QUALITY MANUAL

MMC Metrology Lab, Inc.

4989 Cleveland Street
Virginia Beach, VA 23462
(757) 456-2220
www.mmc.ws

Foreword

This manual is designed such that it follows the sectional format of the American National Standard for Calibration, ANSI/NCSL Z540-1-1994. Each section of the manual is aligned with that of the corresponding section in the ANSI/NCSL Z540-1-1994 standard. The last section of the manual consists of an annex containing the policy statements of MMC Metrology Lab, Inc. including the statement which documents the Distributor / Supplier Quality System.

This manual is reviewed by management annually during a Formal Quality Manual Review commissioned by the President. This review addresses the recommendations and observations presented during (1) the annual internal activity audit, (2) audits conducted by outside agencies, (3) a review of changes or updates to reference documents or other pertinent directives and (4) a review of documented customer complaints and new product quality deficiencies. Changes made to this Quality Manual are presented by the Quality Manager and approved by the President and shall ensure practicality, effectiveness and suitability with regard to customer quality requirements while maintaining technical and administrative compliance with current reference documents and the American National Standard for Calibration.

Submitted: _____ 10 June 2011
Daniel T. O'Donnell, Quality Manager Date

Approved: _____ 10 June 2011
William E. Marcum, President Date

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36	CCA Revision, MMC-9	09-30-2008
37	Formal Annual Review	01-30-2010
38	Formal Annual Review	01-31-2011
39	CCA Revision	06-10-2011

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
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Title: 1.0 Scope	Revision: 37

1.1 The scope and purpose of this Quality Manual is to describe and define how MMC Metrology Lab, Inc. complies with the requirements of **ANSI/NCSL Z540-1-1994 (NAVSEA 04-4734)** Calibration Laboratories and Measuring and Test Equipment-General Requirements, **ISO-10012** Quality Assurance Requirements for Measuring Equipment and the general requirements of **ISO/IEC 17025**. If a difference exists between these documents, ANSI/NCSL Z540-1 will be the governing document. If MMC Metrology Lab, Inc. does not comply with or is in disagreement with requirements of any of the mentioned documents it will state so and give the rationale behind that decision.

1.2 Additionally, Policy Statement MMC-9 of this Quality Manual documents and establishes a quality system that provides assurance to its customers that the products and instruments supplied by MMC Metrology Lab, Inc. meet all contractual requirements, including conformance to drawings, specifications and required inspections and tests. This quality system is based on the requirements contained in **MIL-Q-9858A**, Quality Program Requirements, and **MIL-I-45208A**, Inspection System Requirements and is consistent with the general requirements of NAVSEA Standard Item 009-04, and the quality system models of ISO 9000 and ANSI/ASQC 9000 series.

2.1	ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment-General Requirements.
2.2	NAVSEA 04-4734	Naval and Marine Corps Audit/Certification Manual
2.3	ISO-10012-1	Quality Assurance Requirements for Measuring Equipment.
2.4	ISO/IEC 17025	General Requirements for Competence of Testing and Calibration Laboratories.
2.5	NAVAIR 17-35MTL-1 NAVSEA OD-45845	Metrology Requirements List.
2.6	NAVAIR 17-35FR-06	Facility Requirements for Navy and Marine Corps Calibration Laboratories
2.7	MIL-Q-9858A/Amendment 3	Quality Program Requirements (For record purposes only - canceled 1 Oct 96)
2.8	MIL-I-45208A/Amendment 2	Inspection System Requirements (For record purposes only - canceled 1 Oct 96)
2.9	NAVSEA ltr 4734, serial SEA 04RME/1864 dtd 26APR05	NAVSEA Approved Calibration Laboratory Accrediting Bodies (ABs)

3.1 General Profile:

3.1.1 MMC Metrology Lab, Inc. is a privately owned small business incorporated in Virginia. It was founded in 1989 to provide customers a high quality calibration laboratory in the fields of electrical / electronic, dimensional, pressure, temperature, and liquid flow measurement. MMC Metrology Lab, Inc. also provides maintenance service on these types of measuring devices.

3.1.2 Our measurement standards have measurement traceability to national standards maintained by the National Institute of Standards and Technology (NIST), international standards, intrinsic standards or natural physical constants. We employ a 4:1 accuracy ratio between the stimuli and the unit under test.

3.1.3 MMC Metrology Lab, Inc. is also a distributor of several measurement related products and is an approved supplier to the U.S. Government and commercial entities nationwide.

3.2 Definitions:

3.2.1 *Calibration:* The set of operations which establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system, and the corresponding standard or known values derived from the standard.

3.2.2 *Certified Reference Material*: A reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.

3.2.3 *Measurand:* A quantity subjected to measurement. This is also known as "measured quantity" or the "quantity to be measured."

3.2.4 *Measurement*: The set of operations having the object of determining the value of a measurand.

3.2.5 *Measurement Standard*: A material measure, measuring instrument, reference material or system intended to define, realize, conserve or reproduce a unit or one or more known values of a quantity to serve as a reference.

3.2.6 *Primary Standard*: A standard, generally of the highest metrological quality available at a given location, from which measurements made at that location are derived. This is also known as a Reference Standard.

3.2.7 *Tolerance*: The extreme values of an error permitted by specifications, regulations, etc. for a given measurement instrument. This is also known as "limits of permissible error".

3.2.8 *Traceability*: The property of a result of a measurement whereby it can be related to

3.2 Definitions: (continued)

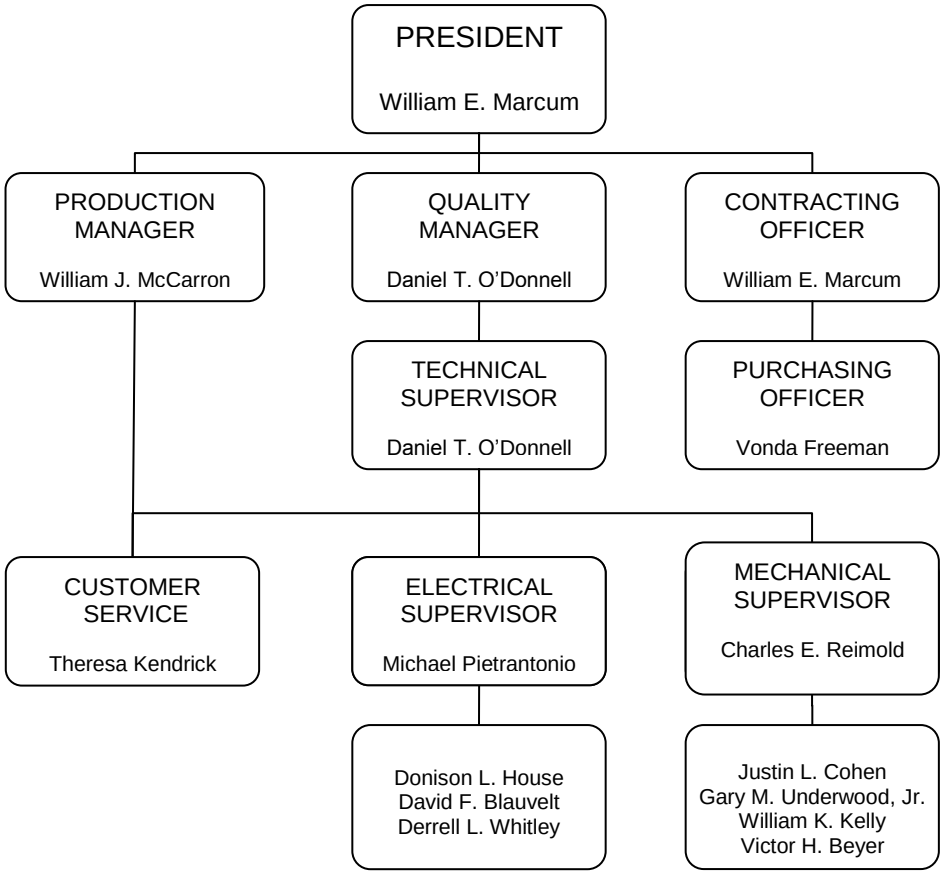
3.2.8 (Continued) appropriate standards, generally national or international standards, through an unbroken chain of comparisons.

3.2.9 *Verification*: Evidence by calibration that specified requirements have been met. With reference to measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values are consistently smaller than the tolerance defined in a standard, regulation or specification peculiar to the management of the measuring equipment. As related to this quality manual, verification is the process of calibration which compares the measured readings to required tolerances listed in the calibration procedure.

4.1 General:

4.1.1 This Quality Manual establishes policies and procedures that meet the specific requirements of ANSI/NCSL Z540-1-1994, NAVSEA 04-4734, and ISO-10012-1 and is consistent with the requirements of ISO/IEC 17025. MMC Metrology Lab, Inc. submits to recurring audit / certification reviews conducted at intervals not to exceed 36 months by entities acceptable to the Department of the Navy, Naval Sea Systems Command for conformance to NAVSEA 04-4734. These audits, as evidenced by the assignment of Navy Lab Code 7MM, are conducted to assure this quality system will substantiate that all materials submitted by the customer will be certified / verified to its conformance to contract requirements, specifications and / or drawings.

4.1.2 *Organization Chart*:



4.2 Management Responsibility:

4.2.1 *President:* The President is responsible for the overall enterprise of the company, administrative duties, payroll, customer relations and the well being of the company and its employees. He initiates all policies and procedures and ensures that they are adhered to. He also approves all policy documents that are legal contracts with customers. He has signature authority over all company endeavors however; various responsibilities are assigned and delegated to specific company officers and managers during the course of normal operations. These company officials are given the resources and authority to properly administer their area of responsibility and as such have signature authority when representing the company.

4.2.2 *Quality Manager:* The Quality Manager shall report directly to the president and is tasked with overall quality system development, implementation and monitoring. The Quality Manager shall use specialist, inspectors and representatives to inspect, audit and review organization performance to ensure compliance with contract requirements, specifications, procedures, instructions, test memos and drawings. The Quality Manager is also responsible for subcontractor administration. He shall ensure their quality systems meet requirements consistent with this Quality Manual, and that the requested service and materials received meet contract requirements and specifications.

4.2.2.1 Authorized Signatory: The Quality Manager has signature authority of all internal and external quality related matters, including Certificates of Conformance, Complaint Reports, quality audit requests / reports and client quality surveys and questionnaires.

4.2.3 *Production Manager*: The Production Manager reports to the President and is assigned the responsibility for application of quality assurance methods and practices with regard to timely and reliable production, including on-site activities. He ensures all personnel associated with production are made aware of their responsibilities for achieving product quality while meeting production schedules. A quality product is one that meets specification and is cost efficient.

4.2.4 *Contracting Officer:* The Contracting Officer reports to the President and is responsible for the overall contractual dealings with external activities, including Associate Calibration Laboratories and suppliers of reference material and repair parts, consistent with the requirements of this Quality Manual. Additionally, he reviews and recommends approval, modification or refusal of proposed contractual repair and / or calibration service requests. Also, if required prior to the start of a contract, the Contracting Officer shall submit a list of authorized representatives to the contracting facility. He also has overall responsibility for the issuance of instrument sales and service price quotations.

4.2.5 *Technical Supervisor:* The Technical Supervisor shall report to the Quality Manager and shall act as the alternate Quality Manager in his absence. The Technical Supervisor is responsible for calibration equipment recall within the MMC Metrology Lab, Inc. He is tasked to maintain the calibration status of all measurement standards and measuring and test equipment current. He controls all procedures used in performance of calibrations, either those generated internally or from other sources. He has signature authority on all calibration procedures produced by MMC Metrology, Lab, Inc. He is also tasked to ensure that employees have the training and the skills essential to perform their daily task.

4.2.5.1 Authorized Signatory: The Technical Supervisor has signature authority over all aspects of the technical operation of laboratory activities, including personnel training qualifications,

4.2.5.1 (Continued) traceability letters and internally generated calibration procedures.

4.2.6 *Purchasing Officer:* The Purchasing Officer reports to the Contracting Officer and is responsible for administering and the issuance of purchase orders for services, reference material and other supplies consistent with the requirements of this Quality Manual. Additionally, the Purchasing Officer has overall responsibility for receipt inspection for all items depicted on issued purchase orders.

4.2.6.1 Authorized Signatory: The Purchasing Officer has signature authority over all purchase orders for services, supplies, new products, repair parts or other items required to support laboratory operation.

4.2.7 *Customer Service Representative:* The Customer Service Representative reports to the Production Manager with regard to assignment of priority and scope of customer's incoming work and to the Technical Supervisor for providing liaison and coordination with customers consistent with the requirements of this Quality Manual.

4.2.7.1 Authorized Signatory: The Customer Service Representative has signature authority on receipt documents as they pertain to incoming customer equipment.

4.2.8 *Electrical and Mechanical Supervisors:* These supervisors report to the Technical Supervisor and are assigned the responsibility of application of quality assurance policies and procedures in their respective areas. They are also designated as alternate Technical Supervisor in their respective areas in case of the Technical Supervisor's absence. They shall ensure that all personnel in their area are made aware of their quality responsibilities and for achieving a high standard of excellence while meeting production schedules promulgated by the Production Manager. They are also responsible for the safe and secure handling of all customer material designated for service in their respective areas.

4.2.9 *Laboratory Technicians:* Laboratory technicians shall report to their respective area supervisors and are responsible for performing assigned tasks, for which they are trained, utilizing procedures and practices consistent with the requirements of this Quality Manual.

4.2.9.1 Approved Signatory: Laboratory technicians when considered qualified by their area supervisor and so designated by the Technical Supervisor shall have signature authority on each Certificate of Calibration for instruments which he was responsible for providing calibration service. Additionally, when designated by the Quality Manager they shall have signature authority as auditor for the purposes of conducting an internal random Quality Process Audit or Product Quality Audits.

4.2.9.2 Laboratory personnel shall be insulated from any work related pressures internal or external, which would compromise the quality of work, i.e. management pressure, deadlines, etc.

4.3 Customer Rights:

4.3.1 MMC Metrology Lab, Inc. has no need to implement a procedure to protect a customer’s identity, proprietary rights or other confidential business information as it pertains to *calibration*.

The rationale is that the service we provide to all our customers is evidenced by readily viewable labels and unclassified certificates. The customer's material we service is general purpose test, measuring and diagnostic equipment and its supporting technical documentation is unrestricted, commercially available and clearly in the public domain. However, if a customer requests privacy protection considered beyond the scope of normal and prudent business privacy practice, the Contracting Officer will generate a letter-of-intent to protect that customer or associate's rights. It shall be approved by the President of the company.

4.3.2 MMC Metrology Lab, Inc. does not possess or require classified National Security information in the performance of normal *calibration* activities. Unclassified customer controlled or other proprietary documents if required for calibration purposes shall be listed separately on the Material Receipt form and shall be the custody responsibility of the relevant calibration area supervisor. These documents are returned to the customer when no longer needed and a signature for custody receipt is obtained at the time of transfer. Reproductions for retention or disposal of such documents is not permitted unless the customer so requests. All customer authorized document disposal actions shall be accomplished by shredding.

4.3.3 MMC Metrology Lab, Inc., when functioning as a supplier / distributor of products to the Department of Defense (DoD) or the ship building / repair industry, shall provide appropriate protection for equipment and technical data that is associated with DoD export-controlled technology and specifically that which is unique to the *Naval Nuclear Propulsion Program*. This information requires special handling in accordance with published Naval Sea Systems Command and DoD directives. MMC Metrology Lab, Inc. utilizes the procedures and policy depicted in Policy Statement MMC-9 "Distributor / Supplier Quality System" in Section 17 of this Quality Manual to afford the necessary level of protection of this sensitive data.

4.4 Program Exclusions:

4.4.1 MMC Metrology Lab, Inc. does not participate in formal interlaboratory comparison or proficiency testing programs and consider these programs unnecessary to effectively support its scope of calibration competency. Additionally, in-service checks of reference standards and measuring and test equipment between calibrations are considered to be incorporated during normal standard usage and are not separately performed.

4.4.2 Rationale. MMC Metrology Lab, Inc. employs technicians that are adequately trained to perform assigned tasks and their proficiency is reviewed during random internal process and product quality audits. Additionally, all measurements are made using measurement standards or reference materials whose performance has been verified, documented and historically recorded. Comparing these performance data and calibration results over time facilitate the development of an extremely reliable calibration interval assignment. If significant changes occur in the standard's performance or calibration results, they are investigated immediately to determine the problem, and bring it to resolution. In this regard the calibration intervals are adjusted accordingly to prevent recurrence and further enhance reliable performance of laboratory's standards.

5.1 Policy of MMC Metrology Lab, Inc.:

5.1.1 MMC Metrology Lab, Inc. and its management are dedicated to provide the resources and trained personnel to serve its customers with a quality system that will assure all materials and services submitted for calibration / verification by the customer conforms to requirements set forth in the contract or purchase order. This includes all components and equipment manufactured or processed by sub-contractors or suppliers of MMC Metrology Lab, Inc. MMC Metrology Lab, Inc. shall perform whatever test, inspection, calibration and / or verification as required substantiating product conformance to specifications, contracts and / or drawings. The quality system is available for review during normal work hours throughout the contract or performance period and at other times by appointment. All changes to the quality system shall be made by the Quality Manager.

5.2 Interrelationships: (see also Section 4.2)

Department:	**Quality Responsibility:**
Contracts	Review contract Quality requirements and clauses for work to be performed. Procurement of test memos, work specifications and technical documents.
Purchasing	Invoke supplier quality requirements and perform receipt inspection.
Production	Use procedures, plans, tools, and processes designed to meet product quality requirements.
Quality Assurance	Administer the Quality Assurance program by testing, inspection, writing procedures and auditing to assure quality requirements are being met. Invoke subcontractor control and quality criteria. Review engineering drawings and documents to assure that quality needs are invoked.

5.3 Document Control:

5.3.1 *Quality Manager*. The Quality Manager shall be responsible for controlling all quality system documentation and to update it as required. The Technical Supervisor shall be

5.3 Document Control: (Continued)

5.3.1 (Continued) responsible for calibration procedures and other technical data ensuring that they are maintained current.

5.3.1.1 *Document control and maintenance.* All documents issued to personnel in the laboratory as part of the quality system shall be reviewed and approved by the Quality Manager prior to issue. A master list or an equivalent document control procedure identifying the current revision status of documents in the quality system shall be maintained by the Quality Manager and be readily available to preclude the use of invalid and/or obsolete documents. Documents are periodically reviewed and, where necessary, revised to ensure continuing suitability and compliance with applicable requirements. Changes/amendments to documents pending re-issue are prohibited. Changes to documents shall be initiated by the Area Supervisor, reviewed by the Technical Supervisor, and approved by the Quality Manager.

5.3.2 *Quality Manual*. There is one set of hard-copy Quality Manuals consisting of identical copies. They are maintained by the Quality Manager and are issued to the President, the Quality Manager, the Technical Supervisor, and the Mechanical Supervisor. The Quality Manual is available for customer review on premises during normal working hours and is also posted for viewing on the company web site. Digital copies of the Quality Manual shall be “Write Protected”.

5.4 Traceability:

5.4.1 MMC Metrology Lab’s primary measurement standards are periodically calibrated / verified by laboratories having standards that are certified directly by the National Institute of Standards and Technology (NIST) or traceable to the NIST maintained national standards, other intrinsic standards of measurements or invariable physical constants. These laboratories are accredited by an accreditation body approved by the Naval Sea Systems Command, confirming compliance to national or international standards for calibration laboratories. If an accredited laboratory as defined in Section 14 of this manual is not available, a fully capable laboratory with NIST traceable standards shall be utilized and an audit shall be conducted by MMC Metrology Lab, Inc. in accordance with Section 17, Policy Statement MMC-4, Sub-Contractor Auditing.

5.4.2 MMC Metrology Lab, Inc. reference materials such as salts, solutions and calibration gases are procured from manufacturers who are accredited by a nationally recognized agency confirming their quality programs are compliant to national or international standards for producing such reference material. If an accredited manufacturer is not available, a fully capable manufacturer shall be utilized and an audit shall be conducted by MMC Metrology Lab in accordance with Section 17, Policy Statement MMC-4, Sub-Contractor Auditing.

5.4.3 MMC Metrology Lab, Inc. utilizes its primary measurement standards or reference material in the performance of calibrations / verifications of all in house working standards. These primary or working standards are subsequently used in the performance of calibration of all customer material. Documentation supporting the measurement traceability to the National Institute of Standards and Technology (NIST) shall be maintained by the Technical Supervisor and is depicted in Section 17, Policy Statement MMC-6, Traceability of Calibration Standards.

5.5 Scope of Work: (see Policy Statement MMC-5)

5.5 Scope of Work: (Continued)

5.5.1 If a customer requires calibration services beyond the scope of capability of MMC Metrology Lab, Inc. and desires that the services be sub-contracted to an associate calibration laboratory, the pertinent information on the associate calibration laboratory certificate shall be transferred onto an MMC Metrology Lab, Inc. Certificate of Calibration. The customer's instrument(s) and the MMC Metrology Lab, Inc. Certificate of Calibration shall then be returned to customer and the associate calibration laboratory calibration data shall be kept on file indefinitely.

5.6 Review of New Work:

5.6.1 If a customer requires calibration or other service which has not previously been provided by MMC Metrology Lab, Inc. the Quality Manager or appropriate supervisor shall review the customer's requirement and make appropriate recommendations to the Contracting Officer. If the task is beyond the capability of MMC Metrology Lab, Inc. two options shall be considered: (1) refusal of the work (No Bid), or (2) accept the work and sub-contract to an associate calibration laboratory to have work completed.

5.7 Handling of Customer's Equipment:

5.7.1 See Section 17, Policy Statement MMC-1, Handling of Customer's Material.

5.8 Calibration / Verification Procedures:

5.8.1 MMC Metrology Lab, Inc. predominately utilizes instrument calibration procedures incorporated in the Metrology Requirements List, NAVSEA OD-45845, provided by current U.S. Navy distributed METPRO software documentation. If a specific instrument is not supported by METPRO software, then calibration data is sought within the Government/Industry Data Exchange Program (GIDEP). The GIDEP provides participating government agency, commercial industry and instrument manufacturer metrology data. If a procedure is not otherwise available, one shall be written based on instrument manufacturer specifications, available standards possessing sufficient accuracy (minimum 4:1 TAR) and Navy / industry standard test methods. These locally produced calibration procedures shall be approved by the Technical Supervisor. In all cases documented calibration procedures shall be utilized.

5.8.2 When it becomes necessary to modify published instrument calibration procedures to accommodate authorized substitution of standards, it shall be accomplished by the associated area supervisor. Where obvious procedural, typographical or data errors require correction, they shall be accomplished by the Technical Supervisor. All changes shall be made so that they are easily understood and readily identified. Where deletions are necessary, a single line shall be used with the supervisor's initials and date in the margin.

5.9 Quality Assurance Practices:

5.9.1 MMC Metrology Lab, Inc. shall assure quality service is provided by utilizing only measurement standards and reference materials in the performance of calibration / verification of customer equipment. This calibration / verification is accomplished by technicians that are adequately trained and whose proficiency is reviewed during random internal process and product quality audits. If indications from the standard appear abnormal during calibration, the

5.9 Quality Assurance Practices (continued)

5.9.1 (Continued) technician shall follow procedures in Section 10.9, Paragraph 10.9.3. No interlaboratory comparisons or proficiency testing are used at MMC Metrology Lab, Inc.

5.10 Exceptions:

5.10.1 When it becomes necessary for MMC Metrology Lab, Inc. to deviate from established policies and / or documented procedures, the Quality Manager or appropriate supervisor shall document that change in a memorandum detailing the variance. The customer shall be notified of the deviation if applicable, and the memorandum shall be filed in the customer's Job File.

5.10.2 See also Section 17, Policy Statement MMC-1, Handling of Customer's Material.

5.11 Customer Complaints:

5.11.1 See Section 17, Policy Statement MMC-2, Customer Complaints.

5.12 Audit and Review:

5.12.1 See Section 17, Policy Statement MMC-3, Internal Quality Audits.

5.13 Calibration Intervals:

5.13.1 Calibration intervals are established to ensure that measurement standards and test and measurement equipment remain within accuracy specifications throughout the interval. MMC Metrology Lab, Inc. utilizes calibration intervals based on those found in “Metrology Requirements List”, NAVAIR 17-35MTL-1, either as a specific model type or from the generic listing. Any variance from the published interval shall be determined by the Technical Supervisor based upon customer recognized competent authority requirements.

5.13.2 Commercial customer requested calibration intervals must be specified at time of instrument delivery or included in their purchase order / contract.

5.14 Measurement Uncertainty:

5.14.1 MMC Metrology Lab, Inc. policy on calibration uncertainty of measurement is to use the accuracy of the standard derived from its calibration / verification certificate, which generally is the manufacturer's specification. If more than one measurement standard is needed to form the stimuli, the accuracy of each standard are added together to arrive at the total estimated measurand accuracy. Calibration accuracies attainable are contained in Section 17, Policy Statement MMC-5, Calibration Uncertainties.

6.1 Staffing:

6.1.1 MMC Metrology Lab, Inc. has the required personnel to perform all functions of the calibration services it offers to its customers. Prior to their hire technical applicants furnish a resume delineating their experience and education to substantiate their skill level in the job for which they are applying. Once hired, they are given a ninety day trial period to prove their competence to perform applicable technical task. The appropriate area supervisor evaluates their competence prior to final hire.

6.2 Personnel Training:

6.2.1 Technicians are provided additional training as deemed necessary to meet quality or technical requirements. Additionally, each technician is presented a Required Reading List for which he / she is responsible. The completion of reading requirements and all supplementary training shall be documented and included in the employee's training file.

6.3 Training Records:

6.3.1 Each technician has a training file containing their resume and a MMC qualification record, which indicates that he / she has the necessary skills to perform the task assigned. Documented completion of required reading and any additional training provided shall also be entered into their training file. These records contain personal data and are available only for official review while on premises and during normal business hours.

7.1 Facilities:

7.1.1 Each calibration area has the energy sources, lighting, temperature, humidity and other environmental aspects controlled to the extent necessary to facilitate the proper performance of the calibration / verifications taking place in them. Lighting levels for calibration areas shall be maintained at 75 ft-c minimum at bench top and noise levels shall not exceed 55 dB(A). Environmental conditions shall be maintained in accordance with NAVAIR 17-35FR-06.

7.1.2 Every effort shall be made so as not to exceed the environmental limits in each calibration area. However, if environmental limits are exceeded in any calibration area, there shall be no calibration / verification performed in the area during that period. Thermohumidigraph charts shall be annotated for any out of tolerance conditions.

7.2 Environmental Limits:

7.2.1 *Pressure / Temperature Calibration Area:*

Temperature:	73° F ± 5°F spatial uniformity, ± 4ºF/Hr. stability
Humidity:	20% to 60% RH

7.2.2 *Dimensional (Length) Calibration Area:*

Temperature (> 50 µin/in accuracies):	68°F ± 8°F spatial uniformity, ± 4ºF/Hr. stability
Temperature (>10 to 50 µin/in):	68°F ± 2°F spatial uniformity, ± 4°F/Hr. stability
Humidity (> 50 µin/in accuracies):	20% to 60% RH
Humidity (>10 to 50 µin/in):	20% to 50% RH

7.2.3 *Torque / High Pressure Calibration Area:*

Temperature:	73ºF ± 9ºF spatial uniformity, ± 4ºF/Hr. stability
Humidity:	20% to 60% RH

7.2.4 *Electrical / Temperature Calibration Area:*

Temperature:	73ºF ± 5ºF spatial uniformity, ± 4ºF/Hr. stability
Humidity:	20% to 60% RH

7.2.5 *Liquid Flow Calibration Area:*

Temperature:	60º to 85ºF throughout area, ± 4ºF/Hr. stability

7.2 Environmental Limits: (continued)

7.2.5 Liquid Flow Calibration Area (Continued)

Humidity:	20% to 60% RH

7.2.6 *Pressure (High Accuracy - RUSKA) Calibration Area:*

Temperature:	73ºF ± 9ºF spatial uniformity, ± 4ºF/Hr. stability
Humidity:	20% to 60% RH

7.3 Control Monitoring and Housekeeping:

7.3.1 The spacing between calibration areas is such that the activity in one does not affect the out come of the calibration results in the other. Each area is defined for its intended use and controlled to the extent necessary. Each calibration area shall monitor and record temperature and humidity and account for these factors in the calibration / verification results if required. These recorded environmental parameters shall be verified to be within the limits specified herein and shall be annotated with explanatory information when these conditions are out-of-specification during periods of normal service hours. The recorder charts shall be retained for record purposes by the Area Supervisor for the time period between accreditation audits as a minimum.

7.3.2 All employees are made aware of and are instructed in good housekeeping practices in their work areas.

7.4 On-Site Calibration:

7.4.1 Environmental influences for on-site calibration of instruments identified in reference (2.5), NAVAIR 17-35MTL-1, with an approved NAVAIR 17-20 series calibration procedure are considered minimal. The parameters cited in the approved instrument calibration procedure will meet requirements without the need for environmental compensation.

7.4.2 On-site calibrations not specifically listed in reference (2.5), NAVAIR 17-35MTL-1, and covered by an approved NAVAIR 17-20 series calibration procedure will not normally be performed unless specifically requested by the customer. Performance of such calibrations requires analysis and approval by the Technical Supervisor after accounting for environmental factors which could adversely affect the measurement and / or its uncertainty.

8.1 Equipment and Reference Materials:

8.1.1 MMC Metrology Lab, Inc. has the necessary resources to facilitate the proper performance of the calibration / verifications undertaken. However, if the situation arises that the capability of this laboratory is exceeded, the customer's material or equipment will be sent to an associate calibration laboratory for service. An associate laboratory is one that is accredited by an accreditation body approved by the Naval Sea Systems Command as defined in Section 14 of this manual, or which is audited by the Quality Manager or his designee to the requirements contained in Section 17, Policy Statement MMC-4, Sub-Contractor Auditing.

8.2 Equipment Maintenance and Use:

8.2.1 *Preventive Maintenance.* When laboratory reference material or measurement standards are recalled for calibration / verification the associated preventive maintenance shall be performed as specified in the applicable technical manual or calibration procedure. Recurring preventive maintenance recommended in technical manuals or other technical publications to be accomplished at intervals between scheduled calibration times shall be accomplished as directed by the Technical Supervisor. These maintenance actions shall be documented on the Standard History Card by the technician performing the maintenance or by the applicable Area Supervisor if the item is being sent to an associate laboratory for calibration / verification.

8.2.2 *Corrective Maintenance.* Any reference material or measurement standard that is suspect, mishandled, abused or indicates that it may be in unsatisfactory working order, i.e. missing or compromised tamper-resistant seals or void labels, shall be investigated to determine cause. If discrepancies can not be remedied immediately, the measurement standard or reference material shall be removed from service, tagged to the effect that it is not usable, and then segregated from other laboratory standards or reference material.

8.2.3 *Measurement Standards Usage*. All of MMC Metrology Lab, Inc. primary measurement standards and reference material shall be used in the performance of calibration / verification on customer and laboratory equipment only. Only working standards or other test and measurement equipment shall be used in a repair or troubleshooting function.

8.2.4 *Extended Calibration Intervals*. Calibration intervals of laboratory standards shall be as depicted in the Metrology Requirements List, NAVSEA OD-45845. Any variance from the published interval shall be determined by the Technical Supervisor based on previous calibration results or performance data. In cases where the interval for a measurement standard is lengthened a minimum of two consecutive "In Tolerance" calibration cycles shall be achieved. Should an instrument with an extended interval subsequently be found faulty or beyond acceptable limit of error, the calibration interval depicted in the Metrology Requirements List shall be assigned when the instrument is returned to service.

8.2 Equipment Maintenance and Use: (Continued)

8.2.5 *Employee-owned Instruments.* Company owned reference material, measurement standards and general purpose test equipment shall be the only items utilized in the performance of calibration / verification services. Employee-owned test and measurement equipment shall not be permitted on premises or otherwise authorized for any purpose, directly or indirectly, supporting the services provided to customers or clients.

8.3 Labeling:

8.3.1 *CALIBRATION.* All reference material and measurement standards shall be labeled with a MMC calibration label (see MMC-1, Figure 1.5) to identify their calibration status. These labels shall indicate; (1) the MMC technician or associate calibration laboratory that performed the calibration, (2) instrument serial number, (3) date of calibration and, (4) date when recalibration or certification is due.

8.3.2 *NO CALIBRATION REQUIRED.* Measuring and test equipment that does not require periodic calibration shall be labeled “No Calibration Required” (see MMC-1, Figure 1.5).

8.3.3 *INACTIVE.* Measurement standards and general purpose test equipment that is determined to be no longer essential to support the current workload requirements shall be labeled “Inactive” (see MMC-1, Figure 1.5). These items must be calibrated before being placed back in service.

8.3.4 *SPECIAL CALIBRATION.* Measurement standards and general purpose test equipment having functions that require calibration / verification that; (1) do not meet published specifications or (2) have functions not required in the performance of calibrations or general testing, may be assigned a “Special Calibration” status and labeled accordingly (see MMC-1, Figure 1.5).

8.4 Records:

8.4.1. *STANDARD HISTORY CARD:* Is a record of each reference material or measurement standard and its maintenance record. Its format is as shown in Figure (1). The Standard History Card is filed in the standard’s technical file maintained by the area supervisor.

8.4.2. *RECALL CARD:* Is a card used for each measurement standard and reference material to ensure that calibration interval, calibration date and calibration due date is recorded. Its format is shown in Figure (2). These recall cards are maintained by the Technical Supervisor and filed by month of calibration due.

FIGURE 1
(NOT TO SCALE)

STANDARD HISTORY CARD

INSTRUMENT:_____ **MODEL:**_____

MANUFACTURER:_____ **SERIAL #:**_____

DATE / P.O.#	VENDOR	MAINTENANCE ACTION

FIGURE 2

RECALL CARD

STANDARD:_____ SERIAL NO:_____

MANUFACTURER:_____ MODEL NO:_____

CALIBRATION INTERVAL:_____MONTHS

DATE CAL:	DATE DUE:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

9.1 Scope:

9.1.1 This section provides for the establishment of MMC Metrology Lab, Inc. measurement traceability policy and the calibration of its reference materials and measurement standards.

9.2 Purpose:

9.2.1 To ensure that calibrations of all measuring and test equipment is either accomplished by MMC Metrology Lab, Inc. or sub-contracted to an associate calibration laboratory with traceability to the National Institute of Standards and Technology (NIST).

9.3 Calibration / Verification:

9.3.1 All reference material, measurement standards and general purpose test equipment shall be calibrated / verified prior to use.

9.3.2 All of MMC Metrology Lab, Inc. primary measurement standards and reference material shall be used exclusively to perform calibration / verification actions only and no other purpose. Only working standards or other general purpose test equipment shall be used in a repair or troubleshooting function.

9.3.3 Any measurement standard or general purpose test equipment's performance deemed to be suspect is investigated immediately to determine its problem and be brought to resolution. When performing calibrations / verifications and the results are obviously in error, it shall be investigated immediately to determine the problem. If the problem is related to the measurement standard, it shall be resolved before the item being serviced is accepted as being calibrated and certified. These events shall be brought to the attention of the Technical Supervisor or the appropriate area supervisor when they occur.

9.3.4 General purpose test equipment that does not require periodic calibration and is used to provide stimuli for calibration / verification of other equipment shall have its output monitored by calibrated measurement standards.

9.4 Traceability:

9.4.1 MMC Metrology Lab, Inc. primary measurement standards are periodically calibrated / verified by laboratories having standards that are certified directly by the National Institute of Standards and Technology (NIST) or traceable to the national standards maintained by the National Institute of Standards and Technology or other intrinsic standards of measurement or invariable physical constants. These laboratories are accredited by a nationally recognized agency approved by the National Cooperation of Laboratory Accreditation (NACLA) or the Naval Sea Systems Command for their compliance to national or international standards for calibration

9.4 Traceability: (Continued)

9.4.1 (Continued) laboratories. If a nationally accredited laboratory is not available, a fully capable laboratory with NIST traceable standards is utilized and an audit is conducted by MMC Metrology Lab in accordance with Section 17, Policy Statement MMC-4, Sub-Contractor Auditing.

9.4.2 MMC Metrology Lab, Inc. measurement standards when calibrated / verified shall be documented in accordance with the requirements of NAVSEA 04-4734 or ANSI/NCSL Z540-1. This documentation, including the measured data recorded during calibration / verification shall be filed in the standard's technical history file maintained by the area supervisor.

9.4.3 MMC Metrology Lab, Inc. reference materials such as salts, solutions and calibration gas are procured from manufacturers who are accredited by a nationally recognized agency confirming their quality programs are compliant to national or international standards for producing such reference material. If an accredited manufacturer is not available, a fully capable manufacturer is utilized and an audit is conducted by MMC Metrology Lab, Inc in accordance with Section 17, Policy Statement MMC-4, Sub-Contractor Auditing.

9.4.4 MMC Metrology Lab, Inc. utilizes its NIST traceable primary standards and reference materials in the performance of calibration of all in-house working standards. These traceable primary or working standards are subsequently used in the calibration of customer's test and measurement equipment. Primary standards and reference materials are utilized exclusively for calibration / verification and no other purpose.

10.1 Scope:

10.1.1 This section provides for the establishment of MMC Metrology Lab, Inc. calibration system and ensures that it complies with the requirements of ANSI/NCSL Z540-1-1994, NAVSEA 04-4734, and ISO-10012-1 and the general requirements of ISO/IEC 17025. This calibration system shall be used to assure the accuracy of measuring and test equipment and to ensure that supplies, parts, and services provided to the customer conform to prescribed technical requirements.

10.2 Purpose:

10.2.1 To ensure that calibrations of all measuring and test equipment is either accomplished by MMC Metrology Lab, Inc. or subcontracted to associate calibration laboratories with appropriate capability and traceability to the National Institute of Standards and Technology (NIST).

10.3 References:

10.3.1 ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
10.3.2 NAVSEA 04-4734	Naval and Marine Corps Calibration Audit / Certification Manual
10.3.3 ISO-10012-1	Quality Assurance Requirements for Measuring Equipment
10.3.4 NAVAIR 17-35MTL-1, NAVSEA OD-45845	Metrology Requirements List
10.3.5 ISO/IEC 17025	General Requirements for the Competence of Calibration and Testing Laboratories

10.4 Responsibilities:

10.4.1 The Quality Manager, Technical Supervisor and area supervisors shall be responsible for the implementation and application of this calibration system. The system shall apply to all contracts for which MMC Metrology Lab, Inc. is required to provide calibration / verification services for measuring, testing and diagnostic equipment.

10.5 Description:

10.5.1 *Overview.* MMC Metrology Lab, Inc. calibration system provides for the prevention of instrument inaccuracy by ready detection of deficiencies and timely corrective action as found

10.5 Description: (Continued)

10.5.1 (Continued) during periodic calibration / verification. Calibration instructions and procedures utilized are primarily NAVAIR 17-20 series contained in the Navy's METPRO software documentation, supplemented with manufacturer, ANSI and USAF documented procedures. These calibration documents and publications are the administrative responsibility of the Technical Supervisor. All calibration / verification services provided to U.S. Navy concerns shall be undertaken utilizing current NAVAIR 17-20 series procedures or other approved procedure if a NAVAIR document has not been published. If a commercial customer desires a special method or procedure be employed in the performance of the calibration or verification, they shall include these instructions in the purchase order / contract and it shall be documented on the Certificate of Calibration and the instrument history card.

10.5.2 *Unusual Methods.* Anytime that unusual methods need to be used in the performance of a calibration / verification of a commercial customer's material, that customer shall be notified and his approval sought in the use of the method. If no concurrence is received, the work shall be refused.

10.5.3 *Calibration Intervals.* Measurement standards shall be operated and maintained as prescribed by manufacturer technical manuals and continued assurance of accuracy shall be provided by periodic calibration at specified intervals. These intervals shall be established to ensure that measuring standards and test equipment remain within accuracy specifications throughout the interval. The calibration intervals used at MMC Metrology Lab, Inc. are based upon those found in NAVAIR 17-35MTL-1 "Metrology Requirements List" either as a specific model type or from the generic interval list. Any variance from the Metrology Requirements List published interval shall be determined by the Technical Supervisor based upon customer recognized competent authority requirements. Commercial customers determining their own calibration intervals for their material must specify these intervals at time of material delivery or in their purchase order / contract.

10.5.4 *Data Transfer and Calculations.* When calculations are required during the performance of a calibration action they shall be included as a worksheet and filed in the standard's history file for measurement standards or reference material or in the Job File for customer related work. The task of transferring measured calibration data, coefficients, calculations or other related data pertaining to measurement standards or reference material to programmable indicating devices, computer programs or other peripheral components to enable the proper operation of a measurement system shall be accomplished by a competent technician familiar with the applicable measurement system and verified by the responsible Area Supervisor. The accomplishment of data transfer and its verification shall be documented on the Standard History Card indicating date of accomplishment and the names of personnel accomplishing the tasks.

10.6 Calibration Procedures:

10.6.1 MMC Metrology Lab, Inc. predominately utilizes instrument calibration procedures incorporated in the Metrology Requirements List, NAVSEA OD-45845, provided by current U.S. Navy distributed METPRO software documentation. If a specific instrument is not supported by METPRO software, then calibration data is sought within the Government / Industry Data Exchange Program (GIDEP). The GIDEP provides participating government agency, commercial industry and instrument manufacturer metrology data. If a procedure is not

10.6 Calibration Procedures: (Continued)

10.6.1 (Continued) otherwise available, one shall be written based on instrument manufacturer specifications, available standards possessing sufficient accuracy (minimum 4:1 TAR) and Navy / industry standard test methods. These locally produced calibration procedures shall be approved by the Technical Supervisor. In all cases documented calibration procedures shall be utilized.

10.6.2 When it becomes necessary to modify published instrument calibration procedures to accommodate authorized substitution of standards, it shall be accomplished by the associated area supervisor. Where obvious procedural, typographical or data errors require correction, they shall be accomplished by the Technical Supervisor. All changes shall be made so that they are easily understood and readily identified. Where deletions are necessary, a single line shall be used with the supervisor's initials and date in the margin.

10.6.3 MMC Metrology Lab, Inc., where calibration methods/procedures are not specified, does not employ calibration methods that are not well established. Sampling calibration, statistical techniques, interlaboratory comparison, proficiency testing programs, calibration methods published by international or national standards, published by reputable technical organizations or in relevant scientific texts or journals are not used. Nor is computer/automated equipment utilized. Only well documentated and approved calibration procedures/processes are used. Should such methods be required in the future a procedure shall be developed and approved.

10.7 Reference Material / Standards, Measuring and Test Equipment:

10.7.1 Reference material, i.e. Technical Manuals, etc., measurement standards and general purpose test equipment belonging to MMC Metrology Lab, Inc. shall be operated and maintained in accordance with manufacturer technical instructions and shall be calibrated with standards traceable to the National Institute of Standards and Technology. They will be calibrated in accordance with the requirements of ANSI/NCSL Z540-1-1994 (NAVSEA 04-4734), and ISO-10012-1 and in conjunction with ISO/IEC 17025 standards. The performance of the calibration may be done by MMC Metrology Lab, Inc. or an associate calibration laboratory as long as they meet the requirements set forth in this Quality Manual.

10.7.2 Calibration facilities accomplishing calibrations for MMC Metrology Lab, Inc. shall be accredited by an accrediting body approved the Naval Sea Systems Command as defined in Section 14 of this manual, or be audited by the Quality Manager or his designee to the requirements contained in Section 17, Policy Statement MMC-4, Sub-Contractor Auditing.

10.7.3 MMC Metrology Lab, Inc. reference material, measurement standards and general purpose test equipment shall be the only items utilized in the performance of calibration / verification services. Employee-owned test and measurement equipment shall not be permitted on premises or otherwise authorized for any purpose, directly or indirectly, supporting the services provided to customers or clients.

10.8 Recall System:

10.8.1 The Technical Supervisor shall be responsible for the establishment and maintenance of a measurement standard / reference material calibration recall system. This recall system shall

10.8 Recall System: (Continued)

10.8.1 (continued) consist of a data base and a card file backup that is cross indexed by month and shall be used to facilitate calibration scheduling and work load planning. The recall cards and the information required on them are described in Section 8.0 of this manual. Additionally, the area supervisors shall maintain a technical history file for each measurement standard and reference material. These files contain data supporting recall intervals and other pertinent information such as calibration certificates with measured results, out-of-tolerance reports and maintenance performed.

10.8.2 Temporary extensions to the assigned calibration interval of a recalled measurement standard are normally not permitted except under extreme conditions such as work stoppage on a deploying vessel. An extension for a period of 30 days or less shall be approved by the President or the Technical Supervisor in his absence.

10.9 Standard Use File:

10.9.1 A Standard Use File is a file relating to a specific measurement standard or reference material containing the calibration certificates of instruments calibrated by that standard. These files shall be maintained by the area supervisors.

10.9.2 The Standard Use File shall be purged and subsequently restarted when the specific standard is recalled for calibration and was found "in-tolerance".

10.9.3 If the standard is found to be out-of-tolerance during its recalibration and it is determined to have a direct effect on items that were calibrated with that standard, the appropriate supervisor pulls the Standard Use File identifying all items that were calibrated using that standard. All customers will then be notified as to the results of the out-of-tolerance conditions and their items will be recalled and recalibrated if deemed necessary by the customer.

11.1 Identification:

11.1.1 MMC Metrology Lab, Inc. utilizes the procedures contained in Section 17, Policy Statement MMC-1, Handling of Customer's Material, for handling of calibration items. This Policy Statement is applicable to both customer and MMC Metrology Lab, Inc. items.

11.2 Abnormalities:

11.2.1 Abnormalities encountered during handling of calibration items are addressed in Section 17, Policy Statement MMC-1, Handling of Customer's Material.

11.3 Handling and Storage:

11.3.1 Each employee shall be instructed in the handling, storage and preparation of calibration items. Additionally, documented procedures for calibration may also dictate conditions under which the item shall be calibrated or special handling instructions may be provided by the customer. If for any reason items need to remain in the possession of MMC Metrology Lab, Inc. for a prolonged period, the item shall be stored in the area that is responsible for the its calibration. Additionally, if the work station / bench setup must also be maintained, then the work area shall be protected by whatever means necessary. The material safety of all calibration items shall be the responsibility of the area supervisor.

11.3.2 Customer items containing mercury, PCBs, or other hazardous material shall not be accepted for service.

11.4 Receipt:

11.4.1 Receipt of calibration items is addressed in Section 17, Policy Statement MMC-1, Handling of Customer's Material.

11.5 Tamper-resistant Seals:

11.5.1 MMC Metrology Lab, Inc. uses tamper-resistant seals called Void Labels. These labels are applied to instrument controls, access covers or hardware that if disturbed or removed would permit an adverse effect on the instrument calibration. If this label is broken or removed, the calibration of the instrument would be suspect and necessitate instrument recalibration prior to use.

12.1 Records:

12.1.1 *HISTORY CARD:* MMC Metrology Lab, Inc. uses sequentially numbered History Cards to record customer's equipment / service data. The History Card data includes the date the item was received, customer's name, purchase order number, MMC job number, instrument description, manufacturer, model number, serial number, date service completed, who performed the service and calibration interval. The History Card is the vehicle that tracks a customer's equipment through the calibration / service process. It allows for technician notes, repair parts data and other service related information. These cards shall be filed sequentially by card number in the main office when service is complete. Its format is as shown in Figure (1).

12.1.2 *JOB FILE:* MMC Metrology Lab, Inc. uses the Job File to maintain all pertinent documentation related to a specific job. This documentation shall include material receipt forms, purchase orders, Certificates of Calibration and other calibration reports, invoices, record of payment, and any other job related information. This documentation shall be sufficient so as to permit replicate calibrations or other service actions. The Job File shall also contain reference to History Card numbers applicable to each item serviced under the assigned job number. These file folders shall be filed sequentially by year, customer name, and job number and are kept in the file cabinets in the main office.

12.2 Record Retention:

12.2.1 All calibration / service related records shall be maintained on file indefinitely. The first year they shall be maintained in the main office filing system, and then they will be archived.

FIGURE 1
(NOT TO SCALE)

HISTORY CARD

DATE: _____ **INSTRUMENT:** _____

CUSTOMER: _____ **MFG:** _____

P.O. NO: _____ **MODEL:** _____

MMC JOB NO: _____ **SERIAL NO:** _____

ANSI-Z540-1 **CAL INT:** _____

DATE COMPLETED: _____ **BY:** _____

ACTION TAKEN / REMARKS: _____

_____

_____

_____

13.1 Calibration Certificate:

13.1.1 MMC Metrology Lab, Inc. shall use a Certificate of Calibration to document every item calibrated for its customers. Additionally, a Certificate of Calibration shall also be used to document all MMC Metrology Lab, Inc general testing equipment and measurement standards calibrations. The Certificate of Calibration is as shown in Figure 1.

13.2 Certificate Format:

13.2.1 The Certificate of Calibration shall contain all the necessary information required by pertinent calibration directives and customer requirements, and shall provide sufficient data so as to replicate calibrations or other service actions. A copy of each certificate issued shall be maintained on file indefinitely in the associated Job File. The Job File is located in the main office filing system for the first year and then it shall be archived.

13.3 Sub-Contractor Calibration:

13.3.1 When a sub-contracted associate calibration laboratory performs a calibration, all the pertinent data shall be transferred from the sub-contractor's certificate to a MMC Metrology Lab, Inc. Certificate of Calibration. Additionally, the associate calibration laboratory shall also be identified on the MMC Metrology Lab's Certificate of Calibration. The associate calibration laboratory's certificate shall be filed in the Job File and the MMC Metrology Lab's Certificate of Calibration shall be provided to the customer.

13.4 Layout of Certificate:

13.4.1 The layout of certificate information shall be easily understood and shall provide for customer requirements consistent with current calibration directives.

13.5 Addendums and Amendments:

13.5.1 *Addendums.* When supplemental pages are necessary they are identified as an addendum to the original Certificate of Calibration. An addendum to a Certificate of Calibration shall be annotated with the certificate ID number plus any other information necessary to reduce ambiguity. All addendums shall be considered an integral part of the Certificate of Calibration.

13.5.2 *Amendments.* There shall be no erasures, white-outs, line-outs or other such corrections or changes to Certificates of Calibration. Amendments or changes to certificates subsequent to issue shall be accomplished by replacement with a newly issued Certificate of Calibration annotated as a "Corrected Copy". A copy of the "Corrected Copy" shall be marked as such and shall be filed with the original certification so as to facilitate the reproduction of the entire transaction.

13.6 Notification:

13.6.1 In the event that discovery of a defective or an out-of-tolerance laboratory measurement standard that would cast doubt upon calibration results or could have an effect on other customer equipment; MMC Metrology Lab, Inc. shall notify the customer immediately by telephone so that they may initiate corrective action if needed. This telephone notification shall be followed by notification in writing as soon as practicable. The decision to notify a customer shall be the responsibility of the Technical Supervisor and shall be based on evaluation of the impact of the standard's deficiency as it relates to the customer's item parameters. If customer notification is deemed necessary, re-calibration of the customer's item shall be offered.

13.6.2 When the calibration results of customer items are found to be beyond the limits of permissible error, the customer shall be notified by the inclusion of this data in the Out-of-Tolerance Data section of the Certificate of Calibration or Reject Data Sheet. Refer to MMC-1 paragraph 4.0 for customer notification.

13.7 Data Transmission:

13.7.1 MMC Metrology Lab, Inc. shall use electronic transmission of customer calibration information only when considered essential by the customer. Facsimile and electronic mail transmissions when requested shall be acknowledged by the customer prior to transmission and upon receipt. Receipt acknowledgements shall be filed in the Job File.

FIGURE 1
(NOT TO SCALE)

Certificate Number

MMC METROLOGY LAB, INC.
4989 Cleveland Street
Virginia Beach, VA 23462
E-mail: mmc@mmcmetlab.com ‖ Web: www.mmc.ws
Phone: (757) 456-2220 ‖ Fax: (757) 473-2204

CERTIFICATE OF CALIBRATION

Customer:_____
Customer Order:_____
I.D. Number:_____
Job Number:_____
Location:_____

Instrument:_____
Manufacturer:_____
Model Number:_____
Serial Number:_____
U.U.T. Accuracy:_____

Compliance:
( ) ANSI Z540-1-1994 / ISO 10012-1
( ) Manufacturer's Specification
( ) Other

Temperature:_____ºF
Humidity:_____%RH
Measurand Accuracy:_____
Calibration Procedure:_____
Calibration Interval:_____
Calibration Date:_____
Calibration Due:_____

This instrument was received:
Date:_____ (m/d/yy)
( ) In-Tolerance
( ) Out-of-Tolerance
( ) Inoperative
Condition:
( ) New ( ) Excellent ( ) Good
( ) Fair ( ) Poor

This instrument is returned:
( ) In-Tolerance ( ) Out of Tolerance
( ) Repaired ( ) Functional Test Only
( ) Certified ( ) Special Calibration:
( ) Other:

Standards Used

Model	Serial	Cal Due Date
		(m/d/yy)

( ) Out-of-Tolerance Data ( ) Requested Data ( ) See Attached Data

Test Range / Check Point	Standard Reading	As Found Reading	As Left Reading

It is certified that at the time of service the item called for in the above order is in conformance with the requirements, specifications and drawings listed on the order. There is no calibration warranty, implied or otherwise, beyond the actual test results. The devices used to calibrate, adjust, inspect and test are traceable to the **National Institute of Standards and Technology (NIST),** intrinsic standards or natural physical constants. Records substantiating this are contained in our Quality Manual and are available upon request by authorized personnel. This certification shall not be reproduced except in full and without the written approval of MMC Metrology Lab, Inc.

Associate Calibration Lab:_____
(if applicable)

Authorized Signature:_____ Date:_____(m/d/yy)

14.1 Sub-Contractor Selection:

14.1.1 MMC Metrology Lab, Inc. contracts an outside laboratory for the performance of calibrations that are deemed beyond the scope of internal capabilities. An outside associate laboratory shall be selected based on their capability and ability to comply with the requirements of ANSI/NCSL Z540-1-1994 (NAVSEA 04-4734). The Quality Manager shall review documentation that the laboratory was accredited by a NAVSEA approved accrediting body to be in compliance with the requirements of ANSI/NCSL Z540-1, ISO/IEC 17025 and / or NAVSEA 04-4734 and that their scope of accreditation includes the appropriate measurement parameters and ranges for the calibrations to be performed. In accordance with reference 2.9 the NAVSEA approved accrediting bodies are those recognized by the National Cooperation of Laboratory Accreditation (NACLA) or are independently recognized by the National Institute of Standards and Technology (NIST), such as the National Voluntary Laboratory Accreditation Program (NVLAP), the International Laboratory Accreditation Cooperation (ILAC) and the Asia Pacific Laboratory Accreditation Cooperation (APLAC). These accreditation documents are maintained by the Quality Manager or his designee. If the laboratory was not audited by an approved accrediting body, then the Quality Manager or his designee shall audit the facility using the guidance contained in Section 17, Policy Statement MMC-4, Sub-Contractor Auditing.

14.1.2 MMC Metrology Lab, Inc. audits shall be performed in accordance with the Section 17, Policy Statement MMC-4, Sub-Contractor Auditing. Documentation of satisfactorily completed audits is maintained by the Quality Manager or his designee.

14.2 Records and Retention:

14.2.1 Records of all sub-contracted calibrations shall be kept in the specific Job File along with a copy of the completed MMC Metrology Lab, Inc. Certificate of Calibration. The Job File shall be available in the main office for one year and then it shall be archived.

14.3 Customer Notification:

14.3.1 When the calibration of customer's equipment is deemed beyond the scope of MMC Metrology Lab's capability the customer shall be so notified. If an accredited associate laboratory is available, the option of out-sourcing the calibration service to the associate laboratory shall be offered to the customer. Subsequent to obtaining the customer's concurrence, MMC Metrology Lab, Inc. shall issue a purchase order and contract the associate laboratory to perform the required service. All related contract documentation shall be filed in the Job File.

15.1 Scope:

15.1.1 This section is presented to explain how MMC Metrology Lab, Inc. controls expendable materials used in the performance of calibration and maintenance services for its customers.

15.2 Inspection:

15.2.1 All perishable calibration related material received shall be accepted upon the inspection of the adequacy of their published expiration dates. Supplier's certifications, if applicable, shall be filed in the Technical Supervisor's file. When the material has exceeded its expiration date, it shall be disposed of in accordance with State and Federal regulations.

15.3 General:

15.3.1 MMC Metrology Lab, Inc. use of outside support services and supplies that may affect calibration results such as batteries, solutions or other perishable items shall be handled and controlled as follows:

15.3.2 *Solutions and Salts.* Conductivity solutions, PH solutions and chemical salts shall be entered into the calibration standard recall system by their manufacturer batch number and are recalled per manufacturer's recommendation. The conductivity and PH solutions shall have a calibration interval (usage) based on their expiration dates assigned by the manufacturer. The chemical salts shall have an assigned interval of three years from when the container seal is removed. A calibration label for recall purposes shall be attached to the container upon activation by the Technical Supervisor.

15.3.3 *Calibration Gases.* Bottled calibration gases are identified by cylinder, batch, or bottle number and shall be entered into the MMC Metrology Lab, Inc. recall system for bottled gases maintained by the Technical Supervisor. These bottles come certified from the supplier and the certificates shall be filed in the Technical Supervisor's file. Each bottle shall be labeled with the expiration date provided by the supplier.

15.3.4 *Oxygen Sensors.* Oxygen sensors generally have a shelf life of one or two years once their sealed package is opened. MMC Metrology Lab, Inc. uses these sensors immediately after opening to accomplish repair of the device that was submitted for repair and calibration. There is no need to track shelf life of these items.

15.3.5 *Batteries.* Batteries when purchased have a use-by date on the packaging that shall be verified and accepted if adequate upon receipt. The battery inventory shall be maintained at a minimum level consistent with established history of battery usage.

15.3.6 *Paint.* Paint inventories shall be kept at a level such that quantities are expended in three months or less. Containers shall be labeled with receipt date and their usage data evaluated

15.3 General: (continued)

15.3.6 (Continued) periodically to ensure shelf duration goals. If its shelf duration exceeds one year, inventory quantities shall be adjusted and the material shall be discarded in accordance with State and Federal regulations.

15.4 Repair Materials

15.4.1 When repair of customer's equipment becomes necessary to complete calibration, original manufacturer's replacement parts shall be used if at all possible. Second source, generic or other suitable substitute replacement parts shall only be used in cases where original manufacturer parts are not available and not without the Technical Supervisor's consent or the customer's specific request.

15.4.2 Repair of gas analyzers, gas monitors or gas detectors shall be performed utilizing original manufacturer replacement parts only. If original manufacturer replacement parts are not available, the instrument shall be rejected and returned to the customer with a recommendation to return to the manufacturer for evaluation or repair. Under no circumstance shall generic or other substitute parts be utilized.

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Quality Manual	Release Date: May 13, 1996
Title: 16.0 Complaints	Revision: 11

16.1 Policy:

16.1.1 MMC Metrology Lab, Inc. addresses customer complaints utilizing procedures contained in Section 17, Policy Statement MMC-2, Customer Complaints.

ANNEX

POLICY STATEMENT INDEX

NUMBER / REV.	TITLE	RELEASE DATE
MMC-1 / Rev 30	HANDLING OF CUSTOMER'S MATERIAL	05-13-1996
MMC-2 / Rev 38	CUSTOMER COMPLAINTS	05-13-1996
MMC-3 / Rev 39	QUALITY AUDITS	05-13-1996
MMC-4 / Rev 35	SUB-CONTRACTOR AUDITING	05-13-1996
MMC-5 / Rev 33	MEASUREMENT UNCERTAINTIES	07-22-1996
MMC-6 / Rev 29	TRACEABILITY OF CALIBRATION STANDARDS	08-22-1996
MMC-7 / Rev 16	ISOLATION, BLANKING AND TAGGING ON-SITE	08-28-1996
MMC-8 / Rev 39	ASSOCIATE CAL LABS/ VENDORS	09-15-2000
MMC-9 / Rev 38	DISTRIBUTOR / SUPPLIER QUALITY SYSTEM	12-29-2003

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-1	Release Date: May 13, 1996
Title: Handling of Customer's Material	Revision: 30

1.0 Scope:

This policy statement describes sequentially how MMC Metrology Lab, Inc. handles customer material. It delineates the associated responsibilities assigned to the various functional areas and depicts the documentation utilized in the various evolutions.

2.0 Customer Service-Receiving Function:

2.1 The Customer Service Representative shall complete the Material Receipt Form (Figure 1.1) listing all instruments received, along with the customer's name, date, customer's purchase order number (if applicable) and a contact person with phone number. Unique customer requirements or instructions shall also be listed, as well as any accessories such as test leads, battery chargers, power cords and etc. Any abnormalities or apparent deficient condition of items received shall also be noted at time of receipt.

2.1.1 Customer items containing mercury, PCBs or other hazardous material shall not be accepted for service.

2.2 The Customer Service Representative shall then sign the Material Receipt Form and provide the customer the duplicate copy as their receipt. If the instrument(s) were delivered by other means (UPS, FEDEX, USPS, etc.), the Customer Service Representative shall inventory the instrument(s) received and shall compare this inventory to the packing list or purchase order. Any inventory discrepancy or apparent shipping damage shall immediately be resolved with the customer.

2.3 The Customer Service Representative shall then make an entry in the MMC Metrology Lab, Inc. Job Book listing the instrument(s) received and assigns a Job Number.

2.4 Each instrument shall then be given a sequentially numbered History Card (Figure 1.2) depicting the date received, customer's name, purchase order number (if applicable), MMC job number, instrument nomenclature, manufacturer, model number and serial number. Additionally, every twentieth History Card shall be annotated as an item requiring QA action.

2.5 If the instrument(s) are to receive expedited service, then the Customer Service Representative places a small circular ' Red Dot ' label on the associated History Card to signify special handling. Expedited items are to be the next item on the work bench.

2.6 The Customer Service Representative shall then enter the appropriate data on a MMC Metrology Lab, Inc. Material Control Tag (Figure 1.3) and attach it to the instrument to be serviced.

2.7 The Customer Service Representative shall then place the instrument(s) on the incoming work shelf and the History Card(s) in the card rack located in the calibration laboratory. If the instrument(s) is to receive expedited service, the area supervisor shall then be informed.

3.0 Calibration Laboratory-Calibration Function:

3.1 A technician shall take the instrument from the incoming work shelf into the service area along with its History Card.

3.2 Prior to commencing the calibration service the technician shall look for any special instructions on the History Card and proceeds accordingly. The technician shall then retrieve the proper calibration procedure and commence calibration.

3.3 If the instrument passes calibration the technician shall annotate the History Card accordingly and completes a Certificate of Calibration (Figure 1.4). He shall then apply the appropriate Calibration Label as depicted in Figure 1.5 and places the instrument on the outgoing / completed work shelf.

3.3.1 Minor repair and alignment is considered incidental to calibration if material and labor does not exceed approximately 10% of the assessed calibration fee. Instrument "As Found" data that was measured prior to an adjustment which exceeded the limits of permissible error shall be recorded and reported in the Certificate of Calibration. Final "As Left" data for those check points initially found beyond the limits of permissible error shall be recorded and reported in the Certificate of Calibration.

3.4 The completed Certificate of Calibration and History Card shall then be placed in the completed work rack located in the main office.

3.5 If the instrument fails calibration the technician shall depict on the history card the degraded instrument parameters / functions and shall determine the probable cause and estimate repair time and material requirements. He shall then locate a source of supply, delivery time and cost of material if required and also enters this information on the History Card.

3.6 The technician shall then place the failed instrument on the idle shelf along with a photocopy of the History Card. The original History Card shall be given to the Customer Service Representative so the customer may be informed and disposition requested.

4.0 Customer Service-Liaison Function:

4.1 If the instrument fails to pass calibration the Customer Service Representative shall notify the customer as to the condition of the instrument and requests disposition based on the data provided by the technician on the History Card. Disposition options include (1) "Special Calibration" authorized, (2) repair authorized, and (3) repair not authorized.

4.2 If the customer does not authorize repair, the Customer Service Representative shall then return the History Card to the technician with instructions to prepare Reject documentation (Figure 1.6).

4.3 If the customer desires that the instrument be repaired and no parts are required, the Customer Service Representative shall return the History Card to the technician with instructions to repair the instrument.

4.4 If the customer desires repair and parts were identified on the History Card, the Customer Service Representative shall deliver the History Card to the Purchasing Department. The Purchasing Department shall place the parts on order with the shipping method and priority

4.0 Customer Service-Liaison Function: (Continued)

4.4 (Continued) required by the customer. Upon receipt of the repair parts they shall be delivered to the technician along with the History Card. When repairs are completed, the instrument shall be resubmitted to the calibration process.

4.5 If the customer desires "Special Calibration", the Customer Service Representative shall return the History Card to the technician with instructions to special calibrate the instrument based on the degraded parameters / functions. The technician shall affix a Special Calibration label as depicted in Figure 1.5 and complete a Certificate of Calibration (Figure 1.4), including all measured out-of-tolerance data.

5.0 Customer Service - Delivery Function:

5.1 The Customer Service Representative shall review the completed calibration documentation for completeness and compares the data with the associated instrument to ensure that everything applicable to the job has been properly documented (calibration label, void labels and calibration certificate).

5.2 The Customer Service Representative shall then compare the completed calibration documentation to the original Material Receipt Form to ensure that each item on the purchase order is completed. A detailed Packing List (Figure 1.7) shall then be prepared and the customer notified that their work is complete and ready for pickup. If the items are to be shipped, they shall be properly packaged and prepared for shipping by whatever method the customer requests.

5.3 When the customer arrives to pick up their material, they shall be presented the Packing List depicting all the material that was serviced and ready for pick up. Upon inventorying and accepting their material the customer shall sign the Packing List and is given the duplicate copy as their receipt. The signed original Packing List shall then be placed in the Job File and submitted to the billing process.

6.0 Handling of Customer's Material - Special Functions:

6.1 Occasionally, calibration services are provided to commercial shipyards contracted to build U.S. Navy ships in their facilities. The calibration of new product purchased by these shipyards for installation on newly constructed Navy ships may contractually require the use of Navy METCAL program labels. In this regard the required METCAL labels shall be provided by the shipyard and their application shall be in accordance with the same procedures utilized for calibration labels depicted in Figure 1.5, but with the addition of a lab code (7MM) annotation. Custody of the METCAL calibration labels shall be the responsibility of the Technical Supervisor. These labels shall be used for the sole purpose of indicating the calibration status of new product purchased by commercial shipyards from MMC Metrology Lab, Inc. for Navy new construction applications.

FIGURE 1.1
(NOT TO SCALE)

MMC METROLOGY LAB, INC.

4989 Cleveland Street
Virginia Beach, Virginia 23462
Phone: (757) 456-2220
Fax: (757) 473-2204

Job No._____ Customer Order # _____ Date:

Customer:

Brought in for:
☐ Estimate ☐ Repair ☐ Calibration

Customer's Phone No.

Agent:

ITEM	QUAN.	MATERIAL	UNIT PRICE		AMOUNT	

MATERIAL RECEIPT

FIGURE 1.2

HISTORY CARD
(NOT TO SCALE)

HISTORY CARD

DATE: _____ **INSTRUMENT:** _____

CUSTOMER: _____ **MFG:** _____

P.O. NO: _____ **MODEL:** _____

MMC JOB NO: _____ **SERIAL NO:** _____

ANSI-Z540-1 **CAL INT:** _____

DATE COMPLETED: _____ **BY:** _____

ACTION TAKEN / REMARKS: _____

_____

_____

_____

FIGURE 1.3

MATERIAL CONTROL TAG
(NOT TO SCALE)

MMC METROLOGY LAB, INC.
4989 CLEVELAND STREET
VIRGINIA BEACH, VA 23462
PHONE: (757) 456-2220

ITEM_____

SER NO_____**SCALE**_____

CUSTOMER_____

JOB#_____**DATE**_____

ITEM_____

SER NO_____**SCALE**_____

CUSTOMER_____

JOB#_____**DATE**_____

REMARKS_____

_____

_____

FIGURE 1.4
(NOT TO SCALE)

Certificate Number

MMC METROLOGY LAB, INC.
4989 Cleveland Street
Virginia Beach, VA 23462
E-mail: mmc@mmcmetlab.com ‖ Web: www.mmc.ws
Phone: (757) 456-2220 ‖ Fax: (757) 473-2204

CERTIFICATE OF CALIBRATION

Customer:_____
Customer Order:_____
I.D. Number:_____
Job Number:_____
Location:_____

Instrument:_____
Manufacturer:_____
Model Number:_____
Serial Number:_____
U.U.T. Accuracy:_____

Compliance:
( ) ANSI Z540-1-1994 / ISO 10012-1
( ) Manufacturer's Specification
( ) Other

Temperature:_____ºF
Humidity:_____%RH
Measurand Accuracy:_____
Calibration Procedure:_____
Calibration Interval:_____
Calibration Date:_____
Calibration Due:_____

This instrument was received:
Date:_____ (m/d/yy)
( ) In-Tolerance
( ) Out-of-Tolerance
( ) Inoperative
Condition:
( ) New ( ) Excellent ( ) Good
( ) Fair ( ) Poor

This instrument is returned:
( ) In-Tolerance ( ) Out of Tolerance
( ) Repaired ( ) Functional Test Only
( ) Certified ( ) Special Calibration:
( ) Other:

Standards Used

Model	Serial	Cal Due Date
		(m/d/yy)

( ) Out-of-Tolerance Data ( ) Requested Data ( ) See Attached Data

Test Range / Check Point	Standard Reading	As Found Reading	As Left Reading

It is certified that at the time of service the item called for in the above order is in conformance with the requirements, specifications and drawings listed on the order. There is no calibration warranty, implied or otherwise, beyond the actual test results. The devices used to calibrate, adjust, inspect and test are traceable to the **National Institute of Standards and Technology (NIST),** intrinsic standards or natural physical constants. Records substantiating this are contained in our Quality Manual and are available upon request by authorized personnel. This certification shall not be reproduced except in full and without the written approval of MMC Metrology Lab, Inc.

Associate Calibration Lab:_____
(if applicable)

Authorized Signature:_____ Date:_____(m/d/yy)

FIGURE 1.5

MMC Calibration / Service Labels

<table>
<tr><th>Calibration Label</th><th>Reject Label</th></tr>
<tr><td>
MMC METROLOGY LAB
VA. BEACH, VA 456-2220
ANSI Z540 CALIBRATED USN 7MM
BY_____DATE_____
JOB_____DUE_____
S/N_____
Warranty is Void if seal is broken

MMC METROLOGY LAB
VA. BEACH, VA 456-2220
ANSI Z540 CALIBRATED USN 7MM
BY_____DATE_____
JOB_____DUE_____
S/N _____

Indicates instrument is within its applicable tolerance on all parameters.
</td><td>
REJECT
MMC METROLOGY LAB
VA. BEACH, VIRGINIA
456-2220
REASON:_____
_____
BY:_____DATE:_____

Instrument fails to meet required criteria during calibration.
</td></tr>
<tr><th>Functional Test Label</th><th>Void Label</th></tr>
<tr><td>
MMC METROLOGY LAB
VA. BEACH, VA 456-2220
FUNCTIONAL TEST ONLY
BY_____DATE_____
JOB_____DUE_____
S/N _____

Used when instrument operation is checked for proper operation only. No defined parameters required.
</td><td>
CALIBRATION
WARRANTY VOID
IF REMOVED

MMC METROLOGY LAB
CALIBRATION WARRANTY VOID IF REMOVED
VA. BEACH, VA.

Placed over readily accessible adjustments to prevent tampering by user when such tampering could affect the calibration.
</td></tr>
<tr><th>Serviced By Label</th><th>Special Calibration Label</th></tr>
<tr><td>
Attached to instrument to indicate MMC Metrology Lab as the servicing activity.

MMC METROLOGY LAB
4989 CLEVELAND ST.
VA. BEACH VA 23462
(757) 456-2220
WWW.MMC.WS
</td><td>
MMC METROLOGY LAB
VA. Beach, VA 456-2220
SPECIAL CALIBRATION
BY_____DATE_____
JOB_____DUE_____
S/N_____
Reason:_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Indicates deviation from usual calibration tolerances such as reduced tolerances or less than all ranges and parameters tested.
</td></tr>
</table>

FIGURE 1.5 (contd.)

No Calibration Required Label	Caution Filled System Label
 This label is for instruments not requiring calibration. These instruments do not make quantitative measurements or operate beyond specifications readily apparent to the user.	This label is placed on instruments that are filled with liquid to dampen the pointer movement. 
Directional Use Label	**Inactive Label**
  These label are for torque wrenches that are calibrated and certified in a specific direction only	 This label is placed on instruments that are no longer needed to support current workload. They must be recalibrated before they are placed in service.

FIGURE 1.6
(NOT TO SCALE)

Certificate Number

MMC METROLOGY LAB, INC.
4989 Cleveland Street
Virginia Beach VA 23462
E-mail: mmc@mmcmetlab.com ‖ Web: www.mmc.ws
Phone: (757) 456-2220 ‖ Fax: (757) 473-2204

REJECT DATA SHEET

Customer:_____
Customer Order:_____
I.D. Number_____
Job Number:_____
Location:_____

Instrument:_____
Manufacturer:_____
Model Number:_____
Serial Number:_____

Compliance:
( ) ANSI Z540-1-1994 / ISO 10012-1
( ) Manufacturer's Specification
( ) Other

This instrument was received:
Date:_____(m/d/yy)
( ) Out-of-Tolerance
( ) Inoperative

Place Reject Label Here

Instrument Test Data

Temperature:_____°F
Humidity:_____%RH
Calibration Procedure:_____
Instrument Accuracy:_____
Measurand Accuracy:_____

Standards Used

Model	Serial	Cal Due Date

Out-of-Tolerance Data

Test Range / Check Point	Standard Reading	As Found Reading	As Left Reading

The devices used to adjust, inspect and test are traceable to the **National Institute of Standards and Technology (NIST)**, intrinsic standards or natural physical constants. Records substantiating this are contained in our Quality Manual and are available upon request by authorized personnel. This data sheet shall not be reproduced except in full and without the written approval of MMC Metrology Lab, Inc.

Associate Calibration Lab:_____
(if applicable)

Authorized Signature:_____Date:_____(m/d/yy)

FIGURE 1.7
(NOT TO SCALE)

MMC METROLOGY LAB, INC.
4989 CLEVELAND STREET
VIRGINIA BEACH, VA 23462

PHONE (757) 456-2220 FAX (757) 473-2204
Email: mmc@mmcmetlab.com web site: www.mmc.ws

PACKING LIST NUMBER

4195

SOLD TO:

COMPANY
1717 JOB STREET
PORTSMOUTH, VA 23707

SHIP TO:

COMPANY
1717 JOB STREET
PORTSMOUTH, VA 23707

ACCOUNT NO.	PURCHASE ORDER NO.	F.O.B.	SHIP VIA	TERMS	SHIP DATE
14001	EV93045-21	VA BEACH, VA	P/U	NET 30 DAYS	12/18/03

DESCRIPTION	ITEM NO.	QTY ORDERED	QTY B/O	QTY SHIPPED
SURFACE THERM. 0/500F #DF-644	CAL	1	0	1
SURFACE THERM. 0/250F #DF-337	CAL	1	0	1
INSULATION TESTER # DF-227	REP/CAL	1	0	1
DIAL INDICATOR #DF-1060	CAL	1	0	1
TORQUE WRENCH # DF-233	CAL	1	0	1

SIGNATURE_____

PRINT NAME/RANK_____

DATE_____

PACKING LIST
THANK YOU

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-2	Release Date: May 13, 1996
Title: Customer Complaints	Revision: 38

1.0 Scope:

1.1 This policy statement describes sequentially how MMC Metrology Lab, Inc. handles customer complaints. It delineates the associated procedures and responsibilities of the various functional areas, and depicts the documentation utilized.

2.0 Policy:

2.1 Customer complaints may be communicated electronically, by letter or in person. Regardless of origin all complaints shall receive immediate attention, taking precedent over all production work unless otherwise directed by the Quality Manager.

2.2 Complaints shall be handled by persons knowledgeable in the pertinent service or product related area, preferably by the specific individual who actually performed the service or prepared the product. If the complaint can not be resolved immediately and further investigation is required, the customer shall be notified and the area supervisor or Product Representative shall take the necessary action to ensure timely resolution.

2.3 Complaints concerning administrative matters, such as billing, certificates, receipts, acknowledgements, etc., that require corrected copies of original documents shall be handled in such a manner so as to facilitate the reproduction of the entire transaction. All corrected copies shall be marked as such and shall be filed with the original documentation in the Job File.

2.4 Complaints concerning personnel shall be addressed at a level that ensures permanent resolution.

3.0 Instrument Service Compliant:

3.1 *Customer Service Representative.* When a customer returns previously serviced equipment or material to MMC Metrology Lab, Inc., the Customer Service Representative shall provide receipt for the material, attach a material control tag to the item, and deliver the item directly to the appropriate area supervisor relating the customer's complaint.

3.2 *Area Supervisor.* The area supervisor or his designee shall retrieve the relevant calibration / service data from the Job File in the main office. The area supervisor shall then deliver the item and associated service documentation to the technician who performed the original calibration / service.

3.3 *Technician.* The technician shall attempt another calibration / service action in an effort to validate the customer's complaint. If the complaint is deemed valid, the technician shall take whatever action necessary to return the equipment / material to the status previously requested by the customer. If the complaint is not valid, the customer shall be notified and assistance shall be offered to resolve the issue.

3.0 Instrument Service Complaint: (continued)

3.3.1 The technician shall then initiate a Complaint Report (Figure 2.1) using data from the original job history card / certificate and detailing the nature of the complaint, description of condition found, and corrective action taken. He shall then forward the Complaint Report to the area supervisor.

3.4 *Area Supervisor.* The area supervisor shall determine what action, if any, is required for MMC Metrology Lab, Inc. to prevent recurrence of the complaint. The area supervisor shall then document the required action in the space provided on Complaint Report and forward it to the Quality Manager.

3.5 *Quality Manager.* The Quality Manager shall review the report for correctness and assign a sequential Complaint Report number and enter it into the Complaint Report Log. He shall authorize the report by signature and retain a copy on file. The Quality Manager shall then review current policy and procedures, evaluate corrective recommendations, and implement any corrective action deemed necessary to prevent recurrence. Effectiveness of these corrective actions shall be continuously monitored by all concerned and specifically reviewed during the conduct of the Annual Activity Audit.

3.6 When the material in question is returned to the customer a copy of the completed Complaint Report shall be provided. Additionally, a copy of the Complaint Report shall be filed with the original calibration / service data in the Job File.

4.0 Nonconforming New Product Complaint:

4.1 C*ustomer Service Representative.* When a customer returns a product that was purchased new from MMC Metrology Lab, Inc., the Customer Service Representative shall complete and provide the customer a material receipt form. The Customer Service Representative shall then attach a material control tag to the item and deliver the product directly to the appropriate Product Representative relating the customer's complaint.

4.2 *Product Representative.* The Product Representative or his designee shall retrieve the relevant purchase data; review the contract specifications, and initiate action to validate the customer's complaint. If the complaint is deemed valid, the Product Representative shall take whatever action is necessary to return the product to specification. If the complaint is not valid, the customer shall be notified and assistance offered to resolve the issue.

4.2.1 When the complaint is resolved the Product Representative shall initiate a Complaint Report using contract identification data from the original purchase order and supplementing with details of the nature of the complaint, description of condition found, and corrective action taken. He shall then determine and document on the Complaint Report what action, if any, is required to prevent recurrence of the complaint. The report shall then be forwarded to the Quality Manager.

4.3 *Quality Manager.* The Quality Manager shall review the report for correctness and assign a sequential Complaint Report number and enter it into the Complaint Report Log. He shall authorize the report by signature and retain a copy on file. The Quality Manager shall then review current policy and procedures, evaluate corrective recommendations, and implement any corrective action deemed necessary to prevent recurrence. Effectiveness of these corrective

4.0 Nonconforming New Product Complaint: (continued)

4.3 (Continued) actions shall be continuously monitored by all concerned and specifically reviewed during the conduct of the Annual Activity Audit.

4.4 When the product in question is returned to the customer a copy of the completed Complaint Report shall be provided. Additionally, a copy of the Complaint Report shall be filed with the original purchase data in the Job File.

FIGURE 2.1
(NOT TO SCALE)

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462
Ph (757) 456-2220 ‖ Fax (757) 473-2204
E-mail mmc@mmcmetlab.com ‖ Web www.mmc.ws

CUSTOMER COMPLAINT REPORT

Report Number_____ **Complaint Date** _____

Job Date_____ Instrument_____
Job No _____ Manufacturer_____
Customer_____ Model No _____
P.O. No_____ Serial No _____
RMA No_____ ID No _____

Complaint:_____

_____

_____

Description of Condition Found:_____

_____

_____

Cause: _____

_____

Corrective Action:_____

_____

_____

Action Required (if any) by MMC to Prevent Recurrence:_____

_____

_____

_____

Quality Manager **Date**

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-3	Release Date: May 13, 1996
Title: Quality Audits	Revision: 39

1.0 Policy:

1.1 Quality audits shall be performed on a recurring basis to ensure quality activities and related results comply with planned arrangements and procedures and that these arrangements and procedures are adequate to achieve objectives.

2.0 Scope:

2.1 This policy statement provides for the scheduling and conduct of formal capability evaluations conducted by NAVSEA acceptable entities and for internal quality audits to include; (1) periodic spot-checks of internal processes and product quality audits verifying compliance with procedures and practices found in MMC Metrology Lab, Inc. Quality Manual; (2) the annual auditing of all components of the laboratory's activities; and (3) the annual review of the Quality Manual itself, ensuring it remains suitable to achieve quality goals consistent with prevailing reference documents and other directives.

3.0 Responsibility.

3.1 The Quality Manager shall be overall responsible for the content and conduct of the procedures delineated in this policy statement and for ensuring effectiveness and compliance there to.

4.0 Planning and conduct of audits:

4.1 *Calibration Capability Evaluation:* The Calibration Capability Evaluation (CCE) shall be conducted at intervals not to exceed 36 months by an entity acceptable to the Department of the Navy, Naval Sea Systems Command. This external evaluation will provide for the accredited recognition of MMC Metrology Lab's scope of calibration capabilities.

4.2 *Process / Calibration Quality Audit:* Periodic spot-checks at the bench level shall be conducted on a random basis. These checks / audits shall be conducted on approximately 5% of customer material inducted for calibration / verification as determined by random selection during the material check-in process. Every twentieth history card shall be annotated by the Customer Service Representative as an item requiring QA action. Prior to commencing the calibration / verification of the designated item the technician shall complete part (1) of the Calibration Quality Audit form, Figure 3.1, and route it to the Quality Manager. The Quality Manager shall decide if a process audit or a calibration quality check will be conducted. If a process audit is conducted the quality manager or his designee shall conduct the audit using part (2) of the quality audit form to record the results. If a calibration quality check is performed, part (3) of the quality audit form will be completed. The completed forms shall be maintained by the Quality Manager for a period of 24 months.

4.0 Planning and conduct of audits: (continued)

4.3 *Annual Activity Audit:* Annual activity audits shall be conducted during the month of January. The audit will encompass all laboratory activities and will follow procedures depicted in Enclosure (A). The audit shall be carried out by technicians independent of the area to be audited whenever possible. The results will be documented in Enclosure (A) audit checklists and will be maintained on file by the Quality Manager indefinitely.

4.4 *Formal Quality Manual Review:* Formal Quality Manual reviews shall be accomplished annually subsequent to the annual activity audit. The review shall be conducted by the Quality Manager and the Technical Supervisor under the direction of the President. The review will include supporting reference documents and other pertinent directives with emphasis on technical and administrative compliance. The review will also include any corrective action considered necessary as a result of the annual activity audit. The goal of this review is to maintain the Quality Manual's practicality, effectiveness, and suitability with regard to customer quality requirements. Report of this formal review will be contained in the foreword of the manual.

5.0 Corrective Action:

5.1 *Random Spot-Checks:* Should deficiencies arise during a Calibration Quality Check or a Calibration Process Audit, the auditor shall document them on the Quality Audit Form and submit the form to the area supervisor.

5.1.1 The supervisor of the area audited shall take corrective action as necessary to ensure compliance with procedures and practices contained in the Quality Manual, and shall document this action on the Calibration Quality Audit Form prior to submitting it to the Quality Manager.

5.2 *Annual activity audit:* Discrepancies or Non-conformance items uncovered during audit shall be reported to the Quality Manager immediately to ascertain impact on product quality and extent of customer notification. Non-conformance items will be investigated in a timely manner and brought to resolution as soon as practicable, documenting root cause and contributing factors on audit checklist. All Complaint Reports and Quality Deficiency Reports filed in the previous year shall be reviewed and each associated corrective action evaluated for effectiveness. All discrepancies shall be considered during annual formal Quality Manual review for possible Quality Manual revision to eliminate ambiguities and to preclude discrepancy recurrence.

FIGURE 3.1
(NOT TO SCALE)

MMC Metrology Lab, Inc.
Calibration Quality Audit Form

Part 1 - Identification Data (Perform ☐ Part 2 ☐ Part 3)

Technician:_____ Calibration Procedure:_____

Customer:_____Item:_____Mfg:_____

Job No.:_____ Range / Model:_____ S/N:_____

Part 2 - Calibration Process Audit

1.0	Is the calibration procedure being used current?	Yes_____ No_____
2.0	Are documented temperature and humidity within specification?	Yes_____ No_____
3.0	Are standards being used calibrated and labeled as such?	Yes_____ No_____
4.0	Is the Target Accuracy Ratio (TAR)at least 4:1 or per procedure?	Yes_____ No_____
5.0	Are proper labels applied to the Unit Under Test (UUT)?	Yes_____ No_____
6.0	Are all safety precautions observed?	Yes_____ No_____

Part 3 - Calibration Quality Check

NOMINAL	MEASURED VALUE	PASS	FAIL

Deficiencies / Comments:_____
_____

Auditor:_____ Date:_____

Corrective Action:_____
_____
_____
_____Area Supervisor:_____ Date:_____

***** RETURN TO QUALITY MANAGER *****

ENCLOSURE A

This enclosure is maintained as a separate Microsoft Word Document file. This separate file enables access to audit areas and checklists for revision purposes without initiating formal Quality Manual changes.

A hard copy of the current Audit Plan and Checklist will be filed following this Enclosure page and shall be reviewed and revised if necessary by the Quality Manager during the annual Formal Quality Manual Review.

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-4	Release Date: May 13, 1996
Title: Sub-Contractor Auditing	Revision: 35

1.0 Scope:

1.1 This policy statement explains how MMC Metrology Lab, Inc. audits sub-contractors that perform calibration services as an Associate Calibration Laboratory or are suppliers of reference materials, critical consumables or supplies which affect the quality of testing and calibration.

2.0 Purpose:

2.1 To ensure that products and services delivered to the customer meet the requirements of ANSI/NCSL Z540-1-1994 (NAVSEA 04-4734) or ISO-10012-1.

3.0 Procedure:

3.1 When outside calibration services or reference material is deemed necessary and a technically capable calibration facility or supplier is identified, the Quality Manager shall acquire documentation confirming the facility or supplier was audited to the requirements of ANSI/NCSL Z540-1-1994 (NAVSEA 04-4734), ISO/IEC 17025, or ISO 9000 series (for reference materials) by an approved accrediting body. In regard to calibration facilities the Quality Manager shall review documentation that the laboratory was accredited by a NAVSEA approved accrediting body to be in compliance with the requirements of ANSI/NCSL Z540-1, ISO/IEC 17025 and / or NAVSEA 04-4734 and that their scope of accreditation includes the appropriate measurement parameters and ranges for the calibrations to be performed. In accordance with reference 2.9 the NAVSEA approved accrediting bodies are those recognized by the National Cooperation of Laboratory Accreditation (NACLA) or are independently recognized by the National Institute of Standards and Technology (NIST), such as the National Voluntary Laboratory Accreditation Program (NVLAP), the International Laboratory Accreditation Cooperation (ILAC) and the Asia Pacific Laboratory Accreditation Cooperation (APLAC). All outside source accreditation documents shall be maintained by the Quality Manager or his designee. If the facility or supplier has not been audited, then the Quality Manager or his designee must perform an audit of that facility using format of Enclosure (1) if feasible or obtain a satisfactorily completed self audit using the forms as depicted in Figure 4.1 or Figure 4.2 as appropriate.

3.2 At the completion of each sub-contracted calibration the Quality Manager or his designee shall review all sub-contractor calibration documentation to ensure compliance with the requirements specified in the purchase order. All discrepancies shall be resolved prior to payment.

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, Virginia 23462
(757) 456-2220

Associate Lab Audited:_____ **Audited By:**_____
Date: _____

REQUIREMENT	PROCEDURE	SAT	UNSAT
1. Laboratory has a Quality System that: a. Controls and maintains documentation? b. Has procedures for achieving traceability of measurements? c. Explains scope of calibrations and/or verifications? 2. Laboratory performs checks to ensure the quality of calibration results? 3. Laboratory has sufficient trained personnel? 4. Laboratory has proper environmental controls: a. Temperature/Humidity b. Environment is monitored c. Cleanliness is maintained 5. Laboratory has calibration standards sufficient to maintain 4:1 accuracy ratio? 6. Certificates / labels contain all pertinent information? 7. Laboratory standards are traceable to national or international standards? 8. Laboratory uses appropriate methods and procedures for all calibrations/verifications? 9. Laboratory maintains recall file for all calibration standards?			

Enclosure (1)

FIGURE 4.1
(NOT TO SCALE)

MMC METROLOGY LAB, INC.
ASSOCIATE CALIBRATION LABORATORY
QUALITY SURVEY

LABORATORY NAME AND ADDRESS: _____
_____
_____

POINT OF CONTACT: Name _____
Title _____
Phone _____

Please circle your response to the following questions:

1. Are your personnel that perform calibrations qualified on the basis of appropriate education, training, experience and/or demonstrated skills? YES / NO

2. Does your laboratory report and/or record relevant environment conditions, i.e. temperature, humidity, barometric pressure, etc., that may have an influence on the measurement results during calibration? YES / NO

3. Does your laboratory utilize written calibration procedures/methods that are technically appropriate and current? YES / NO

4. Does your laboratory maintain a "Test Uncertainty Ratio" (Unit Under Test : Standard) of at least 4:1, or if not is the customer notified of this variance? YES / NO

5. Are your measurement standards calibrated/compared on a recurring basis and are historical records maintained for each standard requiring calibration? YES / NO

6. Are your measurement standard's accuracy traceable to the standards maintained by the National Institute of Standards and Technology (NIST), or derived from natural physical constants? YES / NO

7. Does your laboratory provide actual measured data for all "out of tolerance" conditions both before and after corrective alignment? YES / NO

Page 1 of 2

FIGURE 4.1 (Continued)

8. Does your laboratory require customer's prior approval for the correction of any condition that requires repair or other service beyond the scope of calibration or service requested in the purchase order? YES / NO

9. Remarks or a brief explanation of any answer that is difficult to answer with a simple "yes" or "no": _____

_____

_____

_____

Person completing survey (Name -Print) _____

(Signature and date)_____

Please return completed survey to : MMC Metrology Lab, Inc.
Attn: Quality Manager
4989 Cleveland St.
Virginia Beach, VA 23462
Phone (757) 456-2220
Fax: (757) 473-2204

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FIGURE 4.2
(NOT TO SCALE)

MMC METROLOGY LAB, INC.
SUPPLIER QUALITY SURVEY

SUPPLIER NAME AND ADDRESS: _____
_____
_____

POINT OF CONTACT: Name _____

Title _____

Phone _____

Please circle your response to the following questions:

1. Are your personnel that perform testing/certifications qualified on the basis of appropriate education, training, experience and/or demonstrated skills? YES / NO

2. Does your facility report and/or record relevant environmental conditions, i.e. temperature, humidity, barometric pressure, etc., that may have an influence on the measurement results during testing/certification? YES / NO

3. Does your facility utilize written test/certification procedures/methods that are technically appropriate and current? YES / NO

4. Are your measurement standards calibrated/compared on a recurring basis and are historical records maintained for each standard requiring calibration? YES/NO

5. Are your measurement standard's accuracy traceable to the standards or reference materials maintained by the National Institute of Standards and Technology (NIST), or derived from natural physical constants? YES / NO

6. Does your facility provide lot/batch numbers on each item of product and/or on the associated certification documentation? YES / NO

7. Does your facility manufacture or otherwise produce any product which contains metallic mercury, mercury compounds, or is produced utilizing mercury-bearing instruments/equipment, i.e. direct-connected manometers, mercury vacuum pumps,or mercury seals? YES / NO / N/A

Page 1 of 2

FIGURE 4.2 (Continued)

8. Does your facility clearly label any product that contains mercury or mercury compounds? YES / NO / N/A

9. Can your manufacturing or certifying facility provide a “mercury free” statement as it pertains to a specific product by lot/batch number or other product identifying means if requested to do so? YES / NO / N/A

10. Remarks or a brief explanation of any answer that is difficult to answer with a simple “yes” or “no”:_____
_____
_____
_____
_____

Person completing survey (Name - Print)_____

Signature and Date_____

Please return completed survey to: MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462
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FAX: (757) 473-2204

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MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-5	Release Date: July 22, 1996
Title: Calibration Uncertainties	Revision: 33

1.0 Scope:

1.1 This policy statement explains MMC Metrology Lab, Inc. position on handling measurement uncertainty.

2.0 Purpose:

2.1 To ensure that calibration uncertainties are sufficiently small so that the adequacy of the measurement is not affected. The collective accuracy of the measurement / reference standards shall not exceed 25% of the acceptable tolerance / specification of each characteristic of the unit under test.

3.0 Policy:

3.1 When the unit under test (U.U.T.) requires calibration / verification of multiple characteristics, or when several measurement / reference standards are required to adequately test a characteristic, it becomes impractical to denote the associated measurand accuracy on the certificate of calibration. In this regard the certificate of calibration shall reference this policy statement.

4.0 Measurand Accuracy:

4.1 The data contained in the following Scope of Calibrations depict pertinent system accuracy currently attainable at MMC Metrology Lab, Inc.

4.2 Due to the dynamic nature of recertification of measurement standards and reference materials the data contained in the Scope of Calibrations shall be reviewed and updated annually. However, if the current data are requested it shall be furnished to the customer upon written request. The current data shall be located in the Technical Supervisor’s file.

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

I. Electrical - DC / Low Frequency

Parameter/Equipment	Range	Best System Accuracy	Comments
DC Voltage Systems			
Generate			
(Laboratory)	0 to 19.9999mV	± .005% + 5.2µV	Fluke 5102B
	20mV to 199.999mV	± .005% + 7µV	Fluke 5102B
	200mV to 1.99999V	± .005% + 25µV	Fluke 5102B
	2V to 19.9999V	± .005% + 205µV	Fluke 5102B
	20V to 199.999V	± .005% +2mV	Fluke 5102B
	200V to 1100V	± .005% + 11mV	Fluke 5102B
(On-site)	0 to 100mV	± .02% + 20µV	Fluke 715
	100mV to 10V	± .02% + 2mV	Fluke 715
	10V to 105V	± .2% + 52.5mV	Arbiter 1040C
	100V to 1050V	± .2% + .53V	Arbiter 1040C
Measure			
(Laboratory)	0 to 200mV	± .00145% + .2µV	Datron/Wavetek 1271
	200mV to 2V	± .00115% + 1µV	Datron/Wavetek 1271
	2V to 20V	± .00095% + 5µV	Datron/Wavetek 1271
	20V to 200V	± .00135% + .1mV	Datron/Wavetek 1271
	200V to 1000V	± .00145% + 2mV	Datron/Wavetek 1271
	1kV to 2kV	± .05% + .05%/kV + .5V	Valhalla 4600
	2kV to 9kV	± .05% + .05%/kV + 5V	Valhalla 4600
	9kV to 100kV	± .5%	MMC HV-1 / Fluke 8600A
(On-site)	0 to 200mV	± .04% + 20µV	Fluke 8600A
	200mV to 2V	± .02% + .1mV	Fluke 8600A
	2V to 20V	± .02% + 1mV	Fluke 8600A
	20V to 200V	± .02% + 10mV	Fluke 8600A
	200V to 1200V	± .02% + 96mV	Fluke 8600A
	1.2kV to 2kV	± .05% + .05%/kV + .5V	Valhalla 4600
	2kV to 40kV	± 1%	Fluke 80K-40 / 8600A

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

I. Electrical - DC / Low Frequency (Continued)

Parameter/Equipment	Range	Best System Accuracy	Comments
DC Current Systems			
Generate			
(Laboratory)	0 to 199.999µA	± .025% + .015µA	Fluke 5102B
	200µA to 1.99999mA	± .025% + .06µA	Fluke 5102B
	2mA to 19.9999mA	± .025% + .51µA	Fluke 5102B
	20mA to 199.999mA	± .025% + 5µA	Fluke 5102B
	200mA to 1.99999A	± .025% + 50µA	Fluke 5102B
	2A to 20A	± .025% + 1mA	Fluke 5102B / 5220A
	20A to 100A	± .054% + 20mA	Empro HA100-100 / Fluke 8600A
(On-site)	0 to 24mA	± .015% + 2µA	Fluke 715
	24mA to105mA	± .2% + 53µA	Arbiter 1040C
	.1A to 1.05A	± .2% + .53mA	Arbiter 1040C
	1A to 10.5A	± .2% + 5.3mA	Arbiter 1040C
Measure			
(Laboratory)	0 to .3A	± .0036% + .5µA	L&N 4025 / Datron 1271
	.3A to 100A	± .0094% + .1mA	L&N 4221 / Datron 1271/ MMC 100-1000
(On-site)			
	0 to 24mA	± .015% + 2µA	Fluke 715
	24mA to 200mA	± .1% + 20µA	Fluke 8600A
	200mA to 2A	± .1% + .2mA	Fluke 8600A
	2A to 4A	± .2% + 4mA	Fluke 87-3
	4A to 10A	± .2% + 20mA	Fluke 87-3

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

I. Electrical - DC / Low Frequency (Continued)

Parameter/Range	Frequency	Best System Accuracy	Comments
AC Voltage Systems			
Generate (Laboratory)			
0 to 20mV	50Hz to 10kHz,	± .05% + 51µV	Fluke 5102B
	10kHz to 50kHz	± .08% + 52µV	
20mV to 200mV	50Hz to 10kHz,	± .05% + 60µV	Fluke 5102B
	10kHz to 50kHz	± .08% + 66µV	
200mV to 2V	50Hz to 10kHz,	± .05% + 150µV	Fluke 5102B
	10kHz to 50kHz	± .08% + 210µV	
2V to 20V	50Hz to 10kHz,	± .05% + 1.05mV	Fluke 5102B
	10kHz to 50kHz	± .08% + 1.65mV	
20V to 110V	50Hz to 10kHz,	± .05% + 10mV	Fluke 5102B
	10kHz to 50kHz	± .08% + 10mV	Fluke 5102B / 5205A
110V to 200V	50Hz to 1kHz,	± .05% + 10mV	Fluke 5102B
	1kHz to 50kHz	± .08% + 10mV	Fluke 5102B / 5205A
200V to 1100V	50Hz to 1kHz,	± .05% + 55mV	Fluke 5102B
	1kHz to 50kHz	± .08% + 55mV	Fluke 5102B / 5205A
(On-site)			
1.5V to 15.75V	50Hz to 75Hz,	± .2% + 8mV	Arbiter 1040C
	333.3Hz to 500Hz	± .2% + 8mV	Arbiter 1040C
15V to 150V	50Hz to 75Hz,	± .2% + .079V	Arbiter 1040C
	333.3 Hz to 500Hz	± .2% + .079V	Arbiter 1040C
150V to 750V	50Hz to 75Hz,	± .2% + .75V	Arbiter 1040C
	333.3Hz to 500Hz	± .2% + .75V	Arbiter 1040C

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

I. Electrical - DC / Low Frequency (Continued)

Parameter/Range	Frequency	Best System Accuracy	Comments
AC Voltage System (continued)			
Measure (Laboratory)			
2mV to 90mV	40Hz to 100Hz, 100Hz to 2kHz, 2kHz to 10kHz, 10kHz to 30kHz, 30kHz to 100kHz	± .014% + 4μV ± .014% + 2μV ± .014% + 4μV ± .047% + 8μV ± .115% + 20μV	Datron/Wavetek 1271 Datron/Wavetek 1271 Datron/Wavetek 1271 Datron/Wavetek 1271 Datron/Wavetek 1271
90mV to 100V	40Hz to 20kHz, 20kHz to 50kHz, 50kHz to 100kHz	± .003% ± .007% ± .015%	Datron/Wavetek 4920M Datron/Wavetek 4920M Datron/Wavetek 4920M
100V to 1000V	40Hz to 20kHz, 20kHz to 50kHz, 50kHz to 100kHz	± .0035% ± .0075% ± .0150%	Datron/Wavetek 4920M Datron/Wavetek 4920M Datron/Wavetek 4920M
1kV to 2kV	20Hz to 100Hz, 100Hz to 400Hz	± .1% + .05%/kV + 2V ± .5% + .05%/kV + 5V	Valhalla 4600 Valhalla 4600
2kV to 15kV	20Hz to 60Hz	± .5% + .05%kV + 50V	Valhalla 4600
15kV to 28kV	60Hz	± 5%	Fluke 80K-40 / 8600A
(On-site)			
2mV to 200mV	50Hz to 10kHz	± .2% + .16mV	Fluke 8600A
200mV to 2V	50Hz to 10kHz	± .2% + .3mV	Fluke 8600A
2V to 20V	50Hz to 10kHz	± .2% + 3mV	Fluke 8600A
20V to 200V	50Hz to 10kHz	± .2% + 30mV	Fluke 8600A
200V to 500V	50Hz to 10kHz	± .2% + .36V	Fluke 8600A
500V to 1200V	50Hz to 10kHz	± .37% + .36V	Fluke 8600A

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

I. Electrical - DC / Low Frequency (Continued)

Parameter/Range	Frequency	Best System Accuracy	Comments
AC Current System			
Generate			
(Laboratory)			
0 to 200µA	50Hz to 1000Hz	± .05% + .03µA	Fluke 5102B
200µA to 2 mA	50Hz to 1000Hz	± .05% + .12µA	Fluke 5102B
2mA to 20mA	50Hz to 1000Hz	± .05% + 1.02µA	Fluke 5102B
20mA to 200mA	50Hz to 1000Hz	± .05% + 10µA	Fluke 5102B
200mA to 2A	50Hz to 1000Hz	± .05% + .1mA	Fluke 5102B
2A to 20A	50Hz to 400Hz	± .07% + 1mA	Fluke 5102B / 5220A
(On-site)			
.1A to 1.05A	50Hz to 75Hz,	± .2% + .53mA	Arbiter 1040C
	333.3Hz to 500Hz	± .2% + .53mA	Arbiter 1040C
1A to 7.5A	50Hz to 75Hz,	± .2% + 7.5mA	Arbiter 1040C
	333.3Hz to 500Hz	± .2% + 7.5mA	Arbiter 1040C
Measure			
(Laboratory)			
2µA to 20µA	40Hz to 2kHz	± .0147%	L&N 4035 / Datron 1271
20µA to 1mA	40Hz to 100Hz,	± .0117%	L&N 4035 / Datron 1271
	100Hz to 2kHz	± .0097%	L&N 4035 / Datron 1271
1mA to 10mA	40Hz to 100Hz,	± .012%	L&N 4030 / Datron 1271
	100Hz to 2kHz	± .01%	L&N 4030 / Datron 1271
10mA to 100mA	40Hz to 100Hz,	± .0136%	L&N 4025 / Datron 1271
	100Hz to 2kHz	± .0116%	L&N 4025 / Datron 1271
100mA to 1A	40Hz to 2kHz	± .019%	L&N 4221 / Datron 1271
1A to 20A	60Hz and 400Hz	± .07%	MMC 100-1000 / Datron 1271
20A to 70A	60Hz,	± .08%	MMC 100-1000 / Datron 1271
20A to 70A	400Hz	± .07%	MMC 100-1000 / Datron 1271
(On-site)			
0 to 200µA	50Hz to 10kHz	± .3% + .16µA	Fluke 8600A
200µA to 2mA	50Hz to 10kHz	± .3% + 1.6µA	Fluke 8600A
2mA to 20mA	50Hz to 10kHz	± .3% + 16µA	Fluke 8600A
20mA to 200mA	50Hz to 10kHz	± .3% + .16mA	Fluke 8600A
200mA to 2000mA	50Hz to 5kHz	± .3% + 1.6mA	Fluke 8600A
2000mA to 10A	45Hz to 2kHz	± 1% + 20mA	Fluke 87

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

I. Electrical - DC / Low Frequency (Continued)

Parameter/Range	Frequency	Best System Accuracy	Comments
Phase			
Generate 0 to 360°	60Hz and 400Hz	± .33°	Arbiter 1040C
Measure 0 to 360°	50Hz to 500Hz	± .1°	Dranetz 305D/PA3008

Parameter/Range	Frequency	Best System Accuracy	Comments
AC Power / VARS			
Generate (Laboratory)			
0 to 10000VA	60Hz and 400Hz	± .5%	Fluke 760A system
(On-site)			
1.5VA to 165VA	60Hz and 400Hz	± .4% + .165VA	Arbiter 1040C
165VA to 1180VA	60Hz and 400Hz	± .4% + 2.36VA	Arbiter 1040C
1180VA to 5625VA	60Hz and 400Hz	± .4% + 11.25VA	Arbiter 1040C

Parameter/Equipment	Range	Best System Accuracy	Comments
Capacitance			
Generate (Fixed point)	.02µF	± .011%	GENRAD 1409M
Measure (1kHz)	.1pF to .0012µF	± .2% + .1pF +(1% x D)	ESI 250DE
	.0012µF to .012µF	± .2% + 1pF +(.5% x D)	ESI 250DE
	.012µF to .12µF	± .2% + 10pF +(.5% x D)	ESI 250DE
	.12µF to 1.2µF	± .2% + 100pF +(.5% x D)	ESI 250DE
	1.2µF to 12µF	± .2% + .001µF +(.5% x D)	ESI 250DE
	12uF to 120µF	± .2% + .01µF +(.5% x D)	ESI 250DE
	120µF to 1200µF	± .2% + .1µF + (1% x D)	ESI 250DE

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

I. Electrical - DC / Low Frequency (Continued)

Parameter/Equipment	Range	Best System Accuracy	Comments
Inductance			
Generate (Fixed point)	200mH	± .05%	GENRAD 1482M
Measure (1kHz)	.1µH to 1.2mH	± .2% + .1µH + 1.2%/Q	ESI 250DE
	1.2mH to 12mH	± .2% + 1µH + .7%/Q	ESI 250DE
	12mH to 120mH	± .2% + 10µH + .7%/Q	ESI 250DE
	120mH to 1.2H	± .2% + 100µH + .7%/Q	ESI 250DE
	1.2H to 12H	± .2% + 1mH + .7%/Q	ESI 250DE
	12H to 120H	± .2% + 10mH + .7%/Q	ESI 250DE
	120H to 1200H	± .2% + 100mH + 1.2%/Q	ESI 250DE

Parameter/Equipment	Range	Best System Accuracy	Comments
Resistance			
Generate (Fixed Points)	.0001Ω	± .0277%	BIDDLE 249005
	.001Ω	± .0141%	BIDDLE 249004
	.01Ω	± .0082%	BIDDLE 249003
	.1Ω	± .0015%	L&N 4221B
	1Ω	± .0010%	L&N 4020B
	10Ω	± .0026%	L&N 4025B
	100Ω	± .0010%	L&N 4030B
	1kΩ	± .00072%	L&N 4035B
	10kΩ	± .0007%	L&N 4040B
	100GΩ	± .1%	IET SR-C-100G
Measure	0Ω to 10Ω	± .00225% + .04mΩ	Datron / Wavetek 1271
	10Ω to 100Ω	± .00145% + .1mΩ	Datron / Wavetek 1271
	100Ω to 1kΩ	± .00145% + 1mΩ	Datron / Wavetek 1271
	1kΩ to 10kΩ	± .00145% + 10mΩ	Datron / Wavetek 1271
	10kΩ to 100kΩ	± .0018% + .1Ω	Datron / Wavetek 1271
	100kΩ to 1MΩ	± .0027% + 2Ω	Datron / Wavetek 1271
	1MΩ to 10MΩ	± .0045% + 100Ω	Datron / Wavetek 1271
	10MΩ to 100MΩ	± .05% + 10kΩ	Datron / Wavetek 1271
	100MΩ to 1GΩ	± .3% + .5MΩ	Datron / Wavetek 1271

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

II. Time and Frequency

Parameter/Equipment	Range	Best System Accuracy	Comments
Frequency			
Generate			
(Laboratory)	.1MHz, 1MHz, and 5MHz	± 5 parts in 10^{12}	HP 5061A
	10Hz to 10.99999MHz	± 1 part in 10^{6}	Fluke 6011A-01
	1MHz to 520MHz	± 10 parts in 10^{6}	Wavetek 3000
(On-site)	50Hz to 75Hz	± .01%	Arbiter 1040C
	333.3Hz to 500Hz	± .01%	Arbiter 1040C
Measure	10Hz to 520MHz	±3 parts in 10^{8}	Fluke 7220A

III. Acoustics

Parameter/Equipment	Range	Best System Accuracy	Comments
Acoustics			
Generate	114dB @ 125Hz	± .7dB	GENRAD 1562A
	114dB @ 250Hz	± .7dB	GENRAD 1562A
	114dB @ 500Hz	± .5dB	GENRAD 1562A
	114dB @ 1000Hz	± .7dB	GENRAD 1562A
	114dB @ 2000Hz	± .7dB	GENRAD 1562A
	94dB @ 1000Hz	± .8dB	Extech 407766

IV. Chemical

Parameter/Equipment	Range	Best System Accuracy	Comments
			Standard buffer solutions
pH (Fixed points)	4.000pH @ 25°C	± .002pH	Cole Parmer 05942-26
	7.000pH @ 25°C	± .002pH	Cole Parmer 05942-46
	10.000pH @ 25°C	± .002pH	Cole Parmer 05942-66

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

IV. Chemical (Continued)

Parameter/Equipment	Range	Best System Accuracy	Comments
			Standard solutions
Conductivity (Fixed points)	10µS @ 25°C	± .25µS	Fisher 09328-1
	100µS @ 25°C	± .25%	Fisher 09328-2
	1000µS @ 25°C	± .25%	Fisher 09328-3
	1413µS @ 25°C	± .25%	Fisher 09328-11
	10000µS @ 25°C	± .25%	Fisher 09328-4

V. Thermodynamics

Parameter/Equipment	Range	Best System Accuracy	Comments
Relative Humidity			ACS salt solutions
Generate (Fixed points)	11.30%RH @ 25°C	±1%RH	Lithium Chloride
	43.16%RH @ 25°C	±1%RH	Potassium Carbonate
	75.29%RH @ 25°C	±1%RH	Sodium Chloride
	84.34%RH @ 25°C	±1%RH	Potassium Chloride
	97.30%RH @ 25°C	±1%RH	Potassium Sulfate
Measure	0 to 90%RH	±1%RH	Vaisala HMP233
	90 to 100%RH	±2%RH	Vaisala HMP233

Parameter/Equipment	Range	Best System Accuracy	Comments
Temperature			
Generate	- 13°F to 30°F	± .45°F	Hart 9103 Thermo Unit
	30°F to 220°F	± .15°F	Temperature bath / Azonix
	220°F to 284°F	± .45°F	Hart 9103 Thermo Unit
	284°F to 600°F	± 1°F	King Nutronics 3604
	600°F to 1200°F	± .2%	King Nutronics 3604
Measure	- 40°F to 1220°F	± .036°F	Rosemount 162CE

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

VI. Mechanical

Parameter/Equipment	Range	Best System Accuracy	Comments
Pressure			
(Laboratory)	0psig to 6psig	± .0036 psig	Meriam 350
	6psig to 12000psig	± .01%	Ruska 2400 system
	12000psig to 60000psig	± 78 psig	Viatran 345
	0psia to 38psia	± .0038 psia	Ruska 6222
	38psia to 150psia	± .03 psia	Ruska 6222
(On-site)	0psig to 7psig	± .0036 psig	Meriam 350
	7psig to 36psig	± .05% + .0018 psig	Crystal 33
	36psig to 3000psig	± .05% + .15 psig	Crystal 33
	3000psig to 5000psig	± 5 psig	Heise CM
	5000psig to 10000psig	± 10 psig	Heise CM
Vacuum			
(Laboratory)	0 in Hg to 29.5 in Hg	± .03 in Hg	Heise CC
(On-site)	0 in Hg to 27 in Hg	± .075 in Hg	Crystal 33

Parameter/Equipment	Range	Best System Accuracy	Comments
Torque	10 to 600 in-oz	± 1%	Torque Controls ET600Z
	25 to 250 in-lb	± 1%	Torque Controls ET250P
	15 ft-lb to 150 ft-lb	± 1%	Sturtevant 10367
	100 ft-lb to 500 ft-lb	± 1 ft-lb	AKO TSD-1200/1101
	500 ft-lb to 1000 ft-lb	± .2%	AKO TSD-1200/1101

Parameter/Equipment	Range	Best System Accuracy	Comments
Rotation	62.5 RPM to 40000 RPM	± .02%	Quantum N11ECS-2B

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

VI. Mechanical (Continued)

Parameter/Equipment	Range	Best System Accuracy	Comments
Flow			
(Gas)	0 scfm to .22 scfm .22 scfm to 3 scfm	± .5% ± .5%	CME 10-25-6N CME 10-25-85N
(Liquid)	.9 gpm to 275 gpm	± .25%	Sponsler SP5/8, SP2

Parameter/Equipment	Range	Best System Accuracy	Comments
Force (Compression)			
Measure	0 lbs to 20000 lbs	± 10 lbs	T-Hydronics TH-UC

Parameter/Equipment	Range	Best System Accuracy	Comments
Gas Analysis (Fixed points)	Carbon monoxide - 20ppm Carbon monoxide - 50ppm Carbon monoxide - 100ppm	± .2 ppm of component ± .5 ppm of component ± 1 ppm of component	Certified calibration gas NIST Traceable
	Hexane - 100ppm Hexane - 500ppm	± 2 ppm of component ± 5 ppm of component	
	Hydrogen - 1.0%	± .01% of component	
	Hydrogen sulfide - 25ppm	± .25 ppm of component	
	Methane - 1.0% Methane - 1.62% Methane - 2.5%	± .01% of component ± .016% of component ± .025% of component	
	Nitrogen - 99.99%	99.9995% pure	
	Oxygen - 2.0% Oxygen - 17.0%	± .02% of component ± .17% of component	
	Pentane - .75% / O_2 -15%	± .075% pentane/± .015% O_2	
	Isobutylene 100 ppm	± 1ppm of component	

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

VI. Mechanical (Continued)

Parameter/Equipment	Range	Best System Accuracy	Comments
Mass (Fixed points)	10 mg	ANSI/ASTM E617 class 1	Fisher certified weights
	20 mg	"	
	50 mg	"	
	100 mg	"	
	200 mg	"	
	500 mg	"	
	1 g	ANSI/ASTM E617 class 1	Fisher certified weights
	2 g	"	
	5 g	"	
	10 g	"	
	20 g	"	
	50 g	"	
	100 g	"	
	200 g	ANSI/ASTM E617 class 6	Troemner certified weights
	500 g	"	
	1 kg	ANSI/ASTM E617 class 1	Troemner certified weights
	5 kg	"	
	.5 lb	NIST HDBK 105-1 class F	MSD D-77 certified weights
	1 lb	"	
	2 lb	"	
	3 lb	"	
	5 lb	"	
	10 lb	"	
	20 lb	"	
	50 lb	NIST HDBK 105-1 class F	AKO 50LB
Scales and Balances	Up to 420 lbs	Cumulative per weight	MSD D-77 certified weights

Scope of Calibrations

NAVSEA 04-4734 / ANSI/NCSL Z540-1-1994

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

VII. Dimensional

Parameter/Equipment	Range	Best System Accuracy	Comments
Plain Rings	.125 in to 16 in	± .0001 in	Mitutoyo 511-912 Mitutoyo 516-401
Plain Plugs	.011 in to 1 in 1 in to 10 in	± 10 µin ± (12 + 1µin/in) µin	Pratt & Whitney U302582 Mitutoyo 516-401
Length standards	.05 in to 1 in 1 in to 10 in 10 in to 36 in	± 10 µin ± (12 + 1µin/in) µin ± (19 + 2µin/in) µin	Pratt Whitney U302582 Mitutoyo 516-401
Micrometers			
Inside	Up to 1 in 1 in to 36 in	± 2 µin ± (4 + 2 µin/in) µin	Mitutoyo 516-401
Outside (INCH)	Up to 1 in 1 in to 60 in	± 2 µin ± (4 + 2 µin/in) µin	Mitutoyo 516-401
(METRIC)	Up to 10mm 10mm to 1524mm	± .1 µm ± (.1 + .05µm/25mm) µm	Mitutoyo 516-401
Depth	Up to 1 in 1 in to 12 in	± 2 µin ± (4 + 2 µin/in) µin	Mitutoyo 516-401
Height gages	Up to 1 in 1 in to 10 in 10 in to 24 in	± 7 µin ± (7 + 1µin/in) µin ± (9 + 2µin/in) µin	Mitutoyo 516-401 Brown Sharpe 599-246-100
Dial Indicators	Up to 4 in	± 50 µin	Starrett 716
Calipers			
(Dial, digital and vernier)	Up to 1 in 1 in to 72 in	± 2 µin ± (4 + 2µin/in) µin	Mitutoyo 516-401

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-6	Release Date: August 22, 1996
Title: Traceability of Calibration Standards	Revision: 29

1.0 Scope:

1.1 This policy statement describes the procedures MMC Metrology Lab, Inc. utilizes to maintain traceability of calibration standards.

2.0 Purpose:

2.1. The purpose of this policy statement is to ensure that all calibration / verification actions performed by MMC Metrology Lab, Inc. are accomplished utilizing standards which are traceable to the National Institute of Standards and Technology (NIST), basic constants of nature, or invariant properties of materials.

3.0 Policy:

3.1 Traceability to the National Institute of Standards and Technology (NIST) is achieved by the certification of MMC Metrology Lab's primary standards by competent / recognized laboratories which possess standards of a higher degree of accuracy that are directly or indirectly certified by NIST. These primary standards shall then be employed in the conduct of approved instrument calibration procedures verifying specified performance of in-house working standards.

3.2 Primary standards shall be designated as such by the Technical Supervisor. They are generally the most accurate standard associated with a given parameter. Enclosure (1) is the list of MMC Metrology Lab, Inc. primary standards.

3.3 Due to the dynamic nature of maintenance and recertification of measurement standards and reference materials the listing in Enclosure (1) shall be updated annually. However, current data when requested shall be furnished to the customer upon written request. The data shall be located in the Technical Supervisor’s file.

ENCLOSURE 1
(MMC-6)

This enclosure is maintained as a separate Microsoft EXCEL document file. This separate file enables access to the enclosure for revision purposes without initiating formal Quality Manual changes.

A hard copy of the current enclosure will be incorporated in the Quality Manual in lieu of this Enclosure page and shall be revised by the Quality Manager when traceability data changes.

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-7	Release Date: August 28, 1996
Title: Isolation, Blanking and Tagging On-Site	Revision: 16

1.0 Scope:

1.1 This policy statement defines MMC Metrology Lab, Inc. procedures as they pertain to system / equipment isolation, blanking and tag-out.

2.0 References:

2.1 NAVSEA Standard Item 009-24 Isolation, Blanking, and Tagging Requirements.

2.2 COMSCINST 3540.6 Tag-Out Procedures.

3.0 Policy:

3.1 MMC Metrology Lab, Inc. uses procedures consistent with references (2.1) and (2.2). The on-site supervisor using Isolation and Tagging Requirement Request (Figure 7.1) as a guide is responsible for coordinating with the customer all necessary actions to accomplish the required system / equipment isolation, blanking and / or tag-out as it applies to contracted work.

FIGURE 7.1
(NOT TO SCALE)

MMC METROLOGY LAB, INC.
4989 CLEVELAND STREET
VIRGINIA BEACH, VA 23462
(757) 456-2220
FAX (757) 473-2204

REQUESTED BY:

MMC _____
SIGNATURE

TAG LOG NO. _____

ISOLATION AND TAGGING REQUIRMENTS REQUEST

SHIP NAME _____ CONTRACT # _____

J.O. # _____ ITEM # _____

DATE _____ TIME _____

SYSTEM/EQUIPMENT _____
_____
_____

SHIPS TAG-OUT RECORD LOG SIGNED? YES _____ NO _____

DANGER TAG SIGNED AFTER INSTALLATION? YES _____ NO _____

MECHANIC _____ SIGNATURE _____
REMOVAL

TAG-OUT RECORD SHEET SIGNED FOR REMOVAL AFTER REPAIRS HAVE BEEN COMPLETED.

MECHANIC _____ SIGNATURE _____

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-8	Release Date: September 15, 2000
Title: Associate Laboratories	Revision: 39

1.0 Scope:

1.1 This policy statement depicts the identification of Associate Calibration Laboratories and vendors contracted for services beyond the capability of MMC Metrology Lab, Inc.

2.0 Purpose:

2.1 To assure traceability of calibration and materials.

3.0 Procedure:

3.1 Each associate laboratory / vendor shall be assigned a unique three digit code by the Technical Supervisor pursuant to their acceptance under the requirements of MMC Metrology Lab, Inc. Policy Statement MMC-4. Enclosure (A) depicts the current approved associate laboratories and vendors.

3.2 When a calibration is sub-contracted, the associate calibration laboratory's name and location is entered on the MMC Metrology Lab's Certificate of Calibration. The assigned associate laboratory's vendor code is utilized on the MMC Metrology Lab's calibration label to identify the laboratory performing the service. All other pertinent calibration data are transferred from the associate calibration laboratory's calibration certificate to the MMC Metrology Lab's Certificate of Calibration. The associate calibration laboratory's calibration data are filed in the Job File and is maintained in the main office for one year, and then it is archived.

ENCLOSURE A

ASSOCIATE LABORATORY / VENDOR CODE NUMBERS

CODE	NAME	LOCATION	AGENCY
102	Innocal (Fmr.Cole Parmer)	Vernon Hills, IL	A2LA
103	Commonwealth of VA	Richmond, VA	NVLAP
105	Fisher Scientific	Fair Lawn, NJ	DNV
107	Hart Scientific	Pleasant Grove, UT	NVLAP
110	Mitutoyo	Elk Grove Village, IL	A2LA
114	Ruska (GE)	Houston, TX	NVLAP
116	Liquid Controls (Fmr. Sponsler)	Lake Bluff, IL	DNV/MMC
117	Starrett	Cleveland, OH	NVLAP
118	Troemner	Thorofare, NJ	NVLAP
121	Amyouny Thread Gage	Quincy, MA	NQA/MMC
123	Fluke Electronics	Everett, WA	A2LA
127	Certified Measurements	Centerville, GA	A2LA
129	Transcat	Rochester, NY	NVLAP
132	Dynamic Technology	Hartland, MI	A2LA
133	DH Instruments, Inc.	Phoenix, AZ	A2LA
134	Graftel, Inc.	Elkgrove Village, IL	L-A-B
135	Precision Metrology	Milwaukee, WI	A2LA
136	Quest Technologies	Oconomowoc, WI	A2LA
137	Sturtevant Richmont	Franklin Park, IL	A2LA
138	SIMCO Electronics	Newport News, VA	A2LA
139	Standard Calibrations	Chesapeake, VA	IAS
140	Arizona Instrument, LLC	Chandler, AZ	GWR/MMC
141	Lockheed Martin IMC	Stennis Space Center, MS	ACCLAS
142	Liquid Technology Corp.	Apopka, FL	MMC
143	Vaisala	Woburn, MA	A2LA

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-9	Release Date: 29 December 2003
Title: Distributor / Supplier Quality System	Revision: 38

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MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-9	Release Date: 29 December 2003
Title: Distributor / Supplier Quality System	Revision: 38

TABLE OF CONTENTS - DISTRIBUTOR / SUPPLIER QUALITY SYSTEM

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Enclosures:

MMC Metrology Lab, Inc.	Approved By: William Marcum, President
Policy Statement: MMC-9	Release Date: 29 December 2003
Title: Distributor / Supplier Quality System	Revision: 38

1.0 Scope: This policy statement establishes the administrative and operational procedures necessary to ensure that instruments / products supplied to customers meet all contractual requirements, including product conformance to drawings and specifications, and the completion of specified inspections and tests. To the extent of any inconsistency between the purchase contract or its general provisions and this policy statement the purchase contract shall control.

1.1 *Applicability*. This policy statement applies to all instruments / products supplied by MMC Metrology Lab when performing in its capacity as a manufacturer's distributor, whether presented as a value added instrument or distributed directly as finished product.

2.0 Purpose: This policy statement documents and establishes a quality system depicting the technical aspects of procurement, processing and sale of finished product that will meet the requirements of contract or purchase order specifications. It assures adequate quality throughout all areas of contract performance, including value added enhancement, document processing, inspection, test, packaging, shipping and storage.

2.1 *Policy References*. The procedures delineated in this policy statement are developed from the requirements contained in MIL-I-45208A, Inspection System Requirements, and MIL-Q-9858A, Quality Program Requirements, and are consistent with the requirements of NAVSEA Standard Item 009-04 and the quality system models ISO 9000 and ANSI/ASQC 9000 series.

3.0 Management:

3.1 *Organization.* The management organization as it applies to the distributor / supplier function of MMC Metrology Lab, Inc. is generally described in Section 4 of this Quality Manual. More specific descriptions of responsibility as they pertain to pertinent personnel are contained in the following paragraphs.

3.1.1 *Quality Manager*. In addition to responsibilities delineated in Section 4, paragraph 4.2.2 of this Quality Manual the Quality Manager is also responsible for the overall test and inspection system for product provided to customers. These responsibilities include all required in-house inspection and testing, and the review of all test and inspection documentation provided by the manufacturer to support contract requirements. Additionally, he shall maintain current all pertinent Military Specifications, Standard Items and other reference documents.

3.1.2 *Contracting Officer*. In addition to responsibilities delineated in Section 4, paragraph 4.2.4 of this Quality Manual the Contracting Officer shall also be responsible for the review of all customer purchase orders, contracts, contract modifications and contract amendments to determine applicable specifications, federal regulations and unique requirements such as required delivery date, packaging and method of shipping. He shall, in conjunction with the Purchasing Officer, ensure that the order placed with the manufacturer reflects the invoked

3.1.2 (Continued) requirements of the customer's purchase order or contract. Additionally, he shall be responsible for the review of all customer Requests for Quote (RFQ) or Solicitations, ensuring any unique product requirements are addressed prior to the issuance or refusal (no bid) of any price and delivery quotation or proposal.

3.1.3 *Quality Engineer.* The Quality Engineer shall report to the Quality Manager in matters pertaining to the technical aspects of product quality requirements. He provides for manufacturer liaison in areas that require unique customer quality documentation and evidentiary, including Government Source Inspection. He shall also be responsible for assessing the customer's and client's quality requirements contained in their Request for Quotation (RFQ) or contract solicitation, and for advising the Contracting Officer of these specific additional contractual obligations.

3.1.3.1 Authorized Signatory. The Quality Engineer has signature authority of all technical related quality matters not specifically authorized to the Quality Manager, including but not limited to product Certificates of Identicality, Certification Data Sheets, signature receipt of unclassified / unrestricted drawings and procedures, and test / inspection witness affidavits.

3.1.4 *Technical Consultant.* The Technical Consultant shall report to the Contracting Officer and provides information and technical support for Government contracts, associated testing requirements, and procurement history. Additionally, he reviews and analyzes usage rates, recommends contract procedures for future contracts and monitors contract activities.

3.1.5 *Purchasing Officer*. In addition to responsibilities delineated in Section 4, paragraph 4.2.6 of this Quality Manual the Purchasing Officer shall also be responsible for the coordination and application of special packaging, labeling, bar coding, RFID and shipping methods consistent with customer requirements and applicable regulations.

3.1.6 *Product Representative*. Each manufacturer for which MMC Metrology Lab, Inc. distributes **product is assigned a Product Representative. The Product Representative shall be responsible** for all aspects of technical support for associated products and shall act as liaison with the manufacturer in all technical matters. Responsibilities include but are not limited to; (1) the development of product test and inspection criteria, (2) the conduct and documentation of required tests and inspections, and (3) maintaining a file of current manufacturer drawings and associated specifications. Additionally, the Product Representative shall oversee all value added enhancements for associated products, such as scale changes, calibrated range adjustments, custom colors, and mounting / hardware kit assembly, etc. The Product Representative shall also be responsible for documenting all product deficiencies and for coordinating product deficiency correction both in-house and with the manufacturer.

3.2 Organization Chart:

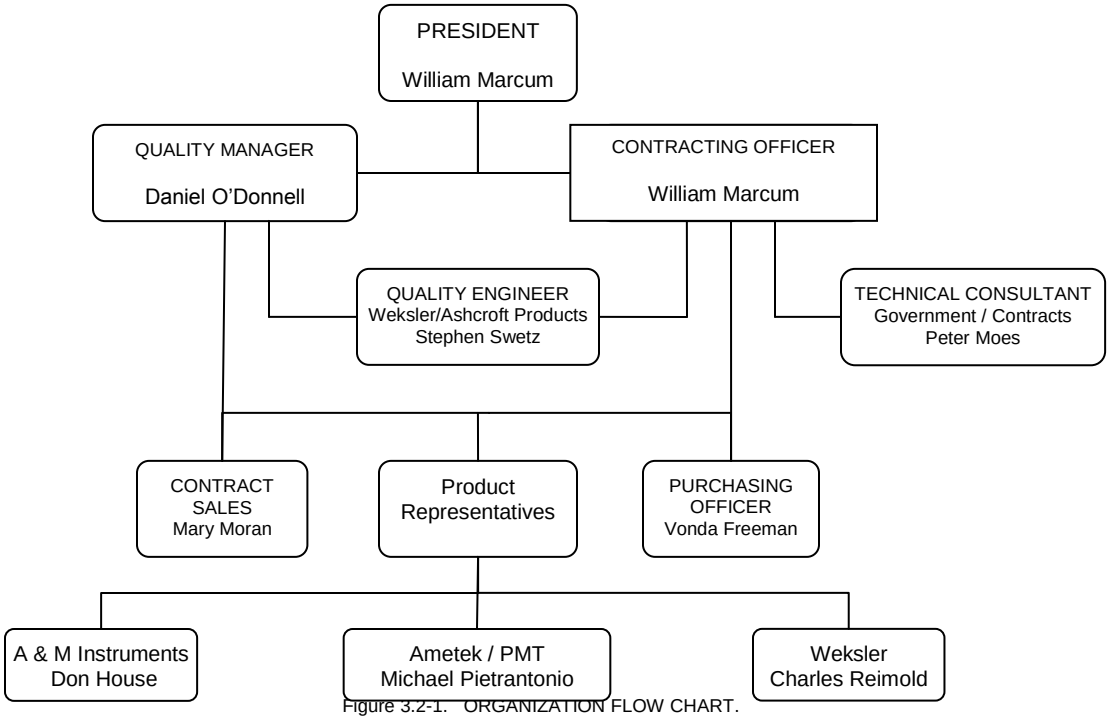


Figure 3.2-1. ORGANIZATION FLOW CHART.

3.3 *Quality Planning*. Initial quality planning as it pertains to the distributor / supplier system of MMC Metrology Lab shall commence when receiving a solicitation or request for quotation for new product. A complete review of the customer's requirements, including all attachments, addendums and amendments shall be accomplished at all levels involved prior to any official response. Particular attention shall be given to any specification requiring deviation from standard product configuration. Additionally, supplemental testing, cleaning, manufacturing procedure approvals and packaging methods are also requirements that dictate planning prior to responding to solicitation. This initial review shall be the responsibility of the Contracting Officer but is generally accomplished with the assistance of personnel as depicted in the product-specific sections of this policy statement.

3.4 *Order Processing Overview*. Requests for quotation, solicitations, and proposals as well as purchase orders and contracts shall be processed in accordance with a standard processing procedure. A standardized procedure shall permit a traceable path through the various functional areas of the internal order processing system and shall make available the information necessary to initiate appropriate planning and action at each level.

3.4.1 *Contract Sales.* Contract sales shall be conducted in such a manner so as to permit the reconstruction of any event involved in the ordering process. All documentation relating to each sales order shall be retained and filed in the associated Job File, including any technical data, procedure approvals and all customer communications. Telephone communication with buyers or other customer representatives shall be documented for record purposes.

3.4.1.1 *Solicitations and Requests for Quotation.* Solicitations or Requests for Quotation (RFQ)

3.4 Order Processing Overview. (Continued)

3.4.1.1 (Continued) are received, copied and filed by office administration personnel. Subsequent to an initial review by the Contracting Officer, a copy of the solicitation shall be provided to Contract Sales and the Quality Engineer for assessment of customer requirements, manufacturer capabilities and product pricing. When all the customer's requirements are evaluated and with the approval of the Contacting Officer; Contract Sales shall then respond directly to the buyer with an offer that includes price, delivery time and payment terms for each line item of the request. Copies of the quotation are maintained on file by Contract Sales and office administration. See Figure 3.4-1.

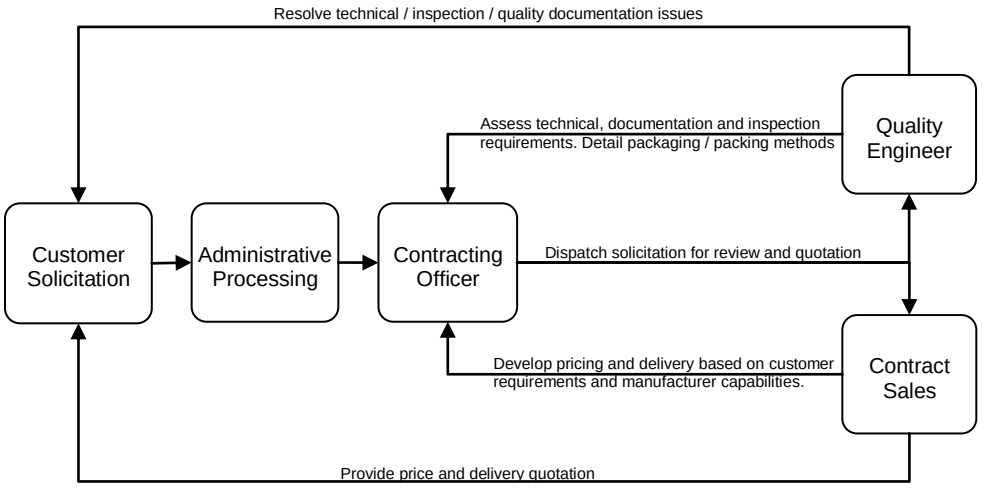


Figure 3.4-1. SOLICITATIONS AND REQUESTS FOR QUOTATION FLOW CHART.

3.4.1.2 *Purchase Orders and Contracts.* Purchase orders and contracts shall be processed similarly to solicitations and Requests for Quotation in that they are received by office administrative personnel and reviewed by the Contracting Officer. When contracts or purchase orders are received they shall be copied and provided to Contract Sales and the Quality Engineer for a review of their contractual requirements and a comparison to the associated solicitation and offer. All discrepancies shall be addressed and brought to the attention of the Contracting Officer prior to the acceptance of the order. A copy of all purchase orders and contracts shall be maintained on file by Contract Sales and by office administration in the associated Job File. Amendments, revisions or other changes to purchase orders and contracts shall be processed utilizing the same procedures depicted for new orders and contracts, including review, acceptance, entry and acknowledgement.

3.4.1.3 *Order Entry Processing*. When accepted by the Contracting Officer, purchase orders and contracts shall be interpreted and paraphrased by Contract Sales on an order data sheet depicting the specific requirements of the order or contract. The order data sheet generated by Contract Sales shall be utilized by office administration personnel to assign the order a Job Number, initiate a Job File, enter the order into the accounting system and generate an Order Acknowledgement for the customer. Additionally, if the item can not be provided from stock inventory the Purchasing Officer shall prepare a purchase order to the appropriate manufacturer based on the specific order data sheet requirements. See the Order Processing Flow Chart, Figure 3.4-2.

3.4 Order Processing Overview. (Continued)

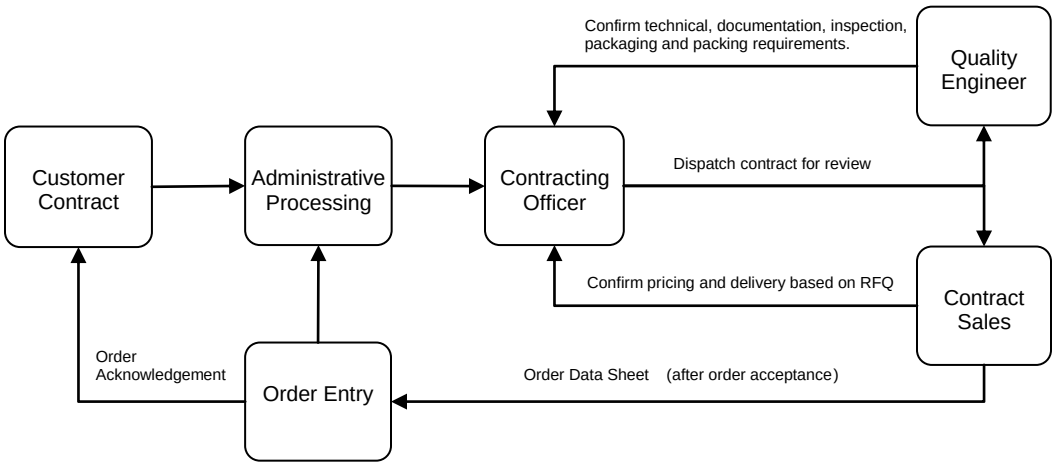


Figure 3.4-2. ORDER PROCESSING FLOW CHART

3.4.1.4 *Contract Sales Oversight.* Because of the complex nature that generally involves custom manufacturing and supplemental inspection requirements; contract sales shall be subjected to continual oversight. The Quality Manager shall have the overall responsibility for providing the customer the correct product with proper documentation, however, each functional level of the contract sales processing system shall ensure compliance to contractual and specification requirements.

3.4.2 *Over the Counter - Direct Sales.* Over the counter or direct sales are those transactions that are basically conducted utilizing any sales methods other than written purchase orders or sales contracts. Over the counter purchases generally involve purchases of stock inventory product or product that is ordered by part number and considered standard by the manufacturer. These type sales are generally funded by credit card or an open account with approved credit and shall be governed by standard business practice.

3.5 *Costs Related to Quality*. Quality cost data is used as a management element in the distributor / supplier quality system. These data identifies the cost of both the prevention and correction of nonconforming product, including labor for test, inspection and deficiency documentation, return shipping to manufacturer, and related customer expenses. This cost data is monitored at all levels of management and is used to develop sampling inspection rates, product processing procedures and the necessary level of interaction with the product manufacturer. Cost data although not specifically documented is derived from associated documentation contained in the Job File, including test reports, shipping documents, deficiency reports, return authorizations, and records of communication with manufacturer or customer.

4.0 Facilities:

4.1 *Product Storage and Handling*. All product provided to customers shall be stored or warehoused as determined by its status in the procurement process. At all times during product processing adequate protection shall be afforded so as not to damage or otherwise diminish product quality.

4.1 Product Storage and Handling. (Continued)

4.1.1 *Security.* When product is stored, long term or temporary, it shall be located in predetermined areas based on its status. All product storage areas are locked or are within the boundaries of a locked area when not manned. Keys to storage areas are maintained in the key lock box located at the front desk in the main office.

4.1.2 *Product Identification.* All new products regardless of storage location or status shall be labeled. This label shall be affixed by the manufacturer or by MMC Metrology Lab personnel during the receiving process, and as a minimum will depict product part number / catalog number, generic description and range / size. The labeling of product shall enable its positive identification without its removal from the packaging.

4.1.2.1 *Value Added Accessories and Parts*. All value added accessories and parts shall be stored where practicable and labeled individually or by bin with the manufacturer's part number or other readily identifiable marking system.

4.1.3 *Controlled Material*. Products requiring special handling and controls to preserve traceability and quality evidence, such as heat or lot numbers shall be segregated from other products. They shall be readily identifiable and stored in limited access areas having the necessary environmental controls so as not to compromise product integrity. Copies of traceability and other pertinent identification documentation shall be kept with the product at all times.

4.1.3.1 *Age Controlled Materials.* MMC Metrology Lab does not supply products that contain age controlled or shelf life limited materials or components that have expiration dates.

4.1.4 *Accommodation and Environment.* All storage areas utilized for new product regardless of status shall be environmentally controlled. In so much as possible the temperature shall be maintained within the range of 60° to 85°F, and the humidity within 20% to 60%RH. Long term storage facilities shall be such that product will be stored above floor level and on shelving of sufficient construction to support product weight and stacking requirements. Good housekeeping practices shall be employed at all times and trash shall not be permitted to accumulate.

4.1.4.1 *Hazardous Materials.* MMC Metrology Lab does not supply or service products containing mercury, asbestos, PCBs or cadmium plating, nor are any such materials present in storage or production facilities. Flammable liquids or other such hazardous materials shall not be stored in locations designated for long term storage. These type products shall be stored in designated areas in approved lockers designed for such use.

4.1.5 *Temporary Storage*. Temporary storage of new product is determined by its status in the procurement process. Product shall be segregated and grouped by order / job number and appropriately labeled.

4.1.5.1 *Awaiting Service.* All new product awaiting service, regardless if for calibration, sample inspection or value added enhancement, shall be appropriately labeled and temporarily stored in the incoming work area of the associated service facility. Upon completion of the required service the product is delivered to (1) long term storage for stock product or customer warehousing, (2) the packaging area for product requiring shipping, or (3) the outgoing product area for product that will be directly accepted by the customer.

4.1 Product Storage and Handling. (Continued)

4.1.5.2 *Awaiting Packaging**.*** All products being processed for shipping shall be temporarily stored in the packaging area. The product shall be individually labeled as required by contract, segregated and grouped by job / order number and accompanied with all the documentation required by the customer. Upon packaging the product utilizing methods and materials required by contract specification or industry standards and affixing the necessary shipping labels, the product shipping container is then delivered to the awaiting shipment storage area.

4.1.5.3 *Awaiting Shipment*. All products awaiting shipment shall be temporarily stored at the front desk area in the main office. These products are ready in all respects for shipping company acceptance and are stored to facilitate ease of access and loading.

4.1.5.4 *Awaiting Pick-up**.*** All new products that were purchased and will be directly accepted by the customer shall be temporarily stored in the outgoing product area. The product shall be appropriately labeled and be accompanied with all customer required documentation. Transfer of product custody is accomplished in accordance with procedures contained in Policy Statement MMC-1 of this Quality Manual. The outgoing product area is adjacent to the front desk area in the main office.

4.1.6. *Preparation for Delivery*. Product preservation and packaging shall be sufficient to afford adequate protection against corrosion, deterioration and physical damage during shipment from MMC Metrology Lab, Inc. facilities to the using activity.

4.1.6.1 *Packing.* Packing shall be accomplished in a manner which will insure acceptance by common carrier or any contractually specified means of transport and will afford protection against physical and environmental damage. Shipping containers and packing methods shall be consistent with industry standards or contractual requirements when invoked.

4.1.6.2 *Marking*. Shipment information shall be provided on exterior shipping containers in accordance with the requirements of the carrier being utilized. Special marking of interior or exterior containers, including bar codes, RFIDs, contract or order numbers, and product identification, shall be as specified by contract or purchase order.

4.2 *Test, Measurement and Diagnostic Equipment*. Appropriate test, measurement and diagnostic equipment (TMDE) shall be maintained as necessary to ensure that in-house inspection and testing of new product provided to customers conform to all technical contract requirements. The TMDE used in the inspection and testing process shall be of sufficient accuracy, generally four times as accurate as product specification, to assure adequacy of test. All TMDE shall be calibrated at established intervals in accordance with ANSI/NCSL Z540-1 and NAVSEA 04-4734 as specified by the procedures contained in this Quality Manual. Additionally if required, the TMDE utilized in the inspection process along with appropriately trained personnel will be made available to customer Quality Assurance Representatives for purposes of determining product conformance with contract or purchase order requirements.

4.2.1 *Production Tooling*. MMC Metrology Lab does not use production tooling such as jigs, fixtures, tooling masters, templates or patterns as a media of inspection.

4.3 *Test and Inspection Facilities.* Facilities used for the testing and inspection of new product are the same as provided for the associated calibration areas. The characteristics of calibration area facilities are discussed in detail in Section 7.0 of this Quality Manual.

5.0 Inspection Methods and Procedures.

5.1 *Documentation, Records and Corrective Action*.

5.1.1 *Inspection and Testing Documentation*. Inspection and testing shall be conducted in accordance with applicable Military Specification, manufacturer's build specification, contract specification, instrument calibration procedure or other pertinent inspection / test criteria invoked by contract, purchase order or as determined by a sampling plan. This inspection and / or testing may be accomplished and documented by the original equipment manufacturer or by in-house inspectors during sampling inspection, quality conformance inspection, contracted new product calibration or completion of a value added enhancement.

5.1.2 *Records*. Records documenting all contract or purchase order required inspections and tests are provided to the customer as specified by contract or at time of delivery. Copies of such records are also filed in the Job File, which is maintained in the front office for one year and then archived. Inspection and test records are also made available to customer Quality Assurance Representatives prior to acceptance of product provided by contract or purchase order.

5.1.2.1 *Sample Inspection*. Sample inspection documentation shall be accomplished utilizing a Sample Inspection Log. The Sample Inspection Log is maintained by the Product Representative and its format is depicted in Enclosure (3) of this policy statement. Successful completion of a sample inspection shall be so indicated in the log data sheet and a "tested" label (see 5.12.3) shall be affixed to the product and its packaging. An unsatisfactory sample inspection shall result in; (1) a Quality Deficiency Report being filed, (2) a Nonconforming Product label (see 5.12.3) being affixed to the product packaging and (3) a subsequent corrective action to be initiated.

5.1.2.2 *Calibration*. Calibrations of new product accomplished as a requirement of contract or purchase order shall be documented on a Certificate of Calibration and also recorded as an inspection in the Sample Inspection Log. This data shall be included in trend analysis when developing sample inspection plans.

5.1.3 *Document Corrections and Additions*. Inspection and test reports required by contract or otherwise required to substantiate product conformance are considered Objective Quality Evidence (OQE). There shall be no corrections or additions to reports of this nature unless accomplished by the entity originating the document. If corrections or additions are considered excessive, a new report shall be required.

5.1.3.1 *Corrections*. All corrections to OQE shall be made by drawing a single line through the incorrect entry, enter the correct data, and initial and date the transaction. There shall be no erasures, "white-out" or other type obliteration of data utilized. There shall be no corrections of any type permitted to MMC Metrology Lab, Inc. Certificates of Calibration.

5.1.3.2 *Additions*. Adding data to a report after initial issue shall be accomplished by annotating the original in a manner so as not to add confusion or misunderstanding of content. All data added to a report shall be identified by the word "added", initialed and dated in the margin of the report. When additional pages are deemed necessary, the original report shall be annotated to indicate the number of additional pages and each added page shall reference the original report and be signed by an authorized signatory. Normally, corrections requiring additional pages are considered excessive and necessitate a new report.

5.1 Documentation, Records and Corrective Action. (Continued)

5.1.4 *Corrective Action*. Prompt and effective action shall be taken to correct deficient conditions which have resulted in or could result in providing product to customers which do not conform to (1) the quality assurance provisions of the contract or purchase order specifications, (2) tests and inspections required by the contract or purchase order, and / or (3) other inspections and tests required to substantiate product conformance. These deficient conditions whether design, purchasing, manufacturing, testing or any other related operation shall be addressed at whatever level necessary to affect resolution. Corrective action shall extend to the performance of manufacturers as well and shall be responsive to customer or end-user input. Corrective action shall be based on (1) analysis of inspection data of nonconforming product to determine extent and cause, whether performed during in-house processes or as a result of customer / end-user return, (2) analysis of trends in product line performance or the performance of manufacturers to prevent nonconforming product, and (3) the introduction of required improvements and corrections, an initial evaluation of adequacy of such measures and monitoring of the effectiveness of action taken.

5.1.4.1 *Manufacturer Deficiencies*. Deficient conditions or nonconforming new product discovered during in-house inspection and / or calibration prior to delivery to the customer shall be brought to the immediate attention of the Product Representative for resolution. Nonconforming product shall be so labeled (see 5.12.3) and a product Quality Deficiency Report, Enclosure (1), shall be completed and filed. The Quality Deficiency Report (QDR) shall be assigned a sequential number by the Product Representative and maintained on file for a period of two years.

5.1.4.2 *Customer Feedback.* A report of deficient new product, verbal or written, from a customer subsequent to product delivery shall be documented and resolved utilizing procedures contained in Policy Statement MMC-2, Customer Complaints. If the product is to be returned to MMC Metrology Lab, Inc. for deficiency resolution or investigation, a sequential Return Material Authorization (RMA) number shall be assigned the transaction and the customer directed to return the product utilizing collect shipping procedures. The Return Material Authorization log shall be maintained by the Product Representative.

5.2 *Inspection Provisions*. All inspections and tests required by contract or purchase order will be conducted as specified in so much as practicable. In the rare instance where alternative inspection procedures or alternative inspection equipment become necessary, a written description of the proposed inspection or demonstration of alternative equipment shall be presented to the customer's Quality Assurance Representative for approval. If the customer's Quality Assurance Representative considers the alternative procedures less effective than the originally specified procedures, the contractual specification shall apply.

5.2.1 *Inspection Accessibility.* Products, procedures and workmanship forming part of an order are available for inspection by authorized representatives of the purchasing customer when such requirement is included in the order or contract. This inspection shall be on premises only during normal work hours and shall be coordinated with the Quality Manager.

5.3 *Authorized Inspectors*. Personnel whose demonstrated training level is sufficient to be considered qualified by calibration area supervisors and the Technical Supervisor to perform calibrations and repair service on associated instruments are also authorized to perform as quality inspector in areas for which they are qualified. Personnel training records are maintained

5.3 Authorized Ispectors (Continued)

5.3 *Authorized Inspectors* (Continued) in accordance with procedures contained in this Quality Manual. A listing of authorized quality inspectors and their areas of qualification are provided in Enclosure (2).
5.4 *Process Controls*. Process control procedures when applicable are addressed in the product-specific sections of this policy statement.

5.5 *Indication of Inspection Status*. All products procured with the intent of providing such product to a customer or client shall be subject to receiving and sampling inspections. These inspections are applicable to products procured for both direct sale and stock inventory, and are further addressed in the product-specific sections of this policy statement.

5.5.1 *New Receipts*. All product received from the manufacturer and not yet inspected shall remain in the original shipping containers, grouped by purchase order lot and tagged with a copy of the manufacturer's packing list. Receiving inspection of products shall commence as soon as practicable (see 5.11) and shall be considered complete when the lot's attached manufacturer's packing list is dated and annotated by the inspector as "accepted". All products procured for stock inventory shall be subjected to product-specific receiving procedures prior to being placed in inventory storage. All products procured for direct sale shall be grouped by order, identified with a Material Control Tag / Job History Card and subjected to inspection as required by contract or the product-specific sections of this policy statement.

5.5.2 *Technical Inspection*. When the product-specific sampling plan dictates, a technical sampling inspection shall be conducted to assure specification conformance as directed by the Product Representative. Indicating the successful completion of a technical sampling inspection shall be accomplished by affixing an "Inspected" label (see 5.12.3) to the product and its packaging. This label shall be annotated with the date and initials of the technician who performed the inspection. Identification of a product not conforming to the requirements of the physical / documentation inspection or the technical sampling inspection shall be accomplished by affixing a "Nonconforming Product" label (see 5.12.3). Nonconforming product will be handled in accordance with the product-specific sections of this policy statement.

5.5.3 *Customer Source Inspection.* Material designated for source inspection at the time of purchase shall be labeled as such when received from the manufacturer. The Quality Manager or his representative shall assemble the test and inspection documentation required by contract and labels all products that require inspection as Source Inspection Material. This label shall indicate the customer's purchase order number, line item and part number. All products requiring source inspection (100%) shall be subjected to technical testing utilizing procedures contained in this manual. If contractually required a calibration label shall be affixed to each item. If calibration is not contractually required, an inspected label shall be affixed. Upon completion of technical testing all Source Inspection Material shall be re-packaged and placed in secure temporary storage designated for this purpose pending customer inspection.

5.5.4 *Conditional Release Material.* Products may require additional product testing, inspection, evaluation or software approvals after the product has been delivered to the customer or client, such as shock and vibration testing or First Article Testing. Product preparation in these instances shall be similar to that of Source Inspection Material and shall be the responsibility of the Quality Manager. In all cases post-delivery testing and evaluation shall be included in the purchase contract and funded by the customer. Product acceptance criteria shall be reviewed and approved by the Contracting Officer prior to acceptance of the contract.

5.6 Government-furnished Material.

5.6 *Government-furnished Material*. Government-furnished material is not used in the production or fabrication of the products that we provide to customers.

5.6.1 *Program Material*. A customer may request material that has been identified for a future government or non-government application to be "set aside" until it is required to support the application. By negotiated agreement, MMC Metrology Lab, Inc. will reserve / store that material until an order is issued. In that regard all products "set aside" for a specific application shall be subjected to receiving and sampling inspections, segregated from normal stock and labeled with the associated application and customer name. This Program Material shall be stored in an environmentally controlled, secure location and used for no purpose other than intended unless specifically requested by the customer.

5.7 *Proprietary and Controlled Technical Data*. Proprietary or controlled technical data is provided by the customer / client or any agency associated with the product application when required for preparing quotations or proposals in response to customer / client solicitations. In all cases proprietary and controlled technical data shall be afforded the appropriate level of protection required by the originator of the data. If a customer / client's solicitation requires protection of technical data beyond the scope of normal and prudent business privacy practice, then the procedures provided in this policy statement shall be utilized. If sufficient levels of protection are not specifically addressed herein, then the solicitation shall be returned without bid. In this regard the Contracting Officer may generate a letter-of-intent for approval of the President to establish the necessary data security required by the customer / client and if the proposed changes are accepted by the customer / client, then such changes shall be implemented and documented as a change to this policy statement.

5.7.1 *Proprietary Commercial and Department of Defense (DoD) Export-Controlled Technical Data.* Customer / client commercial and DoD export-controlled technical data generally will be in hard copy format and will consist of technical drawings or specifications depicting product parameters and capabilities. This information shall be used for the sole purpose of preparation of a quotation or proposal to provide a product for which MMC Metrology Lab, Inc. is a distributor or representative.

5.7.1.1 *Control and Access*. Proprietary and controlled data will be identified by an appropriate warning label affixed by the customer / client or their agent denoting authorized distribution and a controlling organization. Access to this information, physical or visual, shall be limited to company employees that possess "need-to-know" credentials in order to perform their assigned tasks in the procurement process. These documents shall not be reproduced or transmitted outside the company unless specifically authorized by the customer / client. It shall be assumed that all limited distribution data is to be returned in its entirety to the originating customer / client unless specifically authorized in writing for retention or disposal. Any unauthorized release or loss shall be reported to the originating customer / client as soon as practicable. Any Freedom of Information Act (FOIA) request received shall be referred to the originating customer / client for resolution.

5.7.1.2 *Custody*. Custody of commercial proprietary information associated with a customer / client's solicitation shall be assumed by the employee responsible for preparing the quotation or proposal. If signature custody is required at time of proprietary data delivery, then signature custody shall be obtained when the data is returned. Custody of DoD export-controlled technical data shall be in accordance with procedures provided in section 5.7.2 of this policy statement.

5.7 Proprietary and Controlled Technical Data. (Continued)

5.7.1.3 *Storage.* Storage of commercial proprietary data shall be such that access, physical or visual, is limited to those employees who possess a valid need-to-know. This data when for retention shall be stored / filed with other customer specific related procurement data in the access controlled laboratory service area or "job file" archives. Storage of DoD export-controlled technical data shall be in accordance with procedures provided in section 5.7.2 of this policy statement.

5.7.1.4 *Disposal.* When disposal of commercial proprietary technical data is directed by the originating customer / client, it shall be accomplished by shredding the document to a shredded width of two inches maximum. Shredded documents maybe be disposed of by recycling or otherwise discarded. Disposal of DoD export-controlled technical data shall be in accordance with procedures provided in section 5.7.2 of this policy statement.

5.7.2. *Naval Nuclear Propulsion Information (NNPI).* Naval Nuclear Propulsion Information (NNPI) is considered DoD export-controlled technical data and is defined as all information, classified or unclassified, concerning the design, arrangement, development, manufacture, testing, operation, administration, training, maintenance and repair of the propulsion plants of naval nuclear-powered ships and prototypes, including the associated shipboard and shore-based nuclear support facilities. Handling of this information may be required when processing or procuring product in support of the ship building or ship repair industry. A client or customer's solicitation for bid or purchase contract will stipulate that access to NNPI will be associated with a specific procurement action. MMC Metrology Lab, Inc. shall maintain active registration and Defense Logistics Agency certification as a qualified supplier under the U.S./Canada Joint Certification Program to facilitate access to this export-controlled DoD technical data. Generally, this data will be in a hard copy format and will consist of technical drawings or specifications depicting product parameters and capabilities. It shall be used for the sole purpose of assisting in the preparation of a quotation or proposal by identifying the specific characteristics and capabilities of a product for which MMC Metrology Lab, Inc. is an authorized distributor or representative. All NNPI and DoD export-controlled technical data shall be safeguarded in accordance with this policy statement.

5.7.2.1 *Control and Access.* The NNPI and other DoD export-controlled technical data may be hand-delivered by the client or customer, delivered by the U.S. Postal Service or other common carrier in an unmarked enclosure, or transmitted by facsimile if deemed appropriate by the originator. Identification of NNPI will be apparent by the specific distribution statement "Warning" applied to the data. The following shall not be permitted access to NNPI without written approval of the client or customer; (1) any person or entity outside the United States, (2) any foreign national not specifically working on the procurement action, (3) any foreign organization, (4) any international organization or, (5) any foreign government. For the purpose of this policy statement the term United States means the States, the District of Columbia, Puerto Rico, American Samoa, the Virgin Islands, Guam and any areas subject to the complete sovereignty of the United States.

5.7.2.2 The NNPI shall not be transmitted outside the company, unless such transmittal complies with the detailed guidance provided as part of the originating client or customer's proposal instructions. Additionally, NNPI documents shall not be copied or otherwise reproduced unless done in conformance with the detailed guidance provided by the originating client or customer's proposal instructions. It shall be assumed that all NNPI documents are to be returned in their entirety to the originating client or customer following preparation and final

5.7 Proprietary and Controlled Technical Data. (Continued)

5.7.2.2 (Continued) disposition of the quotation or bid proposal unless specifically authorized for disposal or retention. If signature custody was required by the originating client or customer, signature custody receipt shall be obtained when and if the NNPI is returned. Any unauthorized release or loss of positive control of NNPI shall be reported to the originating client or customer as soon as practicable. Any Freedom of Information Act (FOIA) requests received by MMC Metrology Lab, Inc. shall be referred to the NNPI originator for resolution.

5.7.2.3 *Custody*. Primary custodian of NNPI shall be the Contract / Government Sales Representative. The Contracting Officer and the Quality Manager are designated alternate custodians and will perform as such only on an interim basis until such time as custody may be transferred to the primary custodian. Access to NNPI, visual or physical, shall be limited by the custodian to those individuals who have a specific "Need-to-Know" to perform their function in the procurement process.

5.7.2.4 *Storage.* Storage of NNPI shall be the responsibility of the custodian. Storage shall be facilitated by locked container with access limited to those individuals that possess "Need-to-Know" credentials in all procurement actions, specifically the Contracting Officer, the Quality Manager and the Purchasing Officer. A documented inventory of storage container contents shall be maintained current at all times by the custodian. This inventory document shall be located within the storage container and will reflect all NNPI access and usage transactions, its format shall be such that it will enable a NNPI document history that covers the period from receipt to final disposition. At no time shall NNPI be left unattended or otherwise be made available for access (visual or physical) to unauthorized personnel or entities.

5.7.2.5 *Disposal*. When disposal of unclassified documents containing NNPI is directed by the originating client / customer, it shall be accomplished by shredding the document to a shredded width of 2 inches maximum. Additionally, in the unlikely event that product was procured for the Naval Nuclear Propulsion Program but was not delivered for whatever reason to the client / customer, it shall be purged of all NNPI prior to disposal. Components or markings which may reveal a nuclear propulsion plant application that must be removed or obliterated from the product include: nameplate data, stock number, Special Material Identification Code (SMIC), tags, stickers or dial markings. The final disposition of product after being purged of NNPI shall be determined by the Product Representative.

5.8 *Nonconforming Product*. Product not conforming to specification regardless of deficiency will be labeled as such (see 5.12.3) and segregated from conforming product until the deficiency is resolved or final disposition determined. The label shall be affixed to the product or its packaging so as to be readily visible and will depict the job or order number, initials of person determining the nonconformance, reason for nonconformance and the date. A Quality Deficiency Report (QDR) shall be initiated and disposition of the nonconforming product will be handled in accordance with product-specific sections of this policy statement.

5.9 *Qualified Products*. Products included on a Military Specification - Qualified Product List (QPL) are handled the same as any other product that is provided to customers. These products are subject to the same inspection, test and / or calibration in order to assure their conformance to contract or purchase order requirements.

5.10 *Purchasing Data*. To assure required specifications and applicable quality criteria are

5.10 (Continued) supported, all applicable requirements shall be included or referenced in purchase orders for products provided to the government directly or for products that will ultimately apply to a government contract. The purchase order shall contain a complete description of the product ordered including a reference part number and any additional information considered essential by the manufacturer to enable product identification for the purposes of applying the necessary requirements for manufacturing, inspecting, testing, packaging, and allowing for required government inspection, qualification or approval. Supplemental information shall also be included when special services are required of the manufacturer to meet customer contract or purchase order specifications, including custom scales, dials, product marking and packaging. Purchase orders, contracts, contract modifications, contract amendments, and other related documents shall be filed in the Job File and made available for customer / client review.

5.11 *Receiving Inspection*. New product shall be subject to inspection upon receipt to the extent necessary to assure conformance to contract and technical requirements. The receipt inspection process shall be a two step procedure consisting of a physical / documentation inspection and a subsequent technical inspection based on the product sampling plan. The physical / documentation inspection is conducted by the purchasing department and entails; (1) a visual inspection of the shipping container(s) looking for any sign of damage, improper packaging or improper handling during shipping; and (2) a comparison of the packing slip data to that of the associated purchase order and a review of any required manufacturer certificates of conformance and / or test documentation. Shipping damage will be brought to the attention of delivery personnel and resolved utilizing procedures required by the transporting agency. Discrepancies between packing list data and purchase order requirements or other required documentation shall be immediately addressed with the manufacturer and resolved to assure customer contract or purchase order specification. Technical inspection of products will be accomplished in accordance with product-specific sections of this policy statement.

5.11.1 *Source Inspection Material.* When new product is received which is subject to customer source inspection, it shall be directed to the Quality Manager or his representative for receipt physical / documentation inspection and preparation of the Inspection Data Package based on purchase order or contract requirements.

5.11.1.1 *Inspection Data Package.* The Quality Manager or his representative shall ensure all required test and inspection reports have been received and are correct. All report pages and additional required documentation shall then be assembled into an Inspection Data Package and labeled with the customer's purchase order number; line item number and material part number. A copy of the Inspection Data Package shall be retained in the Job File and the original presented at the time of source inspection.

5.11.1.2 *Technical Inspection*. The Quality Manager or his representative shall visually inspect the product to ensure each item is consistent with purchase order or contract requirements. He shall then deliver the product to the appropriate Product Representative for technical inspection. The technical inspection shall consist of performing and documenting a Sample Inspection in accordance with the product-specific sections of this policy statement. The Sampling Plan shall be 100% of product. Additionally, a Certificate of Calibration with measured data shall be completed and entered in the Job File for each item regardless of contractual requirements.

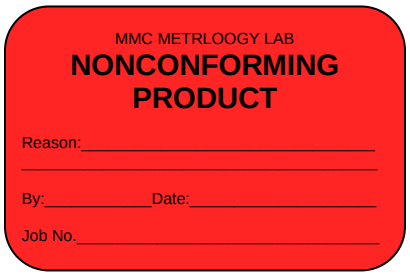
5.12 *Sampling Plan and Inspection*. Sampling inspections shall be conducted as determined by the product sampling plan. The sampling plan is developed by each Product Representative based on historical product performance data and shall provide for valid product confidence and quality levels. Sampling plans are addressed in the product-specific sections of this policy statement.

5.12.1 *Documentation*. Upon satisfactory completion of a sampling inspection the product and its packaging will be labeled as such. This label will depict "Inspected" status (see 5.12.3) with the initials of the technician performing the inspection and the date. The completion of a sample inspection that is considered unsatisfactory shall result in; (1) the product being labeled as a "Nonconforming Product" (see 5.12.3), (2) a Quality Deficiency Report (QDR) to be initiated and (3) the entire inspection lot (100%) to be subjected to sample inspection procedures. The technical inspection of products shall be conducted in accordance with product-specific sections of this policy statement.

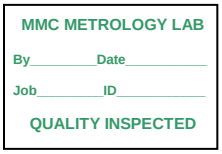
5.12.2 *Inspection Lot*. An inspection lot consists of all product of the same category having the same range, style, configuration and size that is received by MMC Metrology Lab, Inc. at the same time and under the same contract or order.

5.12.3 *Labels.*

NONCONFORMING PRODUCT LABEL



INSPECTED LABEL



5.13 *Order Processing Inspection*. The order processing inspection shall be conducted by the technician preparing the product for customer delivery. This inspection shall be applicable to orders being filled from stock inventory and those being filled by finished product received from the manufacturer for direct sale. This inspection shall not apply to orders for product that require calibration or for product that require value added enhancements, as the processing inspection requirements are fulfilled when accomplishing these tasks. The order processing inspection shall consist of two parts. The initial part of the inspection is a visual investigation of 100% of the product being delivered. The visual inspection shall detect any physical anomalies and verify product identification data are as required by the order, i.e. part number, model number, stock number, etc. The second part of the order processing inspection shall consist of a technical inspection that is accomplished in accordance with the product-specific Sampling Plan. The order processing inspection shall be documented as a Sample Inspection utilizing the applicable Sample Inspection Log Data Sheet.

5.14 *Mercury Contamination Inspection*. The mercury contamination inspection shall be performed when mercury-free certification is contractually required and the new product being purchased is from manufacturers that do not routinely supply mercury-free product certification.

5.14 Mercury Contamination Inspection. (Continued)

5.14 (Continued) The mercury contamination inspection shall be conducted by a qualified technician and documented in accordance with MMC Metrology Lab, Process Control Procedure, MMC-202.

5.14.1 *Mercury-Free Certification.* Mercury-free hardware as defined by NAVSEAINST 5100.3D is hardware that does not contain functional mercury and is not contaminated by mercury or mercury compounds. Functional mercury is defined as mercury or mercury compounds contained in equipment that is required for the equipment to operate properly. MMC Metrology Lab, Inc. does not supply or service products that contain functional mercury. A mercury-free statement shall be included in the MMC Metrology Lab's Certificate of Compliance for products certified by the Original Equipment Manufacturer (OEM) to be mercury-free. Additionally, when contractually required, a mercury-free statement shall be included in the Certificate of Compliance for products supplied from manufacturers that normally do not certify mercury-free when such products satisfactorily meet the mercury contamination free criteria of MMC Metrology Lab, Process Control Procedure, MMC-202.

6.0 AMETEK - PMT Products Procedures.

6.1 *General*. MMC Metrology Lab, Inc. distributes products manufactured by the PMT Products Division of AMETEK. The primary product line that is represented consists of pressure transducers that meet the requirements of MIL-P-24212C, MIL-D-24304B and MIL-T-24742 specifications. MMC Metrology Lab, Inc. is a factory authorized repair center, sole stocking distributor and is authorized to perform value added product enhancements.

6.2 *Procurement Data*. Product from this manufacturer is procured by manufacturer's part number and product description on an electronically transmitted (facsimile) purchase order. At the time of order a Certificate of Compliance with mercury free statement and the Mil Spec required QPL test data sheets are requested for each item.

6.3 *Receiving Procedures.* In addition to the arrival physical / documentation receipt inspection the receiving process for this product shall consist of a visual inspection of the entire lot to detect any product anomaly and a verification / comparison of product identification with associated manufacturer certificate of compliance and QPL test documentation. The accepted product shall be individually packaged along with its technical manual and mating electrical connector and subsequently labeled with the manufacturer's part number, government designation, serial number and pressure range. The product shall be calibrated if contractually required or sample inspected if required by the sampling plan and either placed in stock inventory or processed for delivery under purchase contract or order.

6.4 *Sampling Inspection.* The sampling inspection shall consist of two parts. The initial part of the inspection is a visual investigation of the product. The visual inspection shall; (1) detect any physical anomalies utilizing manufacturer drawings and applicable specifications, and (2) confirm product identification data are correct and appropriate, i.e. part number, model number, stock number, etc. as required by contract or purchase order. The second part of the sampling inspection shall consist of a technical inspection performed by accomplishing the instrument calibration procedure in accordance with the provisions of this Quality Manual. The sampling inspection shall be documented utilizing the applicable Sample Inspection Log Data Sheet.

6.0 AMETEK - PMT Products Procedures. (Continued)

6.5 *Sampling Plan.* The sampling inspection and test plan that has been developed for this product line which will produce an acceptable level of product confidence and quality has been determined to be 5% (1 in 20) of the inspection lot (minimum of one).

6.5.1 *Inspection Lot*. An inspection lot shall consist of all transducers having the same range, style and configuration that are received at the same time and under the same order or contract.

6.6 *Documentation*. Documentation of a sampling inspection shall be accomplished by the technician completing the applicable sections of the product Sample Inspection Log Data Sheet depicted in Enclosure (3). A separate data sheet is utilized for each MMC job number or purchase order. A successfully completed sample inspection will be indicated by an "Inspected" label affixed to the product and its packaging. An unsatisfactory sampling inspection shall be documented on a product Quality Deficiency Report (QDR) and a Nonconforming Product label shall be affixed to the product until such time as the deficiency is resolved. Documentation of a contractually required calibration shall be accomplished by completing a Certificate of Calibration in accordance with procedures contained in this Quality Manual and shall also be recorded in the Sample Inspection Log for trend analysis data collection purposes. All job related documentation shall be included in the Job File.

6.7 *Value Added Enhancement*. Value added enhancements generally consist of calibrated range adjustment and electrical connector replacement. These enhancements are provided to meet customer requirements.

6.7.1 *Final Acceptance Test*. A final acceptance test will be performed as the last step in the process of a value added enhancement. The test will consist of performing the instrument calibration procedure and will be documented as a sample inspection and a calibration if contractually required.

6.8 *Nonconforming Product.* New product not meeting specifications regardless of deficiency shall be labeled as Nonconforming Product until such time the deficiency has been resolved. A Quality Deficiency Report (QDR) shall be initiated at time of discovery and the product will be segregated from conforming product until final disposition has been determined. Deficiency resolution shall be evidenced by the satisfactory completion of the instrument calibration procedure and documented in accordance with sample inspection procedures. If deficiency resolution is beyond the scope of MMC Metrology Lab, Inc., the manufacturer's Repair Department, Customer Service Representative shall be notified and a Return Authorization obtained for factory evaluation and repair. All associated factory correspondence will be documented and filed with the QDR. All factory repairs shall be 100% sample inspected upon return receipt.

6.8.1 *Return Material Authorization*. When a complaint is received from a customer concerning new product and it is determined that the deficient product must be returned for investigation and / or resolution, a Return Material Authorization (RMA) number shall be issued. The Product Representative shall assign a number from the Ametek PMT Products RMA log that will identify the transaction so timely corrective action can be taken when the product is received.

6.8.2 *Complaint Report*. All customer complaints received after new product has been delivered regardless of deficiency shall be handled in accordance with MMC Metrology Lab, Inc Policy Statement MMC-2, Customer Complaints.

7.0 Ashcroft, Inc., WEKSLER Instruments Product Procedures.

7.1 *General.* MMC Metrology Lab, Inc. distributes products manufactured by Weksler Instruments, a division of Ashcroft Incorporated. MMC Metrology Lab is the sole master distributor for the Weksler Instruments Mil-Spec / Hi-Shock product line. The primary type of products that are represented consist of pressure gages that meet MIL-G-18997E, Navy Type bi-metal thermometers that meet MIL-I-17244E, and remote indicating gas actuated thermometers that meet MIL-T-19646 specifications. Additionally, MMC Metrology Lab also distributes various Ashcroft Inc. commercial pressure and temperature related products for direct sale.

7.2 *Procurement Data.* Product from this manufacturer is procured by manufacturer's part number and product description on an electronically transmitted (facsimile) purchase order. These products are manufactured strictly in accordance with approved manufacturer's master drawings. Customer requests for deviation from master drawing specifications shall be documented on the purchase order and shall clearly describe customer specified marking, testing and other nonstandard requirements.

7.3 *Receiving Procedures*. These products are received from the manufacturer individually packaged and labeled. In addition to the arrival physical / documentation inspection the receiving process for these products shall be determined by their final destination or contractual requirements.

7.3.1 *Stock Inventory Items*. Products ordered and received for stock inventory shall be sample inspected according to the sampling plan and then placed in the stock inventory storage area.

7.3.2 *Contract Sale Items*. Products ordered and received for direct sale per contract shall be sample inspected according to the sampling plan, calibrated if contractually required and then delivered to the packaging area or the outgoing product area, if being picked-up by the customer.

7.3.3 *Customer Source Inspection Items*. Products ordered and received for a contract that requires customer source inspection prior to shipping shall be labeled as such when received from the manufacturer. The Quality Manager or his representative shall assemble the test and inspection documentation required by contract and shall label the items as Source Inspection Material, indicating the customer's purchase order number, line item and part number. All products requiring source inspection shall be sample inspected. The sample inspection technical performance verification shall be accomplished utilizing NAVSEA approved instrument calibration procedures with measured data recorded in accordance with the provisions of this Quality Manual. If contractually required and the product meets requirements, a calibration label shall be affixed to each item. If calibration is not contractually required, an inspected label (see 5.12.3) shall be affixed. Upon successful completion of the receiving inspection the Source Inspection Material shall be re-packaged and placed in the secure temporary storage area designated for this purpose pending customer inspection.

7.3.4 *Special Cleaned Items.* Bourdon tube type pressure gauges purchased under contracts that require special cleaning to the requirements of MIL-STD-767 or MIL-STD-1330 by an accredited cleaning facility shall be 100% sample inspected. If customer source inspection is required, they shall be labeled as such and offered for pre-cleaning inspection. Upon return from the cleaning facility, the receiving inspection shall include verification of cleanliness certification documentation and the proper cleanliness preservation of the product as required in the

7.3.4 (Continued) cleaning specification (sealed double polyethylene bags). If customer source inspection is required, the product shall then be offered for post-cleaning inspection prior to shipping.

7.4 *Sampling Inspection.* The sampling inspection for these products is a two part procedure consisting of a comprehensive visual inspection and subsequent technical performance verification.

7.4.1 *Visual Inspection*. Visual inspection of these products shall be limited to the examinations that may be performed without disassembling the instrument in such a manner that its performance, durability or appearance will be affected. Visual inspection shall ascertain that the material, finish, workmanship, construction, assembly, dimensions and product markings conform to contract specifications.

7.4.2 *Technical Performance Verification.* Technical inspection of these products shall consist of performing the NAVSEA approved instrument calibration procedure in accordance with the provisions of this Quality Manual. The inspection shall not compromise the integrity of product cleanliness or finish and shall be performed utilizing calibrated measurement and testing instruments. Technical inspection of pressure gages shall be accomplished using an approved calibration pressure medium. When oil free gaseous nitrogen is used as a pressure medium, it shall be certified 99.50 percent pure (minimum). At no time shall internal wetted surfaces of pressure gages be exposed to corrosion products, grease, preservative, oil, flux, scale, machining particles, or any other foreign material.

7.5 *Sampling Plan.*

7.5.1 *Inspection Lot*. An inspection lot consists of all product of the same category, i.e. pressure gage, remote thermometer or bi-metal thermometer, having the same range, style and size that are received at the same time and under the same order or contract.

7.5.2 *Visual Inspection.* The visual inspection portion of the sampling inspection is applicable to 100% of inspection lot regardless of product type.

7.5.3 *Technical Performance Inspection*. The technical inspection portion of the sampling inspection is applicable dependent upon the type of product.

7.5.3.1 *Pressure Gage.* The technical inspection portion of the sampling inspection and test plan that has been developed for the pressure gage product line which will produce an acceptable level of product confidence and quality has been determined to be 5% (1 in 20) of the inspection lot (minimum of one).

7.5.3.2 *Bi-Metal Thermometer.* The technical sampling inspection and test plan that has been developed for the bi-metal thermometer product line which will produce an acceptable level of product confidence and quality has been determined to be 20% (1 in 5) of the inspection lot (minimum of one).

7.5.3.3 *Remote Indicating Thermometer.* The technical sampling inspection and test plan that has been developed for the remote indicating thermometer product line which will produce an acceptable level of product confidence and quality has been determined to be 20% (1 in 5) of

7.5.3.3 (Continued) the inspection lot (minimum of one).

7.5.3.4 *Miscellaneous Commercial Products.* The technical sampling inspection and test plan that has been developed for temperature and pressure related commercial products which will produce an acceptable level of product confidence and quality has been determined to be 100% of the inspection lot.

7.5.4 *Sampling Plan Exceptions*.

7.5.4.1 *Government Inspection Items*. When product is procured and received for a government contract purchase which specified a Special Material Identification Code (SMIC) that would invoke unique quality control or testing procedures, the sampling plan for that order or contract shall be modified to 100% of the inspection lot. Special Material Identification Codes that invoke such procedures are generally related to Navy Nuclear Reactor Plant material and include the SMIC "X3" and "X5". These SMIC products are randomly inspected / witnessed by the government Quality Assurance Representative (QAR) prior to acceptance and shipping.

7.5.4.2 *Mil-Spec Quality Conformance Inspection Items*. When product is procured and received for a government contract requiring documented Mil-Spec Quality Conformance Inspection, a sampling inspection is not required. This requirement is usually invoked by an attachment or an exhibit to a purchase contract.

7.5.4.3 *Customer Source Inspection Items*. When product is procured and received for a contract purchase that requires source inspection, the sampling plan for that order or contract shall be modified to 100% of the inspection lot. If contractually required and the product meets requirements, a calibration label shall be affixed to each item. If calibration is not contractually required, an inspected label (see 5.12.3) shall be affixed. Upon successful completion of the technical performance verification the Source Inspection Material shall be re-packaged and placed in the secure temporary storage area designated for this purpose pending customer inspection.

7.5.4.4 *Special Cleaned Items.* When bourdon tube type pressure gauges are procured and received for a contract purchase that invokes the cleaning of internal pressure boundary surfaces beyond the general applications level, the sampling plan for that order or contract shall be modified to 100% of the inspection lot. This requirement is invoked whenever hardware cleaning is required to meet the specifications of MIL-STD-767 or MIL-STD-1330.

7.6 *Documentation.*

7.6.1 *Sampling Inspection.* Documentation of a sampling inspection shall be accomplished by the technician completing the required sections of the applicable product line Sample Inspection Log Data Sheet depicted in Enclosure (3) of this policy statement. A separate data sheet shall be utilized for each MMC job number or purchase order reference number. Separate data sheet entries shall be used for each inspection lot comprising the order and shall indicate the origin tracking number (MMC’s purchase order number associated with product purchase) for each lot. A successfully completed sampling inspection will be indicated by an "Inspected" label affixed to the product and its packaging. An unsatisfactory inspection shall be documented on a product Quality Deficiency Report (QDR) and a Nonconforming Product label shall be affixed to the

7.6.1 (Continued) product until such time as the deficiency is resolved. All job related documentation shall be included in the Job File.

7.6.2 *Quality Conformance Inspection (Mil-Spec).* Documentation of Mil-Spec product Quality Conformance Inspection shall be accomplished when invoked by an attachment or exhibit to a government purchase contract, generally in the form of Contract Data Requirements List, DD form 1423 or as otherwise required by purchase order. The required Report of Test and Inspection (ROTI) and applicable test instruction sheets shall be prepared by the Quality Manager or his representative in such a format so as to depict test parameters and the results of the specified tests derived from the applicable Military Specification's Quality Conformance Inspection criteria. This test documentation is required for each contract item being delivered and shall be submitted for inspection and approval in accordance with contract requirements. All job related documentation shall be included in the Job File.

7.6.3 *Purchase Contract Calibration.* Documentation of a contractually required, new product calibration shall be in accordance with procedures contained in this Quality Manual utilizing a Certificate of Calibration. A contractually required calibration shall also be recorded in the applicable Sample Inspection Log for trend analysis data collection purposes. All job related documentation shall be included in the Job File.

7.6.4 *Delayed Calibration Certification.* Bourdon tube pressure gages procured and calibrated for government end-use may be temporarily stored in a clean, dry, vibration free environment for periods not exceeding 27 months. The time in storage shall not be considered as part of the calibration interval. The date of calibration of these gages for documentation purposes shall be considered as the date the gage is removed from storage. The due date for recalibration shall be determined based on the prevailing NAVSEA calibration interval. If the storage period exceeds 27 months, recalibration of the gage shall be required.

7.6.4.1 *Documentation*. A Certificate of Calibration shall be completed and a calibration label shall be attached to the gage without the assignment of a "Calibration Due" date. If the storage period does not exceed 27 months, determination of the "Calibration Due" date may be delayed until such time as the gage is removed from storage for installation. The date the gage is removed from storage shall be considered as the date calibrated and the approved NAVSEA calibration interval shall be applied by the customer when determining the "Calibration Due" date in accordance with NAVSEA OD-45845, Metrology Requirements List, Section 1, paragraph 25.c.

7.6.4.2 *Product Identification*. At the time of procurement a label with the following notation shall be added to the Certificate of Calibration and also placed on the gage to indicate delayed calibration certification: "This gage may be placed in storage for up to 27 months after calibration per NAVSEA OD-45845, Section 1, para 25.c. The date the gage is removed from storage is considered the "Date Calibrated" for purposes of determining "Calibration Due". Storage periods exceeding 27 months require gage recalibration."

7.6.4.3 *Label*.

This gage may be placed in storage for up to 27 months after calibration per NAVSEA OD 45845, Section 1, para 25.c. The date the gage is removed from storage is considered the "Date Calibrated" for purposes of determining "Calibration Due". Storage periods exceeding 27 months require gage recalibration.

7.6.5 *Special Cleaning*. Bourdon tube pressure gauges requiring special cleaning shall be cleaned by an accredited cleaning facility utilizing a previously approved procedure. Purchase orders sub-contracting a cleaning facility shall indicate the type of gauge and the level of cleaning required. If the cleaning must be witnessed / inspected by a government QAR, a statement to that end shall be included in the order. Cleaned product shall be returned with a cleaning facility Certificate of Compliance and the sealed double polyethylene bagged items properly labeled in accordance with the applicable standard.

7.7 *Value Added Enhancement.* Value added enhancements generally consist of changing cases, dials, dial color and markings, and / or adding mounting kits to accommodate customer requirements.

7.7.1 *Final Acceptance Test*. A final acceptance test shall be performed as the last step in the process of a value added enhancement. The test shall consist of performing the instrument calibration procedure and shall be documented as a sample inspection and a calibration if contractually required.

7.8 *Nonconforming Product.* New product received that does not meet specifications regardless of deficiency shall be labeled as Nonconforming Product (see 5.12.3) until such time the deficiency has been resolved. The product will be segregated from conforming product until final disposition has been determined. Deficiency resolution shall be evidenced by the satisfactory completion of the instrument calibration procedure and documented in accordance with sample inspection procedures.

7.8.1 *Quality Deficiency Report.* A Quality Deficiency Report (QDR) shall be initiated at the time of discrepancy discovery. If deficiency resolution is beyond the scope of MMC Metrology Lab, Inc., the manufacturer's Repair Department, Customer Service Representative shall be notified and a Return Authorization obtained for factory evaluation and repair. All associated factory correspondence shall be documented and filed with the QDR. All factory repairs shall be 100% sample inspected upon return receipt.

7.8.2 *Return Material Authorization*. When a complaint is received from a customer concerning new product and it is determined that the deficient product must be returned for investigation and / or resolution, a Return Material Authorization (RMA) number shall be issued. The Product Representative shall assign a number from the Weksler Instruments RMA log that will identify the transaction so timely corrective action can be taken when the product is received.

7.8.3 *Complaint Report*. All customer complaints received after new product has been delivered, regardless of deficiency, shall be handled in accordance with MMC Metrology Lab, Inc Policy Statement MMC-2, Customer Complaints.

8.0 Electrical Indicating Instrument Procedures.

8.1 *General.* MMC Metrology Lab, Inc. distributes electrical indicating products, including those manufactured by Jewell Instruments, LLC; A & M Instruments, a division of Jewell Instruments, and Yokogawa Corporation of America. The most common product lines that are represented consist of ruggedized panel meters, aircraft type instruments and switchboard meters and instruments for military and commercial applications. The stocking of product from these

8.0 Electrical Indicating Instrument Procedures. (Continued)

8.1 (Continued) manufacturers is generally limited to modification (MOD) meters and their associated major subassemblies that when combined will produce a value added indicating device meeting customer contract specification or purchase order requirements. These MOD meters and subassemblies are used in a variety of instruments and when stocked in this form permit customized product with reasonable delivery. MMC Metrology Lab, Inc. is the exclusive value added and distribution center for A & M Instruments' products, and additionally functions as a value added product distribution center for Yokogawa and Jewell electrical indicating products.

8.2 *Procurement Data.* Products from represented manufacturers are procured by manufacturer's part number and product description utilizing an electronically transmitted (facsimile) purchase order. Modification (MOD) meter and subassembly part numbers are derived solely from the manufacturer's Bill of Material (BOM) for the various instruments supported.

8.3 *Receiving Procedures*. Products received from represented manufacturers when in finished form are individually packaged and labeled. After the arrival physical / documentation inspection the finished form product shall be sample inspected in accordance with the sampling plan or calibrated if contractually required. The products shall then be repackaged, appropriately labeled and delivered to the packing area for shipping purposes or to the outgoing product area for customer pick-up.

8.3.1 *Value Added Product*. Material procured for value added product shall be inspected at arrival similar to all other products however, there is no sample inspection conducted. Material procured for value added product shall be stored by manufacturer part number or assembly description in the product assembly area and shall be subjected to testing during process control and final acceptance of the value added product.

8.4 *Sampling Inspection.* The sampling inspection for these products shall consist of performing a visual inspection to detect any product anomaly and then accomplishing the instrument calibration procedure in accordance with this Quality Manual. The sampling inspection shall apply as a receipt inspection for new product received as finished form instruments and as a value added product sample inspection for customized product being provided under contract or purchase order.

8.5 Sampling Plan. The sampling inspection and test plan that has been developed for finished form electrical indicating instruments and value added products which will produce an acceptable level of product confidence and quality has been determined to be 5% (1 in 20) of the inspection lot (minimum of one).

8.5.1 *Inspection Lot*. An inspection lot shall consist of; (1) all finished form product of the same range, style and size that is received at the same time and under the same contract or purchase order, or (2) all value added product of the same range, style and size that was prepared at the same time under the same contract or purchase order.

8.6 *Process Controls.* Processes involved in producing value added electrical indicating products are derived solely from manufacturer procedures and Bills of Material (BOM). A customer's purchase order or contract specifies a manufacturer part number or other unique

8.6 (Continued) number that identifies a specific product. This product shall then be assembled utilizing the following process; (1) ensure conformance to manufacturer specification or other contractually required specification, (2) calibrated if contractually required, (3) individually packaged and labeled, and (4) prepared for shipment or customer pick-up.

8.6.1 *Product Specification and Bill of Material*. Technical data required to support enhancement of a manufacturer's MOD meter to meet customer requirements is obtained directly from the manufacturer. The manufacturer Bills of Material are maintained for each product supported and are the responsibility of the Product Representative. General technical specifications are published in the manufacturer catalogs. More specific technical characteristics and specifications are included in the Bill of Material as are any unique material requirements, supplemental instructions or applications.

8.6.2 *Test and Inspections Criteria*. Test and inspection of value added product shall be determined by specific product characteristics including type, size, function, range and frequency. Test and inspection methods and parameters tested are generally those employed as industry standard, but may also be methods and parameters specified by contract, drawing or Military Specification. Individual test and inspection procedures are derived from the manufacturer technical specifications or may be those included as a specification conformance test invoked by contract. All test and inspections shall be performed by qualified inspectors. As a minimum, a manufacturer's final acceptance test or the instrument calibration procedure shall be performed prior to product delivery.

8.7 *Documentation.* Documentation of a sampling inspection shall be accomplished by the technician completing the required sections of the applicable product Sample Inspection Log Data Sheet as depicted in Enclosure (3) to this policy statement. A separate data sheet shall be utilized for each MMC job number or purchase order. A satisfactorily completed sampling inspection shall be indicated by an "Inspected" label affixed to the product and its packaging. An unsatisfactory inspection shall be documented on a product Quality Deficiency Report (QDR) and a Nonconforming Product label shall be affixed to the product until such time as the deficiency is resolved. Documentation of a contractually required calibration shall be in accordance with procedures contained in this Quality Manual utilizing a Certificate of Calibration. A contractually required calibration shall also be recorded in the Sample Inspection Log for trend analysis data collection purposes. All job related documentation shall be included in the Job File.

8.8 *Nonconforming Product.* New finished form product not meeting specifications regardless of deficiency shall be labeled as Nonconforming Product until such time the deficiency has been resolved. A Quality Deficiency Report (QDR) shall be initiated at time of discovery and the product will be segregated from conforming product until final disposition has been determined. Deficiency resolution shall be evidenced by the satisfactory completion of the instrument calibration procedure and documented in accordance with sample inspection procedures. If deficiency resolution is beyond the scope of MMC Metrology Lab, Inc., the manufacturer's Repair Department, Customer Service Representative shall be notified and a Return Authorization obtained for factory evaluation and repair. All associated factory correspondence shall be documented and filed with the QDR. All factory repairs shall be 100% sample inspected upon return receipt.

8.8.1 *Return Material Authorization*. When a complaint is received from a customer concerning new product and it is determined that the deficient product must be returned for investigation and / or resolution, a Return Material Authorization (RMA) number shall be issued. The Product Representative shall assign a number from the Electrical Instruments RMA log that will identify the transaction so timely corrective action can be taken when the product is received.

8.8.2 *Complaint Report*. All customer complaints received after new product has been delivered, regardless of deficiency, shall be handled in accordance with MMC Metrology Lab, Inc Policy Statement MMC-2, Customer Complaints.

9.0 Over the Counter Product Procedures.

9.1 *General.* MMC Metrology Lab, Inc. distributes various electrical, electronic and mechanical measurement products for several different manufactures. These products are intended for direct re-sale and stocking quantities are minimal and based on customer short-fused requirements.

9.2 *Procurement Data.* Product in this category is procured by manufacturer model, catalog, or part number and product description on an electronically transmitted (facsimile) purchase order. These items are generally commercially available and modifications or changes to product specifications are not possible.

9.3 *Receiving Procedures.* In addition to the arrival physical / documentation inspection the receiving process for these products consists of performing the sampling inspection.

9.4 *Sample Inspection.* The sampling inspection shall consist of two parts. The initial part of the inspection is a visual investigation of the product. The visual inspection shall detect any physical anomalies and verify product identification data are correct and appropriate, i.e. part number, model number, stock number, etc. The second part of the sampling inspection shall consist of a technical inspection performed by accomplishing the instrument calibration procedure in accordance with the provisions of this Quality Manual. The sampling inspection shall be documented utilizing the applicable Sample Inspection Log Data Sheet.

9.5 *Sampling Plan.* The sampling inspection and test plan for this category of products is 100%. All commercial products received for direct re-sale that does not specifically require calibration under contract shall be sample inspected.

9.6 *Documentation.* Documentation of a contractually required calibration shall be accomplished by the technician completing a Certificate of Calibration in accordance with procedures contained in this Quality Manual. Documentation of a satisfactorily completed sampling inspection shall be indicated by an "Inspected" label affixed to the product packaging and the completion of applicable Sample Inspection Log Data Sheet. An unsatisfactory sample inspection shall be documented on a Quality Deficiency Report (QDR) and a Nonconforming Product label shall be affixed to the product until such time as final disposition is determined.

9.7 *Nonconforming Product.* New product not meeting specifications regardless of deficiency shall be labeled as Nonconforming Product until such time the deficiency has been resolved. A

9.7 (Continued) Quality Deficiency Report (QDR) shall be initiated at time of discovery and the product will be segregated from conforming product until final disposition has been determined. Deficiency resolution shall be evidenced by the satisfactory completion of the instrument calibration procedure and documented in accordance with sample inspection procedures. If deficiency resolution is beyond the scope of MMC Metrology Lab, Inc. or will invalidate product warranty, the manufacturer's Repair Department, Customer Service Representative shall be notified and a Return Authorization obtained for factory evaluation and repair. All associated factory correspondence will be documented and filed with the QDR. All factory repair service will be 100% sample inspected upon return receipt.

9.7.1 *Return Material Authorization*. When a complaint is received from a customer concerning new product and it is determined that the deficient product must be returned for investigation and or resolution, a Return Material Authorization (RMA) number shall be issued. The Product Representative for Ametek-M&CT products shall be responsible for products in this category, and as such shall assign a number from the Ametek M&CT products RMA log that will identify the transaction so timely corrective action can be taken when the product is received.

9.7.2 *Complaint Report*. All customer complaints received after new product has been delivered regardless of deficiency shall be handled in accordance with MMC Metrology Lab, Inc Policy Statement MMC-2, Customer Complaints.

MMC Metrology Lab, Inc.
4989 Cleveland Street
Virginia Beach, VA 23462

QUALITY DEFICIENCY REPORT

Deficiency Report No._____ Date Reported_____

PRODUCT IDENTIFICATION

Nomenclature :	Ref / Job No :
Manufacturer :	Customer :
Part No :	Date Received :
Range :	

DEFICIENCY

CONDITION FOUND / PROBABLE CAUSE

CORRECTIVE ACTION / DISPOSITION

PREVENTATIVE ACTION

RAN ( )

Notes:

Inspector: _____ Product Representative: _____
Date: Date:

Enclosure (1)

MMC Metrology Lab, Inc.

4989 Cleveland Street
Virginia Beach, VA 23462

AUTHORIZED PRODUCT QUALITY INSPECTORS

INSPECTOR	QUALIFIED / AUTHORIZED				AUTHORIZING SIGNATORY	
	AMETEK PRODUCTS	WEKSLER PRODUCTS	ELECTRICAL PRODUCTS	MERCURY TESTING	SIGNATURE	INITIALS
BEYER, Victor H.		YES				
BLAUVELT, David F.			YES			
COHEN, Justin L.		YES				
DAVIS, Jack L.	YES	YES	YES		Inactive - 24 JUL 2009	
HOUSE, Donison L.			YES			
KAZARIAN, Robert A.			YES		Inactive - 01 AUG 2009	
KELLY, William K		YES		YES		
KLATT, David R.			YES		Inactive - 01 JAN 2008	
O'DONNELL, Daniel T.	YES	YES	YES			
PIETRANTONIO, Michael R.	YES	YES	YES			
REIMOLD, Charles E.		YES		YES		
UNDERWOOD, Gary M., Jr.		YES		YES		
WHITLEY, Derrell L.		YES	YES			

Enclosure (2)

INDEX - Sample Inspection Log - Product Specific Data Sheet

Figure	Nomenclature	Inspection Procedure
3-1	Pressure Transducer	LPE131
3-2	Pressure Gage	NA17-20MP-03, 06, 16, 36
3-3	Bi-Metal Thermometer	NA17-20ST-02, 60, 61
3-4	Remote Thermometer	NA17-20ST-93, 60, 61
3-5	Voltage / Current Meter (AC/DC)	NA17-20AQ-147
3-6	Expanded Scale Voltmeter	NA17-20AE-135
3-7	Frequency Meter	NA17-20AF-19
3-8	Voltage / Ammeter (AC/DC) - Center Zero	NA17-20AQ-147
3-9	Voltage / Current Meter (AC/DC) - Multi-Range	NA17-20AQ-147
3-10	Watt / Varmeter	NA17-20AQ-168
3-11	Watt / Varmeter - Center Zero	NA17-20AQ-168
3-12	Voltage / Current Meter (AC/DC) - Multi - Range / Center Zero	NA17-20AQ-147
3-13	Temperature Meter (RTD Type)	NA17-20ST-75
3-14	Power Factor Meter - Center Zero	NA17-20AQ-168, TM
3-15	Expanded Scale Voltmeter - Dual Range	NA17-20AE-135
3-16	Synchroscope - 60 Hz and 400 Hz	NA17-20AQ-168
3-17	Commercial Pressure / Temperature Products - Switches	MFG INSTRUCTIONS

Enclosure (3)

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **AMETEK PMT PRODUCTS**

DATA SHEET

REF / JOB NO:

SAMPLE INSPECTION LOG - Pressure Transducer

Reference Inspection Procedure: LPE131

	Lot	Sample	Cal Range	Pressure Unit				Diaphragm		VISUAL		LIMIT	0% Ck		25% Ck		50%Ck		75% Ck		100% Ck		OVERALL		DATE	Inspector
	Size	Size	Pressure	PSIG	PSIA	PSID	cmpd	Monel	CRES	pass	fail	(±.16mA)	pass	fail	pass	fail	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
												(±.16mA)														
1												(±.16mA)														
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20												(±.16mA)														

Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-1

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **WEKSLER INSTRUMENTS**

REF / JOB NO:

DATA SHEET

SAMPLE INSPECTION LOG - Pressure Gauge

Reference Inspection Procedure: NAVAIR 17-20MP- 03, 06, 16 or 36

	Lot	Sample	ORIGIN	Gage Size			RANGE	Connection Location			Connection Type			VISUAL Insp		Limit of Error	INC Press		DEC Press		OVERALL		DATE	Inspector
	Size	Size	Tracking No.	3½"	4½"	8½"		back	BTM	5 o'clk	O-ring	flrless	¼NPT	pass	fail	(± unit)	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-2

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc.

DATA SHEET

WEKSLER INSTRUMENTS

REF / JOB NO:

SAMPLE INSPECTION LOG - Bi-Metal Thermometer

Reference Inspection Procedure: NAVAIR 17-20ST-02, 60, 61

	Lot	Sample	ORIGIN	RANGE	STEM		MOUNTING		Min/Max		VISUAL		LIMIT	Lower ⅓ Ck		Center ⅓ Ck		Upper ⅓ Ck		OVERALL		DATE	Inspector
	Size	Size	Tracking No.	(°F)	2"	4"	back	Btm	Yes	No	pass	fail	(± °F)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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2																							
3																							
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-3

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **WEKSLER INSTRUMENTS**

DATA SHEET

REF / JOB NO:

SAMPLE INSPECTION LOG - Remote Thermometer

Reference Inspection Procedure: NAVAIR 17-20ST-93, 60, 61

	Lot	Sample	ORIGIN	Dial Size			RANGE	Capillary	Bulb	Mounting		VISUAL		LIMIT	Lower ⅓ Ck		Center ⅓ Ck		Upper ⅓ Ck		OVERALL		DATE	Inspector
	Size	Size	Tracking No.	3½"	4½"	8½"	(°F)	(feet)	(Code)	U	F	pass	fail	(± unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-4

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Voltage/Current Meter (AC/DC)

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AQ-147**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	⅓ FS Ck		⅔ FS Ck		FS Ck		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	±(range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-5

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc.

DATA SHEET

A&M INSTRUMENTS

SAMPLE INSPECTION LOG - Expanded Scale Voltmeter

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AE-135**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	Left ES		Center		Right ES		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	± (range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-6

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc.

DATA SHEET

A&M INSTRUMENTS

SAMPLE INSPECTION LOG - Frequency Meter

REF / JOB NO:

Reference Inspection Procedure: NAVAIR 17-20AF-19

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	Left ES		Center		Right ES		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	± (range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-7

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - V/A Meter (AC/DC) - Center Zero

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AQ-147**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	Left ES		Center		Right ES		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	± (range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-8

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Voltage/Current Meter (AC/DC)

Multi - Range

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AQ-147**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	⅓ FS Ck		⅔ FS Ck		FS Ck		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	± (range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX

Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-9

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc.

DATA SHEET

A&M INSTRUMENTS

SAMPLE INSPECTION LOG - Watt / Varmeter

REF / JOB NO:

Reference Inspection Procedure: NAVAIR 17-20AQ-168

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	⅓ FS Ck		⅔ FS Ck		FS Ck		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	±(range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-10

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Watt / Varmeter (Center Zero)

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AQ-168**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	Left ES		Center		Right ES		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	±(range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-11

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Voltage/Current Meter (AC/DC)
Multi - Range (Center Zero)

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AQ-147**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	Left ES		Center		Right ES		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	± (range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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	XX	XX	3rd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
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	XX	XX	2nd Range →	XX												XX	XX	XX	XX
	XX	XX	3rd Range →	XX												XX	XX	XX	XX

Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-12

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Temperature Meter (RTD Type)

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20ST-75**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	⅓ FS Ck		⅔ FS Ck		FS Ck		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	±(range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-13

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Power Factor Meter - Center Zero

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AQ-168 or Mfg Manual**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	Left ES		Center		Right ES		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	± (range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-14

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Expanded Scale Voltmeter (Dual Range)

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AE-135**

	Lot	Sample	Model / Part Number	MFG	RANGE	SCALE	VISUAL		Limit of Error	Left ES		Center		Right ES		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(Span)	(Min/Max)	pass	fail	± (range unit)	pass	fail	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-15

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **A&M INSTRUMENTS**

DATA SHEET

SAMPLE INSPECTION LOG - Synchroscope - 60 Hz and 400 HZ

REF / JOB NO: **Reference Inspection Procedure: NAVAIR 17-20AQ-168 or Mfg Manual**

	Lot	Sample	Model / Part Number	MFG	Frequency	Voltage	VISUAL		Limit of Error	12 o'clock		OVERALL		DATE	Inspector
	Size	Size	(manufacturer's)		(60 / 400 Hz)	(Nominal)	pass	fail	(12 o'clock)	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation and requires the technical inspection of entire lot. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-16

ENCLOSURE (3)
(Not to Scale)

MMC Metrology Lab, Inc. **Ashcroft Inc. Products**

DATA SHEET

SAMPLE INSPECTION LOG - Pressure / Temperature Switches

REF / JOB NO: **Reference Inspection Procedure: Manufacturer Instructions**

	Lot	Sample	ORIGIN	Gage Size			RANGE	Connection Location			Connection Type			VISUAL Insp		Limit of Error	INC Press		DEC Press		OVERALL		DATE	Inspector
	Size	Size	Tracking No.	3½"	4½"	8½"		back	BTM	5 o'clk	O-ring	flrless	¼NPT	pass	fail	(± unit)	pass	fail	pass	fail	SAT	UNSAT	(mm/dd/yy)	initials
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Any failed check point is the basis of an overall UNSAT evaluation. Notify the Product Representative for all UNSAT evaluations.

MMC9 Encl (3) Figure 3-17