



161 Thorn Hill Road  
Warrendale, PA 15086-7527

## AUDIT CRITERIA

### AC 7108 REV. E

Issued 1995-01

Revised 2011-10

Superseding AC7108 Rev D

**TO BE USED ON AUDITS AFTER MARCH 4, 2012**

Nadcap  
AUDIT CRITERIA FOR  
CHEMICAL PROCESSING

## 1. QUALITY SYSTEM APPROVAL AND OTHER GENERAL REQUIREMENTS

- 1.1 Companies seeking accreditation for processing to AC7108 and its related slash sheets (AC7108/x) must be accredited to an acceptable quality system by an acceptable registration body - see Nadcap operating procedure NOP-002.
- 1.2 Companies carrying out analysis and testing in support of processes to AC7108 must be accredited to AC7108 for the scope of analysis and testing carried out. Should a processor use a sub-contract laboratory for some or all of the analysis and testing in support of their AC7108 accreditation that subcontract laboratory must be Nadcap accredited for AC 7101 (MTL), accredited by a registration body recognized by MTL, accredited by CP to AC7108/4 or AC7108 for the scope of analysis and testing performed, or approved by Prime customer(s) for laboratory analysis (see AC7108 Para 3.5.2). Manufacturers that provide solution analysis and process control testing for their proprietary solutions may be exempt from this requirement provided the following criteria are met: they are the original manufacturer [not a distributor]; testing is provided as a service with the supply of the solution; they have an in house laboratory and evidence that a quality management system accreditation (Example: AS/EN/JIS Q 9100, ISO 9001) is held.

## 2. INSTRUCTIONS TO SUPPLIER TO BE AUDITED

### 2.1 Prior to the Audit

#### 2.1.1 Self-Audit

The supplier must complete a self-audit to AC 7108 and related slash sheets, AC 7004, , AS/EN/JISQ 9100 or AS/EN/JISQ 9110 (as applicable) in preparation for this audit. Performing a thorough, objective self-audit against each question in the checklist is the critical first step in the Nadcap accreditation process. This can significantly reduce the number of non-conformances issued by the auditor and the time required to achieve accreditation. All non-conformances should be corrected prior to the actual audit. Non-conformances of a technical nature found during the actual audit will, at the Task Group's discretion, require a follow-up audit at the supplier's expense. **NOTE: The location and**

PRI operating procedures provide that "This report is published by PRI to advance the state of technical, engineering, and quality sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising there from, is the sole responsibility of the user."

PRI values your input. To provide feedback on this document, please contact the appropriate commodity staff engineer.

(Contact information is located at <http://www.eauditnet.com> under "Contact Us".)

Copyright 2011 Performance Review Institute. All rights reserved.

t-frm-15

5-Aug-11

**identification of all applicable documentation must be indicated on the self-audit form. This will greatly expedite the audit and avoid the expense of additional audit days.**

#### 2.1.2 Auditor Review

Retain a copy of the self-audit on site for review by the Nadcap auditor when requested.

#### 2.1.3 Required Audit Information:

The information in questions 2.1.3.1 through 2.1.3.5 must be provided to the auditor, in English unless another language is acceptable to the auditor, at least 30 days prior to the scheduled audit:

NOTE: No ITAR/EAR restricted materials are to be submitted.

##### 2.1.3.1 Original Self-Audit

The self-audit complete with procedure titles/procedure numbers for all documentation.

##### 2.1.3.2 Travelers/Route Cards.

One sample traveler/route card for a process performed.

##### 2.1.3.3 List of Prime Customers and prime processing specifications in the scope of the audit.

##### 2.1.3.4 List of Supplier's Procedures

List of supplier's procedures (index/table of contents only) for processing, testing, inspection, etc.

##### 2.1.3.5 Organization Chart

Organization Chart

#### 2.1.4 List of items that need to be presented to the auditor on arrival:

- Quality Control Manual.
- List of purchased services
- Schedule of calibrations, TUS, SAT, solution analysis etc.
- List of Quality personnel by process.
- List of trained personnel by process.

## 2.2 During the Audit

#### 2.2.1 In-briefing

The supplier should provide for an in-briefing for the auditor and arrangements for a brief plant tour prior to the start of the audit. Key members of the applicant's staff should attend the in-briefing so the audit purpose, methods and assessment processes can be discussed.

#### 2.2.2 Working Space

Working space for the auditor with desks or tables, chairs, telephone, etc. Clerical, typing and reproduction services are to be provided as required. This is not a full time assignment.

#### 2.2.3 Out-Briefing

A final out-briefing will be conducted at the completion of the audit. Each nonconformance report (NCR) will be reviewed and the supplier will be given the opportunity to discuss proposed corrective action or to provide any additional information. A copy of the NCR(s) will be provided to the supplier. NCR's deemed a non-conformance (e.g., a nonconformance to a requirement) are numbered. NCR's that are judged by the auditor to be a nonconformance to recommended practice are observations and are lettered. NOTE: The Chemical Processing Task Group may, upon review, change the auditor's determination of non-conformance or observation.

#### 2.2.4 Submittal of Corrective Actions/Objective Evidence

The supplier shall have **21 calendar days** to submit corrective actions, effective dates for each NCR along with objective evidence of implementation. The response must address the root cause of the nonconformance from a systems management approach and the actions taken to preclude recurrence.

#### 2.2.5 Delinquency of Corrective Actions

Delinquency of corrective actions and/or responses may result in failure of the audit, see NOP-011.

If this is the first audit following a failed audit, verification of implementation of corrective actions for all non-conformances from the failed audit is required. Repeat non-conformances from the failed audit are to be counted as non-sustaining NCRs.

### 2.3 Review of the Audit Report

#### 2.3.1 Responsibility

Responsibility for meeting submittal deadlines rests with the supplier. Failure to comply with specified dates will result in significant delays in your accreditation and a reduction in the term of your accreditation.

A supplier representative should be available for questions during the final Task Group review to clarify issues (either on site or by telephone).

PRI Staff or the Task Group may, after review of your audit report, require additional information or may elect to issue additional non-conformances. NOTE: Final authority over the audit report, acceptability of corrective actions, and accreditation recommendation rests with the Task Group.

### 2.4 Definition of Terms (See ISO2080 for general terms and definitions associated with chemical processing)

**AMBIENT TEMPERATURE FOR PROCESS TANKS:** Unless otherwise specified by customer, specification or technical data sheet, ambient is the natural uncontrolled temperature at the location of the tank and need not be monitored or controlled

**AUTOMATIC PROCESS LINE:** A fully automatic process line is one in which all the variables of a chemical process sequence are maintained, controlled and recorded by an automated, e.g. computer, system. Variables include (but are not limited to) solution immersion times, solution temperatures, step sequencing, and current/voltage settings. An automated process line does not require operator intervention to validate or monitor any part of the processing operation. The operator may be required to initiate, sequence or queue the specified, pre-established and programmed handling equipment or process, but does not alter or adjust the process variables, with the exception of halting a sequence that is in failure mode (in response to an alarm, warning, etc).

**BATCH:** A quantity of parts of the same part number that are processed on the same route card/traveler.

**BUY-OFF:** A recorded declaration by a qualified/approved person, or their authorised designee/representative, that they have worked to the defined instructions and that any related records are true and accurate. The recorded declaration can take many forms (e.g. electronic

badge reader, stamp, signature) but must only trace back to a single individual. Where an authorised designee/representative is used to buy-off for other individuals then this shall be defined by internal procedures. If an inspection step is carried out by more than one person there must be a record of what each person has inspected but a single representative may buy-off the complete step per internal procedure requirements. To show the status of product or product-related materials, parts, processes, assemblies, tests, operations and documentation. When product or product-related materials, parts, processes, assemblies, tests, operations and documentation is completed the responsible individual can stamp or buy-off (also referred to as sign-off) the shop paper or documentation.

**CHEMICAL ETCHING FOR CLEANING:** The chemical removal of metal with the intent of removing surface contamination and oxide. AC7108/2 is not required for this.

**CHEMICAL ETCHING FOR NDT:** The process of controlled chemical removal with the intent of removing a small amount of material to open up surface cracks or to reveal a grain structure.

**CHEMICAL MILLING:** The process of controlled chemical removal of metal to achieve a final dimension.

**CONCESSION REQUESTS:** A request to the prime contractor that allows for the material to be outside engineering requirements.

**CONTAMINANT:** An unwanted constituent, to make impure by contact or admixture.

**CONTROL LIMITS:** Calculated operating limits resulting from statistical process control programs.

**CONTROL PLAN:** A formalized written plan that intends to control the product characteristics and the associated processing variables. The control plan assures that the good improvements established by your project will not deteriorate once the project is returned to manufacturing.

**CORROSION PIT:** For salt spray testing on aluminum panels, the most common type of corrosive attack is pitting -- a highly localized reaction to the salt spray environment resulting in cavities of variable size, shapes and depths. Corrosion pits commonly occur at surface scratches, breaks in protective coatings, and variations in surface compositions (for example, grain boundaries or nonmetallic inclusions) or finishes. After exposure, salt spray test panels should be rinsed and dried cautiously so that any corrosion by-products are not disturbed. Evaluation for corrosion pitting should be conducted as soon as possible after salt spray exposure because continued corrosion activity may occur within observed pits. Typical characteristics of a corrosion pit are, a rounded, elongated or irregular appearance when viewed normal to the test panel surface, a "comet tail" or line or "halo" (i.e., surface discoloration) that emanates from the pit cavity, some quantity of corrosion by-product inside or immediately around the pit (on aluminum test panels the by-product may be granular, powdery or amorphous, and white, grayish or black in color). To be considered a corrosion pit, an observed surface cavity must exhibit at least two of the above characteristics. Surface cavities that exhibit only one of these characteristics may require additional analysis before being classified as a corrosion pit. Visual inspection with 10X magnification is typical practice when corrosion by-products are not visible with the unaided eye. For example MIL-A-8625 also defines a corrosion pit as having depth greater than its width. Measurement of pit dimensions can be difficult since the extent of a pit is usually not fully revealed from the surface. For example some typical corrosion pit measurement methods are described in ASTM G 46.

DEIONIZED WATER: 50,000 ohm•cm resistivity minimum or <20 μS/cm. Examples could be water produced by reverse osmosis or resin transfer columns.

DISTILLED WATER: Water that has been produced by the distillation process. Where a process or test specification, within the scope of AC7108 accreditation, requires distilled water to be used, and does not provide any quantitative value of purity, the Chemical Process Task Group has agreed that water having a conductivity of 5μS/cm or less, e.g. ASTM D1193 Type IV, can be used unless otherwise directed by customer.

ENGINEERING REQUIREMENTS: Technical requirements identified in the purchase order, specifications or drawing.

FIRST PIECE: First time processing a specific part number.

FROZEN PROCESS: The shop paper/traveler/work instruction that is pre-approved by the main contractor and cannot be changed without re-approval or repair/MRB authority.

IN PROCESS: Parts have been accepted for processing and released to manufacturing but not yet accepted at final inspection or scrapped. (In process inspections are typically "visual" (water break, uniformity, coverage, etc.) "checks" to determine if parts should proceed to the next processing step.)

INVALID TEST: A test where it can be shown that the test piece was of an incorrect material, or it was processed incorrectly, or it was tested incorrectly.

JOB: All of the hardware processed to a single order control document as a lot or multiple lots with a unique control number.

LABORATORY WATER: For general analysis and testing use or when a specification within the scope of AC7108 accreditation, requires distilled water or de-ionized water to be used for testing or analysis but does not specifically define a purity the Chemical Process Task Group has agreed that water having a conductivity of 5μS/cm or less, e.g. ASTM D1193 Type IV, can be used unless a higher purity is appropriate for the analysis method.

LOT: Where not defined by specification or customer, shall be all parts of the same part number, material, size and shape, processed at the same time, using the same processing materials, under the same conditions in not more than 8 hours and presented for inspection at one time.

MATERIAL CONDITION: This can include the heat treatment condition, the hardness and the surface finish, e.g. shot peened. Depending on the substrate material and process being carried out some or all of these conditions may be required to be known.

MATERIAL REVIEW BOARD (MRB): Is authority granted by the prime contractor to allow sub-contractors to reprocess material under their authority that does not meet drawing requirements, using out of manufacturing sequence steps, to return the material back to drawing requirements. MRB authority may allow material to exceed drawing requirements.

OPERATOR CONTROLLED VARIABLES (OCV): Operator controlled variables (OCV) are process parameters that are directly under the control of the operator.

**POLICY:** A written company philosophy on how something should be done in very broad generic terms. The existence of a procedure shall satisfy the requirements for a policy.

**PROCEDURE:** A detailed "how to", step-by-step revision controlled document used to enforce or implement company policy.

**PROCESS PARAMETER:** A process parameter is any variable that can influence the process and as such may vary depending on the process in question. For process solutions, examples are: solution temperature, contact/immersion time, concentration of constituents. For painting, examples are: mixing time, induction time, pot life, drying time, oven cure time, humidity and temperature. For electrolytic processes examples are: current density/amperage, voltage and ramp rate. See Appendix D for a list of process parameters that must be recorded either by an automatic system or by the operator.

**REFEREE MAGNIFICATION:** A higher magnification than that required by the standard inspection procedure. A referee magnification is used to assess an indication when examination at the normal inspection identifies a suspect indication but is unable to establish whether it meets acceptance criteria.

**REPAIR -** Using approved processing to return material to a usable condition, even though it does not meet drawing requirements. Requires MRB/Customer approval.

**REPLACEMENT TEST:** A repeat test where the original test can be shown to be an invalid test. A replacement test may be done once without customer permission.

**RETEST:** A repeat test where the original test result is believed to be wrong but cannot be invalidated. A retest can only be done if permitted by specification or customer. Does not apply to solution analysis

**REWORK:** Using standard approved processing to return material to drawing requirements before the next processing step.

**SHOP PAPER/ TRAVELER:** The paperwork that controls and records the manufacturing process.

**SOLUTION CONTROL LIMIT:** Where a specification defines nominal solution chemistry but does not define operating ranges, and a commercially available solution is not used (see Technical Bulletin Limit), the processor shall define Solution Control Limits beyond which the solution should not be used. Product assessment is required if a Solution Control Limit is exceeded but customer notification is only required if product impact has been identified.

**SYSTEM ACCURACY TEST:** See definition in AMS2750

**TECHNICAL BULLETIN LIMITS:** The specification or manufacturer-set-limits beyond which the process must be shut down.

**TECHNOLOGY:** For the purpose of AC7108 technologies are defined as;

- Anodizing
- Conversion Coating.
- Chemical Milling
- Etching
- Electroplating

- Electropolishing
- Electroless Plating.
- Painting & Dry Film Lubricant.
- Surface preparation for metal bond.
- Vacuum Cadmium and Ion-Vapor Deposition of Aluminum.
- Cleaning and Descaling as standalone processes.
- Passivation

TEMPERATURE UNIFORMITY SURVEY (TUS): See definition in AMS2750.

TEST PIECE: A specific piece of material, or sample of parts, that is processed and assessed/tested to determine the performance or a characteristic of a process. Test pieces are not typically included in the delivered batch.

THERMAL TREATMENT: Any process within the scope of the AC7108 accreditation where the intent of the process is to provide heat to the part, e.g. de-embrittlement, paint curing, part drying.

TREND ANALYSIS: The concept of collecting information/data and attempting to spot a pattern or trend, in the information. A negative trend is when trend analysis predicts a diminishing effect to a process or parameter such as a specification limit being exceeded prior to the next test being conducted. This does not mean that the specification limit is exceeded, it means that it will be exceeded if no action is taken

VALIDATED TESTING FAILURE: Either the original test failed, the test could not be invalidated and a retest was not permitted or the retest, if permitted, or replacement test also failed.

**2.5 Audit Scope**

- FULL SCOPE (all questions completed)
- VCA or Follow-Up Audit
- MODIFIED SCOPE AUDIT (**NOTE: Modified Scope only applies to Nadcap Audits that have an AC7108 checklist in the scope**)

**2.6 Processes to be approved/Plant Layout:**  
Processes to be approved and plant layout.

Is a revision controlled document (drawing or detailed list) available which defines the specific location of each process line for which Nadcap Accreditation is sought? (e.g. Chrome Plating Line located in North End of Building 10).	YES NO
---	--------

\*\*\*Auditor, please attach an uncontrolled copy of the above drawing/list. \*\*\*

**COMPANY INFORMATION**

Company Name: \_\_\_\_\_ Survey Date: \_\_\_\_\_

Division: \_\_\_\_\_ Facility: \_\_\_\_\_

Address: \_\_\_\_\_ Phone \_\_\_\_\_

City/State/Zip: \_\_\_\_\_ Fax: \_\_\_\_\_

e-mail: \_\_\_\_\_

Nature of Business: \_\_\_\_\_

In-House Products Only:

Accepts Outside Work:

Total #of Employees: \_\_\_\_\_

No. of QA Personnel: \_\_\_\_\_

Square Feet of Work Area: \_\_\_\_\_

No. of Shifts Worked \_\_\_\_\_

Contacts: \_\_\_\_\_

Position: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**SCOPE OF SURVEY:**

Comments: \_\_\_\_\_

\_\_\_\_\_

**LIST OF PRIME CUSTOMERS:**

Prime Customers: \_\_\_\_\_

\_\_\_\_\_

**REASON FOR VISIT:**

Initial Audit

Reaccreditation Audit

VCA Audit

Follow Up Audit

Surveyor's Signature: \_\_\_\_\_

Date: \_\_\_\_\_



**3.0 GENERAL QUALITY SYSTEM**

- 3.0.1 Required Auditor Information:
  - 3.0.1.1 Key Supplier personnel associated with audit aside from the Supplier Audit Contact:  
<Comment Box>
  - 3.0.1.2 NCR's requiring special attention:  
<Comment Box>
  - 3.0.1.3 General impression of supplier:  
<Comment Box>
  - 3.0.1.4 Recommendation for accreditation: (Note: Where the supplier chooses NOP-011 Mode A, exceeds NOP-011 Mode B, or potentially meets NOP-011 Mode C then just comment "NA".  
<Comment Box>
  - 3.0.1.5 Obtain a copy of the supplier's quality system certificate to allow you to verify it on the audit checklist completion screen. If the supplier does not have a valid quality system certificate then please provide comment below. If the audit includes satellite sites then ensure all satellite sites are identified on the quality system certificate.  
<Comment Box>
- 3.0.2 Has the supplier performed an effective self audit per Para. 2.1.1? YES NO
- 3.0.3 Has the supplier's corrective action system ensured that corrective actions for all non-conformances identified in the previous Nadcap Chemical Process audit been fully and effectively implemented? YES NO NA  
*Compliance Assessment Guidance: NA applies if this is an Initial Audit or if there were no NCRs in the previous Chemical Process audit.*

**3.1 Process Integrity**

- 3.1.1 Continuous Process Improvement
  - 3.1.1.1 Has the supplier identified what chemical process data shall be collected and analysed in order to identify opportunities for improvement? YES NO
    - *Compliance Assessment Guidance: See AS9100 section 8.1 & 8.4. Such data may include inspection rejects, customer rejects/complaints, key characteristics and process capability data.*
  - 3.1.1.2 Is there evidence that the identified data is collected and analysed? YES NO
  - 3.1.1.3 If the data has shown an opportunity for improvement in the Chemical Process area is the process improvement in progress or has it been implemented? YES NO NA
    - *Compliance Assessment Guidance: NA applies if the analysis has shown the best opportunities are in non-chemical process areas.*

3.1.2	Sampling Plans	
3.1.2.1	Are inspection and test personnel trained in procedures and techniques for using sampling plans? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if sampling plans are not used.</i></li> </ul>	YES NO NA
3.1.2.2	If used, are supplier-developed sampling plans available for review and approved by the customer when required by contract? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if supplier developed sampling plans are not used.</i></li> </ul>	YES NO NA
3.2	Training, Qualification, and Evaluation of Planning, Processing, Inspection, and Testing Personnel. <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> <li><i>Processing personnel includes all personnel involved in processing the part including masking, blasting, demasking etc.</i></li> </ul>	Section NA
3.2.1	Has the competency for all personnel functions affecting conformity to chemical process requirements been defined, including processing personnel, testing/inspection personnel and planning personnel?	YES NO
3.2.2	For those functions identified in 3.2.1, do records show that training or other actions were taken to achieve the necessary competence?	YES NO
3.2.3	Is there evidence that the effectiveness of these actions was evaluated?	YES NO
3.2.4	Have operations/tasks that affect conformity to chemical process requirements (e.g. planning, processing, inspection) been carried out correctly?	YES NO
3.3	<b>Job Documentation</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	<b>Section NA</b>
3.3.1	Does shop paper/traveler, which accompanies each lot, contain as a minimum the following information:	
	a. Evidence of frozen process approval as required by the customer? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if frozen processes are not performed.</i></li> </ul>	YES NO NA
	b. Evidence of customer approval of any changes to the frozen process? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if frozen processes are not performed.</i></li> <li><i>Non-technical changes are permitted without customer approval.</i></li> </ul>	YES NO NA
	c. Relevant purchase order number, purchase order requirements OR identification which is traceable to engineering requirements?	YES NO

- *Compliance Assessment Guidance: The shop paper does not have to reference the PO or contract number, but must have traceability to it.*
  
- d. Part identification, number of parts (ensuring traceability), and when required material and/or material condition? YES NO
  - *Compliance Assessment Guidance: The material and/or material condition are required on the traveler unless one of the following applies: it does not influence the process steps/sequence; when the customer specifies the process steps, e.g. repair manual sequence or processing to defined steps on customer traveler; if it is readily available to the operator in some other manner, e.g. drawing; part is an assembly/kit.*
  
- e. A description of the number, composition and dimensions of test specimens to be processed with the parts when use of test specimens is permitted/required by the applicable specification? YES NO NA
  - *Compliance Assessment Guidance: NA only applies if processing does not require/permit the use of test specimens.*
  - *Reference to a defined test specimen, e.g. test specimen drawing, is acceptable.*
  
- f. A step for each process performed, defining the required operator controlled process parameters/ranges and referencing applicable internal process/or inspection procedure numbers including as applicable: YES NO
  - 1) Incoming inspection YES NO NA
    - *Compliance Assessment Guidance: NA applies for transfer of work between facilities or departments.*
  
  - 2) Pre-process cleaning method(s) YES NO NA
    - *Compliance Assessment Guidance: NA applies if this step is not required for the process.*
    - *Pre process cleaning is cleaning of incoming parts prior to the primary process i.e. prior to masking/racking, e.g. sandblast, solvent clean.*
  
  - 3) Pre-process thermal treatment YES NO NA
    - *Compliance Assessment Guidance: NA applies if this step is not required for the process.*
  
  - 4) Masking YES NO NA
    - *Compliance Assessment Guidance: NA applies if this step is not required for the process.*
  
  - 5) Fixturing, racking YES NO NA
    - *Compliance Assessment Guidance: NA applies if this step is not required for the process.*
    - *Shop paper to reference internal racking instruction, a general instruction for routine racking or specific details for unique racking requirements as required.*

- |     |  |           |
|-----|--|-----------|
| 6)  | In process cleaning, water break free check?<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process or for barrel plating and automated line</i></li> </ul>                        | YES NO NA |
| 7)  | Etch<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process.</i></li> </ul>  | YES NO NA |
| 8)  | Strike/activation<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process.</i></li> </ul>   | YES NO NA |
| 9)  | Chemical finishing e.g. Plate, anodizing, conversion coating, passivation?<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process.</i></li> </ul>                                  | YES NO NA |
| 10) | Primer<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process.</i></li> </ul>  | YES NO NA |
| 11) | Paint/film<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process.</i></li> </ul>  | YES NO NA |
| 12) | Post-process steps including cleaning, de-masking and removal of fixturing and racking.<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process.</i></li> </ul>                     | YES NO NA |
| 13) | Post-finishing thermal treatment<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if this step is not required for the process.</i></li> </ul>  | YES NO NA |
| 14) | In-process and final tests and inspections?<br><ul style="list-style-type: none"> <li>•</li> </ul>   | YES NO    |
| 15) | Packaging and handling   | YES NO    |
| 16) | Shipping<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if the part is moved within the same plant.</i></li> </ul>  | YES NO NA |
| g.  | Documentation of rework that is traceable to the shop paper / traveler and all processing performed on the parts?<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no rework observed during the audit.</i></li> </ul> | YES NO NA |
| h.  | Each step, or buy-off step in the process flow, is bought off and dated?   | YES NO    |



- k. Lot inspection and test results are recorded and bought off by the person carrying out the inspection/test or their designee/representative.
  - *Compliance Assessment Guidance: Where more than one person carries out an inspection step the inspection records shall identify each person, however, the inspection step on the traveller may be bought off by a single designee/representative per internal instructions.*

3.3.2 Are shop papers (travelers, work instructions etc) understood by the operators using them? YES NO

- *Compliance Assessment Guidance: Observe that the operator correctly follows the instructions and records required information.*

**3.4 Process and Quality Planning** **Section NA**

- *Compliance Assessment Guidance: Section NA applies if a modified scope audit.*

3.4.1 Does a procedure define system/requirements for process and quality planning which effectively ensures compliance with customer and/or specification requirements? YES NO

3.4.2 Are there instructions for actions to be taken by the operator, inspector, or any other personnel, when a discrepancy is detected? YES NO

3.4.3 Is there a procedure that defines the review of repeat orders for changes in requirements? YES NO

3.4.4 Are there procedures for each process that defines the required method for processing including all processing steps with a definition of the controls to perform the process? YES NO

3.4.5 Does the quality planning address removal of defective or nonconforming platings and coatings and their reapplication (rework) to preclude part life degradation or nonconforming part dimensions? YES NO NA

- *Compliance Assessment Guidance: NA applies when plating and coating is not performed or where rework is not observed during the audit.*
- *The supplier is not required to have standard rework instructions, it is acceptable for a rejection to be assessed and rework planning then created. This methodology and the requirements for customer approval of rework should be defined in the supplier's procedures.*

**3.5 Purchasing-Source Selection** **Section NA**

- *Compliance Assessment Guidance: Section NA applies if a modified scope audit.*

3.5.1 Are all subtier suppliers that provide any consumable material, or service used in the process taken from an approved supplier list? YES NO

3.5.2 Are all solution analysis and process control testing sources approved in accordance with an internal supplier procedure meeting all contractual

YES NO NA

requirements?

- *Compliance Assessment Guidance: NA applies if no subcontract analysis or testing is done.*
- *For jobs audited, outside laboratory testing is performed by a laboratory that is approved to prime customer requirements. If no prime requirement then one of the following must be met:*
  - a) *Any Prime customer laboratory approval (scope does not need to match).*
  - b) *MTL accreditation or any MTL recognized approval (scope does not need to match).*
  - c) *AC 7108/4 or AC 7108 accreditation (scope does need to match).*
  - d) *Manufacturers that provide solution analysis and process control testing for their proprietary solutions may be exempt from this requirement provided the following criteria are met: they are the original manufacturer [not a distributor]; testing is provided as a service with the supply of the solution; they have an in house laboratory and evidence that a quality management system accreditation (Example: AS/EN/JIS Q 9100, ISO 9001) is held..*

<b>3.6</b>	<b>Receiving Procedure</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	
3.6.1	<p>Does the processor obtain through customer-provided information: part identification, material type and any other part specific information required for subsequent processing?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies only if the traveler states that this is the next operation and the work being performed is being bought off in the same traveler</i></li> <li>• <i>A yes answer would be a work instruction or a place on their traveler looking for information that is critical for their processing, e.g. hardness for steel materials, shot peened surfaces, alloy composition.</i></li> </ul>	YES NO NA
3.6.2	<p>Does the system provide for holding and segregation of hardware pending receipt of proper material documentation or if nonconformance is detected?</p>	YES NO
3.6.3	<p>Does the supplier have incoming inspection procedures identifying characteristics to be checked and methods to be used, including sampling plan as defined in the quality manual?</p>	YES NO
3.6.3.1	<p>Are actual as-received dimensions for jobs having post-processing dimensional requirements determined prior to processing?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies only if post-processing dimensional requirements are not contractually required.</i></li> <li>• <i>Actual pre-process dimensions may be provided by earlier machining inspection or by customer</i></li> <li>• <i>Some customers may require the processor to measure the actual dimension directly prior to processing.</i></li> </ul>	YES NO NA
3.6.4	<p>Does incoming material quality planning provide for shelf-life monitoring and</p>	YES NO NA

control for materials that so require?

- *Compliance Assessment Guidance: NA applies if no materials requiring shelf-life control are used.*

<b>3.7</b>	<b>Housekeeping</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	
3.7.1	Are the company's facilities clean, uncluttered, and well lighted?	YES NO
3.7.2	Are incompatible materials such as acids/alkalis or oxidizers/organics segregated in storage?	YES NO
3.7.3	Are all containers legibly and indelibly labeled and are unlabeled containers not used?	YES NO
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Not applicable to containers used for transfer, or non-production materials.</i></li> </ul>	
3.7.4	Are process materials stored to preclude damage or degradation from heat, cold, water, atmospheric moisture or other environmental considerations?	YES NO
3.7.5	Are process materials, that are transferred from original manufacturer's containers controlled, to maintain identity and to prevent contamination or degradation?	YES NO NA
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies when the material is transferred to a container for immediate use.</i></li> </ul>	
3.7.6	Does training or a procedure address cleaning of pumps and other transfer equipment after use to preclude material contamination and for operator safety?	YES NO
<b>3.8</b>	<b>Control of Non-Conforming Parts</b>	
3.8.1	Is there a policy to ensure that customers are informed of discrepancies affecting hardware? (i.e. out of tolerance conditions)	YES NO NA
3.8.2	Is rework approved by the customer when required?	YES NO NA
3.8.3	Is there a rework procedure that requires planning/shop paper to be issued defining all processing performed on the part, including stripping, inspection following stripping and reprocessing?	YES NO NA
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if the supplier does not carry out rework.</i></li> </ul>	
3.8.4	Is repair/MRB always approved by the customer?	YES NO NA
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies only if the supplier has MRB authority.</i></li> </ul>	
<b>3.9</b>	<b>Product Packaging &amp; Delivery</b>	<b>Section NA.</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope</i></li> </ul>	



*audit.*

3.9.1	Is there a procedure to provide for the protection of parts after final inspection and during shipment that includes customer requirements?	YES NO
3.9.2	Do shipping documents conform to purchase order requirements or contracts?	YES NO
<b>3.10</b>	<b>Calibration of Process and Testing Equipment</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	
3.10.1	Is there evidence of current calibration on:	
	<ul style="list-style-type: none"> <li>a. All shop equipment used to set, control or monitor the control of a process?</li> </ul>	YES NO
	<ul style="list-style-type: none"> <li>b. All test and inspection equipment used to accept product or control a process?</li> </ul>	YES NO
<b>3.11</b>	<b>Internal Quality Audits</b>	
3.11.1	<ul style="list-style-type: none"> <li>• Does the supplier's internal audit schedule include all chemical processes within the scope of this audit? <i>Compliance Assessment Guidance: There should be a schedule/system to ensure that each chemical process is audited over a defined period of time. There is no requirement to audit each process each year</i></li> </ul>	YES NO
3.11.2	<ul style="list-style-type: none"> <li>• Does the audit schedule, or process checklists, ensure that support processes (e.g. solution analysis, lot testing, periodic testing) are also audited?</li> </ul>	YES NO
3.11.3	Are internal Chemical Process audits carried out as planned, by personnel knowledgeable of the process and by personnel not directly responsible for the process?	YES NO
3.11.4	<p>Do records indicate that corrective action was, or is being, taken for Chemical Process internal audit non-conformances?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if there was no non-conformances identified in the supplier's internal audit.</i></li> <li>• <i>Only the implementation of corrective actions and follow-up shall be reviewed; judgement on the correctness of the corrective actions is not permitted.</i></li> </ul>	YES NO NA
<b>4.0</b>	<b>PERIODIC, LOT TESTING &amp; SOLUTION ANALYSIS</b>	
<b>4.1</b>	<b>Specification Compliance</b>	
4.1.1	<p>Does the Supplier have a Process Control System for assuring compliance to specification testing requirements?</p> <p><i>Auditor Note: For <b>Nadcap</b> audits that have an AC7108 checklist, attach a copy of the job tracker here. For specifications that are EC-LR in their own right only the spec number shall be added to the tracker in the "Other</i></p>	YES NO

*Specification” category.*

*Do NOT attach a copy of the supplier’s test matrix to this audit as it may be EC-LR controlled.*

4.1.2	Does the Process Control System contain or reference the following information:	YES	NO
4.1.2.1	All applicable specifications, including revision level?	YES	NO
4.1.2.2	Applicable batch/lot testing including any deviations to the test requirements?	YES	NO
4.1.2.3	Applicable periodic testing, including any deviations to the test requirements?	YES	NO
4.1.2.4	Frequency of tests?	YES	NO
4.1.2.5	Test piece material, quantity and dimensional requirements as applicable?	YES	NO
4.1.2.6	Test method specification?	YES	NO
	<i>Compliance Assessment Guidance: The Test Matrix shown in the Audit Handbook is an example system for achieving this. Applicable specifications include those which the supplier has identified as available to be included in their audit</i>		
4.1.3	Is periodic and lot acceptance testing reviewed in the audit in compliance with customer and/or specification requirements, including Nadcap Table 1, see Appendix G?	YES	NO
4.1.4	Auditor is to select a minimum of 8 tests (not solution analysis) consisting of, where possible, four internal tests and four external tests and evaluate them utilizing the corresponding sections of Appendix B. These tests to be selected in addition to test records reviewed in job audits and to include both periodic and acceptance tests? Note: Even if the supplier is accredited to AC7101 for the testing carried out they are still required to be audited to AC7108 App B.	YES	NO NA
	(A)	YES	NO NA
	(B)	YES	NO NA
	(C)	YES	NO NA
	(D)	YES	NO NA
	(E)	YES	NO NA
	(F)	YES	NO NA
	(G)	YES	NO NA
	(H)	YES	NO NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if no testing is required by specifications.</i></li> </ul>		
4.1.5	Are written purchase orders available, providing definition of requirements for testing performed externally? Do these comply with customer and specification requirements? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if no external testing is</i></li> </ul>	YES	NO NA

performed.

<b>4.2</b>	<b>Periodic Test Documentation</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if no periodic testing is required.</i></li> </ul>	
4.2.1	Are testing records maintained such that they are traceable to both shop travelers and certification/test report and would they enable the processing supplier to reconstruct the test samples or testing conditions and identify any incorrectly tested material?	YES NO
4.2.1.1	Are testing records maintained and organized in a manner in which they are readily available for review?	YES NO
4.2.2	Review of Test Data	
4.2.2.1	Is there a procedure that requires the review of test data for conformance to specification requirements?	YES NO
4.2.2.1.1	If the test is done by an independent laboratory, does the procedure require the reviewer to stamp, or sign-off, and date the test results as proof of review? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if there is no testing by an independent laboratory.</i></li> </ul>	YES NO NA
4.2.2.2	Does a procedure require an examination for historical trends in the testing data and that negative or questionable trends be acted upon? <i>Compliance Assessment Guidance: All periodic test results, quantitative and pass/fail shall be considered.</i>	YES NO
4.2.2.3	Is the responsibility for this review identified in the procedure?	YES NO
4.2.3	Are errors in the internally generated test data corrected by either of the following: (check one) <ul style="list-style-type: none"> <li><input type="checkbox"/> Line out, write correction, initial and date.</li> <li><input type="checkbox"/> Void the data, make corrections, and retype/reprint or electronically record correction.</li> <li>• <i>Compliance Assessment Guidance: When data is voided then the old file/paper/data should still exist giving traceability. The new file/paper/data can have the corrections made and then can be saved or reprinted/retyped if required.</i></li> </ul>	YES NO
4.2.4	Is there a procedure which requires the following in the event that an error is identified in the certificate of test, test data or testing procedure? (check all that apply) <ul style="list-style-type: none"> <li><input type="checkbox"/> Identification of error cause</li> <li><input type="checkbox"/> Implementation of corrective actions</li> <li><input type="checkbox"/> Notification of affected customers as required</li> <li><input type="checkbox"/> Retesting or replacement testing if required and correction of certification/test data</li> </ul>	YES NO

<b>4.3</b>	<b>Test Piece Control</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: Section NA applies if no test pieces are required for specifications within the scope of the audit.</i></li> </ul>	
4.3.1	Are material certifications, manufacturer's labels, or the materials themselves verified against the process suppliers purchase orders in order to ensure receipt of correct material?	YES NO
4.3.2	Are test pieces traceable to material from which they are made? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: Traceability to the CofC or the lab report for the material being used satisfies this requirement.</i></li> </ul>	YES NO
4.3.3	Are test pieces positively identified during all stages of processing and testing until disposed of (tags, bags, etc)? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: Coupons can be identified by Job #, S/N, or any form of identification that can be traced back to the router/traveler.</i></li> </ul>	YES NO
4.3.4	Are all test pieces provided for testing (internal/external lab) accounted for (e.g., tested to completion/failure, or replaced?)	YES NO
4.3.5	Is there documentation which provides for tracking and accountability of all test pieces currently in work (processing and testing)? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: A router should be with every test piece describing the process and all of the variables to make sure that it is representative of the part.</i></li> </ul>	YES NO
4.3.6	Is there specific shop paperwork (router, etc.) which is traceable to the test pieces which specifies how they are to be processed and which tank they are processed in?	YES NO
4.3.7	Unless otherwise authorized by the cognizant engineering organization, are all operator controlled parameters associated with the processing of the test pieces recorded on the shop paper and traceable to the specific samples. (For automated process lines, are all process variables controlled, recorded and retrievable)? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: If test pieces are not processed with hardware, ensure that the process steps represent the production process. If specification requires test pieces to be processed with hardware, ensure that this is being performed.</i></li> </ul>	YES NO
<b>4.4</b>	<b>Test Failure, Replacement Testing and Retesting of Periodic Test Pieces.</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: Section NA applies if periodic testing is not required.</i></li> <li><i>NOTE: This section does not apply to solution analysis.</i></li> </ul>	
4.4.1	Does the supplier have a documented procedure that defines action to be taken in the event of a periodic test failure and does it contain?	YES NO

4.4.1.1	Definitions for "Invalid Test", "Replacement Test" and "Retest"?	YES NO
4.4.1.2	The need for an investigation to determine if the test failure is "Invalid"	YES NO
4.4.1.3	The requirement that a replacement test is only performed when the test failure is conclusively shown to be "Invalid"	YES NO
4.4.1.4	The requirement that a retest is only performed when permitted by customer or specification?	YES NO
4.4.1.5	The requirement that the original test failures, replacement tests, nonconforming tests, and retests are logged and cross indexed, including explanations with entries signed off by authorized personnel?	YES NO
4.4.1.6	The requirement that the test failure log is reviewed at least quarterly for trends which might indicate deterioration of test procedures, methodologies and/or processing/test equipment?	YES NO
4.4.2	Review of Test Failure Data <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies only if no test failures are observed.</i></li> </ul>	Section NA
4.4.2.1	Are replacement tests performed only when original failed test has been shown to be invalid and are retests only performed only when permitted by customer and/or specification?	YES NO
4.4.2.2	Are original test failures, replacement tests, nonconforming tests, and retests logged and cross indexed, including explanations with entries signed off by authorized personnel? (i.e., Replacement / Retests traceable to the original tests) <ul style="list-style-type: none"> <li></li> </ul>	YES NO NA
4.4.2.3	If negative trends are apparent from the test failure log have corrective actions been applied, or is there evidence of active investigation into the cause(s) of the negative trend? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: An NA applies if there is no evidence of negative trends.</i></li> </ul>	YES NO NA
4.4.3	Is there a procedure which addresses the following in the event of a validated testing failure <ol style="list-style-type: none"> <li>Immediate notification of all affected customers?</li> <li>Identification of all affected hardware shipped to the customer?</li> <li>Isolation of all affected in-house hardware?</li> <li>Immediate shutdown of the affected process/process line pending resolution?</li> <li>Investigation of failure cause and implementation of corrective action?</li> </ol>	YES NO YES NO YES NO YES NO YES NO

- f. After the process has been corrected is it tested to show compliance to requirements before production is resumed? YES NO
- *Compliance Assessment Guidance: Limited processing may be re-started after correction prior to test results being obtained if the customer agrees to "at risk" release or parts are held at supplier pending test results.*

- 4.4.4 If there has been a validated testing failure is there evidence that the procedure has been followed? YES NO NA
- *Compliance Assessment Guidance: An NA applies if there are no test failures.*

- 4.5 Process Control Laboratory Procedures (Solution Analysis) Section NA**
- *Compliance Assessment Guidance: Section NA applies if solution analysis is not required.*

- 4.5.1 Are there assigned responsibilities for review and approval of analysis results, authorization of re-analysis, calculation of process solution additions and corrections, and the preparation and approval of analysis procedures as required? YES NO

- 4.5.2 Are these responsibilities performed by a qualified individual (Ref. paragraphs 3.2.1- 3.2.7) and are their job responsibilities, job specification and qualifications documented? YES NO
- *Compliance Assessment Guidance: If there is no on-site technical expertise in simple chemical analysis techniques, witness a typical titration or other test to confirm minimal skill levels in using a pipette, reading a burette, standardizing a pH meter, etc.*

- 4.5.3 Is there a procedurally defined control system to ensure solution composition is maintained within specification/technical datasheet requirements and a system for adjusting frequency of analysis based on rate of change? YES NO
- *Compliance Assessment Guidance: The system will need to ensure the composition limits of all applicable specifications/technical datasheets are accounted for.*
  - *Specification identified contaminants are considered to be composition requirements.*
  - *PH and conductivity are considered to be composition requirements.*
  - *ARP4992 is an example of a system for controlling solution composition based on rate of change.*
  - *When permitted by specification alternative methods to solution analysis may be used to control a process solution, e.g. etch rate, specific gravity, refractive index, dump when ineffective based on a defined control test.*

- 4.5.4 Do the solution control records contain the following information for each tank monitored:
- *Compliance Assessment Guidance: Analysis for the concentration of individual constituents of a solution may not be required if other adequate and appropriate solution control methods are used. Some examples of*

*alternate methods include specific gravity, etch rate, boiling point and defined bath replacement (e.g., dump when strip time exceeds 20 minutes or dump when etch rate drops below 0.005 inches/hour).*

- |       |   |        |
|-------|---|--------|
| a.    | Tank Identification?  | YES NO |
| b.    | Tank Contents?  | YES NO |
| c.    | Tank size (working volume) and level?<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: The working volume shall be defined in the log but the level may be marked, or automatically controlled, in the tank.</i></li> </ul>   | YES NO |
| d.    | Analysis frequency?   | YES NO |
| e.    | Constituents to be analyzed?  | YES NO |
| f.    | Operating tolerances based on, multiple where applicable, specification/technical datasheet requirements, e.g. temperature range, composition range(s), pH range, conductivity range, etch rate?<br><br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: The Chemical Process Audit Handbook provides an example of a Solution Matrix which may be used as a tool to help meet this requirement</i></li> </ul> | YES NO |
| g.    | Date sampled and analyzed?  | YES NO |
| h.    | Analysis result and calculated constituent values?  | YES NO |
| i.    | Additions and corrections?<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Corrections are removal of solutions for the maintenance of controls, for example- electroless nickel</i></li> </ul>  | YES NO |
| j.    | Tank dumps?   | YES NO |
| k.    | Reanalysis after addition when out of specification limits?   | YES NO |
| l.    | Identity of individual conducting analyses, additions, reanalysis and dumps?  | YES NO |
| 4.5.5 | Do records show that corrections are made in a timely manner and that the solution is maintained to defined requirements?<br><ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: This review shall also consider the timeliness of additions based on the closeness to the specification limit and changes in frequency based on rate of change.</i></li> </ul>   | YES NO |

4.5.6	Do procedures require, and documents show, the cessation of processing when any chemical constituent and/or operating parameter (i.e., temperature) does not comply with the applicable process specification or chemical supplier's technical bulletin until the process is brought into compliance?	YES NO
4.5.7	Do detailed internal procedures exist for the following?	
a.	Solution analysis conforming to a laboratory standard or chemical compound manufacturer's procedures? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA Applies when solution analysis is outsourced.</i></li> <li>• <i>The use of test kits supplied for testing proprietary compounds is acceptable.</i></li> </ul>	YES NO NA
b.	Sample collection which assures that the sample is representative of the bath solution and operating condition and precludes sample contamination? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Bath should be at correct level, agitated and at correct temperature prior to sampling.</i></li> </ul>	YES NO
c.	Initial tank make-up and addition calculations?	YES NO
d.	Increase or decrease of analysis frequencies based on historical analysis test data in addition to meeting minimum frequency requirements when defined by specification?	YES NO
4.5.8	Chemicals used as reagents during analysis shall be General Laboratory Reagent Grade or better according to customers/ National requirements? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if solution analysis is performed by external laboratory.</i></li> </ul>	YES NO NA
4.5.9	Are laboratory chemicals labeled and stored properly? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if solution analysis is performed by external laboratory.</i></li> </ul>	YES NO NA
4.5.10	Does water used for analysis and test purposes meet the definition of Laboratory Water and do records support it, e.g. certificate of analysis, test log? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if solution analysis is performed by external laboratory.</i></li> </ul>	YES NO NA
4.5.11	pH Testing <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if pH testing is not required or is sub-contracted.</i></li> </ul>	Section NA
4.5.11.1	Is standardization of the pH meter carried out daily, prior to first use, using a minimum of two buffer solutions that represent both the acid and/or alkali range as applicable? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: The pH buffers used to standardise the meter need to represent the acid and/or alkali ranges but do not need</i></li> </ul>	YES NO



*to bracket the full pH range of samples being tested. Typical pH kits include pH 4, 7 and 10 buffer solutions and the use of the most appropriate two is acceptable.*

- 4.5.11.2 Are certified, commercial-grade or better buffer solutions within shelf-life expiration date.. YES NO
- 4.5.12 Are standards with a limited shelf life properly labeled to preclude usage after expiration date? YES NO NA
  - *Compliance Assessment Guidance: NA applies if solution analysis is performed by external laboratory.*
- 4.5.12.1 Are shelf-life disciplines documented and maintained for standards susceptible to deterioration (e.g., evaporation of liquid standards, reaction with glass storage containers, photochemical reactions)? YES NO NA
  - *Compliance Assessment Guidance: NA applies if solution analysis is performed by external laboratory.*
- 4.5.13 Are titration solutions standardized against appropriate documented, certified reference standards, and are they monitored for stability and protected against degradation? YES NO NA
  - *Compliance Assessment Guidance: NA applies if solution analysis is performed by external laboratory.*

**5. PROCESS EQUIPMENT CONTROL AND MAINTENANCE**

- 5.1 **General** **Section NA**
  - *Compliance Assessment Guidance: Section NA applies if a modified scope audit.*
- 5.1.1 Are current operating manuals or instructions available to operators, maintenance personnel, and other personnel requiring the information? YES NO
- 5.1.2 Are tanks labeled to include identification number, contents, and temperature ranges? YES NO NA
  - *Compliance Assessment Guidance: NA applies if processes do not use tanks. Examples include painting lines and brush plating.*
  - *Tank number is not required if the tank is uniquely identified by some other means.*
- 5.1.2.1 Are tank labels consistent with procedures, shop paper and logs? YES NO NA
  - *Compliance Assessment Guidance: NA applies if processes do not use tanks. Examples include painting lines and brush plating.*
- 5.1.3 Is the location of each process line/area for which Nadcap Accreditation is sought summarized/defined in a revision controlled drawing or other document, and is that equipment line being properly maintained and listed in the Process Control System (see section 2.6)? YES NO
  - *Compliance Assessment Guidance: The purpose of this document is to define the boundaries of the area subject to the audit and to ensure that all*

*areas defined in the scope of the audit are verified by the auditor*

5.1.4	Does the compressed air supply used for production include particulate, moisture, and oil filters with scheduled maintenance and point of use inspection? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for processes that do not require compressed air (e.g. brush plating)</i></li> <li>• <i>This does not mean that every point of use must be inspected, but inspection point should be as close to the point of use as practical.</i></li> </ul>	YES NO NA
<b>5.2</b>	<b>Maintenance Procedures</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	<b>Section NA</b>
5.2.1	Are maintenance procedures prepared with preventative maintenance as a goal and based on prior maintenance records? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: The goal of the maintenance program is to minimize downtime due to equipment failure. The facility maintenance program should include scheduled equipment review and/ or actions based on equipment manufacturer's recommendations and equipment breakdown and repair histories. The procedure and records need to show periodic reviews of maintenance history and preventative actions taken based on those reviews.</i></li> </ul>	YES NO
5.2.2	Do records indicate that maintenance has been performed in accordance with a defined schedule?	YES NO
5.2.3	Is contamination removed from process solutions as required, by a process such as filtration, chemical treatment etc.? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if there are no tanks.</i></li> </ul>	YES NO NA
<b>5.3</b>	<b>Process Line Equipment</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit or if the processes in the scope of the audit does not include tanks.</i></li> </ul>	<b>Section NA</b>
5.3.1	Are tanks and/or work surfaces maintained free of corrosion and chemical spillage detrimental to the process?	YES NO
5.3.2	Are spray and immersion rinse tanks <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for processes that do not utilize spray rinses or tanks.</i></li> </ul>	Section NA
a.	Clean, clear, free-running or monitored for contamination levels <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Does not apply to drag-out tanks if adequate rinsing is provided afterward.</i></li> </ul>	YES NO
b.	Situated in a sequence to prevent cross contamination of process tanks	YES NO
c.	Assuring adequate neutralization and/or removal of process chemicals? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Particular attention must be given</i></li> </ul>	YES NO

*to parts such as small diameter tubes. Processor should have or make provision for auxiliary rinsing.*

5.3.3	<p>Are parts moved between tanks without undue delay such that process quality is not affected?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Time delay between certain process steps may be critical.</i></li> </ul>	YES NO
5.3.4	<p>Are tanks with defined temperature ranges operating within the posted range?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies where none of the tanks have a defined temperature range.</i></li> </ul>	YES NO NA
5.3.5	<p>Is there a system to ensure tanks with defined operating temperature ranges are maintained within the defined temperature range and that the recording system is sufficient to demonstrate compliance to requirements?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: The control and recording process needs to account for environmental temperature changes (summer/winter, night/day) and also temperature changes as a result of endothermic and/or exothermic reactions during actual processing of hardware. Different control and recording systems may be used based on the requirements and characteristics of individual tanks.</i></li> <li>• <i>NA applies for processes that do not utilize heated or cooled tanks.</i></li> </ul>	YES NO NA
5.3.6	<p>Are tanks of sufficient volume and dimensions to contain hardware during processing and assure sufficient coverage of parts?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for processes that do not utilize tanks.</i></li> <li>• <i>For parts requiring processing of selective areas, entire area to be processed must be immersed.</i></li> <li>• <i>Other situations such as double dipping require specification or customer approval.</i></li> </ul>	YES NO NA
5.3.7	<p>Are tanks that require uniformity of temperature and solution concentration agitated?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for processes that do not utilize tanks or where stratification does not occur.</i></li> <li>• <i>Agitation may be turned off when not in use and turned on prior to using with a suitable amount of time for adequate temperature stabilization and solution mixing.</i></li> </ul>	YES NO NA
5.3.8	<p>Are fixtures, workbars, electrical connections, and hard masking free of corrosion and physical damage detrimental to the process while in use?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for processes that do not use these devices</i></li> </ul>	YES NO NA
5.3.9	<p>Are fixtures and masking designed as such so they do not entrap air or processing solutions on parts?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for processes that do not use these devices</i></li> </ul>	YES NO NA

5.3.10	<p>Is fixturing and racking design adequate so that, when hardware is positioned for rinsing, there is adequate process solution neutralization and removal and does it minimize process solution and rinse water drag-out and cross-contamination of process tanks?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies to processes that do not involve rinsing (e.g. painting) or if no fixturing or racking is used.</i></li> </ul>	YES NO NA
5.3.11	<p>Is fixturing and rack design, and the arrangement of workbars and anodes/cathodes, such that electrical contacts are solid but preclude potential pressure damage or electrical arcing?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies to non-electrolytic processes</i></li> </ul>	YES NO NA
5.3.12	<p>Are tanks for application of electrolytic coatings equipped for processing hardware with variable geometric configuration or for variable lot sizes to promote uniform deposition rates as necessary/required by specification and/or part/customer requirements?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies to non-electrolytic processes and for processes that do not utilize tanks.</i></li> <li>• <i>Equipment for uniform deposition shall include reconfigurable/ conforming cathodes/ anodes, thieves and/or robbers as required.</i></li> </ul>	YES NO NA
5.3.13	<p>Are hoists and other lifting equipment labeled as to capacity?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no hoists or lifting equipment is used.</i></li> </ul>	YES NO NA
5.3.14	<p>Are hoists and other lifting equipment electrically insulated from work?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no hoists or lifting equipment is used or if immersion time is so short that isolation of the work is not practical.</i></li> <li>• <i>The requirement applies to all aqueous immersion processes whether electrolytic or not.</i></li> <li>• <i>Disconnection of hoist from work is sufficient.</i></li> </ul>	YES NO NA
5.3.15	<p>Does supplier's de-ionized water system deliver water meeting 50,000 ohm-cm resistivity minimum (20 <math>\mu</math>S/cm conductivity maximum) as demonstrated using a calibrated inline sensor or periodic analysis?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no deionized water is required.</i></li> <li>• <i>50,000 ohm-cm = 20 micro-mhos/cm (approx 10 ppm or mg/L TDS). Any combination of water purification methods may be used to meet the resistivity requirement. In-house deionizer units need either a calibrated red/green light of the correct resistivity value, a calibrated meter capable of read-out of actual resistivity, or the water confirmed by periodic chemical analysis or use of a total Dissolved Solids (TDS) meter, calibrated with known standards.</i></li> </ul>	YES NO NA
5.3.16	<p>Is de-ionized water used for anodize sealant bath make-up?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if anodize sealing is not performed.</i></li> </ul>	YES NO NA

5.3.17	<p>Is de-ionized water used for make-up and additions for anodizing, electroless nickel and precious metal plating solutions, and other process solutions as required by customer specifications, unless there is objective evidence that the water available in the facility is acceptable for use?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for processes that do not use water and for process solutions that do not require deionized water (i.e., other than anodizing, electroless nickel and precious metal plating).</i></li> <li>• <i>Objective evidence would include periodic analysis of facility water and tests meeting relevant specification requirements.</i></li> </ul>	YES NO NA
5.4	<p><b>Certified Ovens for Thermal Treatments at a set point above 250°F (121°C).</b></p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if processing does not require thermal treatments above 250°F (121°C).</i></li> <li>• <i>The only pyrometry requirements to be verified are those required to answer the following questions.</i></li> </ul>	Section NA
5.4.1	<p>For all ovens used to perform thermal treatments (within the scope of the audit), conducted at temperatures above 250°F (121°C), is pyrometry certified in accordance with AMS 2750?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: AMS 2750 is the Baseline requirement. Where customer specifications define higher requirements they shall be met.</i></li> <li>• <i>It is not required to fully assess the pyrometry to AMS2750 and/or customer specification it is only required to ensure the report/certification confirms compliance to them.</i></li> </ul>	YES NO
5.4.2	Thermal Processing Equipment	
5.4.2.1	<p>Do certified ovens meet temperature uniformity requirements of AMS 2750 for Furnace Class 5 (<math>\pm 25^{\circ}\text{F}</math> [<math>\pm 14^{\circ}\text{C}</math>]) unless more stringent requirements are specified?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Furnace Classes specify the minimum requirements for temperature uniformity. Ovens meeting Furnace Class 1 through 4 are also acceptable.</i></li> </ul>	YES NO
5.4.2.2	<p>Do instruments conform to the requirements of AMS 2750 for Instrumentation Type D or better having:</p> <ul style="list-style-type: none"> <li>• At least one control sensor in each control zone, attached to a control instrument that displays and controls temperature?</li> <li>• A recording instrument that records the displayed temperature for each control zone?</li> <li>• Over-temperature protection in each control zone?</li> <li>• <i>Compliance Assessment Guidance: Instrumentation Type D is the minimum acceptable. Instrumentation Types A, B, and C require more sensors and recorders, and are also acceptable.</i></li> </ul>	YES NO
5.4.3	<p>Controlling, Monitoring and Recording Instrument Calibration.</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Controlling, monitoring and recording</i></li> </ul>	

*instruments must be calibrated. Over temperature instruments used solely for oven over temperature protection do not need to be calibrated.*

5.4.3.1	<p>Is calibration accuracy <math>\pm 2^{\circ}\text{F}</math> (<math>\pm 1.1^{\circ}\text{C}</math>) and is sensitivity at least <math>3^{\circ}\text{F}</math> (<math>2^{\circ}\text{C}</math>) unless a different accuracy or sensitivity is specified by AMS 2750 or customer requirements?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: AMS 2750 defines different accuracy requirements for different oven classes and instrumentation types which differ from this requirement. For those ovens that are used for heat treat processes and are included in Nadcap accreditation to AC 7102, no further evaluation is required.</i></li> </ul>	YES NO
5.4.3.2	<p>Is calibration frequency at least semi-annually for digital instruments or quarterly for analog (electromechanical) instruments unless a more stringent requirement is specified?</p>	YES NO
5.4.3.3	<p>Are chart recorder (circular and strip) speed(s) calibrated/ verified at least annually and accurate to within <math>\pm 3</math> minutes per hour?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if temperature recorder is electronic/ digital data collection type.</i></li> </ul>	YES NO NA
5.4.4	<p>System Accuracy Tests (SAT)</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Also called a Probe Check.</i></li> </ul>	
5.4.4.1	<p>Is a SAT performed after any maintenance that could affect the SAT result?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Examples include replacement of thermocouple(s) and re-calibration of the instrument when any adjustment has been made.</i></li> </ul>	YES NO
5.4.4.2	<p>Are SATs performed upon installation and are periodic tests performed Biweekly (every two weeks) thereafter unless a different interval is specified by AMS 2750 or customer requirements?</p> <ul style="list-style-type: none"> <li>• <i>Compliance assessment Guidance: SAT frequency is based upon equipment class and instrumentation type. AMS 2750 requires that the SATs be performed Biweekly for Furnace Class 5, Instrumentation Type D. in accordance with the requirements of AMS 2750, Table 6, including any applicable frequency reductions and customer requirements?</i></li> <li>• <i>AMS 2750 may allow less frequent SATs based oven class and instrumentation types. For those ovens that are used for heat treat processes and are included in Nadcap accreditation to AC 7102, no further evaluation is required.</i></li> </ul>	YES NO
5.4.4.3	<p>Do system accuracy tests demonstrate conformance to the requirements for Furnace Class 5 (<math>\pm 5^{\circ}\text{F}</math> [<math>\pm 2.8^{\circ}\text{C}</math>]) of AMS 2750 unless a more stringent requirement is specified by the customer?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: AMS 2750 requires that the system accuracy of the temperature control and recording systems be within <math>\pm 5^{\circ}\text{F}</math> (<math>\pm 2.8^{\circ}\text{C}</math>) of the test instrument for Furnace Class 5. Other requirements apply for other Furnace Classes. There are specific requirements for test sensor placement and resident SAT thermocouples.</i></li> </ul>	YES NO

5.4.5	Temperature Uniformity Surveys (TUS)	
5.4.5.1	<p>Do the initial uniformity test temperatures include the highest and lowest temperatures for which the equipment will be used (qualified operating range), and are additional surveys conducted at sufficient intermediate temperatures to ensure that no two adjacent survey temperatures are greater than 600°F (335°C) apart?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: The initial uniformity test establishes the qualified operating range. It is acceptable to have more than one qualified operating range.</i></li> </ul>	YES NO
5.4.5.2	<p>If the highest and lowest test temperatures are more than 600°F (or 335°C) apart, are periodic tests performed at a temperature within each range as defined during the initial survey?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the qualified operating range is not more than 600°F (or 335°C).</i></li> </ul>	YES NO NA
5.4.5.3	<p>At least annually, are periodic surveys performed at the minimum and maximum temperatures of the qualified operating range?</p>	YES NO
5.4.5.4	<p>Are periodic uniformity surveys performed at least quarterly unless a reduced frequency is allowed by AMS 2750 or more frequent surveys are required by customer specification?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: AMS 2750 defines different TUS frequencies based on oven class and instrumentation types. For those ovens that are used for heat treat processes and are included in Nadcap accreditation to AC 7102, no further evaluation is required. For existing ovens having 4 or more successive, acceptable uniformity surveys, initiation of quarterly surveys is not required.</i></li> </ul>	YES NO
5.4.5.5	<p>Do temperature uniformity survey results conform to the uniformity requirements (except frequency) for Furnace Class 5 of AMS 2750 (<math>\pm 25^{\circ}\text{F}</math> [<math>\pm 14^{\circ}\text{C}</math>]) unless a more stringent requirement is specified by the customer?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: Uniformity requirements are based on Furnace Class. Furnace Class 5 requires <math>\pm 25^{\circ}\text{F}</math> (<math>\pm 14^{\circ}\text{C}</math>)</i></li> </ul>	YES NO
5.4.6	<p>Is there a procedure for pyrometry (calibration, temperature uniformity surveys and system accuracy tests) whether performed internally or by an outside source?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: The processor must have an internal procedure that defines the calibration, temperature uniformity surveys and system accuracy tests required for each certified oven within the scope of the audit.</i></li> </ul>	YES NO
5.4.7	Does the procedure specify the following as a minimum:	
	a. Test Frequency?	YES NO
	b. Survey temperature(s) and qualified operating temperature range(s)?	YES NO

	c. Does this range cover all applicable thermal treatments?	YES NO
	d. Number and location of sensors?	YES NO
	e. Temperature data recording frequency and period of monitoring after temperature stabilization (for temperature uniformity surveys)?	YES NO
	f. The test parameters that must be included on the purchase order, if pyrometry is performed by a subcontract source? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if a subcontract source is not used for pyrometry.</i></li> </ul>	YES NO NA
<b>5.5</b>	<b>Miscellaneous Equipment for Thermal Treatments at or below 250°F (121°C).</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no thermal treatments at or below 250°F (121°C) are performed within the scope of the audit or if these treatments are performed in a certified oven. Equipment that is not fully enclosed but provides this type of thermal treatment shall be considered as an oven for the purpose of the audit.</i></li> </ul>	<b>Section NA</b>
5.5.1	Are temperature controllers on miscellaneous thermal treatment equipment calibrated? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if the thermal treatment equipment is engineered to provide the required temperature without the use of a temperature controller.</i></li> </ul>	YES NO NA
5.5.2	Do procedures require and records show a periodic check is performed to ensure the minimum (if specified) and maximum temperatures within the working zone meet requirements? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: For spin dryers a periodic temperature survey is not feasible and periodic testing of parts on removal from the dryer is acceptable to prove the temperature does not exceed requirements.</i></li> <li>• <i>If there is no minimum temperature requirement and the drying space is fed by heated air then a periodic check of the input air temperature is acceptable.</i></li> </ul>	YES NO
<b>5.6</b>	<b>Cleaning Procedures: General</b> <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i>	<b>Section NA</b>
5.6.1	Are cleaning procedures compatible (and selected in accordance with customer requirements if required) with part alloys and heat treat conditions (as applicable to the process), dissimilar components of assemblies, previously deposited coatings, and braze/solder joint material?	YES NO
5.6.2	Are test pieces, if permitted/required by the applicable specifications, processed as required through the cleaning solutions with the hardware they represent? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if test pieces aren't required, e.g. testing may be performed on hardware.</i></li> </ul>	YES NO NA



5.6.3	<p>When required by customer or specification, is hardware that is susceptible to hydrogen embrittlement mechanically descaled; or if chemically descaled with materials generating hydrogen, is it baked directly after chemically descaling?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if not performing chemical descaling on material that is susceptible to hydrogen embrittlement.</i></li> </ul>	YES NO NA
5.6.4	<p>Are parts suitably protected against recontamination prior to subsequent processing?</p>	YES NO
5.6.5	<p>Are surface contaminants (including oils, adhesive products and their residues, and part marking inks) removed prior to acid etching and acid descaling?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if acid etching or acid descaling is not required.</i></li> </ul>	YES NO NA
<b>5.7</b>	<p><b>Mechanical Cleaning</b></p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies unless mechanical cleaning is used for one of the following:</i> <ol style="list-style-type: none"> <li>1) <i>To activate or roughen the base metal surface for improved adhesion of the chemical process application such as plating, painting, bonding, etc.</i></li> <li>2) <i>To strip coatings applied within the scope of the chemical processing audit.</i></li> <li>3) <i>To remove heat treat scale or oxides on base metal surface in preparation for etch prior to an NDT operation.</i></li> </ol> </li> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	Section NA
5.7.1	<p>Are procedures and controls in place:</p>	
5.7.1.1	<p>To assure proper grit size and media type are used?</p>	YES NO
5.7.1.2	<p>To assure proper particle size distribution is maintained within requirements?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if mechanical cleaning other than abrasive blasting is performed.</i></li> </ul>	YES NO NA
5.7.1.3	<p>To minimize cross contamination of alloys during mechanical cleaning (e.g., aluminum and iron based alloys)?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: This can be accomplished through media changeout, dedicated blast equipment, etc.</i></li> </ul>	YES NO
5.7.2	<p>When abrasive blast techniques are used, are off-set distances, pressures, and media recorded?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if mechanical cleaning other than abrasive blasting is performed.</i></li> <li>• <i>If these parameters are not defined by customer specification, appropriate parameters may be derived from test results or references such as MIL-STD-1504, that will provide this information for various alloy types and media types. For manual blasting, recording offset as a range is acceptable.</i></li> <li>• <i>If the parameters are imposed in the work instruction and if the nozzle to part distance is controlled by a means which impose a minimum distance</i></li> </ul>	YES NO NA

*between part and nozzle then this parameter does not need to be recorded by the operator*

5.7.3	<p>Are standards used to evaluate surface finish as required by customer or specification?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no surface finish requirements are imposed.</i></li> <li>• <i>Visual comparison standards are acceptable, as well as profilometer measurements.</i></li> </ul>	YES NO NA
5.7.4	<p>Has hardware been visually checked and documented to verify corrosion, oxides, scale, and abrasive media have been removed?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Visual in-process inspection must be performed prior to the next operation.</i></li> </ul>	YES NO
5.8	<p><b>Chemical Cleaning Prior to Chemical Processing</b></p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if chemical cleaning is not required.</i></li> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> <li>• <i>Ultrasonic cleaning is considered to be a form of chemical cleaning.</i></li> </ul>	<b>Section NA</b>
5.8.1	<p>Is cathodic cleaning prohibited with high strength steels of 180 ksi and greater (unless otherwise approved by the customer)?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if high strength steels are not processed or if supplier does not possess cathodic cleaning capability.</i></li> </ul>	YES NO NA
5.8.2	<p>Is chemical cleaning and rinsing carried out immediately prior to follow-on chemical processing unless otherwise approved by customer or specification?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies for chemical milling.</i></li> </ul>	YES NO NA
5.8.3	<p>Are all production hardware and test pieces maintained wet and is a water break free surface observed after the cleaning cycle?</p> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies as follows:</i></li> <li>• <i>- Barrel plating processing is exempt from water break free surface observance.</i></li> <li>• <i>- Automated processing lines are exempt from water break free surface observance, unless otherwise directed by cognizant engineering organization, provided the following controls are in place:</i></li> <li>• <i>-- All processing solutions are chemically analyzed (see matrix) and maintained within the prescribed solution control limits?</i></li> <li>• <i>-- All process tanks and staging areas are guarded against direct leakage from overhead equipment?</i></li> <li>• <i>-- There is a scheduled inspection and maintenance of the overhead equipment to eliminate sources for leakage?</i></li> <li>• <i>-- There is a history of acceptable process control and lot test results that indicate surface cleanliness conditions, based on test requirements of relevant specifications? (e.g. - salt spray, coating adhesion, wedge crack)</i></li> </ul>	YES NO NA
5.8.4	<p>Is there a procedure that specifies a minimum water-break free interval?</p>	YES NO NA

- *Compliance Assessment Guidance: NA applies only for barrel and/or automated lines.*
- *Minimum water-break free interval should be sufficient to ensure adequate cleaning, but should also ensure that hardware does not dry. Time will be dependent on process, part material, size, geometry and customer specification.*

5.8.5 Does the processor have adequate controls in place to ensure water break free surfaces are obtained prior to continuation of processing?? YES NO NA

- *Compliance Assessment Guidance: NA applies only for barrel and/or automated lines.*
- *Some customers or specifications may require documentation of the water break free acceptance step. Other control systems may be acceptable*

5.8.6 Are activation chemical baths situated so as to permit processing immediately prior to plating and conversion operations? YES NO NA

- *Compliance Assessment Guidance: NA applies if activation baths are not required.*

**5.9 Masking** **Section NA**

- *Compliance Assessment Guidance: Section NA applies if masking is not required within the scope of the audit.*
- *Compliance Assessment Guidance: Section NA applies if a modified scope audit.*

5.9.1 Are procedures in place for masking prior to cleaning, for visual inspection of adequate masking before and after cleaning, and for remasking when damaged during mechanical cleaning? YES NO NA

- *Compliance Assessment Guidance: NA applies if masking prior to cleaning is not required.*

5.9.2 Does shop paper or the traveler clearly show the areas to be masked and specify the masking material to be used? YES NO

- *Compliance Assessment Guidance: Best practice is to have work instructions as part of the traveler that show specifically where to mask and what materials to use. It is acceptable to have a generic work instruction and customer's engineering drawing and/ or customer's process sheets if this provides sufficient information, and the actual masking and maskants are documented in traceable shop records.*

5.9.3 Is masking material compatible with hardware and process conditions? YES NO

5.9.4 Are fixtures and masking designed to assure part area to be processed is exposed and all other areas precluded as required by the customer? YES NO

- *Compliance Assessment Guidance: Particular attention should be given to threaded holes, fayed surfaces and joints of assemblies prior to welding or brazing, and assemblies such as bearing raceways.*

5.9.5 Are adhesives, masking material, markings and residual chemicals removed after processing and before further thermal processing or shipment? YES NO NA

- *Compliance Assessment Guidance: NA applies when maskants that are compatible with thermal operations, as per Section 5.9.3, are removed after thermal processing.*

**5.10 Power Supplies Section NA**

- *Compliance Assessment Guidance: Section NA applies if power supplies are not used within the scope of the audit.*
- *Compliance Assessment Guidance: Section NA applies if a modified scope audit.*

5.10.1 Are power supplies equipped with calibrated ammeters, voltmeters and ramp rate controls (if equipped with ramp rate control)? YES NO

- *Compliance Assessment Guidance: For those tanks equipped with digital or paper chart recorders documenting voltage/ amperage, and time, calibration of the ramp rate control is not required provided the ramp rate can be verified from the recorded data.*

5.10.2 Does each plating circuit have dedicated meters that indicate the actual power for that circuit? YES NO

5.10.3 Is the resolution of the power meters sufficient for the voltage and amperage range specified in the shop paper traveler? YES NO

- *Compliance Assessment Guidance: Resolution of ammeter/ voltmeter needs to be sufficient to properly control processing. For example, an ammeter with a scale of 0-3000 amps in 100 amp increments would not provide sufficient resolution to verify that 64 amps are being applied.*

5.10.4 Are rectifiers identified to the tank which they service, or if not, does each tank have individual rheostat? YES NO

- *Compliance Assessment Guidance: If multiple rectifiers per tank or portable rectifiers are used, the rectifier must be traceable to individual hardware.*

5.10.5 When required by specification, is ripple periodically verified for electrochemical rectifiers as part of calibration? YES NO NA

- *Compliance Assessment Guidance: NA applies if ripple checks not required by specification. Ripple measurements are to be taken at the tank.*

5.10.6 If a power failure occurs, is there a mechanism that requires the operator to physically restart the power supply to plating and anodizing tanks? YES NO

**5.11 Timers Section NA**

- *Compliance Assessment Guidance: Section NA applies if timers are not required for processing.*
- *Compliance Assessment Guidance: Section NA applies if a modified scope audit.*

5.11.1 Are timers available, suitable to the purpose, calibrated and visible or audible from the tanks? YES NO

- *Compliance Assessment Guidance: Timers used for process control must be calibrated. Timers include wall clocks and watches if the operators use them for timing process parameters.*

**5.12 Stripping Section NA**

- *Compliance Assessment Guidance: Section NA applies if stripping is not performed within the scope of the audit.*
- *Compliance Assessment Guidance: Section NA applies if a modified scope audit.*

5.12.1 Do chemical stripping baths include an inhibiting agent when required by specification or customer? YES NO NA

- *Compliance Assessment Guidance: NA applies when inhibiting is not required by specification or customer.*

5.12.2 Does the hardware receive an embrittlement relief bake after chemical stripping as required by specification and/or customer requirement? YES NO NA

- *Compliance Assessment Guidance: NA applies when embrittlement relief baking is not required or when chemical stripping is not performed.*

5.12.3 Are masking, insulators, or similar methods being used to prevent Galvanic Coupling of dissimilar metals? YES NO NA

- *Compliance Assessment Guidance: NA applies if not performing chemical stripping or there are no dissimilar metal couples.*

5.12.4 If required by the customer, has the stripping of parts and the process been approved? YES NO NA

- *Compliance Assessment Guidance: NA applies if customer approval is not required.*

5.12.5 For each strip cycle, are all stripping operations appropriately planned, processing documented, and traceable to the hardware? YES NO

5.12.6 When stripping is not part of the standard process, has the reason for each strip been recorded on the individual part/lot documentation and the rework properly authorized (by appropriate authorities) and the need for corrective action considered? YES NO NA

- *Compliance Assessment Guidance: This question applies if stripping is required due to nonconformance after plating/ coating.*
- *NA applies if stripping is the expectation of the customer as defined in the purchase order or drawing.*

5.12.7 Is there a procedure for mechanical stripping that defines process controls when it is performed? YES NO NA

- *Compliance assessment Guidance: NA applies if no mechanical stripping is performed.*

5.12.8 Do strip procedures include an inspection of the stripped component following the strip operation? YES NO

- *Compliance Assessment Guidance: Inspection may include dimensional,*

surface finish, complete removal of coating, etching and damage.

5.13	<b>Brush Plating</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if brush plating is not within the scope of the audit.</i></li> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	
5.13.1	Are operators trained or certified as required by the customer or specification? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Certification of operators may be required; otherwise, internal training and approval is acceptable.</i></li> </ul>	YES NO
5.13.2	Are anodes controlled and specific to each process solution to avoid cross contamination?	YES NO
5.13.3	Is masking adequate to protect part from corrosion and unwanted coverage?	YES NO
5.13.4	Are equipment and solution in compliance with applicable customer requirements?	YES NO
5.14	<b>Nickel and Copper Electroforming</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if electroforming is not performed.</i></li> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	
5.14.1	Are reusable mandrels and fixtures controlled for identification and condition? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if mandrels are not re-used</i></li> </ul>	• YES NO NA
5.14.2	Is stress measurement performed on deposited coating when required? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if stress measurement is not required.</i></li> </ul>	• YES NO NA
5.14.3	Is the composition of deposited material controlled in accordance with customer requirements?	YES NO
5.14.4	Do mandrel removal procedures preclude part damage?	YES NO
5.15	<b>Titanium Cleaning, Etching and Handling</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if titanium is not processed within the scope of the audit.</i></li> </ul>	
5.15.1	Is there a procedure for the cleaning of titanium that includes cleaning methods within the scope of the audit, including alkaline cleaning by itself, alkaline cleaning with scale removal, and acid etching to remove alpha-case (stable oxide) layer, as applicable?	YES NO
5.15.2	Is anodic alkaline cleaning prohibited with titanium alloys, unless otherwise permitted by the customer or specification?	• YES NO NA

- *Compliance Assessment Guidance: NA applies if no electrocleaning capability exists, or if permitted by customer or specification.*
- *YES applies if cathodic cleaning is hard wired (no reversing switch) to electrocleaning tank.*

- |          |  |             |
|----------|--|-------------|
| 5.15.3   | Do procedures for cleaning titanium surfaces prohibit using methanol or halogenated substances unless permitted by customer or specification?  | • YES NO    |
|          | <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: If the procedures list specific materials to be used and do not include prohibited solvents, this requirement is satisfied.</i></li> </ul>       |             |
| 5.15.4   | Are parts alkaline cleaned and thoroughly rinsed (including complex configurations) prior to processing through acid etches unless customer and/or specification allows other methods of cleaning?                           | YES NO      |
| 5.15.5   | Is water used for final rinse, including spray rinses, de-ionized or monitored for halogen content when required by specification?   | • YES NO NA |
|          | <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if de-ionized water or halogen content monitoring is not required.</i></li> </ul>   |             |
| 5.15.6   | Do procedures require that parts be handled with clean fabric gloves after cleaning and drying? (Chemical resistant rubber gloves may be used during the wet processing steps.)?   | YES NO      |
|          | <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Gloves that contain stearates or powders to keep them from sticking together are disallowed.</i></li> </ul>                                      |             |
| 5.15.7   | Is water used to make additions to processing tanks and in-process rinsing tanks controlled for chlorine/chloride level as required by customer or specification?  | YES NO NA   |
|          | <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if chlorine/chloride controls on process solutions or in-process rinses are not required by customer or specification.</i></li> </ul> |             |
| 5.15.8   | Controlled metal removal (e.g. Alpha Case Removal)   | Section NA  |
|          | <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a controlled metal removal requirement is not imposed.</i></li> </ul>  |             |
| 5.15.8.1 | Have etch rate test coupons / panels been supplied or approved by customer for testing or (if supplier determined), are test coupon(s) of the same alloy and heat treat condition?   | YES NO      |
| 5.15.8.2 | Are stock removal (etching) rates determined daily prior to processing hardware or if not determined prior to processing, is the frequency based upon historical test data when allowed by specification?                    | YES NO      |
| 5.15.8.3 | For the method used to determine etch rate, is the resolution of the measurement instrument 10x more precise than the amount of material removed by the etch rate test.  | YES NO      |
|          | <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: If 0.007 is removed on the etch rate test panel then the resolution of the instrument must be better than 0.0007</i></li> </ul>                  |             |

*regardless of method used.*

5.15.8.4	Are stock removal (etching) rates posted or logged in a manner readily accessible by the operator? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Some primes require this data to be posted.</i></li> </ul>	YES NO
5.15.8.5	Does the etch rate determination meet minimum requirements called out in the processing procedure or customer requirement?	YES NO
5.15.8.6	Is the total thickness of alpha-case (oxide layer) either provided in advance by the customer, or determined in advance of etching, to ensure required alpha-case removal without excessive stock loss? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if alpha case is not in the scope of the audit</i></li> </ul>	YES NO NA
<b>5.16</b>	<b>Electropolishing</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if electropolishing is not in the scope of the audit.</i></li> </ul>	<b>Section NA</b>
5.16.1	Are stock removal rates determined to assure correct processing?	YES NO
5.16.2	Is the required surface finish defined or approved by the purchaser?	YES NO
5.16.3	Is the location of electrical contacts defined or approved by the purchaser when required by specification? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if not required by specification.</i></li> </ul>	YES NO NA
5.16.4	Are processing parameters including voltage/ current density, solution temperature and processing time defined in the work instructions?	YES NO
<b>5.17</b>	<b>Inspection</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if a modified scope audit.</i></li> </ul>	<b>Section NA</b>
5.17.1	Does the supplier utilize “first piece”/”lot” and “in process” inspection as required, to verify process?	YES NO
5.17.2	Do the lot inspection and lot test procedures require sufficient data to be recorded to demonstrate that the sample size and acceptance criteria were fully met, and that results are traceable to the person(s) who actually did the inspection/test? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Recording of just an average may not be acceptable to demonstrate each item measured met the acceptance requirement. In process checks, e.g. coating thickness, that are done to aid processing do not require recording.</i></li> </ul>	YES NO



**6. COMPLIANCE**

See NTGOP-001 Appendix VIII for the required number and composition of job audits.

**6.1 Job 1**

**Section NA**

- *Compliance Assessment Guidance: Section NA applies if this job audit is not required.*

*Note: If the part being audited is EC-LR (e.g. ITAR) the questions marked with an (EC) cannot be answered as they are technical information which cannot be displayed in eAuditNet. Auditor to answer EC questions with "EC/LR".*

**6.1.1 (EC) Job Identity – Job Audit Of \_\_\_\_\_**

6.1.1.1 Part Description \_\_\_\_\_  
*(If EC only include a general description, e.g. "turbine blade", "bracket")*

6.1.1.2 Part Number \_\_\_\_\_

6.1.1.3 Customer \_\_\_\_\_

6.1.1.4 Prime Contractor \_\_\_\_\_

6.1.1.5 Purchase Order/Revision Level \_\_\_\_\_

6.1.1.6 Part Quantity \_\_\_\_\_

6.1.1.7 Serial/Lot Numbers \_\_\_\_\_

6.1.1.8 Date of Job/Job Number \_\_\_\_\_

6.1.1.9 (EC) Alloy/Heat Treat Condition/Hardness \_\_\_\_\_  
 \_\_\_\_\_

6.1.1.10 Processing Specifications \_\_\_\_\_  
*(If EC only include specification number, e.g. "AMS2411")*

6.1.1.11 (EC) Other Purchase Order Requirements \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

6.1.2 Paperwork Review: Compare purchase order, shipping documents, referenced blueprints, specifications, shop travelers, process instructions, and inspection records.

6.1.2.1 Are part numbers, specifications, and revision levels flowed down correctly? YES NO

6.1.2.1.1 Are the frozen processes identified and if so, has customer approval been obtained? YES NO NA

- *Compliance Assessment Guidance: NA applies if no frozen processes.*

6.1.2.1.2	If a follow-on order, have purchase order requirements been reviewed for change?	YES NO
6.1.2.2	Are processing and inspection test requirements flowed down correctly?	YES NO
6.1.2.3	Does the shop paper provide the following:	
6.1.2.3.1	Traceable part identification?	YES NO
6.1.2.3.2	All processing steps identified including procedure numbers as applicable?	YES NO
6.1.2.3.3	All inspection and test requirements identified?	YES NO
6.1.2.3.4	All relevant variable data from process parameters controlled by operator recorded on shop paper or traceable to job in shop records?	YES NO
6.1.2.3.5	All inspection and test results recorded on shop paper or traceable in shop records?	YES NO
6.1.2.3.6	All operations, inspections, and tests done in sequence recorded or traceable to specific process lines/workstations, operator/inspector/technician and date done?	YES NO
6.1.2.3.7	If rework is done are all operations documented? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no rework is required for this job.</i></li> </ul>	YES NO NA
6.1.2.3.8	All test coupons identified and traceable to specific pieces/lots? Coupons processed through all processing steps on pieces/lots they represent; including pre- and post-process chemical and/or mechanical cleaning and thermal cycles? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if test coupons are not required to be processed with this job.</i></li> </ul>	YES NO NA
6.1.2.3.9	All process, test, and inspection equipment calibrated and traceable to part shop documents?	YES NO

**6.1.3 Process Observations**

6.1.3.1 Receiving, paperwork generation, requirement review and receiving inspection:

---



---

6.1.3.2 (EC) Pre-process cleaning (Record pre-cleaning method done, e.g. vapor degrease or none required)

---

---

6.1.3.3 (EC) Pre-process thermal operations (Record actual time and temperature or none required)

---

---

6.1.3.4 (EC) Masking (Record masking type, e.g. tape, wax, tool# or none required)

---

---

6.1.3.5 (EC) Fixturing/Racking (Record basket, hook, wire, tool#)

---

---

6.1.3.6 (EC) Processing (The continuous part after masking and racking. Record steps e.g. degrease, deox, anodize. Parameters need only be recorded if they are non-compliant)

---

---

6.1.3.7 (EC) Post-processing cleaning (Record method, e.g. solvent wipe, or none required)

---

---

6.1.3.8 (EC) Post-processing thermal operations (Record time and temperature, time delay since processing, none required)

---

6.1.3.9 Final Inspection

6.1.3.10 Packing and shipping (e.g. per customer requirement, interop)

6.1.3.11 (EC) Solution and/or material testing (e.g. reviewed and acceptable, if material testing (paint) what was done)

6.1.3.12 (EC) Periodic and/or lot testing (Record testing done, e.g. Lot - Visual, Thickness. Monthly - Salt Spray, Coating Weight)

6.1.3.13	Was required periodic testing performed and documented? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no periodic testing required.</i></li> </ul>	YES NO NA
----------	---	-----------

**6.1.4 Lot Acceptance Testing/Inspection**

6.1.4.1	Does the definition of “lot” as established by the supplier conform to the definition outlined by the specification?	YES NO
---------	--	--------

6.1.4.2	If parts were shipped before completion of lot acceptance testing, was this authorized in writing by the customer? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if parts were not shipped before completion of lot testing.</i></li> </ul>	YES NO NA
---------	---	-----------

6.1.4.3	Did the sampling plan meet specification and/or customer requirements?	YES NO
---------	--	--------

6.1.4.4	Was hardware held pending resolution of nonconformances noted during testing? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no non-conformances.</i></li> </ul>	YES NO NA
---------	--	-----------

6.1.4.5	Was lot testing required? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if no lot testing.</i></li> </ul>	YES NO NA
---------	---	-----------

6.1.4.6 Was lot testing performed and documented? YES NO NA  
 • *Compliance Assessment Guidance: NA applies if no lot testing.*

6.1.4.7 Was lot testing in conformance with specification and/or customer requirements? YES NO NA  
 • *Compliance Assessment Guidance: NA applies if no lot testing.*

**6.1.5 Operator Control and Job Acceptance**

6.1.5.1 List operator(s) who performed processing operations:  
 \_\_\_\_\_  
 \_\_\_\_\_

6.1.5.2 Are the operators trained and approved? YES NO

6.1.5.3 Are all operations, inspections and tests properly stamped off or signed off and dated, as required, by the correct operator or department? YES NO

Describe:  
 \_\_\_\_\_  
 \_\_\_\_\_

6.1.5.4 Does all processing, testing, and inspection conform to requirements? YES NO

6.1.6 Certification and Reports or Test Reports

6.1.6.1 Does certification show compliance to all requirements and reflect actual data as required? YES NO NA  
 • *Compliance Assessment Guidance: NA applies if certificate not raised before audit completed.*  
 • *If the PO/Customer has accepted a deviation to specification/ design requirements the deviation needs to be identified on the Certificate of Conformity.*

6.1.6.2 Certificate or test report number: \_\_\_\_\_ NA  
 • *Compliance Assessment Guidance: NA applies if certificate not raised before audit completed.*

6.1.6.3 Certification or test report date: \_\_\_\_\_ N/A  
 • *Compliance Assessment Guidance: NA applies if certificate not raised before audit completed.*



## APPENDIX B – TEST METHODS.

<b>B1.</b>	<b>HYDROGEN EMBRITTLEMENT TEST SPECIMEN PREPARATION</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if hydrogen embrittlement testing is not required.</i></li> </ul>	Section NA
<b>B1.1</b>	Are specimens manufactured and certified to the applicable specification, or other customer requirement?	YES NO
<b>B2.</b>	<b>HYDROGEN EMBRITTLEMENT TESTING</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if hydrogen embrittlement testing is not required.</i></li> </ul>	Section NA
<b>B2.1</b>	Is there an internal procedure covering this test method that identifies the specs to which it is compliant. <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory</i></li> </ul>	YES NO NA
<b>B2.2</b>	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
<b>B2.3</b>	Is the test carried out at the required frequency?	YES NO
<b>B2.4</b>	Is the testing performed in accordance with applicable specification?	YES NO
<b>B2.5</b>	Is the test device constructed and maintained so as to minimize bending stresses imparted to the specimen including lever arms properly balanced, fulcrums clean and free from excessive wear, and load train self-aligning and hanging freely from suspension point? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
<b>B2.6</b>	Does test procedure include, at a minimum, a visual inspection prior to testing to verify instrument operation in accordance with B2.5? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
<b>B2.7</b>	Do test records include the results of visual inspection of the notch for cracks after testing? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
<b>B2.8</b>	Does the test procedure describe calculations to determine loading? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
<b>B2.9</b>	Do test reports/certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO

B2.10	Does the review also include trend analysis and action if negative trends are identified? <i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i>	YES NO NA
B2.11	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by the customer if required? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed in-house</i></li> </ul>	YES NO NA
<b>B3.</b>	<b>METALLOGRAPHY</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if metallography testing is not required</i></li> </ul>	Section NA
B3.1	Is there an internal procedure covering the test method that identifies the specifications to which it is compliant? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B3.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B3.3	Is testing performed in accordance with applicable specifications?	YES NO
B3.4	Is the test carried out at the required frequency?	YES NO
B3.5	Are precautions taken to prevent cutting or grinding induced specimen damage? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B3.6	Do metallographic mounts display good edge retention with minimal edge rounding and with no gap between specimen and mount media? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B3.7	Does the preparation method produce section perpendicularity adequate for measurement of surface dimensions in accordance with applicable specification? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B3.8	Does the test procedure specify the magnification to be used for thickness measurement? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B3.9	Are the filar eye-pieces used for thickness measurement calibrated using stage	YES NO NA



micrometers?

- *Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.*

B3.10	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B3.11	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B3.12	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required. <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B4.</b>	<b>MICROHARDNESS</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if micro-hardness testing is not required.</i></li> </ul>	Section NA
B4.1	Is testing performed in accordance with applicable specifications?	YES NO
B4.2	Is the test carried out at the required frequency?	YES NO
B4.3	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B4.4	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B4.5	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required. <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if the test is performed in-house.</i></li> </ul>	YES NO NA
B4.6	Microhardness Testing Method <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: Section NA applies if the test is performed by external laboratory.</i></li> </ul>	Section NA
B4.6.1	Is there an internal procedure covering the test method that identifies the specifications to which it is compliant?	YES NO
B4.6.2	Is the person doing the testing identified as trained/competent to do the test?	YES NO
B4.6.3	Does the test procedure specify the default sampling location (i.e., tested on cross section or directly on surface)?	YES NO

B4.6.4	Is testing performed in an area free from vibration?	YES NO
B4.6.5	Is the specimen surface finish adequate that the perimeter of the indentation is clearly defined in the field of the microscope?	YES NO
B4.6.7	Are specimen flatness (lack of edge rounding) and alignment adequate to assure that:	
B4.6.7.1	Indentations closest to the edge are clearly defined in the field of focus?	YES NO
B4.6.7.2	(Knoop) One leg of long diagonal is no more that 20% greater than the other? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if Knoop testing is not done.</i></li> </ul>	YES NO NA
B4.6.7.3	(Vickers) Both legs of same diagonals are not noticeably different? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if Vickers testing is not done.</i></li> </ul>	YES NO NA
B4.7	Are indentations, located closer to the edge of the specimen than the length of the indentation diagonal when measured perpendicular to the edge, disregarded?	YES NO
B4.8	Are hardness test machines verified to applicable specification?	YES NO
B4.9	Do written procedures establish periodicity of verification (to be “daily” when machine is used)?	YES NO
B4.10	Does repeatability conform to applicable specification?	YES NO
B4.11	Does maximum error conform to applicable specification?	YES NO
B4.12	Are hardness blocks certified to applicable specification?	YES NO
B4.13	If microhardness values are converted to other hardness scales, is the conversion table that was used recorded? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if conversion tables are not used.</i></li> </ul>	YES NO NA

List table(s) used

---

<b>B5.</b>	<b>CORROSION/SALT SPRAY TESTING</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if corrosion testing is not required.</i></li> </ul>	<b>Section NA</b>
B5.1	Is there an internal procedure covering the test method that identifies the specifications to which it is compliant? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA

B5.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B5.3	Is testing performed in accordance with applicable specifications?	YES NO
B5.4	Is the test carried out at the required frequency?	YES NO
B5.5	Are specimens suitably masked or protected so as to prevent corrosion of cut or otherwise uncoated edges? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory or if test pieces are coated all over.</i></li> </ul>	YES NO NA
B5.6	Are specimens prepared and handled so as to preclude the introduction of foreign materials to the test surface?	YES NO
B5.7	Are the following items recorded? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> <li><i>The period for which the cabinet is open for daily checks (which should be the minimum necessary to perform the checks and observe and record any visible changes to the test pieces) is not required to be recorded.</i></li> </ul>	Section NA
B5.7.1	The type of salt and water used in preparing the salt solution?	YES NO
B5.7.2	The chamber temperature?	YES NO
B5.7.3	The collection rate?	YES NO
B5.7.4	The specific gravity or concentration of the condensate?	YES NO
B5.7.5	The pH of the condensate?	YES NO
B5.7.6	The method of cleaning specimens before and after testing?	YES NO
B5.7.7	The method of supporting or suspending the specimen in the chamber?	YES NO
B5.7.8	The masking or protection used?	YES NO
B5.7.9	The exposure period?	YES NO
B5.7.10	Interruption in exposure?	YES NO
B5.7.11	The angle at which the specimen is positioned?	YES NO
B5.8	Does the procedure specify a method to determine the disposition of suspect indications? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> <li><i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	YES NO NA
B5.9	Does the salt used for the solution make-up fully conform to that required by the latest issue of the test specification? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	YES NO NA
B5.10	Does the water used for solution make-up conform to the applicable specification?	YES NO NA

	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed by external laboratory.</i></li> </ul>	
B5.11	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B5.12	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B5.13	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required. <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B6</b>	<b>WATER IMMERSION/HUMIDITY TESTING</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if immersion/humidity testing is not required.</i></li> </ul>	Section NA
B6.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant. <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory</i></li> </ul>	YES NO NA
B6.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B6.3	Is the test carried out at the required frequency?	YES NO
B6.4	Is testing performed in accordance with specification requirements?	YES NO
B6.5	Does the test procedure specify the control of test water and is there evidence that the correct water is used? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B6.6	Does the procedure specify a method to determine the disposition of suspect indications? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> <li><i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	YES NO NA
B6.7	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B6.8	Does the review also include trend analysis and action if negative trends are identified?	YES NO NA

- *Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.*

B6.9 If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required. YES NO NA

- *Compliance Assessment Guidance: NA applies if the test is performed in-house*

**B7. HEAT RESISTANCE TESTING** Section NA

- *Compliance Assessment Guidance: NA applies if heat resistance testing is not required.*

B7.1 Is there an internal procedure covering this test method that identifies the specs to which it is compliant? YES NO NA

- *Compliance Assessment Guidance: NA applies if testing is performed by external laboratory*

B7.2 Is the person doing the testing identified as trained/competent to do the test? YES NO NA

- *Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.*

B7.3 Is the test carried out at the required frequency? YES NO

B7.4 Is testing performed in accordance with the applicable specification? YES NO

B7.5 Does the procedure specify a method to determine the disposition of suspect indications? YES NO NA

- *Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.*
- *Referee magnification, see AC7108 section 2.4 is an example method of disposition.*

B7.6 Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification? YES NO

B7.7 Does the review also include trend analysis and action if negative trends are identified? YES NO NA

- *Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.*

B7.8 If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? YES NO NA

- *Compliance Assessment Guidance: NA applies if the test is performed in-house*

**B8. ADHESION-WEAR TESTING** Section NA

- *Compliance Assessment Guidance: NA applies if adhesion-wear testing is not required.*

B8.1 Is there an internal procedure covering this test method that identifies the YES NO NA

	specs to which it is compliant?	
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory</i></li> </ul>	
B8.2	Is the person doing the testing identified as trained/competent to do the test?	YES NO NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	
B8.3	Is the test carried out at the required frequency?	YES NO
B8.4	Is testing performed in accordance with the applicable specification?	YES NO
B8.5	Does the procedure specify a method to determine the disposition of suspect indications?	YES NO NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> <li><i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	
B8.6	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B8.7	Does the review also include trend analysis and action if negative trends are identified?	YES NO NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	
B8.8	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required?	YES NO NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	
<b>B9.</b>	<b>TABER WEAR TESTING</b>	Section NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if taber wear testing is not required.</i></li> </ul>	
B9.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant.	YES NO NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory</i></li> </ul>	
B9.2	Is the person doing the testing identified as trained/competent to do the test.?	YES NO NA
	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	
B9.3	Is the test carried out at the required frequency?	YES NO
B9.4	Is testing performed in accordance with applicable specification?	YES NO
B9.5	Are abrasive wheels resurfaced prior to each test?	YES NO NA

	<ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	
B9.6	<p>Are abrasive wheels updated in accordance with their life limit date?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B9.7	<p>Are test devices standardized in accordance with applicable specification prior to each test?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B9.8	<p>Are specimens conditioned in accordance with the specification and tested in the conditioning environment or immediately upon removal from the conditioning environment?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B9.9	<p>Unless determined by weight change does the test procedure specify a method to determine the disposition of suspect indications??</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory or if visual acceptance criteria is not defined.</i></li> <li><i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	YES NO NA
B9.10	<p>Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?</p>	YES NO
B9.11	<p>Does the review also include trend analysis and action if negative trends are identified?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B9.12	<p>If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B10.</b>	<p><b>ADHESION TAPE TESTING</b></p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if adhesion tape testing is not required.</i></li> </ul>	Section NA
B10.1	<p>Is there an internal procedure covering this test method that identifies the specs to which it is compliant?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory</i></li> </ul>	YES NO NA
B10.2	<p>Is the person doing the testing identified as trained/competent to do the test?</p> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA

B10.3	Is the test carried out at the required frequency?	YES NO
B10.4	Is testing performed in accordance with applicable specification?	YES NO
B10.5	Does the test procedure specify conditioning environment and duration and the allowable time between removal from the conditioning environment and testing? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory or if conditioning is not required.</i></li> </ul>	YES NO NA
B10.6	Does the test procedure specify tape characteristics and, when required, roller mass and hardness? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> <li><i>Use of a roller is not always required for tape adhesion testing. When a roller is not required the question should just consider the tape used.</i></li> </ul>	YES NO NA
B10.7	Does the procedure specify a method to determine the disposition of suspect indications? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> <li><i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	YES NO NA
B10.8	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B10.9	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B10.10	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B11.</b>	<b>ADHESION SCRATCH AND CHISEL TESTING</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if scratch and chisel testing is not required.</i></li> </ul>	Section NA
B11.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B11.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA



B11.3	Is the test carried out at the required frequency?	YES NO
B11.4	Is scratch and chisel testing performed in accordance with the applicable specification?	YES NO
B11.5	Does the procedure specify a method to determine the disposition of suspect indications? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> <li>• <i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	YES NO NA
B11.6	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B11.7	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B11.8	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B12.</b>	<b>ADHESION BEND TESTING (METALLIC COATINGS)</b> <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if adhesion bend testing is not required.</i></li> </ul>	Section NA
B12.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B12.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B12.3	Is the test carried out at the required frequency?	YES NO
B12.4	Is the testing performed in accordance with applicable specification?	YES NO
B12.5	Is the bend mandrel diameter in accordance with the test specification? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory or if a mandrel is not used.</i></li> </ul>	YES NO NA
B12.6	Does the procedure specify a method to determine the disposition of suspect indications? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by</i></li> </ul>	YES NO NA

	<ul style="list-style-type: none"> <li><i>external laboratory.</i></li> <li><i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	
B12.7	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B12.8	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B12.9	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B13.</b>	<b>COATING WEIGHT TESTING</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if coating weight testing is not required.</i></li> </ul>	<b>Section NA</b>
B13.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B13.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B13.3	Is the test carried out at the required frequency?	YES NO
B13.4	Is testing performed in accordance with the applicable specification?	YES NO
B13.5	Does the test record include the initial and final weight and surface area of the specimen determined as necessary to satisfy the level of precision specified by the specification? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B13.6	Does the test procedure describe the calculations to determine coating weight? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B13.7	Are test specimens simple in geometry so as to minimize measurement induced inaccuracies? (A thin panel with parallel sides is recommended)	YES NO
B13.8	Are stripping solutions such that they do not chemically attack the basis material. Is solution selection qualified by trial immersion of uncoated specimens of the same basis material as the test specimens or is solution	YES NO NA

specified by the specification being used?

- *Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.*

B13.9 Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification? YES NO

B13.10 Does the review also include trend analysis and action if negative trends are identified? YES NO NA

- *Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.*

B13.11 If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? YES NO NA

- *Compliance Assessment Guidance: NA applies if the test is performed in-house*

**B14. CONDUCTIVITY TESTING FOR WATER PURITY Section NA**

B14.1 Is there an internal procedure covering this test method that identifies the specs to which it is compliant? YES NO

B14.2 Is the person doing the testing identified as trained/competent to do the test? YES NO

B14.3 Is testing performed in accordance with applicable specification? YES NO

B14.4 If temperature compensation is not performed are the test specimen and reference standard at the same temperature as surrounding medium? YES NO NA

- *Compliance Assessment Guidance: NA applies if the instrument performs temperature compensation.*

**B15. RESISTIVITY TESTING Section NA**

- *Compliance Assessment Guidance: NA applies if resistivity testing is not required*

B15.1 Is there an internal procedure covering this test method that identifies the specs to which it is compliant? YES NO NA

- *Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.*

B15.2 Is the person doing the testing identified as trained/competent to do the test? YES NO NA

- *Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.*

B15.3 Is the test carried out at the required frequency? YES NO

B15.4 Is testing performed in accordance with applicable specification? YES NO

B15.5 Are test specimens and reference standard the same temperature as the surrounding medium? YES NO NA

- *Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.*

B15.6 Is certified resistivity based on more than one measurement per specimen? YES NO NA

B15.7 If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required?

- *Compliance Assessment Guidance: NA applies if the test is performed in-house*

**B16. THICKNESS MEASUREMENT** **Section NA**

- *Compliance Assessment Guidance: NA applies if thickness measurement is not required.*

B16.1 Is there an internal procedure covering this test method that identifies the specifications to which it is compliant? YES NO NA

- *Compliance Assessment Guidance: NA Applies for direct measurement using mechanical instruments, e.g. micrometer, vernier caliper.*

B16.2 Is the person doing the testing identified as trained/competent to do the test? YES NO

B16.3 Are both direct measurement and indirect measurement instruments periodically calibrated? YES NO

B16.4 Is thickness measurement performed in accordance with the applicable specification? YES NO

B16.5 Indirect thickness measurement e.g. magnetic, eddy current, XRF, etc. Section NA

- *Compliance Assessment Guidance: NA Applies if the supplier does not use indirect measurement techniques.*

B16.5.1 Are thickness standards controlled, available to operators, appropriate for the range required and traceable to National Standards? YES NO NA

- *Compliance Assessment Guidance: NA Applies if XRF that uses the fundamental parameter technique is the only indirect method used.*

B16.5.2 Is instrument verification carried out at the appropriate frequency for the instrument type and technique used and is it defined in an internal instruction? YES NO NA

- *Compliance Assessment Guidance: NA Applies if XRF that uses the fundamental parameter technique is the only indirect method used.*
- *Full verification is not required for other XRF machines and other instruments that have a stored calibration curve for the coating system and substrate. Refer to refer to instrument manual and thickness measurement specification for other instrument types.*

B16.5.3 Is a record of verification maintained, and are values within tolerance? YES NO NA

- *Compliance Assessment Guidance: NA Applies if XRF that uses the fundamental parameter technique is the only indirect method used.*
- *The information recorded must be sufficient to demonstrate that the instrument was correctly set up and verified for an historical job.*

- *Record of verification is not required for in process checks, it is only required for formal buy-off inspection.*

B16.6	Are specific locations for thickness measurement defined for processed parts?	YES NO
B16.7	Do thickness measurement methods and locations take into account error associated with edge effect, curvature, and coating/base material properties as applicable?	YES NO
<b>B17.</b>	<b>SOLDERABILITY</b>	<b>Section NA</b>
	<ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if solderability testing is not required</i></li> </ul>	
B17.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B17.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B17.3	Is the test carried out at the required frequency?	YES NO
B17.4	Is testing performed in accordance with the applicable specification?	YES NO
B17.5	Is testing performed on "as-coated" specimens without surface cleaning beyond that specified in the coating procedure? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B17.6	Are specimen immersion and removal rates, as well as time in solder pot, tightly controlled in accordance with the applicable specifications? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B17.7	Does the procedure specify a method to determine the disposition of suspect indications? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> <li>• <i>Referee magnification, see AC7108 section 2.4 is an example method of disposition.</i></li> </ul>	YES NO NA
B17.8	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B17.9	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li>• <i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA

B17.10	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B18.</b>	<b>ADHESION TESTING HEAT &amp; QUENCH</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if heat &amp; quench testing is not required</i></li> </ul>	Section NA
B18.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B18.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B18.3	Is the test carried out at the required frequency?	YES NO
B18.4	Is testing performed in accordance with the applicable specification?	YES NO
B18.5	Do test reports/ certs show evidence of review, compliance to specification or correct retesting/ replacement testing or customer notification?	YES NO
B18.6	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B18.7	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B19.</b>	<b>CLIMBING DRUM PEEL TESTING</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if climbing drum peel testing is not required</i></li> </ul>	Section NA
B19.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B19.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B19.3	Is the test carried out at the required frequency?	YES NO

B19.4	Is testing performed in accordance with applicable specification?	YES NO
B19.5	Is there a shop document that records and provides traceability for the test piece manufacturer, including material certs?	YES NO
B19.6	Is the test machine calibrated (load cell), serviced and in good condition? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B19.7	Does the test method show that the load is applied at the correct speed? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B19.8	Is the formula for determining the peel strength correct? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B19.9	Does the review also include trend analysis and action if negative trends are identified? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA Applies when the test is done as a batch/lot acceptance test and not a periodic process performance test.</i></li> </ul>	YES NO NA
B19.10	If testing is sub-contracted is the Laboratory listed on the supplier's Approved Supplier List and is it approved by customer if required? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if the test is performed in-house</i></li> </ul>	YES NO NA
<b>B20.</b>	<b>POROSITY TESTING</b> <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if porosity testing is not required.</i></li> </ul>	Section NA
B20.1	Is there an internal procedure covering this test method that identifies the specs to which it is compliant? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B20.2	Is the person doing the testing identified as trained/competent to do the test? <ul style="list-style-type: none"> <li><i>Compliance Assessment Guidance: NA applies if testing is performed by external laboratory.</i></li> </ul>	YES NO NA
B20.3	Is the test carried out at the required frequency?	YES NO
B20.4	Is testing performed in accordance with the applicable specification?	YES NO
B20.5	Is the test solution made fresh each day or tested for effectiveness prior to use?	YES NO
B20.6	Is the component, or test piece where permitted, being kept wet/submersed for the required time?	YES NO

<b>B21.</b>	<b>OTHER TEST METHOD</b>	Section NA
	<ul style="list-style-type: none"><li>• Compliance Assessment Guidance: Section NA applies if no other testing is done or audited.</li></ul>	
B21.1	Is testing performed in accordance with the applicable specification?  (Free text box for describing test and audit results)	YES NO NA



**AC7108 APPENDIX C – EXAMPLE TEST MATRIX**

| The example Test Matrix has been removed from here and placed in the Chemical Process Audit Handbook.

|

## AC7108 APPENDIX D – PROCESS PARAMETERS TO BE RECORDED

Note: Temperature is typically controlled and recorded on a periodic basis, e.g. daily, weekly. If the operator is required to change the temperature of a bath for different specifications, e.g. sulfuric tank for type II or type III anodize then the temperature must be recorded on the route card or on a log traceable to the route card.

### Pre-Cleaning

None as long as method is non-etching. Process sheet must specify the maximum time.

Immersion/Contact Time if etching.

### Masking

*It is only necessary to record the masking family, e.g. tape, lacquer, bung, etc.*

### Abrasive Blasting

Media

Pressure

Offset distance

### Cleaning

None so long as method is non-etching. Process sheet must specify the maximum time.

Immersion/Contact Time if etching.

### Rinsing

None.

### De-Oxidize/Pickle

Immersion Time.

### Electrolytic Clean

Immersion time

Voltage or Amperage - as required by specification.

Surface area if current density (amperage) controlled.

Anodic/Cathodic/Reversing unless it is fixed.

### Acid Desmut

None for dilute acid solutions used for alkaline etch desmut or neutralizing. Process sheet specify maximum immersion time.

### Etching

Immersion Time

**Chemical Milling**

Immersion Time

**Conversion Coating**

Immersion Time

**Electroless Plating**

Immersion Time

**Anodize**

Voltage or Amperage - as required by specification.  
Surface area if current density (amperage) controlled.  
Anodize Time

**Sealing/Dying**

Immersion Time

**Barrel Plating**

Voltage or Amperage - as required by specification  
Surface area if current density (amperage) controlled.  
Time

**Brush Plating**

Surface Area  
Solution Type  
Voltage  
Ampere Hours

**Strike**

Voltage or Amperage - as required by specification  
Surface area if current density (amperage) controlled.  
Time

**Electroplating**

Voltage or amperage – as required by specification  
Surface area – if controlled by amperage.  
Time

*NOTE: Where a cathometer is used to control the plating current density the actual current density, rather than amperage, shall be recorded.*

**Ramp Rates**

Time current is initially applied  
Time the required voltage/amperage is reached.

**Painting/Dry Film Coating**

Primer    Mixing Information  
            Base Batch#  
            Mix Start Time  
            Viscosity  
            Spraying information  
            Coat 1 Start  
            Coat 2 Start  
            Cure Start  
            Temperature

Top  
Coat      Mixing Information  
            Base Batch#  
            Mix Start Time  
            Viscosity  
            Spraying information  
            Coat 1 Start  
            Coat 2 Start  
            Cure Start  
            Temperature

**AC7108 APPENDIX E – MINIMUM BUY-OFF STEPS.**

This Appendix identifies the process and inspection steps that can be combined into a single buy-off when carried out by the same person.

If a step(s) have been started by one person and finished by another person then each person must buy-off by applying a stamp or signature/initial sign-off and dated for the step(s) or portion of the step they have done, unless an alternative responsibility is clearly defined..

Thermal treatments at temperatures of greater than 250°F (121°C) require a separate buy-off.

If the sequence of steps contains more than one main process, e.g. conversion and paint, then each main process must have a buy-off.

Potential Process Steps	Buy-Off Requirement
Incoming inspection	Buy-Off Step
Pre-process cleaning method(s)	Buy-Off Step -These steps can be combined into a single buy-off unless otherwise required above.
Pre-coat thermal treatment (If greater than 250°F (121°C) this requires a separate buy-off).	
Masking	
Fixturing, racking	
Degrease / Alkaline Clean.	
Rinse and Water Break Free Test (Note: The WBF test requires a positive recognition, e.g. a tick box.)	
Etch Clean / Deox / Activation	
Rinse and Water Break Free Test (Note: The WBF test requires a positive recognition, e.g. a tick box.)	
Strike / Prime	
Process: (e.g. Anodize, Conversion, Passivate, Electroplating, Painting, Etching ...).	
Drying (If greater than 250°F (121°C) this requires a separate buy-off).	
Post-process cleaning methods	
Post-coating thermal treatment (If greater than 250°F (121°C) this requires a separate buy-off).	
Lot Inspection and Testing e.g. Adhesion, Thickness, Visual.	Buy-Off Step -These inspections / tests can be combined into a single buy-off unless otherwise required above. Also see 5.17.2
Final Inspection	Buy-Off Step - These steps can be combined into a single buy-off unless otherwise required above.
Packaging.	
Shipping	

NOTE: For manufacturing facilities, when final inspection, packaging and shipping operations are outside the scope of the CP audit, buy-off of these steps is not applicable.

**AC7108 APPENDIX F - EXAMPLE SOLUTION MATRIX**

The example Solution Matrix has been deleted from here and moved to the Chemical Process Audit Handbook.

## AC7108 APPENDIX G – TABLE 1, DEFAULT FREQUENCY FOR PERIODIC TESTING

### 1. PURPOSE

To define the default periodic test frequencies adopted by the Chemical Processing Task Group for periodic tests where the specification or purchaser does not specifically define them. Other test requirements (number of samples, size of samples, test parameters etc) shall be as defined in the specification; where these are not defined customer agreement, or Prime agreement, shall be obtained.

To provide agreed clarification of specification requirements.

### 2. SCOPE

This document applies to National Specifications and Consensus Specifications flowed down in OEM contracts from Prime Companies requiring AC7108 Accreditation for that process - it does not apply to customer owned specifications.

An example situation where Table 1 Part A applies is AMS2412 Rev G. AMS2412 states, "Composition (3.4.2), hydrogen embrittlement (3.4.4), and tests of cleaning and plating solutions (See 8.4) are periodic tests and shall be performed at a frequency selected by the processor unless frequency of testing is specified by purchaser."

### 3. GENERAL

This Appendix does not contain any questions but does identify requirements that are to be applied to audits subject to AC7108 Accreditation.

### 4. DEFINITIONS

Lot Test: See AC7108 Para 2.4 for definition of Lot.  
Daily Test: A test shall be done each day the process is used.  
Weekly Test: Time between processing test pieces is not to exceed 7 calendar days.  
Monthly Test: Time between processing test pieces is not to exceed 35 calendar days.  
Quarterly Test: Time between processing test pieces is not to exceed 100 calendar days.

5. TABLE 1 - PART A

Table 1 Part A defines the default frequency requirements.

Periodic Test	AC7108 App B Designation	Frequency
Adhesion Test – Paints.	B6, B10	Monthly
Adhesion Test – Metallic Coatings	B7, B8, B10, B11, B12, B18, B19	Monthly
Hydrogen Embrittlement	B2	Monthly
Hydrogen Pick-Up		Monthly
IGA/EGP	B3	Monthly
Micro Hardness	B4	Monthly
Corrosion Testing for Protective Coatings (e.g. electroplate, anodise, chromate)	B5, B6	Monthly
Testing for Passivated Surface.	B5, B6	Weekly
Erosion or Wear Testing	B9	Monthly
Coating Weight Testing	B13	Monthly
Resistivity Testing	B15	NA - no known periodic test requirement for chemical processing.
Thickness	B16	NA - no known periodic test requirement for chemical processing.
Solderability	B17	NA - no known periodic test requirement for chemical processing.
Porosity Testing	B20	Monthly
Composition – Alloy Plate including Electroless Nickel and Gold.		Monthly
Composition – Pure Plate (e.g. Silver)		Quarterly



**6. TABLE 1 - PART B**

Table 1 Part B provides Task Group clarifications of specification requirements.

Specification Revision and Amendment	Paragraph	Clarification