

 AUDIT CRITERIA 161Thorn Hill Road Warrendale, PA 15086-7527	AC 7130/6 REV. NA Issued 2016-01 Revised 2016-08 Superseding NA
TO BE USED ON AUDITS STARTING ON OR AFTER 24-Apr-2016 Nadcap AUDIT CRITERIA FOR MEASUREMENT & INSPECTION (M&I) ACCREDITATION PROGRAM GENERAL INSPECTION	
Editorial Change was made to the checklist name on 01-Jan-2016, renaming it AC7130/6 (originally /0) Editorial Change to para 9.1.10, 9.1.11, 9.1.12, 9.1.13, 9.1.14, 9.1.15, 10.1.10, 10.1.11, 10.1.12, 10.1.13, 10.1.14, 10.1.15 Editorial Change made to paragraphs and 9.6.6.1, 9.9.3, 10.5.3, 10.6.6.1, 10.9.3 on 17-May-2016 Editorial Change made to paragraphs 9.-10.1.15 for Job Tracker 14-Aug-2016	

1. SCOPE

These checklist criteria define the requirements for companies seeking Nadcap accreditation in General Inspection and are to be used as a supplement to PRI AC7130. This audit checklist is applicable to all measurement and inspection activities covering both automated and manual measurement systems. Some existing and legacy components may not follow modern manufacturing processes and specific legacy requirements may apply.

NOTE: This checklist does not cover measurement technologies outside that of dimensional measurement such as NDT, Heat Treat, etc.

2. GENERAL INFORMATION

In completing this assessment, auditors are instructed to respond with a "Yes" or "No" to address compliance with each statement of requirement. For any negative responses, the auditor must clearly indicate within the NCR if the "No" reflects noncompliance with respect to existence, adequacy, and/or compliance. Existence relates to evidence of a documented procedure or policy, adequacy relates to the completeness of the procedure or policy and compliance relates to evidence of effective implementation. This checklist includes the use of the word "shall" which indicates a clear requirement that must be met

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at all times. The word “may” indicates a possible resolution to a requirement or one recommended method to achieve a given requirement, but does not represent the only way to meet that requirement. In addition the checklist includes the term “Compliance Assessment Guidance”. This term is used to reflect the Task Groups expectation when answering the checklist question as YES or NA.

All negative responses require a Nonconformance Report (NCR). Not Applicable (NA) responses do not require an explanation unless otherwise noted. There is only one plausible reason for an NA, which is, that a particular operation or issue is not being used at the supplier. There are no NA's simply for a lack of a customer requirement. If a system is in use, then all questions pertaining to that system are applicable. If verification of results require documentation it shall be so noted in this checklist.

The audit results shall not include any customer proprietary information. Technical information on parts which have been designated “Export Controlled – License Required”, (EC-LR) cannot be input into eAuditNet. If auditors have any questions about this, they should contact the Staff Engineer for directions.

For further details refer to section 2.0 of AC7130.

FOR INFORMATION - Any checklist question that contains an asterisk (*) at the end of the question, indicates this question is also asked in another M&I checklist. This is to support future checklist question changes/modifications where multiple M&I checklists may be affected.

3. INSPECTION MANAGEMENT SYSTEM

3.1	Is there a documented procedure for the management of change control for measurement & inspection processes?	YES	NO
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Compliance Assessment Guidance: This may be a generic document which controls source or method change for manufacturing processes, including inspection processes.

4. CALIBRATION

4.1	Is there a documented procedure for the control of measurement & inspection equipment that requires calibration?	YES	NO
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Compliance Assessment Guidance: The procedure shall control the interval, method and acceptance limits of calibration.

5. ENVIRONMENT

5.1 Is there a process addressing environmental conditions which could affect the inspection results? YES NO

Compliance Assessment Guidance: It is expected that the environment is considered. This may include but not limited to:

- Temperature (Industry Standard 20°C or 68°F)
- Calibrated environmental measurement, e.g. temperature sensor
- Humidity
- Lighting (including radiant heat)
- Air Current
- Vibration
- Residual magnetism
- Cleanliness

6. INSPECTION PLANNING

6.1 Is there a documented procedure that defines how design requirements are translated into inspection operations and instructions? YES NO

Compliance Assessment Guidance: This document will describe the requirements for inspection planning.

7. MEASUREMENT SYSTEMS ANALYSIS

7.1 Is there a documented procedure to demonstrate capability of measurement systems used for inspection? YES NO

Compliance Assessment Guidance: Examples could be AIAG Guide to Measurement System Analysis (MSA), ISO14253-2, AS13003, customer defined processes such as Gauge Repeatability and Reproducibility (R&R), attribute agreement analysis, or a method of proving the equipment is fit for purpose, etc.

8. COMPETENCE AND TRAINING

8.1 Is there a process that addresses vision requirements where required? YES NO NA

Compliance Assessment Guidance: This will include visual acuity, visual acuity correction, color vision (if applicable) and the need for qualified / trained persons to administer the tests, periodically. NA applies where visual acuity is not required.

9. JOB AUDIT 1

This section is to be completed to record the part witnessed at the time of the audit to verify compliance to the checklist questions identified here on.

Compliance Assessment Guidance: The supplier shall perform representative inspections from current production to determine compliance with these requirements. These parts shall be selected to represent a variety of Nadcap participating customer requirements and different equipment if more than one measurement equipment item is in use at this facility. Selection of the job audits shall also be representative of usual business at the supplier facility and should be selected by the auditor and should not represent parts reviewed in previous audits. Investigate the purchase order specifications to identify any customer unique acceptance, or procedure requirements applicable to these parts. Witness the facility's ability to perform inspection of these parts in accordance with the requirements.

Specifications identified for processing and acceptance that are utilized during each compliance job review, should be verified as to revision by reviewing and interviewing the Document Control personnel to verify their ability to obtain the correct specifications, and to verify that the document Control System currently houses the most recent applicable specifications. If no production parts or tooling are available, demos can be done utilizing production equipment, artifacts or something representative of supplier work to demonstrate the process. In conjunction with the demo work, an additional historical record (archive job, no more than 12 months old) shall be reviewed for 1 customer job to review flow-down. It is expected that the auditor shall review and follow traceability from the purchase order to completion of the measurement process or final certification by reviewing as a minimum the items listed below. The length of each compliance job shall be adequate to allow the auditor to verify that the process applied complies with the procedural system established by the company in terms of flow down, customer specification retrieval (as applicable), inspection

identification, etc. and shall include as a minimum a review of the:

- a) Purchase Order*
- b) Drawing (if applicable)*
- c) Work Order*
- d) Process Specifications and Revision*
- e) Internal Procedures and Revision*
- f) Lot / Batch / Serial Number:*
- g) Applicable Procedures / Work Instructions*
- h) Travelers / Route Cards*
- i) Inspection Log*

Provide the following documentation for auditor review for each of the parts being tested during the compliance portion of the audit: Note:

Export Controlled materials shall not leave the supplier's facility.

a. Copy of supplier procedure or work instruction with evidence of customer approval if required.

b. Copy of the applicable shop traveler or work order.

c. If neither a or b above indicate the process and acceptance standard and their revision status, then the document that shows the link to this data shall also be reviewed.

9.1 Job Details

9.1.1 Customer:

9.1.2 Customer Part Number and Revision:

9.1.3 Part Description:

9.1.4 Identification or Serialization:

9.1.5 Part Program Name:

9.1.6 Part Program Version:

9.1.7 Internal Part Number (if different to Customer):

9.1.8 Work / Job Order Number:

9.1.9 Select whether the Supplier indicated that the part audited was Export Controlled (ITAR/EAR):

Yes, Export Controlled ☐

Did not indicate Export Controlled ☐

9.1.10 Process - CMM / Laser Tracker / Articulated Arm / Airflow:

9.1.11 Subscriber / End User:

9.1.12 Specification and Rev:

9.1.13 Operator:

9.1.14 Equipment / Tool ID:

9.1.15 In-process vs "paper" Archive Job Review:

9.2 Calibration

9.2.1 Is measurement equipment used for inspection identified and have a valid calibration status? YES NO

Compliance Assessment Guidance: This would include all measurement equipment and supporting accessory and setting devices (where the measured result could be affected). The calibration status of the equipment shall be identified.

9.2.2 Is there a process addressing the verification checks of Coordinate Measurement System (CMS) operation and accuracy and is it being followed? YES NO NA

Compliance Assessment Guidance: The process may include periodic checks of master parts or a calibrated gauge, between formal scheduled calibrations, to ensure accuracy. Also check if the process includes the actions to be taken in the event that verification checks were found not to meet the requirements. NA applies where CMS equipment is not used on the job being audited.

9.3 Asset Care

9.3.1 Is there an asset care process in place for the inspection equipment used on the job? YES NO

Compliance Assessment Guidance: Asset care refers to preventive maintenance, proper storage, proper utilities, etc. It is expected that the equipment will be in good order to ensure accuracy is maintained. Evidence may include gauge storage, preventative measures to stop damage, and visual conformance checks before each use.

9.4 Environment

9.4.1 Are the environmental conditions suitable for the inspection being performed? YES NO

Compliance Assessment Guidance: This may include an assessment of temperature, humidity, lighting, etc. or a process of compensation. It is also feasible that the evaluation of part requirements has arrived at "no action is required" where the environmental factors will not affect the measurement values obtained at temperatures other than 20°C (68°F).

9.4.2 Is there evidence of the part temperature being monitored and/or managed? YES NO

Compliance Assessment Guidance: Evidence may include:

- *Part temperature is the same as the ambient temperature.*
- *Parts "soaked" to temperature for a pre-defined time.*
- *Parts have their temperature checked to verify they are at the correct temperature, prior to measurement.*
- *A statement that the effects of temperature on the part have been deemed negligible, and compensation is not required.*
- *The duration of soak time may depend on the size and density of the part and the temperature deviation between the component and ambient temperature of the measurement area.*

9.4.3 Is there evidence to substantiate the effectiveness of the compensation method, when temperature compensations are used? YES NO NA

Compliance Assessment Guidance: Compensation methods vary widely from manual calculation to in-built CMS part and machine compensation algorithms. It is important to verify these methods are effective, usually through trials where the part is measured in a tightly controlled environment and the results are compared with the compensated results. NA applies only when compensation methods are not applied.

9.5 Inspection Planning

9.5.1 Is the method of inspection included in the manufacturing documentation? YES NO

Compliance Assessment Guidance: This may be via an inspection plan, router or other document which defines the inspection method.

9.5.2	Does the manufacturing documentation address the sequencing of the inspection in the manufacturing process?	YES	NO	
	<i>Compliance Assessment Guidance: This may be via an inspection plan, router or other document which defines at which stage in the process each feature is verified.</i>			
9.5.3	Are all required features inspected as planned?	YES	NO	
	<i>Compliance Assessment Guidance: Look for evidence that features were inspected as planned.</i>			
9.5.4	If sampling or reduced inspection is used, is the rate or frequency of inspection defined?	YES	NO	NA
	<i>Compliance Assessment Guidance: NA only applies if 100% inspection is used.</i>			
9.5.5	When required is sampling or reduced inspection approved?	YES	NO	NA
	<i>Compliance Assessment Guidance: NA only applies when approval is not required or sampling or reduced inspection is not used. Approval may be from the customer or flowed down contractually through industry standards.</i>			
9.5.6	Does the inspection establish the datum systems per drawing requirements?	YES	NO	NA
	<i>Compliance Assessment Guidance: For example ASME Y14.5, BS308, BS8888, 6 degrees of freedom, etc. NA applies only when a datum system is not required.</i>			
9.5.7	Does the inspection address requirements for restraining the part during measurement?	YES	NO	NA
	<i>Compliance Assessment Guidance: For example pounds per square foot, torque, etc. NA applies only if restraining the part is not required by the customer or the M&I process does not require the part to be restrained in order to successfully measure it.</i>			
9.6	Measurement Setup			
9.6.1	Is there a process that ensures all previous operations are completed as required and the part adequately prepared for inspection, and is it being followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: Examples may include cleaning, deburring, etc., prior to inspection. The auditor is expected to view components at the point of inspection and visibly assess for cleanliness and excess material that may affect the inspection reading.</i>			

9.6.2	For measurement systems that require specific setup configurations, is the set up documented?	YES	NO	NA
	<i>Compliance Assessment Guidance: For example an inspection may require specific fixtures and equipment, therefore a revision managed illustration, photo, and setup procedure or similar should be in place to ensure consistent setups are applied. NA only applies where no specific setup configurations are required.</i>			
9.6.3	Is there evidence that the fixtures are appropriately identified in the inspection process and where necessary verified and serviced?	YES	NO	NA
	<i>Compliance Assessment Guidance: Verified refers to checking the state of the fixture to ensure it works as intended. This may include calibration where fixtures will affect part measurement. NA only applies where no fixtures or work holding devices are required.</i>			
9.6.4	Is there evidence of compliance with clamping requirements?	YES	NO	NA
	<i>Compliance Assessment Guidance: Requirements may state "inspect in clamped condition" or "inspect in free state". Where "free state" is required, fixtures can be used which do not deform the part or influence the measurement only. NA only applies when there are no requirements for clamping.</i>			
9.6.5	Is the inspection equipment being used within its operational parameters?	YES	NO	
	<i>Compliance Assessment Guidance: This might include maximum weight, part size, force, torque, etc.</i>			
9.6.6	Where the inspection process uses measurement styli, is there a process to ensure they are qualified prior to use, and is it being followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: It is acceptable to control the frequency of stylus qualification rather than qualify each tip before use. The stylus qualification, frequency, and methodology can be documented or controlled and recorded. Other equipment may not require this level of qualification. NA only applies where no equipment using styli or probe tips is used.</i>			
9.6.6.1	Are styli qualification devices properly maintained and in good condition?	YES	NO	NA
	<i>Compliance Assessment Guidance: The qualification device is used to set the size / position of the measurement styli. The size, form, condition of the qualification device will therefore affect part measurement results. NA only applies where no equipment using styli or probe tips is used, or where the styli do not require qualification such as height gage, or dial test indicator.</i>			

9.7	Conduct Inspection			
9.7.1	Are all applicable documents, records, procedures, and instructions available to the inspector?	YES	NO	
	<i>Compliance Assessment Guidance: The inspector shall have access to all information required for inspection, at the correct revision levels.</i>			
9.7.2	If using programmable inspection devices, is there a process to ensure the appropriate program been selected, and is it being followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: There shall be a process to ensure the appropriate inspection program is loaded (under configuration control). NA applies when there is not an inspection program.</i>			
9.7.3	When required by the customer, is the inspection and measurement equipment used for final inspection independent to those used for product measurement during production activities?	YES	NO	NA
	<i>Compliance Assessment Guidance: Where final inspection and production inspection takes place, the use of the same equipment can pose a risk of undetected measurement error. There shall be a process to ensure that where the same measurement equipment is used by manufacturing and final inspect, a confirmation measurement on a known item is taken to ensure correctness of the measured result.</i>			
	<i>NA applies where not required by the customer.</i>			
9.7.4	Is there evidence the inspection method used is capable to perform the required inspection?	YES	NO	
	<i>Compliance Assessment Guidance: There shall be evidence that the measurement system capability has been proven fit for purpose. Examples could be AIAG Guide to Measurement System Analysis (MSA), ISO14253-2, AS13003, customer defined processes such as Gauge Repeatability and Reproducibility (R&R), attribute agreement analysis, or a method of proving the equipment is fit for purpose, etc.</i>			
9.8	Inspection Results and Reporting			
9.8.1	If anomalous inspection results are discarded / changed, is there a process that addresses pass/fail inspections?	YES	NO	NA
	<i>Compliance Assessment Guidance: The process shall address the approach for assessing the inspection result and any subsequent actions. NA only applies when results are not discarded / changed.</i>			

9.8.2	Are the inspection reports completed as required?	YES	NO	
	<i>Compliance Assessment Guidance: All reports shall be completed and dated by the organization performing the analysis. All records must be legible and understandable (not ambiguous in any manner). Inspection reports may not be a stand-alone document and the use of stamps is acceptable.</i>			
9.8.3	When required, do inspection records show actual measurement results / values?	YES	NO	NA
	<i>Compliance Assessment Guidance: The actual measured value shall be recorded as opposed to a pass or fail disposition. NA only applies if measured values are not required by the customer</i>			
9.8.4	Are inspection results traceable to the part(s) inspected, as required by the customer or industry standard?	YES	NO	
	<i>Compliance Assessment Guidance: The inspection results shall be traceable to the parts or batch via a unique identification.</i>			
9.8.5	Are inspection results traceable to the inspector?	YES	NO	
	<i>Compliance Assessment Guidance: This may be through the use of stamps, signatures, password protection, etc.</i>			
9.8.6	Is there a process that addresses the required number of decimal places needed for measurements, and is it being followed?*	YES	NO	
	<i>Compliance Assessment Guidance: For example digital devices have a configurable number of decimal places for the output which can be used to influence the inspection results if applied inappropriately.</i>			
9.8.7	Is there a process that addresses the use of rounding measurement results, and is it being followed?*	YES	NO	
	<i>Compliance Assessment Guidance: The process for rounding of results should be viewed at the point of inspection / recording to ensure the correct methodology is being applied.</i>			
9.8.8	If units of measurements are converted, is the conversion authorized?	YES	NO	NA
	<i>Compliance Assessment Guidance: NA only applies if conversions are not used. Authorization could be via the customer or internally through a recognized process.</i>			

9.9	Software and Programs	SECTION NA		
NA only applies when:				
•Programmable software is not used				
Or				
•All programmable software being used is addressed in another Nadcap M&I Slash Sheet as part of this accreditation audit or the Nadcap M&I Technology Slash Sheets are used as part of this accreditation audit				
9.9.1	Are software changes appropriately validated? Compliance Assessment Guidance: Part inspection programs shall not be transferred between drive software / firmware versions without further validation.	YES	NO	
9.9.2	Is there evidence of control for the inspection part program being used? Compliance Assessment Guidance: This shall include: • Program Identification • Archival and Legacy • Program security, prevention from unauthorized modification • Backup and Disaster Recovery • Document library or storage and access to part programs	YES	NO	
9.9.3	Is there a part program inspection methodology and is it being followed? Compliance Assessment Guidance: This describes the method of measurement and acceptance criteria. It is expected that automated measurement equipment shall have a suitable measurement point density, and programming technique for the feature size, tolerance, etc.	YES	NO	NA
9.9.4	Is the coordinate measurement system established per engineering / customer requirements and is it being followed? Compliance Assessment Guidance: NA only applies if a coordinate method is not used.	YES	NO	NA

Measurement Systems Analysis		SECTION NA		
Section NA applies where Measurement Systems Analysis is not required by the customer				
9.10.1	Can the supplier demonstrate evidence that the measurement systems have been proven fit for purpose?	YES	NO	
Compliance Assessment Guidance: Examples could be AIAG Guide to Measurement System Analysis (MSA), AS13003, ISO14253-2, customer defined processes such as Gauge Repeatability and Reproducibility (R&R), attribute agreement analysis, etc.				
9.10.2	Did the measurement system study include a representative range of tolerances and features?	YES	NO	
Compliance Assessment Guidance: An MSA study should be representative of the feature being measured. While acceptable to read MSA results across, there should be acknowledgment that the study was similar. A generic study of equipment's capability is acceptable if based on statistical data				
9.10.3	Were the individuals in the activity representative of those using the measurement systems on a day-to-day basis?	YES	NO	
Compliance Assessment Guidance: Individuals used in the study shall be representative of the measurement system users.				
9.10.4	Were studies applied to the defined key characteristics?	YES	NO	NA
Compliance Assessment Guidance: This applies to key characteristics identified by the customer. NA only applies if no key characteristics are identified.				
9.10.5	Where the measurement system study did not meet the requirements, was customer acceptance granted?	YES	NO	NA
Compliance Assessment Guidance: Some customers have specific acceptance limits for MSA studies. Where a study indicates the equipment did not reach these acceptance levels was authority sought to continue the equipment's use. NA only applies if no results were found to not meet acceptance requirements.				
9.11	Competence and Training			
Compliance Assessment Guidance: For other aspects relating to competency, refer to AC7130.				
9.11.1	Are records available for review to demonstrate competency of the person to perform the assigned task?*	YES	NO	NA
Compliance Assessment Guidance:				

- *Training can be accomplished by classroom training, OEM training and/or On the Job Training (OJT).*
- *This may include a skills matrix to identify training requirements.*

9.12	Part Marking Inspection	SECTION NA		
	<i>Process control of part marking is not in scope. NA applies when part marking is not required.</i>			
9.12.1	Are planned inspections and tests in place that check part marking including accuracy?	YES	NO	
	<i>Compliance Assessment Guidance: This shall be a check to ensure that part marking conforms to the required specification, for example position, type, typographical error and format.</i>			
9.12.2	Is the legibility of the part marking tested?	YES	NO	NA
	<i>Compliance Assessment Guidance: There should be a check in place to verify the legibility of part marking. This may include visual inspection or a test of machine readable codes.</i>			
9.12.3	Is there a process in place that confirm that the correct part is being part marked and is it being followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: There needs to be a process to ensure the correct parts are marked with the correct identification; this may be achieved by verification or poke yoke to prevent parts being mixed up. NA applies where similar parts are not made.</i>			
10.	JOB AUDIT 2			
	<i>This section is to be completed to record the part witnessed at the time of the audit to verify compliance to the checklist questions identified here on.</i>			

Compliance Assessment Guidance: The supplier shall perform representative inspections from current production to determine compliance with these requirements. These parts shall be selected to represent a variety of Nadcap participating customer requirements and different equipment if more than one measurement equipment item is in use at this facility. Selection of the job audits shall also be representative of usual business at the supplier facility and should be selected by the auditor and should not represent parts reviewed in previous audits. Investigate the purchase order specifications to identify any customer unique acceptance, or procedure requirements applicable to these parts. Witness the facility's ability to perform inspection of these parts in accordance with the requirements. Specifications identified for processing and acceptance that are utilized during each compliance job review, should be verified as to revision by reviewing and interviewing the Document Control personnel to verify their ability to obtain the correct specifications, and to verify that the document Control System currently houses the most recent applicable specifications. If no production parts or tooling are available, demos can be done utilizing production equipment, artifacts or something representative of supplier work to demonstrate the process. In conjunction with the demo work, an additional historical record (archive job, no more than 12 months old) shall be reviewed for 1 customer job to review flow-down. It is expected that the auditor shall review and follow traceability from the purchase order to completion of the measurement process or final certification by reviewing as a minimum the items listed below. The length of each compliance job shall be adequate to allow the auditor to verify that the process applied complies with the procedural system established by the company in terms of flow down, customer specification retrieval (as applicable), inspection identification, etc. and shall include as a minimum a review of the:

- a) Purchase Order*
- b) Drawing (if applicable)*
- c) Work Order*
- d) Process Specifications and Revision*
- e) Internal Procedures and Revision*
- f) Lot / Batch / Serial Number:*
- g) Applicable Procedures / Work Instructions*
- h) Travelers / Route Cards*
- i) Inspection Log*

Provide the following documentation for auditor review for each of the parts being tested during the compliance portion of the audit: Note: Export Controlled materials shall not leave the supplier's facility.

- a. Copy of supplier procedure or work instruction with evidence of customer approval if required.*
- b. Copy of the applicable shop traveler or work order.*
- c. If neither a or b above indicate the process and acceptance standard and their revision status, then the document that shows the link to this data shall also be reviewed.*

10.1.1	Customer:	
10.1.2	Customer Part Number and Revision:	
10.1.3	Part Description:	
10.1.4	Identification or Serialization:	
10.1.5	Part Program Name:	
10.1.6	Part Program Version:	
10.1.7	Internal Part Number (if different to Customer):	
10.1.8	Work / Job Order Number:	
10.1.9	Select whether the Supplier indicated that the part audited was Export Controlled (ITAR/EAR):	
	Yes, Export Controlled	☐
	Did not indicate Export Controlled	☐
10.1.10	Process - CMM / Laser Tracker / Articulated Arm / Airflow:	
10.1.11	Subscriber / End User:	
10.1.12	Specification and Rev:	

10.1.13	Operator:			
10.1.14	Equipment / Tool ID:			
10.1.15	In-process vs "paper" Archive Job Review:			
10.2	Calibration			
10.2.1	Is measurement equipment used for inspection identified and have a valid calibration status?	YES	NO	
	<i>Compliance Assessment Guidance: This would include all measurement equipment and supporting accessory and setting devices (where the measured result could be affected). The calibration status of the equipment shall be identified.</i>			
10.2.2	Is there a process addressing the verification checks of Coordinate Measurement System (CMS) operation and accuracy and is it being followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: The process may include periodic checks of master parts or calibrated gauge between formal calibration schedules to ensure accuracy. NA applies where CMS equipment is not used on the job inspection. Also check if there is a process that identifies the actions to be taken in the event that verification checks were found not to meet the requirements and if it is being followed.</i>			
10.3	Asset Care			
10.3.1	Is there an asset care process in place for the inspection equipment used on the job?	YES	NO	
	<i>Compliance Assessment Guidance: Asset care refers to preventive maintenance, proper storage, proper utilities, etc. It is expected that the equipment will be in good order to ensure accuracy is maintained. Evidence may include gauge storage, preventative measures to stop damage, and visual conformance checks before each use.</i>			
10.4	Environment			

10.4.1	Are the environmental conditions suitable for the inspection being performed?	YES	NO	
	<i>Compliance Assessment Guidance: This may include an assessment of temperature, humidity, lighting, etc. or a process of compensation. It is also feasible that the evaluation of part requirements has arrived at "no action is required" where the environmental factors will not affect the measurement values obtained at temperatures other than 20°C (68°F).</i>			
10.4.2	Is there evidence of the part temperature being monitored and/or managed?	YES	NO	
	<i>Compliance Assessment Guidance: Evidence may include:</i>			
	• Part temperature is the same as the ambient temperature. • Parts "soaked" to temperature for a pre-defined time. • Parts have their temperature checked to verify they are at the correct temperature, prior to measurement. • A statement that the effects of temperature on the part have been deemed negligible, and compensation is not required. • The duration of soak time may depend on the size and density of the part and the temperature deviation between the component and ambient temperature of the measurement area.			
10.4.3	Is there evidence to substantiate the effectiveness of the compensation method, when temperature compensations are used?	YES	NO	NA
	<i>Compliance Assessment Guidance: Compensation methods vary widely from manual calculation to in-built CMS part and machine compensation algorithms. It is important to verify these methods are effective, usually through trials where the part is measured in a tightly controlled environment and the results are compared with the compensated results. NA applies only when compensation methods are not applied.</i>			
10.5	Inspection Planning			
10.5.1	Is the method of inspection included in the manufacturing documentation?	YES	NO	
	<i>Compliance Assessment Guidance: This may be via an inspection plan, router or other document which defines the inspection method.</i>			

10.5.2	Does the manufacturing documentation address the sequencing of the inspection in the manufacturing process?	YES	NO	
	<i>Compliance Assessment Guidance: This may be via an inspection plan, router or other document which defines at which stage in the process each feature is verified.</i>			
10.5.3	Are all required features inspected as planned?	YES	NO	NA
	<i>Compliance Assessment Guidance: Look for evidence that features were inspected as planned.</i>			
10.5.4	If sampling or reduced inspection is used, is the rate or frequency of inspection defined?	YES	NO	NA
	<i>Compliance Assessment Guidance: NA only applies if 100% inspection is used.</i>			
10.5.5	When required is sampling or reduced inspection approved?	YES	NO	NA
	<i>Compliance Assessment Guidance: NA only applies when approval is not required or sampling or reduced inspection is not used. Approval may be from the customer or flowed down contractually through industry standards.</i>			
10.5.6	Does the inspection establish the datum systems per drawing requirements?	YES	NO	NA
	<i>Compliance Assessment Guidance: For example ASME Y14.5, BS308, BS8888, 6 degrees of freedom, etc. NA applies only when a datum system is not required.</i>			
10.5.7	Does the inspection address requirements for restraining the part during measurement?	YES	NO	NA
	<i>Compliance Assessment Guidance: For example pounds per square foot, torque, etc. NA applies only if restraining the part is not required by the customer or the M&I process does not require the part to be restrained in order to successfully measure it.</i>			
10.6	Measurement Setup			
10.6.1	Is there a process that ensures all previous operations are completed as required and the part adequately prepared for inspection, and is it being followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: Examples may include cleaning, deburring, etc., prior to inspection. The auditor is expected to view components at the point of inspection and visibly assess for cleanliness and excess material that may affect the inspection reading.</i>			

10.6.2	For measurement systems that require specific setup configurations, is the set up documented?	YES	NO	NA
	<i>Compliance Assessment Guidance: For example an inspection may require specific fixtures and equipment, therefore a revision managed illustration, photo, and setup procedure or similar should be in place to ensure consistent setups are applied. NA only applies where no specific setup configurations are required.</i>			
10.6.3	Is there evidence that the fixtures are appropriately identified in the inspection process and where necessary verified and serviced?	YES	NO	NA
	<i>Compliance Assessment Guidance: Verified refers to checking the state of the fixture to ensure it works as intended. This may include calibration where fixtures will affect part measurement. NA only applies where no fixtures or work holding devices are required.</i>			
10.6.4	Is there evidence of compliance with clamping requirements?	YES	NO	NA
	<i>Compliance Assessment Guidance: Requirements may dictate "inspect in clamped condition" or "inspect in free state". Where "free state" is required, fixtures can be used which do not deform the part or influence the measurement only. NA only applies when there are no requirements for clamping.</i>			
10.6.5	Is the inspection equipment being used within its operational parameters?	YES	NO	
	<i>Compliance Assessment Guidance: This might include maximum weight, part size, force, torque, etc.</i>			
10.6.6	Where the inspection process uses measurement styli, is there a process to ensure they are qualified prior to use, and is their evidence the process is followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: It is acceptable to control the frequency of stylus qualification rather than qualify each tip before use. The stylus qualification, frequency, and methodology can be documented or controlled and recorded. Other equipment may not require this level of qualification. NA only applies where no equipment using styli or probe tips is used.</i>			
10.6.6.1	Are styli qualification devices properly maintained and in good condition?	YES	NO	NA
	<i>Compliance Assessment Guidance: The qualification device is used to set the size / position of the measurement styli. The size, form, condition of the qualification device will therefore affect the accuracy part measurement results. NA only applies where no equipment using styli or probe tips is used, or where the styli do not require qualification such as height gage, or dial test indicator.</i>			

10.7	Conduct Inspection			
10.7.1	Are all applicable documents, records, procedures, and instructions available to the inspector?	YES	NO	
	<i>Compliance Assessment Guidance: The inspector shall have access to all information required for inspection, at the correct revision levels.</i>			
10.7.2	If using programmable inspection devices, is there a process to ensure the appropriate program been selected, and is it being followed?	YES	NO	NA
	<i>Compliance Assessment Guidance: There shall be a process to ensure the correct inspection program is loaded (under configuration control). NA applies when there is not an inspection program.</i>			
10.7.3	When required by the customer, is the inspection and measurement equipment used for final inspection independent to those used for product measurement during production activities?	YES	NO	NA
	<i>Compliance Assessment Guidance: Where final inspection and production inspection takes place, the use of the same equipment can pose a risk of undetected measurement error. There shall be a process to ensure that where the same measurement equipment is used in manufacture and final inspect, a confirmation measurement on a known item is taken to ensure correctness of the measured result.</i>			
	<i>NA applies where not required by the customer.</i>			
10.7.4	Is there evidence the inspection method used is capable to perform the required inspection?	YES	NO	
	<i>Compliance Assessment Guidance: There shall be evidence that the measurement system capability has been proven fit for purpose. Examples could be AIAG Guide to Measurement System Analysis (MSA), ISO14253-2, AS13003, customer defined processes such as Gauge Repeatability and Reproducibility (R&R), attribute agreement analysis, or a method of proving the equipment is fit for purpose, etc.</i>			
10.8	Inspection Results and Reporting			
10.8.1	If anomalous inspection results are discarded / changed, is there a process that addresses pass/fail inspections?	YES	NO	NA
	<i>Compliance Assessment Guidance: The process shall address the approach for assessing the inspection result and any subsequent actions. NA applies when results are not discarded / changed.</i>			

10.8.2	Are the inspection reports completed as required?	YES	NO	
	<i>Compliance Assessment Guidance: All reports shall be completed and dated by the organization performing the analysis. All records must be legible and understandable (not ambiguous in any manner). Inspection reports may not be a stand-alone document and the use of stamps is acceptable.</i>			
10.8.3	When required, do inspection records show actual measurement results / values?	YES	NO	NA
	<i>Compliance Assessment Guidance: The actual measured value shall be recorded as opposed to a pass or fail disposition. NA only applies if measured values are not required by the customer.</i>			
10.8.4	Are inspection results traceable to the part(s) inspected, as required by the customer or industry standard?	YES	NO	
	<i>Compliance Assessment Guidance: The inspection results shall be traceable to the parts or batch via a unique identification.</i>			
10.8.5	Are inspection results traceable to the inspector?	YES	NO	
	<i>Compliance Assessment Guidance: This may be through the use of stamps, signatures, password protection, etc.</i>			
10.8.6	Is there a process that addresses the required number of decimal places needed for measurements, and is it being followed?*	YES	NO	
	<i>Compliance Assessment Guidance: For example digital devices have a configurable number of decimal places for the output which can be used to influence the inspection results if applied inappropriately.</i>			
10.8.7	Is there a process that addresses the use of rounding measurement results, and is it being followed?*	YES	NO	
	<i>Compliance Assessment Guidance: The process for rounding of results should be viewed at the point of inspection / recording to ensure the correct methodology is being applied.</i>			
10.8.8	If units of measurements are converted, is the conversion authorized?	YES	NO	NA
	<i>Compliance Assessment Guidance: NA only applies if conversions are not used. Authorization could be via the customer or internally through a recognized process.</i>			

10.9	Software and Programs	SECTION NA		
NA only applies when:				
Programmable software is not used				
Or				
All programmable software being used is addressed in another Nadcap M&I Slash Sheet as part of this accreditation audit or the Nadcap M&I Technology Slash Sheets are used as part of this accreditation audit				
10.9.1	Are software changes appropriately validated? <i>Compliance Assessment Guidance: Part inspection programs shall not be transferred between drive software / firmware versions without further validation.</i>	YES	NO	
10.9.2	Is there evidence of control for the inspection part program being used? <i>Compliance Assessment Guidance: This shall include:</i> - Program Identification - Archival and Legacy - Program security, prevention from unauthorized modification - Backup and Disaster Recovery - Document library or storage and access to part programs	YES	NO	
10.9.3	Is there a part program inspection methodology and is it being followed? <i>Compliance Assessment Guidance: This describes the method of measurement and acceptance criteria. It is expected that automated measurement equipment shall have a suitable measurement point density, and programming technique for the feature size, tolerance, etc.</i>	YES	NO	NA
10.9.4	Is the coordinate measurement systems established per engineering / customer requirements and is it being followed? <i>Compliance Assessment Guidance: CMMs will always measure from an established datum system. It is expected that this datum will be described on the part definition or will be in line with the datums used as part of the FAI. For example ASME Y14.5 Section 4.2</i>	YES	NO	NA

Immobilization of part, Section 4.2.1 Application. Section 4.5 Establishing datums. Best Fit has very limited use in production part measurements and is typically used in tooling application only. When Best Fits is used to establish reference frame for a production part typical Best Fit tolerance is reduced compared to the engineering tolerance and shall require customer approval. NA only applies if a coordinate method is not used.

10.10 Measurement Systems Analysis SECTION NA

Section NA applies where Measurement Systems Analysis is not required by the customer

10.10.1 Can the supplier demonstrate evidence that the measurement systems have been proven fit for purpose? YES NO

Compliance Assessment Guidance: Examples could be AIAG Guide to Measurement System Analysis (MSA), AS13003, ISO14253-2, customer defined processes such as Gauge Repeatability and Reproducibility (R&R), attribute agreement analysis, etc.

10.10.2 Did the measurement system study include a representative range of tolerances and features? YES NO

Compliance Assessment Guidance: An MSA study should be representative of the feature being measured. While acceptable to read MSA results across, there should be acknowledgment that the study was similar. A generic study of equipment's capability is acceptable if based on statistical data

10.10.3 Were the individuals in the activity representative of those using the measurement systems on a day-to-day basis? YES NO

Compliance Assessment Guidance: Individuals used in the study shall be representative of the measurement system users.

10.10.4 Were studies applied to the defined key characteristics? YES NO NA

Compliance Assessment Guidance: This applies to key characteristics identified by the customer. NA only applies if no key characteristics are identified.

10.10.5 Where the measurement system study did not meet the requirements, was customer acceptance granted? YES NO NA

Compliance Assessment Guidance: Some customers have specific acceptance limits for MSA studies. Where a study indicates the equipment did not reach these acceptance levels was authority sought to continue the equipment's use. NA only applies if no results were found to not meet acceptance requirements.

10.11 Competence and Training

Compliance Assessment Guidance: For other aspects relating to competency, refer to AC7130.

10.11.1	Are records available for review to demonstrate competency of the person to perform the assigned task?*	YES	NO	NA
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Compliance Assessment Guidance:

- *Training can be accomplished by classroom training, OEM training and/or On the Job Training (OJT).*
- *This may include a skills matrix to identify training requirements.*

10.12 Part Marking Inspection

SECTION NA

Process control of part marking is not in scope. NA applies when part marking inspection is not required

10.12.1	Are planned inspections and tests in place that check part marking including accuracy?	YES	NO
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Compliance Assessment Guidance: This shall be a check to ensure that part marking conforms to the required specification, for example position, type, typographical error and format.

10.12.2	Is the legibility of the part marking tested?	YES	NO	NA
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Compliance Assessment Guidance: There should be a check in place to verify the legibility of part marking. This may include visual inspection or a test of machine readable codes.

10.12.3	Is there a process to confirm that the correct part is being part marked and is it being followed?	YES	NO	NA
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Compliance Assessment Guidance: There needs to be a process to ensure the correct parts are marked with the correct identification; this may be achieved by verification or poke yoke to prevent parts being mixed up. NA applies where similar parts are not made.