

XIX PLATING

SECTION I – Procedure:

A 1. Identify the drawing, specification or document invokes the requirements for plating. Specify:

A	2a. Does a written detailed procedure exist and is it utilized for the plating process? Identify procedure number and revision.	Yes	No	N/A
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	2b. Are procedures readily available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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A	3a. Is the procedure approved by the Customer? List Reference Approval Number, if applicable:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	3b. Does the procedure require review/approval by the government?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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A	4. Are procedures/work instructions adequate for control of:	Sat	Unsat	N/A
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	a. (Proper Equipment) etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	b. (Proper Materials) etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	c. Temperature monitoring - preheat, spraying temp, cooling, etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	d. Methods for masking areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	e. Pressure and flow settings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	f. Preparation of Basis material.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	g. Rate of application/time and plating bath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	h. Inspection process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	i. Test specimens/coupons (when required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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- | | Sat | Unsat | N/A |
|--|--------------------------|--------------------------|--------------------------|
| j. Sample sizes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| k. Make up and operating ranges of solutions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| l. Operating temperature of solutions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| m. Frequency of solution analysis | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| n. Voltage/Amperage ranges(current densities) where applicable. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| o. Frequency of calibrating temperatures indicators, meters oven, etc. and accuracy required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| p. Operational controls for cleaning, plating, baking, etc. (e.g. flowchart, traveler, router) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| q. Records to be maintained | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A 5. Does procedure include system for identification of inspection status on parts and documentation? (e.g. inspection stamp) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION II – Record Review

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|---|--------------------------|--------------------------|--------------------------|
| A 6. Identify inspection methods used to verify conformance with procedures and standards | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • Visual <input type="checkbox"/> | | | |
| • Adhesion Test <input type="checkbox"/> | | | |
| • Hardness <input type="checkbox"/> | | | |
| • Thickness <input type="checkbox"/> | | | |
| • Other (list) <input type="checkbox"/> | | | |
| • Mechanical Test) <input type="checkbox"/> | | | |
| • Surface Finish <input type="checkbox"/> | | | |
| • Nondestructive Test <input type="checkbox"/> | | | |
| • Other Destructive Tests <input type="checkbox"/> | | | |

- | | | Yes | No | |
|---|--|--------------------------|--------------------------|---------------------------------|
| A | 7. What inspection documents exist and are they maintained to confirm inspection process was performed? | <input type="checkbox"/> | <input type="checkbox"/> | |
| | a. Are inspection documents properly completed and maintained? | <input type="checkbox"/> | <input type="checkbox"/> | |
| | b. Review and record number of samples: _____ | | | |
| A | 8. Is traceability maintained for material which has been plated? | <input type="checkbox"/> | <input type="checkbox"/> | |
| A | 9. Is inspection data reviewed and accepted by qualified personnel?: | <input type="checkbox"/> | <input type="checkbox"/> | |
| A | 10. Are all tools, gages, meters, utilized for monitoring and/or inspection a part of the manufacturer's calibration program? | <input type="checkbox"/> | <input type="checkbox"/> | N/A
<input type="checkbox"/> |
| A | 11. Are certifications for raw materials used in plating process reviewed for acceptance and maintained on file for review? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 12. Verify prohibition of reclaimed material as may be required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 13. Adequate inspection work records are maintained. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | 14. The shop traveler and work records can be traced to the inspection personnel. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION III – OBSERVATION OF PLATING PROCESS

Sat Unsat

Detailed observation of platers (complete one section for each plater observed). NOTE: if determined to be N/A, provide explanation.

A 15. Identify process observed. Specify class and type and/or grade.

A a. Plater identification: (name, badge or clock #, shift)

A b. Basis material(s) being welded.

c. Identify plating material.

A d. Is the plater qualified for observed plating procedure?

Sat Unsat N/A

A e. Is the plater familiar with details of the procedure?

A f. Procedure number:

A g. Is it readily available to the plater and inspector?

A 16. Are their adequate methods of segregating accepted and rejected materials in use?

- | | | Sat | Unsat |
|---|--|--------------------------|--------------------------|
| A | 17. Tanks are placarded with solutions they contain and the operating parameters. | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 18. Solution tanks operated at elevated temperatures are equipped with temperature indicating devices. | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 19. Solutions requiring agitation are equipped with acceptable devices to accomplish this requirement. | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 20. Ammeters, voltmeters, thermometers, are "stickered" to indicate calibration next due date. | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 21. Clocks and/or timers are available where applicable. | <input type="checkbox"/> | <input type="checkbox"/> |
| | | Sat | Unsat |
| A | 22.
a. Are pieces to be plated cleaned prior to process. | <input type="checkbox"/> | <input type="checkbox"/> |
| A | b. List methods and materials used, if applicable. | <input type="checkbox"/> | <input type="checkbox"/> |
| A | c. Is cleanliness maintained prior to plating? | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 23. Rinse tanks are as follows:
a. Free of contamination detrimental to the process | <input type="checkbox"/> | <input type="checkbox"/> |
| A | b. Provide for separate rinses following acid and caustic solutions. | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 24. The supplier has thickness measuring equipment available. Identify: | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 25. The thickness measuring equipment is properly calibrated. | <input type="checkbox"/> | <input type="checkbox"/> |

What frequency?_____ Last calibration date_____

		Sat	Unsat	N/A
A	26. Verify test coupons are processed with production material as required by the specification and they are properly identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	27. Process, general – good practices:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	a. Parts are visually examined prior to plating for material defects, dimensions (critical surfaces), heat treat condition, dissimilar metals, presence of residual stresses, etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	b. Parts are visually examined after removal from processing solutions for copper immersion products, nonsoluble smuts, pitting, excessively etched surfaces, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	c. Parts visually examined for a water break free surface before subsequent processing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	d. Wiping and cleaning clothes are checked for grease, oil, etc. content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	28. A certified stress relieve/bake oven is available meeting the following requirements:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	a. Uniformity survey conducted at specified frequency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	b. Accurate at the temperature used to specified tolerances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	What range – Min _____ Max_____			
A	b. Equipped with a recording chart that meets specified degrees per inch.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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|---|---|--------------------------|--------------------------|--------------------------|
| A | e. Control equipment is periodically calibrated and maintained. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | What frequency? | | | |
| A | f. Is the stress relief/baking accomplished within specified time.? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | g. Are the parts held in over for specified time? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | Sat | Unsat | N/A |
| A | 29. Housekeeping – Good Practices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| B | a. Finishing tanks, electrical equipment, bus bars, and electrodes are relatively free of corrosion. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | b. Excessive materials are not allowed in finishing area. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | c. Chemicals and acids are stored in an area separate from finishing area. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | d. Safety precautions are in practice, i.e. proper ventilation, personnel and parts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | e. Tanks, such as anodize, chrome, hot alkaline cleaners, hot deoxidizers, etc., are equipped with exhaust systems. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 30. Adequate cleaning facilities are available and in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 31. Equipment is constructed and arranged to permit a uniform and controlled operation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | a. Sufficient working area has been allocated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | b. adequate fire protection devices are maintained and readily available for use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A | 32. Packaging and Shipping: | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

A a. Is adequate protection taken to prevent damage in shipment? (internal and external)

A b. Is adequate control provided to assure that packaging, marking and documentation is in accordance with applicable requirements.?

Additional Comments/Concerns

General instructions for performing plating process audits:

- A. Determine the types of materials that are plated and the types of plating/coating that are performed at the supplier.
- B. Review a cross section of open and closed orders to measure historical performance. Closed orders should span a two to three year period if possible
- C. Choose a cross section of materials. E.g. type I materials such as 304 or 316 stainless, Type III nickel based alloys with particular attention to X-750 which has special baking requirements, type IV carbon and low alloy steels such as higher strength 4140/4340, type VI materials such as XM-13, 17-4PH, A286. A sample review of each of these materials is appropriate.
- D. Check requirements passed down to the plater in the purchase order from the parts supplier to the plater. Does the purchase order provide specific guidance, such as:
 - 1) Plating, examination and return of coupons

- 2) pre-plating stress relief for higher strength materials
- 3) post bake performed when required and performed at the right length of time
- 4) embrittlement relief testing
- 5) Review the plater certification versus the format requirements of the specification. Check to ensure that information is completed consistent with expectations (e.g. is a post-bake heat treat is required, is a temperature and bake time documented. Are coupons available (not required to retain but many vendors do as objective evidence.)
- 6) Perform similar compliance reviews on a sample basis for other types of plating. Read the specification carefully and understand all the requirements and when they should be complied with.