MILITARY STANDARD

CALIBRATION SYSTEMS REQUIREMENTS

AMSC N/A

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MIL-STD-45662A

DEPARTMENT OF DEFENSE
Washington, DC 20360

Calibration Systems Requirements

1. This military standard is approved for use by all Department 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, U.S. Army Missile Command, ATTN: AMSMI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5270, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
FOREWORD

This military standard contains requirements for the establishment and maintenance of a calibration system used to control the accuracy of measuring and test equipment (M&TE) and measurement standards.
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Scope</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>Applicability</td>
<td>1</td>
</tr>
<tr>
<td>1.3</td>
<td>Significance</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>REFERENCED DOCUMENTS (Not applicable)</td>
<td>1</td>
</tr>
<tr>
<td>3.1</td>
<td>Definitions</td>
<td>1</td>
</tr>
<tr>
<td>3.2</td>
<td>Calibration</td>
<td>1</td>
</tr>
<tr>
<td>3.3</td>
<td>Consensus Standard</td>
<td>1</td>
</tr>
<tr>
<td>3.4</td>
<td>Measuring and test equipment</td>
<td>1</td>
</tr>
<tr>
<td>3.5</td>
<td>Measurement standard</td>
<td>1</td>
</tr>
<tr>
<td>3.5</td>
<td>Traceability</td>
<td>1</td>
</tr>
<tr>
<td>4.1</td>
<td>General</td>
<td>2</td>
</tr>
<tr>
<td>4.2</td>
<td>Quality assurance provisions</td>
<td>2</td>
</tr>
<tr>
<td>5.1</td>
<td>Detailed requirements</td>
<td>2</td>
</tr>
<tr>
<td>5.2</td>
<td>Calibration system description</td>
<td>2</td>
</tr>
<tr>
<td>5.3</td>
<td>Adequacy of measurement standards</td>
<td>3</td>
</tr>
<tr>
<td>5.4</td>
<td>Environmental controls</td>
<td>3</td>
</tr>
<tr>
<td>5.5</td>
<td>Intervals of calibration</td>
<td>3</td>
</tr>
<tr>
<td>5.6</td>
<td>Calibration procedures</td>
<td>3</td>
</tr>
<tr>
<td>5.6</td>
<td>Out-of-tolerance conditions</td>
<td>4</td>
</tr>
<tr>
<td>5.7</td>
<td>Adequacy of the calibration system</td>
<td>4</td>
</tr>
<tr>
<td>5.8</td>
<td>Calibration sources</td>
<td>4</td>
</tr>
<tr>
<td>5.9</td>
<td>Records</td>
<td>4</td>
</tr>
<tr>
<td>5.10</td>
<td>Calibration status</td>
<td>4</td>
</tr>
<tr>
<td>5.11</td>
<td>Control of subcontractor calibration</td>
<td>5</td>
</tr>
<tr>
<td>5.12</td>
<td>Storage and handling</td>
<td>5</td>
</tr>
<tr>
<td>5.13</td>
<td>Amendments and revisions</td>
<td>5</td>
</tr>
<tr>
<td>6.1</td>
<td>Notes</td>
<td>5</td>
</tr>
<tr>
<td>6.1</td>
<td>Subject term (key word) listing</td>
<td>5</td>
</tr>
<tr>
<td>6.2</td>
<td>Changes from previous issue</td>
<td>5</td>
</tr>
</tbody>
</table>
1. SCOPE

1.1 Scope. This MIL-STD provides requirements for the establishment and maintenance of a calibration system to control the accuracy of measuring and test equipment (M&TE) and measurement standards used to assure that supplies and services delivered to the Government comply with prescribed technical requirements.

1.2 Applicability. This MIL-STD applies to all contracts under which the contractor uses M&TE or measurement standards.

1.3 Significance. This MIL-STD and any procedure or document executed in implementation thereof shall be in addition to and not weaken or detract from other contract requirements.

2. REFERENCE DOCUMENTS (Not applicable)

3. DEFINITIONS

3.1 Calibration. The comparison of M&TE or measurement standard of unknown accuracy to a measurement standard of known accuracy in order to detect, correlate, report, or eliminate by adjustment any variation in the accuracy of the instrument being compared.

3.2 Consensus standard. An artifact or process that is used as a de facto standard by agreement of the contractor and O00 when no recognized U.S. national standard is available.

3.3 Measuring and test equipment (M&TE). All devices used to measure, gage, test, inspect, or otherwise determine compliance with prescribed technical requirements.

3.4 Measurement standard. Those devices used to calibrate M&TE or other measurement standards and provide traceability.

3.5 Traceability. The ability to relate individual measurement results through an unbroken chain of calibrations to one or more of the following:

3.5.1 U.S. national standards maintained by the U.S. National Bureau of Standards (NBS) and the U.S. Naval Observatory;

3.5.2 Fundamental or natural physical constants with values assigned or accepted by the U.S. NBS;

3.5.3 National standards of other countries which are correlated with U.S. national standards;
3.5.4 Ratio type of calibrations;

3.5.5 Comparison to consensus standards.

4. GENERAL REQUIREMENTS

4.1 General. The contractor shall establish and maintain a system for the calibration of all M&TE and measurement standards used in fulfillment of contractual requirements. The calibration system shall be coordinated with the contractor's inspection or quality control system and shall be designed to provide adequate accuracy in use of M&TE and measurement standards. All M&TE and measurement standards applicable to the contract, 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 MIL-STD shall be subject to Government verification at unscheduled intervals. Verification will include but not be limited to the following:

4.2.1 Review of the contractor's documented calibration system description to determine compliance with the detailed requirements of this MIL-STD;

4.2.2 Surveillance of calibration operations for conformance to the contractor's documented calibration system;

4.2.3 Review of calibration results to verify adequacy of the contractor's calibration process. The contractor's M&TE and measurement standards shall be made available for use by the Government representative, as required. Where conditions warrant, contractor personnel shall be made available for operation of such devices.

Results of inspections or audits conducted within the last 12 months may be used by the government in determining contractor's compliance with this MIL-STD.

5. DETAILED REQUIREMENTS

5.1 Calibration system description. The contractor shall provide and maintain a written description of the calibration system covering M&TE and measurement standards to satisfy each requirement of this MIL-STD. Requests for deviation from the detailed requirements of this MIL-STD, with supporting justification, shall be submitted to the Government representative for approval.
5.2 Adequacy of measurement standards. Measurement standards used by the contractor for calibrating M&TE and other measurement standards shall be traceable and shall have the accuracy, stability, range and resolution required for the intended use. Unless otherwise specified in the contract requirements, the collective uncertainty of the measurement standards shall not exceed 25 percent of the acceptable tolerance for each characteristic being calibrated. The contractor's calibration system description may include provisions for deviating from the uncertainty requirements, provided the adequacy of the calibration is not degraded. All deviations shall be documented.

5.3 Environmental controls. M&TE 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. When applicable, compensating corrections shall be applied to calibration results obtained in an environment which departs from acceptable conditions.

5.4 Intervals of calibration. M&TE and measurement standards shall be calibrated at periodic intervals established and maintained to assure acceptable accuracy and reliability, where reliability is defined as the probability that the M&TE and measurement standard will remain in-tolerance throughout the established interval. Intervals shall be shortened or may be lengthened, by the contractor, when the results of previous calibrations indicate that such action is appropriate to maintain acceptable reliability. The contractor shall establish a recall system for the mandatory recall of M&TE and measurement standards to assure timely recalibrations, thereby precluding use of an instrument beyond its calibration due date. The recall system may include provisions for the temporary extension of the calibration due date for limited periods of time under certain specific conditions such as the completion of a test in progress.

5.5 Calibration procedures. Procedures shall be available and utilized for the calibration of all M&TE and measurement standards. As a minimum, calibration procedures shall specify the measurement standards and equipment to be used (manufacturer and model or generic description), the required parameter, range, and accuracy of the measurement standard and the acceptable tolerance of each instrument characteristic being calibrated. Calibration procedures shall provide instructions to enable calibration personnel to adequately calibrate each instrument characteristic or measurement parameter of concern. The procedures used may be those available from DoD or other U.S. Government agencies, available in manufacturer's manuals, or published standard practices, and need not be rewritten by the contractor, provided they meet the content requirements of this MIL-STD.
4. The broken pipe may affect the calibration, the conformance of control system specifications, and mass measurement standards. If any mass or volume standard is found to be significantly out-of-calibration, action shall be taken to bring the standard into conformance. The conformance shall be supported by appropriate action to the system and to ensure compliance with all requirements of this MIL-STD.

5.7 Adequacy of the Calibration System. The contractor shall establish and maintain a calibration system that provides for the calibration of the mass and volume measurement standards on a periodic basis, using standards conforming to the specifications and requirements of this MIL-STD.
5.11 Control of subcontractor calibration. The contractor is responsible for assuring that the subcontractor's calibration system conforms to this MIL-STD to the degree necessary to assure compliance with contractual requirements. Results of Government inspections or audits conducted within the last 12 months may be used in determining subcontractor compliance.

5.12 Storage and handling. M&TE and measurement standards shall be handled, stored, and transported in a manner which shall not adversely affect the calibration or condition of the equipment.

5.13 Amendments and revisions. Whenever this MIL-STD is amended or revised subsequent to a contractually effective date, the contractor may follow, or authorize his subcontractor to follow, the amended or revised MIL-STD 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 MIL-STD, then the contractor shall notify the contracting officer of this election in writing.

6. NOTES

6.1 Subject term (key word) listing.

Calibration

6.2 Changes from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - MI
Navy - OS
Air Force - OS

Preparing Activity:
Army - MI
Project No. QCIC-0084

Review Activity:
Army - AR, AV
Navy - AS, EC, SH
DLA - DH

User Activity:
Army - ME
DLA - SS
### STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

<table>
<thead>
<tr>
<th>1. DOCUMENT NUMBER</th>
<th>WIL-STD-45662A</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. DOCUMENT TITLE</td>
<td>CALIBRATION SYSTEMS REQUIREMENTS</td>
</tr>
</tbody>
</table>

**4. TYPE OF ORGANIZATION (Mark one):**
- VENDOR
- USER
- MANUFACTURER
- OTHER (Specify): ___________

**5. PROBLEM AREAS**

a. Paragraph Number and Wordings:

b. Recommended Wordings:

c. Reason/Rationale for Recommendation:

**6. REMARKS**

**7a. NAME OF SUBMITTER (Last, First, M/II) — Optional**

**9. WORK TELEPHONE NUMBER (Include Area Code) — Optional**

**14. MAILING ADDRESS (Street, City, State, ZIP Code) — Optional**

**8. DATE OF SUBMISSION (YYMMDD)**

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