|  |  |  |
| --- | --- | --- |
| **SECTION I - Procedure:** | |  |
| A 1. | Identify the drawing; specification or document invokes the requirements for plating. Specify: |  |
| A. 2 | a. Does a written detailed procedure exist and is it utilized for the plating process? Identify procedure number and revision: | \_\_\_Yes \_\_\_No \_\_\_N/A |
|  | b. Are procedures readily available? | \_\_\_Yes \_\_\_No \_\_\_N/A |
| A 3 | a. Is the procedure approved by the Customer? List Reference Approval Number, if applicable: | \_\_\_Yes \_\_\_No \_\_\_N/A |
|  | 1. Does the procedure require review/approval by the government? | \_\_\_Yes \_\_\_No \_\_\_N/A |
| A 4. | Are procedures/work instructions adequate for control of: |  |
|  | a. (Proper Equipment), etc. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | b. (Proper Materials), etc. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | c. Temperature monitoring - preheat, spraying temp, cooling, etc | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | d. Methods for masking areas | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | e. Pressure and flow settings | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | f. Preparation of Basis material. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | g. Rate of application/time and plating bath | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | h. Inspection process | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | i. Test specimens/coupons (when required) | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |

|  |  |  |
| --- | --- | --- |
|  | j. Sample sizes | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | k. Make up and operating ranges of solutions | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | l. Operating temperature of solutions | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | m. Frequency of solution analysis | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | n. Voltage/Amperage ranges (current densities) where applicable. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | o. Frequency of calibrating temperatures indicators, meters oven, etc. and accuracy required. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | p. Operational controls for cleaning, plating, baking, etc. (e.g. flowchart, traveler, router) | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | q. Records to be maintained | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |

|  |  |  |  |
| --- | --- | --- | --- |
| A 5. | Does procedure include system for identification of inspection status on parts and documentation? (E.g. inspection stamp) | | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| SECTION II - Record Review | | |  |
| A 6. | Identify inspection methods used to verify conformance with procedures and standards | | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | \* Visual \_\_\_\_  \* Adhesion Test \_\_\_\_  \* Hardness \_\_\_\_  \* Thickness \_\_\_\_  \* Other (list) \_\_\_\_ | Mechanical Test \_\_\_\_  Surface Finish \_\_\_\_  Nondestructive Test \_\_\_\_  Other Destructive Tests \_\_\_\_ |  |
| A 7. | What inspection documents exist and are they maintained to confirm inspection process was performed? | | \_\_\_Yes \_\_\_No |
|  | 1. Are inspection documents properly completed and maintained? | | \_\_\_Yes \_\_\_No |
|  | b. Review and record number of samples: \_\_\_\_\_\_\_\_\_\_\_\_ | | \_\_\_Yes \_\_\_No |
| A 8. | Is traceability maintained for material, which has been plated? | | \_\_\_Yes \_\_\_No |
| A 9. | Is inspection data reviewed and accepted by qualified personnel? | | \_\_\_Yes \_\_\_No |

|  |  |  |
| --- | --- | --- |
| A 10. | Are all tools, gages, meters, utilized for monitoring and/or inspection a part of the manufacturer's calibration program? | \_\_\_Yes \_\_\_No \_\_\_N/A |
| A 11. | Are certifications for raw materials used in plating process reviewed for acceptance and maintained on file for review? | \_\_\_Yes \_\_\_No \_\_\_N/A |
| A 12. | Verify prohibition of reclaimed material as may be required. | \_\_\_Yes \_\_\_No \_\_\_N/A |
| A 13. | Adequate inspection work records are maintained. | \_\_\_Yes \_\_\_No \_\_\_N/A |
| A 14. | The shop traveler and work records can be traced to the inspection personnel. | \_\_\_Yes \_\_\_No \_\_\_N/A |
| **SECTION III - OBSERVATION OF PLATING PROCESS**  Detailed observation of platers (complete one section for each plater observed). NOTE: if determined to be N/A, provide explanation. | | \_\_\_Sat \_\_\_Unsat |
| A 15. | Identify process observed. Specify class and type and/or grade. | \_\_\_Sat \_\_\_Unsat |
|  | 1. Plater identification:(name, badge or clock #, shift) |  |
|  | 1. Basis material(s) being welded. |  |
|  | 1. Identify plating material. |  |
|  | 1. Is the plater qualified for observed plating procedure? | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | 1. Is the plater familiar with details of the procedure? | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | 1. Procedure number: |  |
|  | g. Is it readily available to the plater and inspector? | \_\_\_Yes \_\_\_No |
| A 16. | Are there adequate methods of segregating accepted and rejected materials in use? | \_\_\_Yes \_\_\_No |
| A 17. | Tanks are placarded with solutions they contain and the operating parameters. | \_\_\_Yes \_\_\_No |
| A 18 | . Solution tanks operated at elevated temperatures are equipped with temperature indicating devices. | \_\_\_Yes \_\_\_No |

|  |  |  |
| --- | --- | --- |
| A 19. | Solutions requiring agitation are equipped with acceptable devices to accomplish this requirement. | \_\_\_Yes \_\_\_No |
| A 20. | Ammeters, voltmeters, thermometers, are "stickered" to indicate calibration next due date. | \_\_\_Yes \_\_\_No |
| A 21. | Clocks and/or timers are available where applicable. | \_\_\_Yes \_\_\_No |
| A. 22. | Cleanliness | \_\_\_Yes \_\_\_No |
|  | a. Are pieces to be plated cleaned prior to process. | \_\_\_Yes \_\_\_No |
|  | b. List methods and materials used, if applicable. | \_\_\_Yes \_\_\_No |
|  | c. Is cleanliness maintained prior to plating? | \_\_\_Yes \_\_\_No |
| A 23. | Rinse tanks are as follows: | \_\_\_Yes \_\_\_No |

|  |  |  |
| --- | --- | --- |
|  | a. Free of contamination detrimental to the process | \_\_\_Yes \_\_\_No |
|  | b. Provide for separate rinses following acid and caustic solutions. | \_\_\_Yes \_\_\_No |
| A 24. | The supplier has thickness measuring equipment available. Identify: | \_\_\_Yes \_\_\_No |
| A 25. | The thickness measuring equipment is properly calibrated.   1. What frequency? \_\_\_\_\_\_\_\_\_\_ Last calibration date\_\_\_\_\_\_\_\_ | \_\_\_Yes \_\_\_No |
| A 26. | Verify test coupons are processed with production material as required by the specification and they are properly identified. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| A 27. | Process, general - good practices: | \_\_\_Sat \_\_\_Unsat \_\_\_N/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 | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |

|  |  |  |
| --- | --- | --- |
|  | b. Parts are visually examined after removal from processing solutions for copper immersion products, non-soluable smuts, pitting, excessively etched surfaces, etc. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | c. Parts visually examined for a water break free surface before subsequent processing. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | 1. Wiping and cleaning clothes are checked for grease, oil, etc., content. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| A 28. | A certified stress relieve/bake oven is available meeting the following requirements: | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | a. Uniformity survey conducted at specified frequency. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | b. Accurate at the temperature used to specified tolerances. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | What range - Min \_\_\_\_\_ Max\_\_\_\_\_\_\_\_ |  |
|  | c. Equipped with a recording chart that meets specified degrees per inch. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |

|  |  |  |
| --- | --- | --- |
|  | d. Control equipment is periodically calibrated and maintained.  What frequency? | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | 1. Is the stress relief/baking accomplished within specified time? | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | f. Are the parts held in over for specified time? | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| A 29. | Housekeeping - Good Practices | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | a. Finishing tanks, electrical equipment, bus bars, and electrodes are relatively free of corrosion. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | b. Excessive materials are not allowed in finishing area. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | c. Chemicals and acids are stored in an area separate from finishing area. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | 1. Safety precautions are in practice, i.e. proper ventilation, personnel and parts. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |

|  |  |  |
| --- | --- | --- |
|  | e. Tanks, such as anodize, chrome, hot alkaline cleaners, hot deoxiders, etc., are equipped  with exhaust systems. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| A 30. | Adequate cleaning facilities are available and in use. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| A 31. | Equipment is constructed and arranged to permit a uniform and controlled operation. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | a. Sufficient working area has been allocated. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | b. Adequate fire protection devices are maintained and readily available for use. | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| A 32. | Packaging and Shipping: |  |
|  | a. Is adequate protection taken to prevent damage in shipment? (Internal and external) | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
|  | b. Is adequate control provided to assure that packaging, marking and documentation is in accordance with applicable requirements? | \_\_\_Sat \_\_\_Unsat \_\_\_N/A |
| **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. | | |

Additional Comments/Concerns: