



Procedure 03-8083-P02
(Ref: SECTION 11)

**Control of Inspection, Measuring
and
Test Equipment**



CONTROL OF INSPECTION, MEASURING AND TEST EQUIPMENT

1.0 Purpose:

To establish and maintain a system for selecting, using, calibrating and controlling inspection, measuring and test equipment; to verify the conformance of product to the specified requirements.

2.0 Scope:

This procedure applies to inspection, measuring and test equipment used for manufacturing, inspection and testing of products at Precision Metal Works Ltd.

3.0 References:

ASME III	Subsection NCA 4134.12
CAN/CSA-N285.0	Section 11
ISO 9001:2000	Section 7.6

4.0 Responsibilities:

4.1 Quality Assurance Manager shall be responsible for:

- 4.1.1 Establishing, implementing and maintaining the calibration system for the control of each piece of Inspection, Measuring and Test Equipment, to ensure the equipment is calibrated, adjusted and maintained at prescribed intervals or prior to use.
- 4.1.2 Ensuring that current and equipment to be purchased in the future have:
 - Adequate range.
 - Accuracy.
 - Tolerances.
 - Ability to satisfy requirements of intended functions.
- 4.1.3 Evaluating the technical requirements of products to determine the measurements to be made and the accuracy required, so that equipment selected is available for use has the measuring and testing capability, stability, precision and range compatible with its intended application.
- 4.1.4 Establishing calibration intervals for each piece of Inspection, Measuring and Testing Equipment appropriate to the equipment and anticipated usage. No other personnel are authorized to establish or change calibration intervals.
- 4.1.5 Ensuring that subcontractors used for calibration services are qualified and selected from the Approved Suppliers List.
- 4.1.6 Approving Purchase Orders for the provision of subcontracted calibration services.



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- 4.2 **Quality Assurance Inspector shall be responsible for:**
- 4.2.1 Ensuring that a unique identification number is applied to each piece of Inspection, Measuring and Testing Equipment or, if this is impractical, the container.
 - 4.2.2 Ensuring that new Inspection, Measuring and Testing Equipment is calibrated prior to use.
 - 4.2.3 Performing calibrations, or arranging for equipment to be subcontracted for calibrations in accordance with established requirements.
 - 4.2.4 Maintaining an inventory and calibration record of each piece of Inspection, Measuring and Testing Equipment.
 - 4.2.5 The review and acceptance of calibration certificates received from suppliers or subcontract laboratories. Each document shall be dated, signed and/or stamped and retained on file.
- 4.3 **All Users of Inspection, Measuring and Testing Equipment shall be responsible for:**
- 4.3.1 Ensuring each item of Inspection, Measuring and Testing Equipment has a valid 'Calibration Label' attached to it, or to the container prior to use.
 - 4.3.2 Ensuring any item of Inspection, Measuring and Testing Equipment found to be discrepant or damaged is promptly reported to the Quality Assurance Manager.
 - 4.3.3 Ensuring Inspection, Measuring and Testing Equipment are safeguarded and handled in such a manner as to preserve the calibrated accuracy.
- 5.0 **Procedure:**
- 5.1 **General Requirements:**
- 5.1.1 Exhibits illustrated in this Procedure may not reflect the most current revision, but are for reference only. Form numbers and description shall be accurate.
 - 5.1.2 Calibration may be performed, by the original manufacturer, an approved metrology laboratory, or by a Quality Assurance Inspector with demonstrated proficiency in calibration.
 - 5.1.3 The calibration of Inspection, Measuring and Testing Equipment shall be performed under controlled conditions, using approved procedures and methods at prescribed intervals, utilizing calibration standards, which have demonstrated traceability to National Standards.
- Certificates of calibration for the calibration standards shall be reviewed, accepted and maintained by the Quality Assurance Manager. The certificates shall indicate:
- Standard of accuracy.
 - Date of calibration.
 - By whom calibrated.
 - Traceability data.



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- 5.1.4 Where no National Standards exists, the basis for calibration shall be documented.
- 5.1.5 The calibration status shall be recorded on a Calibration Record, form F039 shown in Exhibit 1, and the equipment identified with 'Calibration Label' signifying its validity.
- 5.1.6 Managers and supervisors shall ensure that Inspection, Measuring and Testing Equipment under their direct control or the control of subordinates, are handled and stored in a manner so as to prevent abuse, misuse, damage or change in dimensional or functional characteristics.
- 5.1.7 Inspection, Measuring and Testing Equipment shall be used in a manner, which ensures that the measurement uncertainty is known and consistent with the required measurement capability.
- 5.1.8 Adjustable gauges shall have adjustment devices sealed at the time of calibration. Sealing devices shall be such that tampering will cause damage. Adjustable gauges with damaged seals shall not be used until recalibrated and sealed.
- 5.1.9 No test software is used.
- 5.2 **Environment:**
- 5.2.1 Mechanical Measuring & Testing Equipment shall be calibrated in a calibration area maintained at a suitable level of cleanliness for calibration work.
- 5.2.2 Prior to calibration items to be calibrated, and the standards to be used, shall be held in the calibration area for a period sufficient to permit stabilization to the ambient temperature. This period should be a minimum of 24 hours, but may be adjusted as deemed applicable.
- 5.2.3 There shall be adequate lighting and suitable storage facilities in the calibration area.
- 5.3 **New Equipment:**
- 5.3.1 Purchase Orders for new Inspection, Measuring and Testing Equipment shall stipulate the provision, by the supplier, of calibration certificates.
- 5.3.2 On receipt, the Quality Assurance Inspector shall:
- Identify new Inspection, Measuring and Testing Equipment with a unique identification number.
 - Initiate a Calibration Record form.
 - Review and accept the calibration certificate supplied or perform the calibration if a certificate is not supplied.
 - Attach a Calibration Label to the item or container, as appropriate.



5.4 **Identification of Inspection, Measuring and Testing Equipment:**

- 5.4.1 The Quality Assurance Inspector shall be responsible for the identification numbers and the assignment of each to individual equipment.
- 5.4.2 The application of identification numbers must not interfere with its accuracy and function. The number may be applied by engraving, etching, stamping or other suitable means if practical. Where this is impractical the identification number may be applied to the container by any suitable means.
- 5.4.3 When defective equipment is withdrawn from use, the identification number shall not be allocated to another piece of equipment.

5.5 **Calibration Procedures:**

- 5.5.1 Calibrations performed 'in-house' shall be in accordance with documented procedures approved and issued by the Quality Assurance Manager.
- 5.5.2 The procedures shall define the methods of calibrating each type of Inspection, Measuring and Testing Equipment, acceptance criteria and actions to be taken when results are unsatisfactory.
- 5.5.3 Where no calibration standards exist, the basis of calibration shall be documented and may include manufacturers recommended methods or comparison with standards of similar equipment and accuracy.

5.6 **Calibration Intervals:**

- 5.6.1 Calibration intervals or frequencies of Inspection, Measuring and Testing Equipment shall be determined and documented on the Calibration Record form F039 shown in Exhibit 1 by the Quality Assurance Manager, based on the regularity of use and recommended manufacturers or industry standards.
- 5.6.2 Inspection, Measuring and Testing Equipment shall be calibrated at any time outside of the Calibration Schedule if the output is suspect.
- 5.6.3 The Quality Assurance Manager may change the calibration interval for any item after an evaluation of performance and usage, or other applicable information.
- 5.6.4 Equipment not in use shall be identified, segregated, and calibrated prior to use. Continuing service shall require compliance with the calibration at the specified intervals.
- 5.6.5 Established Calibration Intervals are as shown in Appendix 'A' to this Section.



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5.7 **Calibration Records**

5.7.1 The basic data pertaining to each item of equipment shall be entered on the Calibration Record, Form FO39 shown in Exhibit 1. Each item of equipment shall have an individual form, which shall become the calibration history.

5.7.2 As a minimum this data shall include:

- A unique identification number.
- A brief description of the equipment.
- The frequency of calibration in months.
- The original manufacturer of the equipment.
- Tolerances to which equipment shall be adjusted.
- Department to which equipment is normally assigned.
- The calibration to be used for in-house calibrations.
- The subcontract laboratory normally performing calibrations.

5.7.3 Findings at each calibration shall be entered in the 'Calibration Results' section of the form. The inspector shall date, stamp and/or sign in the appropriate columns and indicate the disposition. This shall indicate acceptable where this is the case, or any applicable nonconformance reports shall be referenced.

5.8 **Calibration:**

5.8.1 'In-house' calibration of Inspection, Measuring and Testing Equipment shall be performed by a Quality Assurance Inspector with demonstrated proficiency in calibration in accordance with approved calibration procedures. Equipment shall be adjusted as found necessary.

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5.8.2 Calibrations shall be performed in accordance with the schedule shown in Appendix 'A' to this Section.

5.8.3 In accordance with calibration frequencies, equipment shall be withdrawn from use by the Quality Assurance Inspector and allowed to reach ambient temperature in the calibration area.

5.8.4 Calibration results shall be entered on an individual Calibration Record Form F039 shown in Exhibit 1.

5.8.5 Upon completion of a successful calibration, the Inspection, Measuring and Testing Equipment shall have a Calibration Label attached.

5.8.6 The Quality Assurance Inspector shall complete the label by writing the Inspection, Measuring and Testing Equipment identification number, date of calibration, initials of Inspector and the due date for the next calibration.

5.8.7 Should the item be too small or encumbered, the Calibration Label may be applied to its container.



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- 5.8.8 Inspection, Measuring and Testing Equipment that are used infrequently shall be sealed in its container with a tamper-proof seal immediately following calibration. If the seal remains intact at the next scheduled calibration, the re-calibration shall be waived and document as such.
- 5.8.9 The Calibration Record form shall also be completed by the Quality Assurance Inspector and forwarded to the Quality Assurance Manager for filing.
- 5.8.10 For equipment calibrated by a subcontract laboratory, the equipment shall be identified with the laboratory label indicating calibrated date and next due calibration date. Should the due date not conform to requirements a label with the correct information shall be placed over the laboratory label.

The calibration Record form shall show the number of the Purchase Order to the subcontractor and the date received in the 'Calibration results' column.

- 5.8.11 Inspection, Measuring and Testing Equipment used in manufacturing for reference shall be uniquely identified and a tag attached signifying 'Calibration not Required', Form F040C as shown in Exhibit 3, its use being for reference only, and is not to 'accept' product.
- 5.8.12 Inspection, Measuring and Testing Equipment that are used infrequently shall be sealed with a tamper-proof, 'Calibration Void if Broken' seal, Form F040B as shown in Exhibit 3, immediately after calibration. If the seal remains intact at the next calibration due date, the re-calibration shall be waived and documented as such.

5.9 **Subcontracted Services:**

- 5.9.1 Calibration may be performed by qualified calibration laboratories, using approved procedures and calibrated masters, which have demonstrated traceability to National Standards.
- 5.9.2 Calibration Laboratories shall provide certification, which should include, but not limited to the following:
- Name of equipment.
 - Serial number.
 - Date of calibration.
 - Statement of standards used in calibrating, test number or other means of documenting traceability.
 - Statement of calibration standards (equipment) traceable to National Standards.

NOTE: Calibration laboratories are not required to submit procedures.

- 5.9.3 The Quality Assurance Manager shall retain subcontractor calibration certificates on file for the life of the equipment.



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5.10 **Nonconforming Inspection, Measuring and Testing Equipment:**

- 5.10.1 Inspection, Measuring and Testing Equipment that is past calibration due date, is suspected of inaccuracy, is damaged or fails in operation, shall be identified with a 'Rejected' tag Form F030C, shown in Exhibit 2, signifying nonconformance, and the equipment placed in the nonconformance 'HOLD' area pending disposition to recalibrate, adjust, repair or scrap.
- 5.10.2 The Quality Assurance Manager shall consider the corrective action to be taken when Inspection, Measuring and Testing Equipment is classified as nonconforming. The degree of nonconformity shall be taken into consideration, as shall the potential impact on any product affected. Products that can be positively identified as measured with the item may be considered nonconforming until re-inspected and dispositioned according to findings.
- 5.10.3 Should there be concern for the quality of items measured by equipment considered defective which might require a recall of those items, the Quality Assurance Manager shall confer with the President on the course of action, if any, to be taken.
- 5.10.4 Nonconformances shall be processed in accordance with Section 14, Control of Nonconforming Product.
- 5.10.5 The Quality Assurance Manager shall ensure that equipment that is worn, or defective, or consistently found out of calibration shall be quarantined or destroyed to prevent inadvertent use. Replacements shall be made as deemed necessary.

5.11 **Customer Notification:**

- 5.11.1 When contractually authorized, customer representatives shall be provided with technical data relevant to the inspection, measuring and test equipment in order to verify accuracy.

5.12 **Records:**

- 5.12.1 The following documents, but not limited to, shall be retained by the Quality Assurance Manager as quality records and shall be maintained in accordance with Control of Quality Records:
 - a) Calibration Schedule.
 - b) Calibration Record.
- 5.12.2 Inspection, Measuring and Test Equipment records shall be available for review by the Customer/Authorized Inspector as required.

6.0 **Related Exhibits:**

Exhibit 1	Form F039	Calibration Record
Exhibit 2	Form F040A	Calibration Label
Exhibit 2	Form F040B	Calibration Void Label
Exhibit 2	Form F040C	Calibration Not Required Label



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Exhibit 2:

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Form: F040 CALIBRATION IDENTIFIERS Revision: 0

CALIBRATION
I.D.No. _____
By _____ Date _____
Due _____

Exhibit 40A – Calibration Validation Label

CALIBRATION
VOID
IF SEAL
IS BROKEN

Exhibit 40B – Calibration Void Seal

**CALIBRATION
NOT
REQUIRED**

Exhibit 40C – Calibration 'Not Required' Label



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APPENDIX ‘A’:

Established calibration intervals in months are as follows:

Caliper - ultrasonic	12
Caliper - wall thickness	12
Comparator - optical.....	12
Dead weight tester.....	60
Dial indicators	12
Gauge block sets	36
Gauges - bore, bore telescopic, etc.....	36
Gauges - groove.....	12
Gauges - height	12
Gauges - height master	24
Gauge pin sets	36
Gauge rods - masters	60
Gauges-radius	36
Gauges - thickness	36
Gauges - thread pitch.....	36
Hardness testers	12
Helium leak	60
Levels – precision.....	24
Measuring Tape	6
Micrometers-external, internal, depth, thread	12
Multimeters	12
Parallels	36
Plug gauges - cylindrical, plain, spline, thread, etc.,	12
Plug gauges - thread masters	24
Pressure gauges - analogue	6
Pressure gauges - digital.....	12
Protractors	24
Ring gauges - plain, spline, thread	12
Rulers	12
Sine bars/tables	36
Snap gauges - plain, thread, etc.....	12
Squares	24
Straight edges	24
Surface tables	36
Torque wrenches	12
Vernier calipers - engraved, dial, digital.....	12