MILITARY STANDARD

DEFENSE SYSTEM

SOFTWARE QUALITY PROGRAM

AMSC NO. A4389

AREA QCIC

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DOD-STD-2168

DEPARTMENT OF DEFENSE
Washington, D.C.   20301

Defense System Software Quality Program

1.   This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2.   Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ /ARDEC/SMCAR-FSC, Picatinny Arsenal, NJ 07806-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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FOREWORD

1. This standard contains requirements for the development, documentation, and implementation of a software quality program. This program includes planning for and conducting evaluations of the quality of software, associated documentation, and related activities, and planning for and conducting the follow-up activities necessary to assure timely and effective resolution of problems.

2. This standard, together with other military specifications and standards governing software development, configuration management, specification practices, project reviews and audits, and subcontractor management, provide a means for achieving, determining, and maintaining quality in software and associated documentation. This standard incorporates the applicable requirements of MIL-STD-1520 and MIL-STD-1535.

3. This standard implements the policies of DODD 4155.1, Quality Program, and provides all of the necessary elements of a comprehensive quality program applicable to software development and support. This standard interprets the applicable requirements of MIL-Q-9858, Quality Program Requirements, for software.

4. The Data Item Description (DID) applicable to this standard is identified in Section 6. When used in conjunction with this standard, this DID provides a vehicle for documenting and communicating information relevant to the requirements specified herein. Production of deliverable data using automated techniques is encouraged.

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1. SCOPE

1.1 Purpose. The purpose of this standard is to establish requirements for a software quality program to be applied during the acquisition, development, and support of software systems.

1.2 Application. This standard applies to the extent specified in the contract clauses, the Statement of Work (SOW), and the Contract Data Requirements List (CDRL). The term "software quality program requirements" as used herein refers to the collective requirements of this standard.

1.2.1 Non-deliverable software. Requirements for non-deliverable software are identified in paragraph 5.6.

1.2.2 Firmware. This standard applies to the software element of deliverable firmware. Paragraph 5.6 identifies requirements for the software element of non-deliverable firmware.

1.2.3 Software support. When this standard is applied to software support, the term "software development" should be interpreted to mean "software support," and the requirements of the standard apply to the organization performing the software support.

1.2.4 Government agencies. The provisions of this standard may be applied to Government agencies. When a Government agency performs software quality program functions in accordance with this standard, the term "contractor" refers to that Government agency and the term "subcontractor" refers to any contractor of that Government agency.

1.3 Contracting agency. In each case in which this standard uses the term "contracting agency," it shall be interpreted to mean "contracting agency or its authorized representative."

1.4 Tailoring. This standard contains a set of requirements designed to be tailored for each contract by the contracting agency. The tailoring process intended for this standard is the deletion of non-applicable requirements.

2. REFERENCED DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this standard to the extent specified herein.

MILITARY STANDARDS

DOD-STD-480   Configuration Control - Engineering Changes, Deviations, and Waivers

DOD-STD-2167   Defense System Software Development

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this standard to the extent specified herein.

None.

(Copies of specifications, standards, handbooks, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer).

2.2 Other publications.

None.

3. DEFINITIONS

3.1 Certification. A process, which may be incremental, by which a contractor provides objective evidence to the contracting agency that an item satisfies its specified requirements.

3.2 Evaluation. The process of determining whether an item or activity meets specified criteria.

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3.3 Non-deliverable software. Software that is not required to be delivered by the contract.

3.4 Software plans. A collective term used to describe the contractor's plans, procedures, and standards for software management, software engineering, software qualification, software product evaluation, and software configuration management.

3.5 Software quality. The ability of a software product to satisfy its specified requirements.

3.6 Terms defined in DOD-STD-480. The following terms used in this standard are defined in DOD-STD-480:

Baseline
Configuration Control

3.7 Terms defined in DOD-STD-2167. The following terms used in this standard are defined in DOD-STD-2167:

Computer software (or software)
Computer software documentation
Firmware
Non-developmental software
Qualification
Software development library
Software engineering environment
Software support
Software test environment

3.8 Definitions of acronyms used in this standard. The following acronyms are used in this standard:

CDRL   Contract Data Requirements List
DID   Data Item Description
DOD   Department of Defense
DODD   Department of Defense Directive
FAR   Federal Acquisition Regulation
SQPP   Software Quality Program Plan

4. GENERAL REQUIREMENTS

4.1 Objective of the software quality program. The objective of the contractor's software quality program shall be to assure the quality of (a) deliverable software and its documentation, (b) the processes used to produce deliverable software, and (c) non-deliverable software, as specified in paragraph 5.6 of this standard.

4.2 Responsibility for the software quality program. Contractor personnel responsible for ensuring compliance with the software quality program requirements shall have the resources, responsibility, authority, and organizational freedom to permit objective evaluations and to initiate and verify corrective actions. The persons conducting the evaluation of a product or activity shall not be the persons who developed the product, performed the activity, or are responsible for the product or activity. This does not preclude members of the development team from participating in these evaluations. The contractor shall assign responsibility for the fulfillment of, and for ensuring compliance with, the software quality program requirements.

4.3 Documentation for the software quality program. The software quality program, including procedures, processes, and products, shall be documented in contractor format and shall provide implementing instructions for each of the requirements in sections 4 and 5 of this standard. The software quality program is subject to review by the contracting agency and may be disapproved by the contracting agency whenever the program does not meet the requirements of the contract.

4.4 Software quality program planning. The contractor shall conduct a complete review of the contract to identify and make timely provision for acquiring or developing the resources and skills required for implementing the software quality program. The contractor shall prepare the plans for applying the documented software quality program to the contract. These plans shall be documented in a Software Quality Program Plan (SQPP). The contractor shall place the SQPP under configuration control prior to implementation.

4.5 Software quality program implementation. The contractor shall implement the software quality program in accordance with the SQPP and shall adhere to the program for the duration of the contract. The software quality program shall be fully integrated with the activities required by the contract.

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4.6 <u>Software quality evaluations</u>. The contractor shall conduct on-going evaluations of the processes used in software development and the resulting software and associated documentation as specified in Section 5. These evaluations shall include a final evaluation of all software and associated documentation to assure that all contract requirements have been met and that internal coordination has been conducted in accordance with the software plans.

4.7 <u>Software quality records</u>. The contractor shall prepare and maintain records of software quality program activities required by the contract. The software quality records and software problem reports shall be made available for contracting agency review and shall be maintained for the life of the contract.

4.7.1 <u>Software quality evaluation records</u>. The contractor shall prepare a software quality evaluation record for each evaluation required by the contract. These records shall be in the contractor's format and shall contain the following items as a minimum:

a. Evaluation date.
b. Evaluation participants.
c. Evaluation criteria.
d. Evaluation results including detected problems, with reference to the appropriate software problem reports, as applicable.
e. Recommended corrective action.

4.7.2 <u>Other software quality records</u>. All other software quality records shall be prepared in the contractor's format.

4.8 <u>Software corrective action</u>. When problems or nonconformances with contract requirements have been detected, they shall be documented and shall serve as input for the contractor's software corrective actions. The contractor shall:

a. Assure that action is initiated to correct the defect and the cause of the defect, and that adverse trends are identified and reversed.

b. Monitor the software corrective actions, as specified in paragraph 5.3.5, to assure timely and positive corrective action.

c. Track the status of all problems detected in carrying out the requirements of this standard.

4.9 <u>Certification</u>. The contractor shall maintain and make available to the contracting agency documented, objective evidence that the software and associated documentation and activities required by the contract meet contractual requirements.

4.10 <u>Management review of the software quality program</u>. The contractor's management shall review the software quality program at intervals as specified in the SQPP to assure that the program complies with the contract and adheres to the SQPP.

4.11 <u>Access for contracting agency review</u>. The contractor shall provide the contracting agency with access to contractor facilities for review of all software products and activities required by the contract to determine compliance with the contract. Contracting agency review shall not constitute acceptance, nor shall it in any way replace evaluation by the contractor or otherwise relieve the contractor of his responsibility to furnish acceptable software and associated documentation.

5. DETAILED REQUIREMENTS

5.1 <u>Evaluation of software</u>. The contractor shall conduct on-going evaluations of all software to assure that:

a. The software complies with the contract.

b. The software adheres to the software plans.

5.2 <u>Evaluation of software documentation</u>. The contractor shall conduct on-going evaluations of the following software documentation:

5.2.1 <u>Evaluation of software plans</u>. The contractor shall evaluate the software plans to be used for the contract. The contractor shall assure that:

a. All software plans required by the contract have been documented.

b. The software plans comply with the contract.

c. Each software plan is consistent with other software plans and with system-level plans.

5.2.2 **Evaluation of other software documentation.** The contractor shall evaluate deliverable software documentation not covered in the preceding paragraph to assure that:

a. Each document adheres to the required format.

b. Each document complies with the contract.

5.3 **Evaluation of the processes used in software development.** The contractor shall conduct on-going evaluations of the following processes used in software development:

5.3.1 **Evaluation of software management.** The contractor shall evaluate the software management practices to assure compliance with the contract and adherence to the software plans.

5.3.2 **Evaluation of software engineering.** The contractor shall evaluate the software engineering practices to assure compliance with the contract and adherence to the software plans.

5.3.3 **Evaluation of software qualification.** The contractor shall evaluate the software qualification planning and conduct required by the contract to assure that:

a. The qualification plans and procedures include provisions for all software requirements.

b. Software qualification is conducted as required by the contract and as specified in the software plans.

c. The version number of each item being qualified and each item used in the qualification is documented.

d. The results of required qualifications are accurately recorded and analyzed to determine whether the software meets its specified requirements.

e. All software, hardware, firmware, and facilities required for qualification are available.

5.3.4 **Evaluation of software configuration management.** The contractor shall evaluate the software configuration management practices to assure compliance with the contract and adherence to the software plans.

5.3.5 **Evaluation of the software corrective actions.** The contractor shall evaluate the software corrective actions to assure that they comply with the software plans and that:

a. All problems detected in processes and in products that are under internal or contracting agency control are promptly reported and entered into software corrective actions.

b. Each problem is classified, as required by the contract, and analysis is performed to identify trends in the problems reported.

c. Action is initiated on the problems and adverse trends, resolution is achieved, status is tracked and reported, and records are maintained for the life of the contract.

d. Corrective actions are evaluated to: (1) verify that problems have been resolved, (2) verify that adverse trends have been reversed, (3) verify that changes have been correctly implemented in the appropriate processes and products, and (4) determine whether additional problems have been introduced.

5.3.6 **Evaluation of documentation and media distribution.** The contractor shall evaluate the controls exercised on the internal distribution of deliverable media and documentation. The contractor shall assure compliance with the contract and adherence to the software plans.

5.3.7 **Evaluation of storage, handling, and delivery.** The contractor shall evaluate the storage, handling, packaging, shipping, and external distribution of deliverable software and associated documentation. The contractor shall assure compliance with the contract and adherence to the software plans.

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5.3.8 <u>Evaluation of other processes used in software development</u>. The contractor shall evaluate all other processes used in software development that are required by the contract to assure compliance with the contract and adherence to the software plans.

5.4 <u>Evaluation of the software development library</u>. The contractor shall evaluate the software development library to assure that:

a. The library and its operation comply with the contract and adhere to the software plans.

b. The most recent authorized version of materials under configuration control are clearly identified and are the ones routinely available from the library.

c. Previous versions of materials under configuration control are clearly identified and controlled to provide an audit trail that permits reconstruction of all changes made to each configuration item.

5.5 <u>Evaluation of non-developmental software</u>. The contractor shall evaluate each item of non-developmental software to be incorporated into deliverable software to assure that:

a. Objective evidence exists, prior to its incorporation, that it performs required functions.

b. It was placed under internal configuration control prior to its incorporation.

c. The data rights provisions are consistent with the contract.

5.6 <u>Evaluation of non-deliverable software</u>. The contractor shall evaluate each non-deliverable software item used in the automated manufacturing of deliverable hardware or in the qualification or acceptance of deliverable software or hardware to assure that:

a. Objective evidence exists, prior to its intended use, that it performs required functions.

b. It was placed under internal configuration control prior to its use.

5.7 <u>Evaluation of deliverable elements of the software engineering and test environments</u>. The contractor shall evaluate each deliverable element of the software engineering and test environments to assure that:

a. It complies with the contract and adheres to the software plans.

b. Objective evidence exists, prior to its use, that it performs required functions.

c. It was placed under internal configuration control prior to its use.

d. The data rights provisions are consistent with the contract.

5.8 <u>Evaluation of subcontractor management</u>. The contractor shall evaluate all subcontractor activity to assure that:

a. All subcontractor developed software and related documentation deliverable to the contracting agency satisfies the prime contract requirements.

b. A set of baselined requirements is established and maintained for the software to be developed by the subcontractor.

c. Applicable software quality program requirements are included or referenced in the subcontract or purchase documents for the subcontractor.

d. Access is available for contractor reviews at subcontractor and vendor facilities.

e. The contracting agency has the right to review all software products and activities required by the subcontract, at subcontractor facilities, to determine compliance with the subcontract. Contracting agency review shall not constitute acceptance, nor shall it in any way replace evaluation by the contractor or otherwise relieve the contractor of his responsibility to furnish acceptable software and associated documentation.

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5.9 Evaluations associated with acceptance inspection and preparation for delivery. In support of software acceptance inspection and preparation for delivery, the contractor shall assure that:

a. All required software products are available and ready for contracting agency inspection.

b. All required procedures have been performed and evidence of satisfactory completion of these procedures is available for contracting agency inspection.

c. All deliverable software and documentation has been updated to reflect all changes approved by the contracting agency and scheduled for inclusion.

5.10 Participation in formal reviews and audits.

a. Prior to each formal review and audit, the contractor shall assure that:

(1) All required products will be available and ready for contracting agency review.

(2) All required preparations have been made.

b. At each formal review and audit, the contractor shall present an evaluation of the status and quality of each of the development products reviewed.

c. Following each formal review and audit, the contractor shall assure that all software-related action items assigned to the contractor have been performed.

6. NOTES

6.1 Intended use. In planning for the software quality program, it is permissible for the contractor to augment the activities required by the contract to satisfy internal requirements, as long as the additional policies and procedures do not conflict with the contract. It is further intended that the contractor use existing internal systems for the software quality program to the extent that they satisfy the requirements of this standard. Any augmentation of the activities to be performed or use of internal contractor systems for software quality program activities shall be documented in the SQPP.

6.2 Data requirements list and cross reference. When this standard is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of the DOD Federal Acquisition Regulation (FAR) Supplement 27.475-1 are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this standard are cited in the following subparagraphs.

Paragraph No.   4.4

Data Requirements Title   Software Quality
                                           Program Plan (SQPP)

Applicable DID No.   DI-QCIC-80572

(The Data Item Description related to this standard and identified in section 6 will be approved and listed as such in DOD 5010.12-L, AMSDL. Copies of DIDs required by contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.3 Subject term (key word) listing.

Evaluation
Certification
Software
Software Quality
Software Quality Program
Software Quality Program Plan

Custodians:
      Navy   - EC
      Army   - AR
      Air Force - 10, 26

Reviewing Activities:
      Navy   - MC, TD, OM, SH, AS
      Army   - SC, CR, MI, AV
      Air Force - 02, 14, 15, 17, 23, 95

Agent:
      Air Force - 10

Preparing activity :
    Army – AR

(project QCIC-0072)

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3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION *(Mark one)*

☐ VENDOR

☐ USER

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b. ADDRESS (Street, City, State, ZIP Code)

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) – Optional	b. WORK TELEPHONE NUMBER (Include Area Code) – Optional
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