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MIL-STD-45662
NOTICE 1
5 January 1983

MILITARY STANDARD

CALIBRATION SYSTEMS REQUIREMENTS

TO ALL HOLDERS OF MIL-STD-45662:

1. THE FOLLOWING PAGES OF MIL-STD-45662 HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
3	5 January 1983	3	10 JUNE 1980
4	5 January 1983	4	10 JUNE 1980

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

3. Holders of MIL-STD-45662 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 Military Standard is completely revised or canceled.

Custodians:
Army-MI
Navy-OS
Air Force-05
DLA-DH

Review Activities:
Army-AR, AV
Navy-AS, EC, SH
AF-15, 23, 85
DLA-ES

User Activities:
Army-ME
DLA-SS

Preparing Activity:
Army-MI

Project No. QCIC-0036

AREA: QCIC

quality shall have the capabilities for accuracy, stability, range, and resolution required for the intended use.

5.3 Environmental controls. Measuring and test equipment and measurement standards shall be calibrated and utilized in an environment controlled to the extent necessary to assure continued measurements of required accuracy giving due consideration to temperature, humidity, vibration, cleanliness, and other controllable factors affecting precision measurement. When applicable, compensating corrections shall be applied to calibration results obtained in an environment which departs from standard conditions.

5.4 Intervals of calibration. Measuring and test equipment and measurement standards shall be calibrated at periodic intervals established on the basis of stability, purpose, and degree of usage. Intervals shall be shortened as required to assure continued accuracy as evidenced by the results of preceeding calibrations and may be lengthened only when the results of previous calibrations provide definite indications that such action will not adversely affect the accuracy of the system. The contractor shall establish a recall system for the mandatory recall of standards and measuring and test equipment within established time limits or interval frequencies.

5.5 Calibration procedures. Written procedures shall be prepared or provided and utilized for calibration of all measuring and test equipment and measurement standards used to assure the accuracy of measurements involved in establishing product conformance. The procedures may be a compilation of published standard practices or manufacturer's written instructions and need not be rewritten to satisfy the requirements of this standard. As a minimum, the procedures shall specify either the measurement standard to be used or the required accuracy of the standard. The procedure shall require that calibration be performed by comparison with higher accuracy level standards.

5.6 Out of tolerance evaluators.

5.6.1 Adequacy of the calibration system. The contractor shall establish a procedure to evaluate the adequacy of the calibration system based on out of tolerance data generated from calibrating test and measuring equipment. The procedure shall include, but not be limited to, adjustment of calibration frequency, adequacy of the measuring or test equipment, calibration procedures and measuring or test procedures. The procedures shall specifically provide for the identification and prevention of use of any equipment which does not perform satisfactorily.

5.6.2 Notification of out of tolerance conditions. The contractor's procedure shall include the requirement for the calibration activity to notify the measurement and test equipment user or appropriate contractor element of significant out of tolerance conditions so that appropriate action can be taken by the contractor or test and measuring equipment user to correct possible nonconforming products. The procedure shall define what constitutes a significant out of tolerance condition.

5.7 Calibration sources.

5.7.1 Domestic contracts. Measuring and test equipment shall be calibrated by the contractor or a commercial facility utilizing standards whose calibration is certified as being traceable to the National Standards, has been derived from accepted values of natural physical constants, or has been derived by the ratio type of self-calibration techniques. Standards requiring calibration by a higher level standards laboratory shall be calibrated by a commercial facility capable of providing the required service, a Government Laboratory under arrangements made by the contracting officer, or by the National Bureau of Standards. All standards used in the calibration system shall be supported by certificates, reports, or data sheets attesting to the date, accuracy, and environmental or other conditions under which the results furnished were obtained. Statements of certification shall contain as a minimum, the requirements prescribed in paragraph 5.8. All subordinate standards and measuring and test equipment shall be supported by like data when such information is essential to achieving the accuracy control required by this standard. In those cases where no data is required, a suitably annotated calibration label on the item shall be sufficient to satisfy the support data requirements of this paragraph. Certificates or reports from other than the National Bureau of Standards or Government Laboratory shall attest to the fact that the standards used in obtaining the results have been compared at planned intervals with the National Standard either directly or through a controlled system utilizing the methods outlined above. The contractor shall be responsible for assuring that the sources providing calibration services, other than the National Bureau of Standards or a Government Laboratory, are in fact capable of performing the required service to the satisfaction of this standard. All certificates and reports shall be available for inspection by authorized Government representatives.

5.7.2 Foreign contracts. The provisions in paragraph 5.7.1 shall apply with the exception that the National Standards Laboratories of countries whose standards are compared with International or U. S. National Standards may be utilized.

5.8. Application and records. The application of the above requirements will be supported by records designed to assure that established schedules and procedures are followed to maintain the accuracy of all measuring and

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10 June 1980
SUPERSEDING
MIL-C-45662A
9 February 1962

MILITARY STANDARD

CALIBRATION SYSTEMS REQUIREMENTS

QCIC
AMSC No. A3099

DEPARTMENT OF DEFENSE
WASHINGTON, DC 20360

Calibration Systems Requirements

MIL-STD -45662

1. This 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: Commander, US Army Missile Command, ATTN: DRSMI-ED, Redstone Arsenal, AL 35809, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FORWARD

1. This standard contains requirements for the establishment and maintenance of a calibration system used to control the accuracy of measuring and test equipment.

2. Data Item Description (DIDS) applicable to this standard are listed in Section 6.

1. SCOPE.

1.1 Scope. This standard provides for the establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment used to assure that supplies and services presented to the Government for acceptance are in conformance with prescribed technical requirements.

1.2 Applicability. This standard applies to all contracts under which the contractor is required to maintain measuring and test equipment in support of contract requirements.

1.3 Significance. This standard and any procedure or document executed in implementation thereof shall be in addition to and not in derogation of other contract requirements.

2. REFERENCED DOCUMENTS (Not Applicable).

3. DEFINITIONS.

3.1 Calibration. Comparison of a measurement standard or instrument of known accuracy with another standard or instrument to detect, correlate, report, or eliminate by adjustment, any variation in the accuracy of the item being compared.

3.2 Measuring and test equipment. All devices used to measure, gage, test, inspect, or otherwise examine items to determine compliance with specifications.

3.3 Measurement standard (reference). Standards of the highest accuracy order in a calibration system which establish the basic accuracy values for that system.

3.4 Measurement standard (transfer). Designated measuring equipment used in a calibration system as a medium for transferring the basic value of reference standards to lower echelon transfer standards or measuring and test equipment.

3.5 Traceability. The ability to relate individual measurement results to national standards or nationally accepted measurement systems through an unbroken chain of comparisons.

4. GENERAL STATEMENTS OF REQUIREMENTS.

4.1 General. The contractor shall establish or adapt and maintain a system for the calibration of all measuring and test equipment used in

fulfillment of his contractual requirements. The calibration system shall be coordinated with his Inspection or Quality Control Systems and shall be designed to provide adequate accuracy in use of measuring and test equipment. All measuring and test equipment applicable to the contractor, whether used in the contractor's plant or at another source, shall be subject to such control as is necessary to assure conformance of supplies and services to contractual requirements. The calibration system shall provide for the prevention of inaccuracy by ready detection of deficiencies and timely positive action for their correction. The contractor shall make objective evidence of accuracy conformance readily available to the Government representative.

4.2 Quality assurance provisions. All operations performed by the contractor in compliance with this standard will be subject to the Government verification at unscheduled intervals. Verification will include but not be limited to the following:

a. Surveillance of calibration operation for conformance to the established system.

b. Review of calibration results as necessary to assure accuracy of the system. The contractor's gages, measuring and testing devices shall be made available for use by the Government when required to determine conformance with contract requirements. If conditions warrant, contractor's personnel shall be made available for operation of such devices and for verification of their accuracy and condition.

5. DETAILED STATEMENTS OF REQUIREMENTS.

5.1 Calibration system description. The contractor shall provide and maintain a written description of his calibration system covering measuring and test equipment and measurement standards to satisfy each requirement of this standard. The portion dealing with measuring and test equipment shall prescribe calibration intervals and sources and may be maintained on the documents normally used by the contractor to define his inspection operations. The description for calibration of measurement standards shall include a listing of the applicable measurement standards, both reference and transfer, and shall provide nomenclature, identification number, calibration interval and source, and environmental conditions under which the measurement standards will be applied and calibrated. The description of the calibration system and applicable procedures and reports of calibration shall be available to the Government representative.

5.2 Adequacy of standards. Standards established by the contractor for calibrating the measuring and test equipment used in controlling product

quality shall have the capabilities for accuracy, stability, range, and resolution required for the intended use.

5.3 Environmental controls. Measuring and test equipment and measurement standards shall be calibrated and utilized in an enviornment controlled to the extent necessary to assure continued measurements of required accuracy giving due consideration to temperature, humidity, vibration, cleanliness, and other controllable factors affecting precision measurement. When applicable, compensating corrections shall be applied to calibration results obtained in an enviornment which departs from standard conditions.

5.4 Intervals of calibration. Measuring and test equipment and measurement standards shall be calibrated at periodic intervals established on the basis of stability, purpose, and degree of usage. Intervals shall be shortened as required to assure continued accuracy as evidenced by the results of preceeding calibrations and may be lengthened only when the results of previous calibrations provide definite indications that such action will not adversely affect the accuracy of the system. The contractor shall establish a recall system for the mandatory recall of standards and measuring and test equipment within established time limits or interval frequencies.

5.5 Calibration procedures. Written procedures shall be prepared or provided and utilized for calibration of all measuring and test equipment and measurement standards used to assure the accuracy of measurements involved in establishing product conformance. The procedures may be a compilation of published standard practices or manufacturer's written instructions and need not be rewritten to satisfy the requirements of this standard. As a minimum, the procedures shall specify the accuracy of the instrument being calibrated and the accuracy of the standards used. The procedure shall require that calibration be performed by comparison with higher accuracy level standards.

5.6 Out of tolerance evaluators.

5.6.1 Evaluation of suspect product. The contractor shall establish a procedure for the analysis of the impact of out of tolerance measuring and test equipment on product quality. The impact on quality of products examined or tested by equipment found to be out of tolerance during calibration will be determined and appropriate corrective action taken to correct product quality. Records of the result of the analysis and the corrective action taken to maintain the required quality of the product shall be maintained and be available for the Government representative.

5.6.2 Evaluation of calibration system accuracy. The contractor shall establish a procedure to evaluate the adequacy of the calibration system based on out of tolerance data generated from calibrating test and

measuring equipment. The procedure shall include but not be limited to adjustment of calibration frequency, adequacy of the measuring or test instrument, calibration procedures and measuring or test procedures. The procedures shall specifically provide for the identification and prevention of use of any equipment which does not perform satisfactorily.

5.7 Calibration sources.

5.7.1 Domestic contracts. Measuring and test equipment shall be calibrated by the contractor or a commercial facility utilizing standards whose calibration is certified as being traceable to the National Standards, has been derived from accepted values of natural physical constants, or has been derived by the ratio type of self-calibration techniques. Standards requiring calibration by a higher level standards laboratory shall be calibrated by a commercial facility capable of providing the required service, a Government Laboratory under arrangements made by the contracting officer, or by the National Bureau of Standards. All standards used in the calibration system shall be supported by certificates, reports, or data sheets attesting to the date, accuracy, and environmental or other conditions under which the results furnished were obtained. Statements of certification shall contain as a minimum, the requirements prescribed in paragraph 5.8. All subordinate standards and measuring and test equipment shall be supported by like data when such information is essential to achieving the accuracy control required by this standard. In those cases where no data is required, a suitably annotated calibration label on the item shall be sufficient to satisfy the support data requirements of this paragraph. Certificates or reports from other than the National Bureau of Standards or Government Laboratory shall attest to the fact that the standards used in obtaining the results have been compared at planned intervals with the National Standard either directly or through a controlled system utilizing the methods outlined above. The contractor shall be responsible for assuring that the sources providing calibration services, other than the National Bureau of Standards or a Government Laboratory, are in fact capable of performing the required service to the satifaction of this standard. All certificates and reports shall be available for inspection by authorized Government representatives.

5.7.2 Foreign contracts. The provisions in paragraph 5.7.1 shall apply with the exception that the National Standards Laboratories of countries whose standards are compared with International or U. S. National Standards may be utilized.

5.8 Application and records. The application of the above requirements will be supported by records designed to assure that established schedules and procedures are followed to maintain the accuracy of all measuring and

test equipment, and supporting standards. The records shall include an individual record of calibration or other means of control for each item of measuring and test equipment and measurement standards, providing description or identification of the item, calibration interval date of last calibration and calibration results of out of tolerance conditions. In addition, the individual record of any item whose accuracy must be reported via a calibration report or certificate will quote the report or certificate number for ready reference. These records shall be available for review by authorized Government personnel.

5.9 Calibration status. Measuring and test equipment and standards shall be labeled or some other suitable means shall be established for monitoring the equipment to assure adherence to calibration schedules. The system shall indicate date of last calibration, by whom calibrated and when the next calibration is due. The system may be automated or manual. Items which are not calibrated to their full capability or which require functional check only shall be labeled to indicate the applicable condition.

5.10 Control of subcontractor calibration. The contractor is responsible for assuring that the subcontractor's calibration system conforms to this standard to the degree necessary to assure compliance with contractual requirements.

5.11 Storage and handling. All measuring and test equipment shall be handled, stored and transported in a manner which shall not adversely affect the calibration or condition of the equipment.

5.12 Amendments and revisions. Whenever this standard is amended or revised subsequent to a contractually effective date, the contractor may follow or authorize his subcontractor to follow the amended or revised military standard provided no increase in price or fee is involved. The contractor shall not be required to follow the amended or revised standard except as a change in the contract. If the contractor elects to follow the amended or revised military standard, he shall notify the contracting officer in writing of this election.

6. MISCELLANEOUS

6.1 Contract data requirements. The following Data Item Descriptions shall be utilized when the contract cites this standard and requires the contractor to develop and deliver data. The approved Data Item Descriptions (DD Form 1664) required in connection with this standard and listed on the DD Form 1423 are as follows:

Data Requirements	Applicable DID	This Standard Referenced Para.
Calibration System Description	DI-R-7064	5.1
Equipment Calibration Procedures	DI-R-7065	5.5
Procedures, Array Calibration	UDI-T-23934	5.5
Calibration-Maintenance Test Data	UDI-T-20340A	5.1 and 5.6
Reports; Test Procedures and Results, Calibration of Test Coupons for Propulsion Shafting	UDI-T-23801	5.1

(Copies of Data Item Description required by the Contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

CUSTODIANS:
ARMY-MI
NAVY-OS
AIR FORCE-05

REVIEW ACTIVITIES:
ARMY-AR, AV
NAVY-AS, EC, SH
DLA-DH

USER ACTIVITIES:
ARMY-ME
DLA-SS

Preparing activity:
Army-MI

Agent:
Army-USAMCC

Project No. QCIC-0003

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document*(s)* or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

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
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

DD FORM 82 MAR 1426

PREVIOUS EDITION IS OBSOLETE.