The justification and impact analysis for any changes proposed shall be described in the change order. If a subcontractor makes a change to a frozen M&O plan, the recommended change shall be reviewed as described above and forwarded to the contractor's PPCB.

6.1.5.1 Changes affecting a critical characteristic

Changes affecting a CC are changes to the Frozen Planning that may negatively alter the characteristic or affect the ability to inspect that characteristic. The changes may be to upstream and downstream processes, in addition to changes to the critical characteristic itself. If it is unclear whether a change will affect a CC, the plan shall be submitted for ESA review. The following are examples of process changes that could affect a CC:

a. Grinding processes performed after a critical heat treat, including changes to wheel speed and type, feed rates, etc.
b. Sequence of operation, where changing the sequence affects the ability of an inspection to detect Nonconforming characteristics.
c. Shot peening shot size, coverage area, spray angle, feed rate, intensity, post cleaning, etc.
d. Change of location or facility where the operation is performed.
e. Change of machinery, tooling, or equipment used to perform the CC operation.

6.1.5.2 Changes in company status

Changes in company status, including name changes, CAGE changes, location changes, quality program changes, and changes in ownership, shall be submitted to the ESA so that the ESA can verify the changes will not affect the contractor's source approval or the quality and conformance of the parts produced. *Note: When a contractor changes subcontractors, it is considered a change to frozen planning, even if the processes performed by both subcontractors are identical*.

6.2 Audits

a. Contractor self-audits. Contractors shall perform self-audits of their frozen M&O planning and their quality program for compliance to QE-STD-2 requirements. At a minimum, audits shall be performed annually on the contractor's quality program. Audits on individual aspects of compliance to QE-STD-2 (i.e. record keeping, calibration, etc.) may be performed at different points throughout the calendar year. Audits of frozen M&O planning shall be performed at the start of each M&O contract or when process changes occur, whichever occurs first. The contractor shall also at minimum perform an annual audit of all current frozen M&O plans. A representative sample may be used but only plans for parts in current production (within the last year) shall be used for sampling. Samples must be chosen such that a company has complete coverage of all current production planning over 5 years. All audit findings shall be recorded, and corrective actions shall be documented.

b. Audits of subcontractors and subcontractor self-audits. Subcontractors performing work that affects a CC shall conduct internal audits as described above. Contractors shall audit subcontractors annually to verify the effectiveness of the subcontractor's internal audit process and compliance to QE-STD-2 and maintain records verifying their subcontractors are in full compliance with the audit requirement. On-site audits shall be performed at a minimum every 3 years or when a subcontractor's quality processes change, whichever occurs first.

6.3 Critical characteristics

6.3.1 Inspection of critical characteristics

All CCs which can be nondestructively inspected and/or tested shall be subjected to 100 percent inspection by the contractor or subcontractor; however, assemblies containing CCs need only be disassembled to the extent required by the statement of work to return the assemblies to a serviceable condition, in these cases inspection of CCs is not necessary. All completed work instructions shall identify the CSI part number, serial or lot number, and characteristic inspected. CCs shall be identified on the work instructions in such a manner as to draw attention to them. Inspection of CCs must be performed by certified personnel who have completed a training/certification program required to perform such inspections as outlined in section 6.5. Quality Control (QC) personnel shall verify that the recorded values meet any tolerance requirements in addition to verifying that the inspection was performed. All inspections of critical characteristics shall be recorded by S/N (or lot number, if serialization is not required), part number, characteristic inspected, actual reading or dimension observed, date of inspection, identity of inspector, calibrated tooling, and all required inspection certifications. Several factors influence decisions regarding contract quality assurance, such as production volume, quality history, stability of the production process, etc. When critical characteristics are identified in the DMWRs, MEOs, by the ESA, or by contractual requirements, all CCs will be 100 percent inspected. In cases where the inspection method alone is specified as the CC, the requirement is to meet the acceptance criteria specified in the DMWR or other tech data, not simply to perform the inspection. An example of a critical inspection method is Fluorescent Penetrant Inspection (FPI). FPI is often defined as a CC, but absence of cracks, inclusions, etc. beyond specified limits would be the acceptance criteria required to meet the CC.

6.3.2 Nonconforming critical characteristics

Nonconforming CCs shall not be dispositioned "use as is" or repaired unless the process has been approved though the PCO or by the ESA. Rework to DMWR or other Army approved procedures are acceptable. Waivers or deviations may be requested from the ESA or as specified in the contract. Request for waivers/deviations of CCs shall be classified as critical and will be forwarded to the ESA (organic) or to the ESA through the PCO (commercial) for approval/disapproval. Nonconformances to processes that measure or inspect CCs or processes that are used to establish a CC may be submitted to the ESA (through the Defense Contracts Management Agency (DCMA) for commercial) by the MRB if the actual CC is conforming (e.g., nonconforming hardness results when tensile strength is the CC).

6.3.2.1 Materiel review board

a. *Evaluation of nonconformances/planning changes.* An MRB is a formal contractor-Government board established for the purpose of reviewing, evaluating, and dispositioning of specific nonconforming materials or processes and for assuring the initiation and accomplishment of corrective action to preclude recurrence. The Government is not required to be a formal member of a commercial supplier's MRB unless specifically directed by contract. MRBs are responsible for categorizing Nonconformances as "critical", "major", or "minor" and ensuring they are dispositioned accordingly. All MRB decisions resulting in any CSI Nonconformance, to include Nonconformances that do not affect a CC, must be approved or disapproved by the Government. The ESA will make the determination to accept or reject minor Nonconformances. For commercial contracts, the ESA may delegate that authority to the cognizant DCMA Quality Assurance Representative (QAR). For an organic government entity, the cognizant ESA dispositions the material or process but is not necessarily part of the MRB.

b. *Major and critical nonconformances*. All major and critical Nonconformances to CSIs (including Nonconformances to CCs) must be reviewed and approved by the ESA. This authority may not be delegated. The ESA also approves all minor Nonconformances unless this authority is delegated to the QAR. Additionally, exceptions to CCs must be approved by the ESA. Where the CSI is used by more than one Service (i.e., the item is a common-use CSI), Nonconformances shall be coordinated through the ESA. Nonconformances to CCs of common-use CSIs must be approved by the ESA.

6.3.3 Installation of critical safety items

Modification of CSIs during installation is prohibited unless approved by the ESA in the DMWR and/or MEO via an alternate repair/installation procedure. Modification of CSIs that are specifically designed for modification during installation such as fuel lines, hydraulic lines, pneumatic lines, wiring, etc. shall be allowed. Prior to installation of replacement CSIs not drawn from "ready for issue" inventory, the contractor shall ensure that the cognizant ESA has approved all required maintenance actions.

6.3.4 Contradictory critical characteristics

In the event of contradictions within the DMWR and/or between the DMWR and other ESA approved technical data, all work pertaining to the CC in question shall be stopped until a written resolution to the contradiction is issued. This contradiction shall be brought to the immediate attention of the ESA through the PCO (in the case of a commercial entity), or the ESA for organic facilities. Work will resume when the written resolution is received and implemented.

6.3.5 Delivered nonconformances

Contractors who discover that previously delivered CSIs may contain a nonconformance must immediately notify the PCO (ESA for organic entities). This requirement applies to all potential Nonconformances on a CSI or its subcomponents and is not limited to nonconforming CCs. Notification shall include a description of the suspected nonconformance, contract number, nomenclature, part number, NSN, and affected S/Ns, or lot number (when applicable). DFARS 252.246–7003, *Notification of Potential Safety Issues*, requires contractors to promptly notify the Government of all Nonconformances of designated CSIs acquired by the Government and of all Nonconformances or deficiencies (i.e., not limited to critical characteristics) of *any* part that may result in a safety impact. Contractors shall notify the ACO and the PCO, and the organic facilities shall notify the ESA as soon as practicable, (but not later than 72 hours) after discovering or acquiring credible information concerning Nonconformances and deficiencies. The Contractor shall issue a written notification to the ACO and the PCO or the ESA (organic) within 5 working days.

6.4 Traceability

Documentation is required to demonstrate, to the Government's satisfaction, the contractor's ability to provide all information necessary to trace the items back through the overhaul and inspection process in the event of an item failure. The required overhaul process information includes date and place of overhaul and additional information as appropriate, such as verification of all aspects of government furnished material, overhaul processes, special processes, personnel certifications, assembly, inspection, installation, and repair. Traceability of an assembly must include traceability through all subassembly CSIs, including the processes described above. Traceability is enabled by effective serialization and/or marking.

6.4.1 Forward and backward traceability

Backward traceability is the ability to trace a Nonconformance back to the process that produced the Nonconformance. Forward traceability is the ability to trace a Nonconformance to all items overhauled to the Nonconforming process. Contractors shall maintain a level of traceability such that they are able to provide both levels of traceability. Contractors shall notify the government in the event of a discovered non-conformance on delivered items in accordance with section 6.3.5 requirements.

6.4.2 Serialization and marking

a. Traceability through serialization. The ability to trace parts to specific manufacturers, overhaul sources, and processes/materials used in production/overhaul is essential. Traceability involves documented evidence that the item to be supplied was/will be manufactured and/or maintained by the contractor is identical to the product that was initially manufactured, and is in full compliance with all specifications, drawings, storage, packaging, and handling requirements, and other associated requirements. Documentation is required to demonstrate, to the Government's satisfaction, the Government's ability to obtain all information necessary to trace the items back through the manufacturing/overhaul/repair and inspection process in the event of the item failure. The manufacturing/overhaul/repair process information includes date and place of actual manufacturing/overhaul/ repair and additional information as appropriate, such as verification of all aspects of material, manufacture, special processes, personnel certifications, assembly, inspection, installation, overhaul, and repair. Traceability is enabled by effective serialization and/or marking.

b. Traceability through part marking. A serial number is a combination of numbers and/or letters assigned to an item that separately identifies one individual item from all others. All CSIs require individual serialization on the part as well as the packaging, unless it is not practical due to size, material property, excessive cost, or other requirements as specified by the ESA. When it is impractical to establish serial numbers on the item itself, CSIs should have distinguishable marking schemes approved by the ESA. Marking schemes may include color coding, imprinting, or other distinguishing marks that do not affect form, fit, or function. The marking scheme should be reflected in all applicable technical documentation. Serial numbers should be marked in accordance with MIL-STD-130, Identification Marking of U.S. Military Property, or other contract requirements. All serialized and lot numbered CSIs should be documented and reported (including material scrapped during manufacturing/overhaul) to the Contracting Officer, Contracting Officer's designee (e.g., DCMA), or directly into the appropriate tracking system for organic facilities.

c. Prohibited marking practice. Rebranding (i.e., remarking or relabeling) by suppliers which obscures the marking of the OEM of CSIs is prohibited. Original S/Ns shall also be preserved throughout the overhaul process.

Note: Refer to DFARS 252.211-7003, Item Unique Identification (IUID) Requirements, and DFARS 211.274, Item Identification and Valuation, for additional information and guidance regarding IUID.

6.4.3 Traceability of records

All records relating to CSI shall be traceable to the date and place of M&O. Records must provide the degree of traceability required to enable subsequent verification of all aspects of material, manufacture and/or repair, special process, personnel certification, variability control charts (if applicable), assembly, and inspection of CCs. Special processes include but are not limited to heat treat, shot peening, and nondestructive testing. For serialized parts requiring traceability from the raw material to the finished product "actual test readings" must be recorded. For parts not individually serialized or assigned serialization upon lot/batch completion, a pass/fail inspection standard is acceptable provided the number of accepted/rejected units is recorded.

6.4.4 Retention of records

The contractor shall retain copies of all records generated pursuant to this standard and make these records available to the Government upon request. The documents may be retained electronically (i.e., scanned and stored on a database), provided that the information, signatures, stamps, and all other data on the scanned documents are legible. The data must be backed up regularly to a back-up server and a contingency plan and/or data recovery procedure must be in place for transfer of the backed-up data to off-site servers in the event of a disaster. Notwithstanding that the FAR requires contractors to retain copies of all records generated for a period of 3 years after final payment (FAR 4.703). SRD requires that records for CSI repair/overhaul shall be retained at least ten years after the contractor ceases to repair/overhaul the part for which this standard applies. Records shall be maintained in a suitable format, and the medium must be appropriate to ensure durability and readability over the required storage period. Furthermore, at the end of this period, or in the event of relocation or shutdown, all records shall be offered to the PCO prior to disposal (or the ESA for organic facilities).

6.5 Personnel requirements

Personnel performing work affecting conformity to product requirements shall be competent on the basis of appropriate education, training, skills, and experience. The contractor shall ensure that its personnel are aware of the relevance and importance of their activities and how they contribute to ensuring the product conformity to CSI requirements.

6.5.1 Personnel training

The contractor shall establish a training program covering the requirements of this document that apply to personnel performing work or inspections on CSIs. All contractor personnel performing work or inspections on CSIs shall be subject to annual training, and records of that training shall be maintained per section 6.4. The contractor shall establish training programs for processes required to manufacture or overhaul a CSI and maintain training records for personnel performing the operations or inspections.

6.5.2 Certification/qualification of personnel

a. Competence of personnel. Contractor personnel performing work or having inspection responsibilities pertaining to CCs shall be certified to the appropriate professional level. If an industry standard or any other generally accepted requirement exists, personnel performing the work or having inspection responsibilities shall be certified. Certification may be obtained through an internal or external certification program. When no industry standard, or generally accepted requirement exists, then a re-current qualification training program (demonstrating technical proficiency and competency of inspection/maintenance personnel) must be developed and managed by the contractor organization. Personnel must be re-certified in accordance with applicable industry standards, or re-certified at a minimum every 3 years if no industry standard exists, to ensure personnel competence.

b. Certification program. All training, qualification, or certification of personnel shall be properly documented and maintained. The contractor organization is responsible for developing the frequency for re-training or re-certification, depending upon the industry standard requirements or type of skill required to perform a function. A system for tracking personnel certification and qualification shall be an element in the contractor internal audit program to assure all certifications and qualifications are maintained in a current status.

6.6 Test, measurement, and diagnostic equipment (synonymous with Measurement and Test Equipment)

6.6.1 Calibration

Test, measurement, and diagnostic equipment (TMDE) used in a facility to inspect and test a product shall be properly maintained and calibrated according to National Institute of Standards & Technology (NIST) standards or other ESA approved standards. These standards outline requirements for calibration frequency and status, records, environmental controls, adequacy of measurement standards, calibration procedures and corrections for out-of-tolerance conditions. Calibration of inspection equipment shall be in accordance with contractual requirements or statements of work. All aspects of the supplier's calibration confirmation system shall be subject to Government verification at unscheduled intervals. The supplier's TMDE shall be made available for use by the Government, as needed. All measuring equipment that is used to measure CCs shall be monitored for accuracy and reproducibility.

6.6.2 Tolerance

TMDE used to inspect CSIs must have discrimination/accuracy to within 10 percent (10:1 Rule) of the total tolerance spread for the feature being inspected except as follows: For total tolerance spreads less than .001, TMDE must be discriminate to 20 percent of the spread. For example, a dimension of 1.05 +/-0.02 has a tolerance spread of 0.04 (1.03-1.07). An acceptable measurement device must have an ability to discriminate to 0.004 or less. A dimension of 1.0005 +/-0.0003 has a tolerance spread of 0.0006 (less than 0.001). An acceptable measurement device must have an ability to discriminate to 0.00012 or less.

6.7 Government furnished material

When material is furnished by the Government, the contractor's procedures shall include, as a minimum, the following:

a. Examination upon receipt to detect damage in transit.

b. Inspection for completeness and proper type.

c. Periodic inspection and precautions to assure adequate storage conditions are maintained, and to guard against damage from handling and deterioration during storage.

d. Functional testing, either prior to or after installation, or both, as required by contract to determine satisfactory operation.

e. Identification and protection from improper use or disposition.

f. Verification of quantity.

g. Damaged/nonconforming Government Furnished Material (GFM) shall be identified as such and is to be segregated in a secure controlled area pending Government disposition instructions. The contractor may be required to submit a Product Quality Deficiency Report (PQDR) against nonconforming GFM.

6.8 Subcontractor requirements

6.8.1 Purchasing documents

All purchase orders/contracts for subcontracted CSIs must clearly identify the part as a CSI and identify all CCs. Purchase orders for CCs or processes affecting CCs must clearly identify that the work to be performed is a CC or affects a CC. Purchase orders to subcontractors for CSIs and CCs must also contain QE-STD-1 for replacement parts or QE-STD-2 for subcontracted overhaul processes. All documents and referenced data for CSIs shall be available for review by the Government to verify compliance. The contractor is responsible for obtaining and maintaining the certificates of conformance (CoC) for items and processes procured from subcontractors.

6.8.2 Local purchase

Organic Facilities purchasing CSIs at the unit/local level must have prior approval by the Service ESA and be justified by unusual and compelling urgency. When CSIs are procured locally, the buying activity shall notify the cognizant Item Manager. Commercial suppliers shall only procure source-controlled items from Army approved suppliers.

6.9 Higher level quality

The contractor shall have an acceptable higher level quality program in place. Certification to AS9100, AS9110, ISO9001, or NATO- AQAP-110 is considered an acceptable higher level quality program. In cases where the contractor is compliant with one of these programs but isn't certified, or when the contractor is certified to another quality program, the contractor shall request concurrence from the contracting officer that their quality program is acceptable.

6.10 Scrap material

Nonconforming CSIs that have been dispositioned as scrap material shall be properly segregated. Scrap material shall be either returned to the government if it is government owned material or mutilated beyond repair and rendered unusable. This requirement also applies to in-process Nonconforming material or fallout. If the contract contains a Serial Number Reporting Requirement (SNRR), the contractor shall report all serial numbers scrapped in addition to the serial numbers delivered to the government.