Special Process: Plating System Assessment, 2nd Edition

Facility Name: Paulo Products
Address: 1307 Rutledge Way, Murfreesboro, TN, 37129

Phone Number: 615-896-1385	**Type(s) of Plating Processing at this Facility:**
Fax Number: 615-896-9613	**Process Table A:**
	Zinc Y
Number of Plating Employees at this Facility: 7	Zinc Alloy Plating N/A
Captive Plater (Y/N): N	**Process Table B:**
Commercial Plater (Y/N): Y	Mechanical Plating N/A
Date of Assessment: 10/16/2019	**Process Table C:**
Date of Previous Assessment: 10/17/2018	Surface Conditioning of Metals for Decorative Plating or Electropolishing N
	Surface Conditioning of Plastics for Decorative Plating N/A
Date of Re-assessment (if necessary):	
	Process Table E:
	Decorative Plating for Metal and Plastic N/A
	Process Table F:
	Electropolishing and/or Chrome Flash on Stainless Steel N/A
	Process Table G:
	Hard Chrome Plating N/A
	Process Table H:
	Electroless Nickel N/A
	Process Table I:
	Hydrogen Embrittlement Relief Bake Process Y
	Process Table J :
	Process Control and Testing Equipment Y

Current Quality Certification(s): IATF-16949

Personnel Contacted:

Name:	Title: Plating Manager	Phone:	Email:
Name: Dave Timken	Title: Plant Manager	Phone: 615-216-3003	Email: dtimken@paulo.com
Name:	Title:	Phone:	Email:

Auditors/Assessors:

Name: Dave Timken	Title: Plant Manager	Phone: 615-216-3003	Email: dtimken@paulo.com
Name:	Title: Plating Manager	Phone:	Email:
Name:	Title:	Phone:	Email:

Number of "Not Satisfactory" Findings: 0

Number of "Needs Immediate Action" Findings: 0

Number of "Fail" Findings in the Job Audit(s): 0

Number of Process Table items identified as failed in Comments/Observation column: NA

Special Process: Plating Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
Section 1 - Management Responsibility and Quality Planning							
1.1	Is there a dedicated and qualified plating person on-site?	To ensure readily available expertise, there shall be a dedicated and qualified plating person on the site. This individual shall be a full-time employee and the position shall be reflected in the organization chart. A job description shall exist identifying the qualifications for the position including chemical and plating knowledge. The qualifications shall include a minimum of 5 years experience in plating and surface finishing or a combination of formal chemistry/chemical engineering education and plating experience totaling a minimum of 5 years.	Copy of Training & qualification records with job description - 1st page (Essential Functions) for CG Organization Chart Plating Manager		X		
1.2	Does the plater perform advanced quality planning?	The plater shall incorporate a documented advance quality planning procedure. A feasibility study shall be performed and internally approved for each part. Similar parts can be grouped into part families for this effort as defined by the plater. After the part approval process is approved by the customer, no process changes are allowed unless approved by the customer. The plater shall contact the customer when clarification of process changes is required. This clarification of process changes shall be documented.	QP 050 AQP QP 70 Contract Review WI 160 PW 1st run production system 86-1 production process development FMMBO0348 QA 69 Capability Study FMMBO0324 PW First Production Run Review Checklist Records are kept in both PICS-Parts Module & Salesforce-opportunities		X		

Special Process: Plating Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.3	Are plater FMEA's up to date and reflecting current processing?	The plater shall incorporate the use of a documented Failure Mode and Effects Analysis (FMEA) procedure and ensure the FMEAs are updated to reflect current part quality status. The FMEA shall be written for each part or part family or they may be process-specific and written for each process. In any case, they shall address all process steps from part receipt to part shipment and all key plating process parameters as defined by the plater. A cross-functional team shall be used in the development of the FMEA. All characteristics, as defined by the plater and its customers, shall be identified, defined, and addressed in the FMEA.	PFMEA's are process specific and CC30 current Revision is dated 4/9/2019		**X**		
1.4	Are finish process Control Plans up to date and reflecting current processing?	The plater shall incorporate the use of a documented Control Plan procedure and ensure the Control Plans are updated to reflect current controls. The Control Plans shall be written for each part or part family or they may be process-specific and written for each process. In any case, they shall address all process steps from part receipt to part shipment and identify all equipment used and all key plating process parameters as defined by the plater. A cross-functional team, including a production operator, shall be used in the development of Control Plans, which shall be consistent with all associated documentation such as work instructions, shop travelers, and FMEAs. All special characteristics, as defined by the plater and its customers, shall be identified, defined, and addressed in the Control Plans. Sample sizes and Frequencies for evaluation of process and product characteristics shall also be addressed consistent with the minimum requirements listed in the Process Tables.	Control plans are part specific with cross functional team. Part specific control plans are our shop orders. Line specific control plans for CC30 & CC31 are Revision 3/11/2019		X		

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Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.5	Are all plating related and referenced specifications current and available? For example: SAE, AIAG, ASTM, General Motors, Ford, and Chrysler.	To ensure all customer requirements are both understood and satisfied, the plater shall have all related plating and customer referenced standards and specifications available for use and a method to ensure that they are current. Such standards and specifications include, but are not limited to, those relevant documents published by SAE, AIAG, ASTM, General Motors, Ford, and Chrysler. The plater shall have a process to ensure the timely review, distribution, and implementation of all customer and industry engineering standards and specifications and changes based on customer-required schedule. This process shall be executed as soon as possible and shall not exceed two weeks. The plater shall document this process of review and implementation, and it shall address how customer and industry documents are obtained, how they are maintained within the plating organization, how the current status is established, and how the relevant information is cascaded to the shop floor within the two-week period. The plater shall identify who is responsible for performing these tasks.	Corporate intranet - spec viewer QP 206 PIC's process procedure		**X**		
1.6	Is there a written process specification for all active processes?	The plater shall have written process specifications for all active processes and identify all steps of the process including relevant operating parameters. Examples of operating parameters include process temperatures, cycle times, load rates, rectifier settings, etc. Such parameters shall not only be defined, they shall have operating tolerances as defined by the plater in order to maintain process control. All active processes should have a written process specification. These process specifications may take the form of work instructions, job card, computer-based recipes, or other similar documents.	Information found on each Paulo shop order Operator training documentation Tolerances monitored by IFIX as well as operator check sheets		X		

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Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.7	Has a valid product capability study been performed initially and after process change?	To demonstrate each process is capable of yielding acceptable product the plater shall perform product capability studies for the initial validation of each process, after relocation of any process equipment, and after a major rebuild of any equipment. The plater shall define what constitutes a major rebuild. Initial product capability studies shall be conducted for all plating processes per line as defined in scope of work and in accordance with customer requirements. Capability study techniques shall be appropriate for the plating product characteristics, e.g. plate thickness, corrosion resistance, etc.. Any specific customer requirements shall be met. In the absence of customer requirements, the plater shall establish acceptable ranges for measures of capability. An action plan shall exist to address the steps to be followed in case capability indices fall outside customer requirements or established ranges.	Definition of Major rebuild is defined in QP 250 Capability studies completed frequently Ranges for capability are on the shop order. Zero tolerance outside capability (Reject)		X		
1.8	Does the plater collect and analyze data over time, and react to this data?	The analysis of products and processes over time can yield vital information for defect prevention efforts. The plater shall have a system to collect, analyze, and react to product or process data over time. Methods of analysis shall include ongoing trend or historical data analysis of special product or process parameters. The plater shall determine which parameters to include in such analysis.	**Barrel weights** **Amp readings** **PH controls** **Plating thickness** **Chemical Titrations** **Temperatures** **At the minimum of twice a year and during monthly departmental reviews.**		**X**		
1.9	Are records retained and available?	All process control and testing records must be retained for a minimum of one calendar year after the year in which they were created.	**Process and testing records in Paulo shop log / IFIX**		**X**		

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				Assessment			
Question Number	**Question**	**Requirements and Guidance**	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
1.10	Does management review and verify bake oven logs for parts requiring hydrogen embrittlement relief every 24 hours?	Management shall review the oven monitoring systems/logs at intervals not to exceed 24 hours or prior to parts being released for shipment. The plater shall have reaction plans for non-conformances to process requirements. This is to contain, at minimum, requirements for quarantining material and notifying customer.	WI-0148 Bake oven procedure QP 270 Control of Non conforming Material QP 276 Reprocess and or scrap Procedure MRB Procedure - Rework shop order Deviation request form - Authorization to reprocess		**X**		
1.11	Are internal assessments being completed on an annual basis, at a minimum, incorporating AIAG PSA?	The plater shall conduct internal assessments on an annual basis, at a minimum, using the AIAG PSA. Concerns shall be addressed in a timely manner.	Yes CHQ annual Audit		**X**		
1.12	Is there a system in place to authorize reprocessing and is it documented?	The quality management system shall include a documented process for reprocessing that shall include authorization from a designated individual. The reprocessing procedure shall describe product characteristics for which reprocessing is allowed as well as those characteristics for which reprocessing is not permissible. All reprocessing activity shall require a new processing control sheet issued by qualified technical personnel denoting the necessary plating modifications. Records shall clearly indicate when and how any material has been reprocessed. The Quality Manager or a designee shall authorize the release of reprocessed product.	QP 270 Control of Non Conforming Material QP 276 Reprocess and/or Scrap Procedure WI-0089 PW Major Process Changes for PPC, MBO QP 275 Material Review Board Review MRB procedure - Rework shop order- Deviation Req Form - Authorization to reprocess.		**X**		
1.13	Does the Quality Department review, address, and document customer and internal concerns?	The quality management system shall include a process for documenting, reviewing, and addressing customer concerns and any other concerns internal to the organization. A disciplined problem solving approach shall be used.	Salesforce-Customer Feedback Log Corrective Actions MRB Open Issues log		**X**		

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Question Number	**Question**	**Requirements and Guidance**	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
1.14	Is there a continual improvement plan applicable to each process defined in the scope of the assessment?	The plater shall define a process for continual improvement for each plating process identified in the scope of the PSA. The process shall be designed to bring about continual improvement in quality and productivity. Identified actions shall be prioritized and shall include timing (estimated completion dates). The plater shall show evidence of program effectiveness.	QP 058 Continual Improvement Procedures Top processes review - Plating details report		**X**		
1.15	Does the Quality Manager or designee authorize the disposition of material from quarantine status?	The Quality Manager or designee is responsible for authorizing and documenting appropriate personnel to disposition quarantine material.	QP 270 Control of Non Conforming Material QA Manager documents Reject material Dispositions Example of a completed Reject Material Ticket		**X**		
1.16	Are there procedures or work instructions available to plating personnel that define the plating process?	There shall be procedures and work instructions available to plating personnel covering the plating process. These procedures or work instructions shall include methods of addressing potential emergencies (such as power failure), equipment start-up, equipment shut-down, product segregation (See 2.8), product inspection, and general operating procedures. These procedures or work instructions shall be accessible to shop floor personnel.	Quality Procedures Work Instructions Plant Forms All available electronically in the Quality System Pics Shop Order Organization Chart with primary and secondary functions indicated		**X**		
1.17	Is management providing employee training for plating?	The plater shall provide employee training for all plating operations. All employees, including backup and temporary employees, shall be trained. Documented evidence shall be maintained showing the employees trained and the evidence shall include an assessment of the effectiveness of the training. Management shall define the qualification requirements for each function, and ongoing or follow-up training shall also be addressed.	On the Job Training Training Checklist Organization Chart with primary and secondary functions indicated		**X**		

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				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.18	Is there a responsibility matrix to ensure that all key management and supervisory functions are performed by qualified personnel?	The plater shall maintain a responsibility matrix identifying all key management and supervisory functions and the qualified personnel who may perform such functions. It shall identify both primary and secondary (backup) personnel for the key functions (as defined by the plater). This matrix shall be readily available to management at all times.	Organization Chart, MBO Process Owners List QP 010 Management responsibility Training records		X		
1.19	Is there a preventive maintenance program? Is maintenance data being utilized to form a predictive maintenance program?	The plater shall have a documented preventive maintenance program for key process equipment (as identified by the plater). The program shall be a closed-loop process that tracks maintenance efforts from request to completion to assessment of effectiveness. Equipment operators shall have the opportunity to report problems, and problems shall also be handled in a closed-loop manner. Company data, e.g., downtime, quality rejects, first time-through capability, recurring maintenance work orders, and operator-reported problems, shall be used to improve the preventive maintenance program. Maintenance data shall be collected and analyzed as part of a predictive maintenance program.	QP180 Preventative Maintenance system (automated) - A maintenance request system (MRF) is utlized to create a closed loop maintenance program. A maintenance PM sheet. WWT PM Sheet.		X		
1.20	Has the plater developed a critical spare part list and are the parts available to minimize production disruptions?	The plater shall develop and maintain a critical spare parts list and shall ensure the availability of such parts to minimize production disruptions.	FM MBO 0095 MA 78 Monthly approved level 2 plating stock inventory		X		

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Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
Section 2 - Floor and Material Handling Responsibility							
2.1	Does the facility ensure that the data entered in the receiving system matches the information on the customer's shipping documents?	Documented processes and evidence of compliance shall exist, e.g., shop travelers, work orders, etc. The facility shall have a detailed process in place to resolve receiving discrepancies.	**QP 220 Receiving Inspection Procedure** **QP 140 Product Identification and Traceability** **QP 270 Control Of Non Conforming Material** **QP 310 Handling, Packaging, Storage, & Preservation of Materials Procedure** **QP 145 Generating a Shop Order** **QP 206 Pic's Processing**		**X**		
2.2	Is product clearly identified and staged throughout the plating process?	Procedures for part and container identification help to avoid incorrect processing or mixing of lots. Appropriate location and staging within the facility also help to ensure that orders are not shipped until all required operations are performed. Customer product shall be clearly identified and staged throughout the plating process. Non-plated, in-process, and finished product shall be properly segregated and identified. All material shall be staged in a dedicated and clearly defined area.	**QP 270 Control Of Non Conforming Material** **QP 140 Product Identification and Traceability** **WI-0244 PL Bake Tray Identifcation and Traceability Single Point** **Reviewed floor layout for specific areas and sticker color code table** **Work storage signs**		**X**		
2.3	Is lot traceability and integrity maintained throughout all processes?	Out-going lot(s) shall be traceable to the incoming lot(s). The discipline of precisely identifying lots and linking all pertinent information to them enhances the ability to do root cause analysis and continual improvement.	**Bin Tags** **Individual Shop Order #'s** **Plating Line Schedule** **WI-0244 PL Bake Tray Identifcation and Traceability Single Point**		**X**		

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Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
2.4	Are procedures adequate to prevent movement of non-conforming product into the production system?	The control of suspect or non-conforming product is necessary to prevent inadvertent shipment or contamination of other lots. Procedures shall be adequate to prevent movement of non-conforming product into the production system. Procedures shall exist addressing proper disposition, product identification and tracking of material flow in and out of hold area. Non-conforming hold area shall be clearly designated to maintain segregation of such material.	**QP 270 Control of Non Conforming Material** **QP 275 Material Review Board Procedure** **QP 140 Product Identification and Traceability**		**X**		
2.5	Is there a system to identify and inspect trap points in the entire plating process to reduce risk of mixed parts (inappropriate, unfinished, or improperly plated parts)?	There shall be a list of trap points and work instructions detailing inspection frequencies.	**WI 0053 PW Container Cleaning Instructions** **WI 0093 PL 30,31,35 Operating Plating Line** **WI 0098 PL 29,31 Loading Plating Line**		**X**		
2.6	Are containers free of inappropriate material?	Containers handling customer product shall be free of inappropriate material. After emptying and before re-using containers, containers shall be inspected to ensure that all parts and inappropriate material have been removed. The source of inappropriate material shall be identified and addressed. This is to ensure that no nonconforming plating parts or inappropriate material contaminate the finished lot.	**WI 0053 PW Container Cleaning Instructions** **Shop Order sign off**		**X**		
2.7	Is part loading specified, documented and controlled?	Loading parameters shall be specified, documented and controlled. Examples include parts per rack and load size.	**Individual Paulo Shop Order** **Process Specific Control Plan**		**X**		

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Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
2.8	Are operators trained in material handling, containment action and product segregation in the event of an equipment emergency including power failure?	Unplanned or emergency downtime greatly raises the risk of improper processing. Operators shall be trained in material handling, containment action, and product segregation in the event of an equipment emergency including power failure. Training shall be documented. Work instructions specifically addressing potential types of equipment emergencies and failures shall be accessible to and understood by equipment operators. These instructions shall address containment/reaction plans related to all elements of the process. Evidence shall exist showing disposition and traceability of affected product.	**QP270 Control Of Non Conforming Material** **WI 0124 Restoring Plating Operations after Power Failure** **WI 0147 Procedure for Unplanned Plating Stoppage** **WI-0093 PL,30,31,35**		**X**		

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Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
2.9	Is the handling, storage and packaging adequate to preserve product quality?	The plater's loading/unloading systems, in process handling and shipping process shall be assessed for risk of part damage or other quality concerns.	**FMEA's QP 70 Contract Review WI 160 First Run Production WI 0098 29,31 Loading Plating line WI 0093 PL 30,31,35 Operating Plating Line**		**X**		
2.10	Are plant cleanliness, housekeeping and environmental and working conditions conducive to control and improved quality?	Plant cleanliness, housekeeping, environmental, and working conditions shall be conducive to controlling and improving quality. The plater should evaluate such conditions and their effect on quality. A housekeeping policy shall be clearly defined and executed. The facility shall be reviewed for the following items: loose parts on floor, spillage around tanks, overall plant lighting, fumes etc.	**WI 0093 PL 30,31,35 Operating Plating Line QP 340 Internal Audits LPA 5S is part of all area processes Environmental controls are addressed in waste treatment WI's and environmental compliance calendar FMMBO0016 PL 30, 31 CC30, 31 - Line Maintenance Checklist**		**X**		
2.11	Are process control parameters monitored per frequencies specified in Process Tables?	Process control parameters shall be monitored per frequencies specified in Process Tables. Computer monitoring equipment with alarms and alarm logs satisfy the verification requirement. A designated floor person shall verify the process parameters, e.g., by initialing a strip chart or data log.	**Operator Daily Check Sheets Waste Treatment Daily Check Sheet Titration sheets Computer Monitoring (IFIX, Top processes, etc)**		**X**		
2.12	Are out of control/specification parameters reviewed and reacted to?	Are there documented reaction plans to both out of control and out of tolerance process parameters? Is there documented evidence that reaction plans are followed?	**Control plans and FMEA's**		**X**		
2.13	Are In-Process / Final Test Frequencies performed as specified in Process Tables?	In-Process / Final Test Frequencies shall be performed as specified in Process Tables. Refer to Process Tables.	**Yes per Customer & Job Requirements Operator Daily Check Sheet Waste Treatment Operator Check Sheet Titration logs IFIX**		**X**		

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				Assessment			
Question Number	**Question**	**Requirements and Guidance**	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
2.14	Is product test equipment verified?	Test equipment shall be verified/calibrated per applicable customer specific standard or per an applicable consensus standard, e.g., ASTM, SAE, ISO, NIST, etc. Verification/calibration results shall be internally reviewed, approved and documented. Refer to Process Tables for frequency of checks.	**Thickness testers verified/calibrated daily. Standards calibrated by outside source every 6 months. Results reviewed monthly. FMMB00092 MA78 Calibration Verification Record**		**X**		
2.15	Are the water rinses controlled and detailed in the process Control Plan to reflect full process parameters?	Identify operating parameters including: - number of rinse tanks between process stages, - tank type (single rinse, counter flowing, stationary rinse, spray rinse) - flow rate, - water requirements (city or deionized water, reverse osmosis), - filtration (if applicable) - control methods.	CC30: Electroclean rinse double counterflow flow on Acid double rinse Zinc rinses double counterflow Chromate rinses single CC31: Soak clean rinse single city water flow on Electroclean rinse double counterflow flow on Acid rinse double counterflow Zinc rinses double counterflow filtered Chromate rinses double counterflow		**X**		

Section 3 - Zinc/ Zinc Alloy Plating Equipment

				Assessment			
Question Number	**Question**	**Requirements and Guidance**	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
3.1	Are process and testing equipment calibrations and/or verification certified, posted, and current?	A system shall be used by the plating facility to track calibration dates of equipment. This system will typically be a computerized tracking system or other notification system. Test equipment shall be verified/calibrated per applicable customer specific standard or consensus standard, e.g., ASTM, SAE, ISO, NIST, etc. Verification/calibration results shall be internally reviewed, approved and documented. Refer to Process Table J, for equipment certification time table.	**Eddy-mag verification log, Test equipment verifiication and calibration log. Outside vendor used for calibration/certification of master standards.**		**X**		
3.2	Are barrels, racks, and baskets maintained?	Plater shall have preventative maintenance system that is documented and implemented.	**Barrels are inspected by the operator. If a barrel needs to be repaired it is tagged and taken off line. Maintenance repairs the barrel and tags it as ready to go back on line. Work Instruction WI-0093 PL 30,31,35 FMMBO0379 MA 78 Plating Barrel Repair List FMMBO0381 MA 78 3001 Plating Barrel Repair List**		**X**		
3.3	Are rectifiers maintained?	Plater shall have preventative maintenance system that is documented and implemented.	**QP180 Preventative Maintenance system (automated) WI-0245 MA 78 Annual Plating Rectifier Maintenance Procedure**		**X**		
3.4	Are Contacts and Bussing maintained?	Plater shall have preventative maintenance system that is documented and implemented.	**FMMBO0016 PL 30, 31 CC30, 31 - Line Maintenance Checklist**		**X**		
3.5	Are filters maintained?	Plater shall have preventative maintenance system that is documented and implemented.	**WI-0010 WT 67 Indexing Filter Operation WI-0158 WT 67 Waste Treatment Shift Responsibilities**		**X**		
3.6	For hydrogen embrittlement relief ovens, are temperature uniformity surveys performed yearly?	Uniformity survey must show that ovens were tested both empty and with a full load. Parts must come up to temperature within one hour of entering oven and meet temperature tolerance specified by customer.	**Yes, annual temperature surveys are done on each oven. WI-0036 MA 78 Annual Survey of Furnaces & Draws FMMB00092 MA78 Calibration Verification Record**		**X**		
3.7	For hydrogen embrittlement relief ovens, are thermocouples checked and/or replaced quarterly?	Plater shall have preventative maintenance system that is documented and implemented.	FMMB00092 MA78 Calibration Verification Record - Quarterly calibration / verification are performed on each oven.		**X**		

3.8	Is there a drying/curing system in place?	Plater shall have a defined drying process to adequately dry parts. Process to include control and verification of temperature and time.	SO identifies drying method and time. IFIX		**X**		

Section 4 - Decorative (Cu, Ni, Cr) Plating Equipment

				Assessment			
Question Number	**Question**	**Requirements and Guidance**	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
4.1	Are process and testing equipment calibrations and/or verification certified, posted, and current?	A system shall be used by the plating facility to track calibration dates of equipment. This system will typically be a computerized tracking system or other notification system. Test equipment shall be verified/calibrated per applicable customer specific standard or consensus standard, e.g., ASTM, SAE, ISO, NIST, etc. Verification/calibration results shall be internally reviewed, approved and documented. Refer to Process Table J, for equipment certification time table.		**X**			
4.2	Are racks maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
4.3	Are rectifiers maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
4.4	Are Contacts and Bussing maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
4.5	Are filters maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
4.6	Is all other applicable equipment maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
4.7	For all thermocouples/ thermometers are they checked and/or replaced?	Plater shall have preventative maintenance system that is documented, implemented and includes thermocouple and thermometer maintenance.		**X**			
4.8	Are the process and equipment alarm checks being tested?	Checks shall be documented. Each alarm shall be reviewed independently for functionality if applicable. Plater shall have a list of alarms relevant to process.		**X**			

Section 5 - EN Plating Equipment

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
5.1	Are process and testing equipment calibrations and/or verification certified, posted, and current?	A system shall be used by the plating facility to track calibration dates of equipment. This system will typically be a computerized tracking system or other notification system. Test equipment shall be verified/calibrated per applicable customer specific standard or consensus standard, e.g., ASTM, SAE, ISO, NIST, etc. Verification/calibration results shall be internally reviewed, approved and documented. Refer to Process Table J, for equipment certification time table.		X			
5.2	Are barrels, racks, and baskets maintained?	Plater shall have preventative maintenance system that is documented and implemented.		X			
5.3	Are rectifiers maintained?	Plater shall have preventative maintenance system that is documented and implemented.		X			
5.4	Are Contacts and Bussing maintained?	Plater shall have preventative maintenance system that is documented and implemented.		X			
5.5	Is all other applicable equipment maintained?	Plater shall have preventative maintenance system that is documented and implemented.		X			
5.6	For all thermocouples / thermometers are they checked and/or replaced?	Plater shall have preventative maintenance system that is documented, implemented and includes thermocouple and thermometer maintenance.		X			
5.7	Are filters maintained?	Plater shall have preventative maintenance system that is documented and implemented.		X			
5.8	Are plating tanks designed and equipped per minimum requirements?	Plater shall show evidence that tanks are fabricated from proper material, proper solution movement is ensured with adequate agitation and filtration meets the TDS guidelines. Solution pumps should be capable of turning over the solution minimum 10 times per hour.		X			
5.9	For all ovens, are thermocouples checked and/or replaced quarterly?	Plater shall have preventative maintenance system that is documented and implemented.		X			

Section 6 - Hard Chrome Plating Equipment

				Assessment			
Question Number	**Question**	**Requirements and Guidance**	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
6.1	Are process and testing equipment calibrations and/or verification certified, posted, and current?	A system shall be used by the plating facility to track calibration dates of equipment. This system will typically be a computerized tracking system or other notification system. Test equipment shall be verified/calibrated per applicable customer specific standard or consensus standard, e.g., ASTM, SAE, ISO, NIST, etc. Verification/calibration results shall be internally reviewed, approved and documented. Refer to Process Table J, for equipment certification time table.		**X**			
6.2	Are racks maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
6.3	Are rectifiers maintained?	Plater shall have preventative maintenance system that is documented and implemented. Including Ripple checks.		**X**			
6.4	Are Contacts and Bussing maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
6.5	For hydrogen embrittlement relief ovens, are temperature uniformity surveys performed yearly?	Uniformity survey must show that ovens were tested both empty and with a dense load. Parts must come up to temperature within one hour of entering oven and meet temperature tolerance specified by customer.		**X**			
6.6	For hydrogen embrittlement relief ovens, are thermocouples checked and/or replaced quarterly?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			

Section 6 - Hard Chrome Plating Equipment

				Assessment			
Question Number	**Question**	**Requirements and Guidance**	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
6.7	Are filters maintained if used?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
6.8	Is all other applicable equipment maintained?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
6.9	For all thermocouples/ thermometers are they checked and/or replaced?	Plater shall have preventative maintenance system that is documented and implemented.		**X**			
6.10	Are the process and equipment alarm checks being tested?	Checks shall be documented. Each alarm shall be reviewed independently for functionality if applicable. Plater shall have a list of alarms relevant to process.		**X**			
6.11	Are anodes replaced when necessary?	Anode cleaning, replacement, or maintenance to be documented in PM system.		**X**			
6.12	Is all electrical bussing being maintained?	Maintenance of busing due to chemical attack from the chrome solution to be documented in PM system.		**X**			

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.1	Are contract review, advance quality planning, FMEA, Control Plans, etc., performed by qualified individuals?	1.2 1.3 1.4 1.17	QP050 Advanced Quality Planning	N/A		Pass
7.2	Does the plater have the proper customer specifications for the part?	1.5	QP050 Advanced Quality Planning	N/A	PEC-58 PEC-99 form	Pass
7.3	Is a shop traveler created to meet customer requirements?	1.6 2.1	QP070 Contract Review	1685142-01	Bin Tag, Shop order, Customer paperwork	Pass
7.4	Is material identification (part numbers, lot numbers, contract numbers, etc.) maintained throughout the plating process?	2.2 2.3 2.4	QP 140 Product Identification and Traceability	Bin Tag	Bin tags with the order	Pass
7.5	Is there documented evidence of Receiving Inspection?	2.1	QP 140 Product Identification and Traceability	SO initialed	Receiving inspection completed	Pass
7.6	Are the Loading / Racking requirements identified?	1.6 2.7 2.9	QP 150 Process Control Procedure	Per shop order	shop order details	Pass

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.7	Is the proper procedure or process specification used? Refer to Process Tables for specific parameters. List parameters that were verified in this audit in the spaces provided below.	1.5 1.6 2.1 2.11 2.13	QP 150 Process Control Procedure	soak clean, rinse, electroclean, rinse, acid, rinse, zinc plate, rinse, chromate, rinse	steps performed Per shop order	Pass
					Cleaner concentrations	Pass
					Acid concentration	Pass
					plating temp and concentration	Pass
					chromate concentration	Pass

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.8	What are the product inspection requirements?	2.13	Each part may have one or more requirements determined by the plating specification. Parts must meet each requirement. List each requirement below and validate.			
7.8.1	Requirement: Plate Thickness					
	Test Method:				Eddy current	Pass
	Test frequency or quantity:				3/ barrel	Pass
	Selection of samples:				standard sampling	Pass
	Specification:		.3 mils minimum	.3 mils minimum	.49-.57 mils	Pass
7.8.2	Requirement: Corrosion Resistance					
	Test Method:			Salt spray	Salt spray	Pass
	Test frequency or quantity:				every 8 hours of run	NA

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
	Selection of samples:				per process	NA
	Specification:		72 hours to red rust	72 hours to red rust	Process has passed in the last month of testing	Pass

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.8.3	Requirement: Hydrogen Embrittlement Relief (if Applicable)		This includes the transition time from the plating bath to the oven plus heating time. The time to temperature is different for different customers. The most strict (shortest heating time) requirements shall be met.	per shop order within 1 hour	Per shop order	Pass
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.4	Requirement: Adhesion Test					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A

Section 7 - Job Audit - Finished Product Review

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Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
	Specification:					N/A

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.8.5	Requirement: Substrate Alloy (if Applicable)					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.6	Requirement: Torque Tension (if Applicable)					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.7	Requirement: Appearance (Decorative)					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
	Specification:					N/A
7.8.8	Requirement: Hardness					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.9	Requirement: Smoothness, Rz/Ra					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.8.10	Requirement: Polishing/Grinding					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.11	Requirement: Stress					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.12	Requirement: Ductility					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.8.13	Requirement: Pore Count/Active Sites					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.14	Requirement: S.T.E.P. (Decorative)					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.15	Sulfur by foil					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
	Specification:					N/A
7.8.16	Pull Test					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A
7.8.17	Requirement: Thermal Cycle (Decorative Plastic)					
	Test Method:					N/A
	Test frequency or quantity:					N/A
	Selection of samples:					N/A
	Specification:					N/A

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
Operator or Inspector Responsibilities						
7.9	Were appropriate process steps signed off?	1.4 2.2 2.3 2.11		Per shop order	completed	pass
7.10	Were all inspection steps, as documented in the Control Plan performed?	1.2 1.4		Per shop order	documented in spec	pass
7.11	Were steps/operations performed that were not documented in the Control Plan?	1.2 1.4 1.6				N/A
7.12	If additional steps were performed, were they authorized?	1.2 1.4 1.6 1.11 1.17				N/A
7.13	If the order was certified, did the certification accurately reflect the process performed?	2.11 2.13		Verified.	Verified automated form.	pass

Section 7 - Job Audit - Finished Product Review

Job Identity: AU-ZP-TB-BK
Customer: N/A
Shop Order Number: 1685142-01
Part Number: N/A
Part Description: N/A
Material: 1050/1070
Plating Requirements: .3 mils min (actual .45-.60)

Question Number	Job Audit Question	Related PSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
7.14	Was the certification signed by an authorized individual?	1.17				N/A
7.15	Are the parts and containers free of foreign objects or contamination?	2.6		Per WI-0053PW	completed	pass
Packaging Requirements						
7.16	Are packaging requirements identified?	2.9		Per shop order	completed	pass
7.17	Are parts packaged to minimize mixed parts (parts packed over height of container)?	2.9		Container weight	Container weight out compared with received weight in	Pass
Shipping Requirements						
7.18	Were the parts properly identified?	2.3			Bin tag	pass
7.19	Were the containers properly labeled?	2.3 2.9			bin tag, customer tag	pass

PROCESS TABLE A - Zinc & Zinc Alloy Plating

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***If minimum requirements are not met, provide supporting records to justify actual conditions. To justify reduced monitoring frequencies, a minimum of 30 consecutive measurements (data points) at stated frequencies must be documented. If any data points at reduced monitoring frequencies are outside of control limits, then revert back to the frequencies stated under the minimum requirements.**

For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
1.0		**Metal Cleaning**					
		Type:					Electro & Soak clean
		Size, volume:					Electro 3001 - 625 gal Electro 3102 - 500 gal Soak 3102 - 800 gal
		Proprietary name:					Electro - SEL-321 Soak - SL-142
		Chemical supplier:					Techmatic
A1.1	1.4; 2.11; 2.13	Temperature	Automatic	automatic	Continuous monitoring by controller. Manually verify daily.	continuous / per shift	pass
A1.2	1.4; 2.11; 2.13	Concentration	Manual	automatic	Once per day	per shift	pass
A1.3	1.4; 2.11; 2.13	Time	Automatic	automatic	After any program changes.	continuous	pass
A1.4		Agitation	Automatic	automatic	Per process sheet	per shift	pass
A1.5	1.4; 2.11; 2.13	Amperage or Voltage Control	Automatic	automatic	Once every 8 hours*	continuous	pass
A1.6		Solution Level	Manual	automatic	Once every 8 hours	per shift	pass
A1.7	2.15	Flowing Rinse	Automatic	automatic	Once every 8 hours	per shift	pass

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
2.0		**Acid Pickling**					
		Type:					Acid dip
		Size, volume:					650 gal
		Proprietary name:					Muriatic acid
		Chemical supplier:					Harcros
A2.1	1.4; 2.11; 2.13	Temperature (if applicable)	Automatic	N/A	Continuous monitoring by controller. Manually verify daily.	N/A	N/A
A2.2	1.4; 2.11; 2.13	Concentration	Manual	manual	Once every 8 hours*	per shift	pass
		Metallic impurity concentration. Obtain metallic impurity limits from chemical supplier with required corrective actions.	Manual	Manual	Once per month	Once per month	pass
A2.3	1.4; 2.11; 2.13	Time (Less than 10 Minutes or Customer Specific)	Automatic	automatic	After any program changes.	7 minute	pass
A2.4		Inhibitor	Manual	N/A	Per Control Plan	N/A	N/A
A2.5		Solution Level	Manual	manual	Once every 8 hours	per shift	pass
A2.6	2.15	Flowing Rinse	Automatic	automatic	Once every 8 hours	per shift	pass

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
3.0		**Acid Plating Bath**					
		Type:					Chloride Zinc
		Size, volume:					CC30 - 1,600 gal CC31 - 8,000 gal
		Proprietary name:					CC30 - Starter brightener CC31 - Carrier & toner
		Chemical supplier:					Pavco
A3.1	1.4; 2.11; 2.13	Temperature	Automatic	automatic	Continuous monitoring by controller. Manually verify daily.	continuous & per shift	pass
A3.2	1.4; 2.11; 2.13	Time	Automatic	automatic	After any program changes.	continuous	pass
A3.3	1.4; 2.11; 2.13	Current/Voltage	Automatic or Manual	automatic	Once every 8 hours	continuous	pass
A3.4		Chloride Concentration	Manual	manual	Once per day	per shift	pass
A3.5		pH	Manual	automatic	Once every 8 hours	continuous	pass
A3.6		Plating Test Cell (Hull)	Manual	manual	Once per day*	per shift	pass
A3.7		Plating Metal Concentration(s)	Manual	manual	Once per day*	per shift	pass
A3.8		Metallic impurity concentration. Obtain metallic impurity limits from chemical supplier with required corrective actions.	Manual	Manual	Once per month	per shift	pass
A3.9		Buffer (Ammonia / Boric Acid per TDS)	Manual	manual	Once per week*	per shift	pass
A3.10		Filtration	Continuous	automatic	Once every 8 hours	continuous / per shift	pass
A3.11		Agitation (Rack only - others optional)	Continuous	automatic	Once every 8 hours	per shift	pass
A3.12	2.15	Flowing Rinse	Automatic	automatic	Once every 8 hours	per shift	pass

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
4.0		**Alkaline Plating Bath**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
A4.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
A4.2	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
A4.3	1.4; 2.11; 2.13	Current/Voltage	Automatic or Manual		Once every 8 hours		NA
A4.4		Caustic Concentration	Manual		Once per day		NA
A4.5		Plating Test Cell (Hull)	Manual		Once per day		NA
A4.6		Plating Metal Concentration(s)	Manual		Once per day		NA
A4.7		Metallic impurity concentration. Obtain metallic impurity limits from chemical supplier with required corrective actions.	Manual		Once per month		NA
A4.8		Filtration	Continuous		Once every 8 hours		NA
A4.9	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
5.0		**Pre-bake acid treatment if baking is required (i.e., nitric, sulfuric, chromate, etc.)**					
A5.1		pH/concentration	Manual	Manual	Once every 8 hours	per shift	pass
A5.2	1.4; 2.11; 2.13	Time	Automatic	Automatic	After any program changes.	During reject investigation & after any program changes	pass
6.0		**Hydrogen Embrittlement Relief**					
A6.1		Refer to PT Embrittlement Bake as required					pass
7.0		**Acid Activation (i.e., nitric, sulfuric, etc.)**					
A7.1		pH/concentration	Manual		Once every 8 hours		NA
A7.2	1.4; 2.11; 2.13	Time	Automatic*		After any program changes.		NA

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
8.0		**Passivates**					
		Type:					Trivalent thick/thin film
		Size, volume:					350 gal
		Proprietary name:					Thin - Tru Blue Thick - HyProtec1010
		Chemical supplier:					Pavco
A8.1		Concentration	Automatic or Manual	Manual	Prior to production start-up. If automatic control once per day, once every 8 hours if manual.	per shift	pass
A8.2	1.4; 2.11; 2.13	Temperature	Automatic	automatic	Continuous monitoring by controller. Manually verify daily.	per shift	pass
A8.3	1.4; 2.11; 2.13	Time	Automatic or Manual	automatic	Automatic -After any program changes. Manual - every load.*	per shift	pass
A8.4		pH	Automatic*	Manual	Prior to production start-up. If automatic control once per day, once every 8 hours if manual.	per shift	pass
A8.5		Agitation	Automatic	automatic	Once every 8 hours	per shift	pass
A8.6		Metallic Impurity level(s) (e.g. Fe, Zn)	Manual	manual	Once per week	per shift	pass
A8.7	2.15	Flowing Rinse	Automatic	automatic	Once every 8 hours	per shift	pass

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
9.0		**Supplemental Treatments - Topcoats, Sealants and Friction Modifiers**					
		Type:					Top-coat
		Size, volume:					350 gal
		Proprietary name:					HyProcoat 320
		Chemical supplier:					Pavco
A9.1		Concentration	Manual	manual	Prior to production start-up. If automatic control once per day, once every 8 hours if manual.	per shift	pass
A9.2	1.4; 2.11; 2.13	Temperature (if applicable)	Automatic	automatic	Continuous monitoring by controller. Manually verify daily.	per shift	pass
A9.3		pH (if applicable)	Automatic or Manual	N/A	Prior to production start-up. If automatic control once per day, once every 8 hours if manual.	N/A	N/A
A9.4	1.4; 2.11; 2.13	Time	Automatic*	automatic	After any program changes if automatic.	per shift	pass

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***If minimum requirements are not met, provide supporting records to justify actual conditions. To justify reduced monitoring frequencies, a minimum of 30 consecutive measurements (data points) at stated frequencies must be documented. If any data points at reduced monitoring frequencies are outside of control limits, then revert back to the frequencies stated under the minimum requirements.**

For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
10.0		**Drying**					
A10.1	3.7	Drying Time	Automatic or Manual	automatic	Per Process Sheet and TDS	continuous	pass
A10.2	3.7	Drying Temperature	Automatic or Manual	manual	Per Process Sheet and TDS	per shift	pass
A10.3		Verify operation of blowers and/or rotation of dryer.	Manual	manual	Once per 8 hours	continuous	pass
A10.4	3.7	There is a procedure to ensure dryness of parts.	Manual	Manual on	Every container and rack.	per barrel	pass

Proceed to PT - Embrittlement Bake (If required)

PROCESS TABLE B - Mechanical Plating

All requirements given below are subordinate to applicable customer/OEM specific requirements.

The customer may have additional requirements, e.g., inspection testing, greater frequencies, etc. When performing the job audit, the auditor shall verify plater is conforming to customer requirements.

***If minimum requirements are not met, provide supporting records to justify actual conditions. To justify reduced monitoring frequencies, a minimum of 30 consecutive measurements (data points) at stated frequencies must be documented. If any data points at reduced monitoring frequencies are outside of control limits, then revert back to the frequencies stated under the minimum requirements.**

For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
1.0		**Metal Cleaning (Off Line*)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
B1.1		Temperature	Automatic		Manually measure once every 8 hours		NA
B1.2		Concentration	Automatic or Manual		Once every 8 hours		NA
B1.3		Time	Automatic or Manual		After any program changes if automatic.		NA
B1.4		Agitation	Automatic		Per process sheet		NA
B1.5		Solution Level	Automatic or Manual		Once every 8 hours		NA
B1.6	2.15	Rinse	Automatic or Manual		Once every 8 hours		NA
		Cleaning in Mechanical Plating Barrel					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
B1.7	1.4; 2.11; 2.13	Time	Manual		Per load		NA
B1.8		Rotation Speed	Manual		Per load		NA
B1.9		Solution Level	Manual		Per load		NA
B1.10	2.15	Rinse	Manual		Per load		NA

PROCESS TABLE B - Mechanical Plating

All requirements given below are subordinate to applicable customer/OEM specific requirements.

The customer may have additional requirements, e.g., inspection testing, greater frequencies, etc. When performing the job audit, the auditor shall verify plater is conforming to customer requirements.

***If minimum requirements are not met, provide supporting records to justify actual conditions. To justify reduced monitoring frequencies, a minimum of 30 consecutive measurements (data points) at stated frequencies must be documented. If any data points at reduced monitoring frequencies are outside of control limits, then revert back to the frequencies stated under the minimum requirements.**

For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
2.0		**Mechanical Plating**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
B2.1		Load Size (e.g. weight, area, volume)	Manual		Per load		NA
B2.2		Water Volume	Manual		Per load		NA
B2.3	1.4; 2.11; 2.13	Temperature	Manual		Per load		NA
B2.4		Media Mix (Ratio) Verification by operator the bead size and mix is correct.	Manual		Per load		NA
B2.5		Media Mix - Sieve Testing Off-line separation dependent on part size and mix unless separation is achieved on-line.	Manual		Once per month		NA
B2.6		Media (Load Volume)	Manual		Per load		NA
B2.7		Media (Cleanliness - To Avoid Contamination)	Manual		Once per week		NA
B2.8		Surface Conditioner (Volume or weight)	Manual		Per load		NA
B2.9		Surface Conditioner (Time)	Manual		Per load		NA
B2.10		Surface preparation (Volume or weight) - Cu Flash	Manual		Per load		NA
B2.11		Surface preparation (Time)	Manual		Per load		NA
B2.12		Promoter(s) (Volume)	Manual		Per load		NA
B2.13		Promoter (Time)	Manual		Per load		NA
B2.14		Zinc Flash (Weight or volume)	Manual		Per load		NA
B2.15		Zinc Flash (Time)	Manual		Per load		NA
B2.16		Metal Addition (Weight or volume)	Manual		Per load		NA

PROCESS TABLE B - Mechanical Plating

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***If minimum requirements are not met, provide supporting records to justify actual conditions. To justify reduced monitoring frequencies, a minimum of 30 consecutive measurements (data points) at stated frequencies must be documented. If any data points at reduced monitoring frequencies are outside of control limits, then revert back to the frequencies stated under the minimum requirements.**

For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
B2.17		Metal Addition (Number of Adds)	Manual		Per load		NA
B2.18	3.2	pH adjustments (Dependent on Adds)	Manual		As needed		NA
B2.19		Metal (Thickness)	Manual		Per load		NA
B2.20		Water Polish (time)	Manual		Per load		NA
B2.21		Part/Media Separation	Manual		Per load		NA
3.0		**Passivates**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
B3.1		Concentration	Automatic or Manual		Prior to production start-up. If automatic control once per day, once every 8 hours if manual.		NA
B3.2	1.4; 2.11; 2.13	Temperature	Automatic or Manual		Automatic - Continuous monitoring by controller and manually verify daily. Manual - every load.*		NA
B3.3	1.4; 2.11; 2.13	Time	Automatic or Manual		Automatic -After any program changes. Manual - every load.*		NA

PROCESS TABLE B - Mechanical Plating

All requirements given below are subordinate to applicable customer/OEM specific requirements.

The customer may have additional requirements, e.g., inspection testing, greater frequencies, etc. When performing the job audit, the auditor shall verify plater is conforming to customer requirements.

***If minimum requirements are not met, provide supporting records to justify actual conditions. To justify reduced monitoring frequencies, a minimum of 30 consecutive measurements (data points) at stated frequencies must be documented. If any data points at reduced monitoring frequencies are outside of control limits, then revert back to the frequencies stated under the minimum requirements.**

For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
B3.4		pH	Automatic or Manual		Prior to production start-up. If automatic control once per day, once every 8 hours if manual.		NA
B3.5		Agitation	Automatic or Manual		Per load		NA
B3.6		Metallic Impurity level(s) (e.g. Fe, Zn)	Manual		Once per week		NA
B3.7	2.15	Rinse	Automatic or Manual		Once every 8 hours		NA
4.0		**Supplemental Treatments - Sealers and Torque Tension Modifiers**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
B4.1	1.4; 2.11; 2.13	Concentration	Automatic or Manual		Prior to production start-up. If automatic control once per day, once every 8 hours if manual.		NA
B4.2	1.4; 2.11; 2.13	Temperature	Automatic or Manual		Automatic - Continuous monitoring by controller and manually verify daily. Manual - every load.*		NA
B4.3	1.4; 2.11; 2.13	Time	Automatic or Manual		Automatic -After any program changes. Manual - every load.*		NA

PROCESS TABLE B - Mechanical Plating

All requirements given below are subordinate to applicable customer/OEM specific requirements.

The customer may have additional requirements, e.g., inspection testing, greater frequencies, etc. When performing the job audit, the auditor shall verify plater is conforming to customer requirements.

***If minimum requirements are not met, provide supporting records to justify actual conditions. To justify reduced monitoring frequencies, a minimum of 30 consecutive measurements (data points) at stated frequencies must be documented. If any data points at reduced monitoring frequencies are outside of control limits, then revert back to the frequencies stated under the minimum requirements.**

For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
B4.4	3.2	pH	Automatic or Manual		Prior to production start-up. If automatic control once per day, once every 8 hours if manual.		NA
5.0		**Drying**					
B5.1	3.7	Drying Time	Automatic/Manual		Per process sheet and TDS		NA
B5.2	3.7	Drying Temperature	Automatic/Manual		Per process sheet and TDS		NA
B5.3		Verify operation of blowers and/or rotation of dryer.	Manual		Once every 8 hours		NA
B5.4	3.7	There is a procedure to ensure dryness of parts.	Manual		Every container and rack.		NA

PROCESS TABLE C - Surface Conditioning of Metals for Decorative Plating or Electropolishing

All requirements given below are subordinate to applicable customer/OEM specific requirements.

The customer may have additional requirements, e.g., inspection testing, greater frequencies, etc. When performing the job audit, the auditor shall verify plater is conforming to customer requirements.

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For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
1.0		**Polishing and Buffing**					
C1.1		**Type: (Manual or Automatic)**					
C1.2		**Check which metals are applicable:**					
		Steel:					
		Stainless Steel:					
		Aluminum:					
		Zinc diecast:					
2.0		**Metal Cleaning**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
C2.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
C2.2	1.4; 2.11; 2.13	Concentration	Manual		Once per day		NA
C2.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
C2.4		Agitation	Automatic		Per process sheet		NA
C2.5	4.4	Amperage or Voltage Control	Automatic		Once every 8 hours*		NA
C2.6		Solution Level	Manual		Once every 8 hours		NA
C2.7	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA

PROCESS TABLE C - Surface Conditioning of Metals for Decorative Plating or Electropolishing

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For multiple tanks that serve the same purpose copy and paste sections as needed.

Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
3.0		**Pretreatment**					
C3.1		Strike (if applicable)	N/A		N/A		NA
C3.2	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
C3.3	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA
C3.4	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
C3.5		Agitation	Automatic		Per process sheet		NA
C3.6	4.4	Amperage or Voltage Control	Automatic		Once every 8 hours*		NA
C3.7		Solution Level	Manual		Once every 8 hours		NA
C3.8	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA
C3.9		**Zincate (Aluminum Only)**					NA
C3.10	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
C3.11	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA
C3.12	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
C3.13		Agitation	Automatic		Per process sheet		NA
C3.14		Solution Level	Manual		Once every 8 hours		NA

PROCESS TABLE C - Surface Conditioning of Metals for Decorative Plating or Electropolishing

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
C3.15		Dump Schedule	Manual		Manually measure impurities once every 8 hours*		NA
C3.16	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA
4.0		**Acid**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
C4.1	1.4; 2.11; 2.13	Temperature (if applicable)	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
C4.2	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA
C4.3	1.4; 2.11; 2.13	Time (Per Specification)	Automatic		After any program changes.		NA
C4.4		Solution Level	Manual		Once every 8 hours		NA
C4.5	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA

Decorative Plating - Proceed to PT - Deco Plating Metal & Plastic
Electropolishing and/or Chrome Flash- Proceed to PT - EPCF

PROCESS TABLE D - Surface Conditioning of Plastics for Decorative Plating

All requirements given below are subordinate to applicable customer/OEM specific requirements.

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
1.0		**Cleaning and Pre-Etch (If Applicable)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
D1.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
D1.2	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA
D1.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
D1.4		Agitation	Automatic		Per process sheet		NA
D1.5		Solution Level	Manual		Once every 8 hours		NA
D1.6	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA
2.0		**Etch**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
D2.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
D2.2	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA
D2.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA

PROCESS TABLE D - Surface Conditioning of Plastics for Decorative Plating

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
D2.4		Agitation	Automatic		Per process sheet		NA
D2.5		Solution Level	Manual		Once every 8 hours		NA
D2.6	2.15	Rinse	Automatic		Once every 8 hours		NA
3.0		**Neutralizer**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
D3.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
D3.2	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA
D3.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
D3.4		Agitation	Automatic		Per process sheet		NA
D3.5		Solution Level	Manual		Once every 8 hours		NA
D3.6	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA

PROCESS TABLE D - Surface Conditioning of Plastics for Decorative Plating

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
4.0		**Activator**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
D4.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
D4.2	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA
D4.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
D4.4		Agitation	Automatic		Per process sheet		NA
D4.5		Solution Level	Manual		Once every 8 hours		NA
D4.6	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA
5.0		**Accelerator**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
D5.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
D5.2	1.4; 2.11; 2.13	Concentration	Manual		Once every 8 hours*		NA

PROCESS TABLE D - Surface Conditioning of Plastics for Decorative Plating

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
D5.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
D5.4		Agitation	Automatic		Per process sheet		NA
D5.5		Solution Level	Manual		Once every 8 hours		NA
D5.6	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA
6.0		**Electroless Plating**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
D6.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
D6.2	1.4; 2.11; 2.13	Concentration	Manual		Once every 4 hours		NA
D6.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
D6.4		Agitation	Automatic		Per process sheet		NA
D6.5		Solution Level	Manual		Once every 8 hours		NA
D6.6	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA

PROCESS TABLE D - Surface Conditioning of Plastics for Decorative Plating

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
7.0		**Electrolytic Plating - Strike**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
D7.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		NA
D7.2	1.4; 2.11; 2.13	Concentration	Manual		Once per day		NA
D7.3	4.1, 4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		NA
D7.4	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		NA
D7.5		Agitation	Automatic		Per process sheet		NA
D7.6		Solution Level	Manual		Once every 8 hours		NA
D7.7	2.15	Flowing Rinse	Automatic		Once every 8 hours		NA

Decorative Plating - Proceed to PT - Deco Plating Metal & Plastic

PROCESS TABLE E - Decorative Plating for Metal and Plastic

All requirements given below are subordinate to applicable customer/OEM specific requirements.

The customer may have additional requirements, e.g., inspection testing, greater frequencies, etc. When performing the job audit, the auditor shall verify plater is conforming to customer requirements.

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
1.0		**Acid Copper (if applicable)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
E1.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
E1.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day*		n/a
E1.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
E1.4		Agitation	Automatic		Per process sheet		n/a
E1.5	4.1, 4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
E1.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
E1.7	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a
E1.8		Filtration	Continuous		Once every 8 hours		n/a
E1.9		Post Clean*	Manual		Once per day		n/a
2.0		**Semi-Bright Nickel**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					

PROCESS TABLE E - Decorative Plating for Metal and Plastic

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
E2.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
E2.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day*		n/a
E2.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
E2.4		Agitation	Automatic		Per process sheet		n/a
E2.5	4.1, 4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
E2.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
E2.7	4.2	pH	Manual		Once every 8 hours		n/a
E2.8	4.2	Internal stress test	Manual		1/Month		n/a
E2.9	4.2	Ductility test	Manual		1/Month		n/a
E2.10	4.2	Sulfur Concentration (as deposited)	Manual		1/Month		n/a
E2.11		Filtration	Continuous		Once every 8 hours		n/a
3.0		**High Activity Nickel (if applicable)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
E3.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
E3.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day*		n/a
E3.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
E3.4		Agitation	Automatic		Per process sheet		n/a

PROCESS TABLE E - Decorative Plating for Metal and Plastic

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Process Line Identification:

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			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
E3.5	4.1, 4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
E3.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
E3.7		pH	Manual		Once every 8 hours		n/a
E3.8		Filtration	Continuous		Once every 8 hours		n/a
4.0		**Bright Nickel**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
E4.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
E4.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day*		n/a
E4.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
E4.4		Agitation	Automatic		Per process sheet		n/a
E4.5	4.1,4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
E4.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
E4.7		pH	Manual		Once every 8 hours		n/a
E4.8		Internal stress test	Manual		1/Month		n/a
E4.9		Ductility test	Manual		1/Month		n/a
E4.10		Filtration	Continuous		Once every 8 hours		n/a

PROCESS TABLE E - Decorative Plating for Metal and Plastic

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Process Line Identification:

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			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
5.0		**Microporous Nickel**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
E5.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
E5.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day*		n/a
E5.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
E5.4		Agitation	Automatic		Per process sheet		n/a
E5.5	4.1,4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
E5.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
E5.7	4.2	pH	Manual		Once every 8 hours		n/a
E5.8	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a
E5.9	4.2	STEP Test (of final product)	Manual		Once per day*		n/a

PROCESS TABLE E - Decorative Plating for Metal and Plastic

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
6.0		**Chromium**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
E6.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
E6.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 4 hours*		n/a
E6.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
E6.4		Agitation (if applicable)	Automatic		Once every 8 hours		n/a
E6.5	4.1,4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
E6.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
E6.7	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a
E6.8	4.2	Pore Count and Pore Size	Manual		Once per day*		n/a

PROCESS TABLE F - Electropolishing and/or Chrome Flash on Stainless Steel

All requirements given below are subordinate to applicable customer/OEM specific requirements.

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
1.0		**Electropolish** (If Applicable)					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
F1.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
F1.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day*		n/a
F1.3		Time	Automatic or Manual		After any program changes.		n/a
F1.4		Agitation	Automatic		Per process sheet		n/a
F1.5	4.1, 4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
F1.6	2.15	Solution Level	Automatic or Manual		Once every 8 hours		n/a
F1.7		Flowing Rinse	Automatic		Once every 8 hours		n/a

PROCESS TABLE F - Electropolishing and/or Chrome Flash on Stainless Steel

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
2.0		**Chromium** (If Applicable)					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
F2.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
F2.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 8 hours*		n/a
F2.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
F2.4	4.1,4.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
F2.5		Solution Level	Automatic or Manual		Once every 8 hours		n/a
F2.6	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a

PROCESS TABLE G - Hard Chrome Plating

All requirements given below are subordinate to applicable customer/OEM specific requirements.

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirements	Actual Condition	(Pass / Fail / N/A)
1.0		**Metal Cleaning**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
G1.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
G1.2	1.4; 2.11; 2.13	Concentration	Manual		Once per day		n/a
G1.3	1.4; 2.11; 2.13	Time	Automatic		After any program changes.		n/a
G1.4		Agitation	Automatic		Per process sheet		n/a
G1.5		Solution Level	Automatic or Manual		Once every 8 hours		n/a
G1.6	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a
2.0		**Mechanical Preparation (If Applicable)**					
G2.1		Polishing/Buffing:					n/a
G2.2		Wheel revolutions per minute (rpm)	Automatic or Manual		Per process sheet		n/a
G2.3		Buffing wheel material	Manual		Per process sheet		n/a
G2.4		Buffing wheel compound	Automatic/Manual		Per process sheet		n/a
G2.5		Surface profile is checked after process (if applicable).	Manual		Every load		n/a
G2.6		Abrasive Blast Process:					n/a
G2.7		Media type	Manual		Every part change		n/a

PROCESS TABLE G - Hard Chrome Plating

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirements	Actual Condition	(Pass / Fail / N/A)
G2.8		Blasting media size/life: - Media size is being checked on a regular schedule to determine effective cleaning and life of product mix.	Manual		Per preventative maintenance schedule, once per week minimum		n/a
G2.9	1.4; 1.6; 2.11; 2.12	Abrasive media flow or nozzle air pressure: - Blasting force is set and maintained within control limits	Automatic or Manual		Per process sheet		n/a
G2.10	1.4; 1.6; 2.11; 2.12	Dwell time is clearly defined. - If additional blasting is required, management approval is needed.	Automatic or Manual		Per process sheet		n/a
G2.11		Abrasive media level	Manual		Every load		n/a
G2.12	1.4; 2.11	Surface cleanliness is checked after process. Copper Sulfate Test (Hogeboom Test)	Manual		Every load*		n/a
G2.13	1.4; 2.11; 2.13	Surface profile is checked after process (if applicable).	Manual		Every load		n/a
3.0		**Acid Activation (If applicable)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
G3.1			Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
G3.2		Concentration	Automatic or Manual		Once per day		n/a
G3.3		Time	Automatic or Manual		Per process sheet		n/a
G3.4		Agitation or Circulation (if applicable)	Automatic		Per process sheet		n/a
G3.5	6.3 ,6.4	Current/Voltage (if applicable)	Automatic or Manual		Once every 8 hours		n/a
G3.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a

PROCESS TABLE G - Hard Chrome Plating

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Process Line Identification:

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirements	Actual Condition	(Pass / Fail / N/A)
G3.7	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a
4.0		**Chrome Plate**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
G4.1		Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
G4.2		Concentration	Manual		Once per day		n/a
G4.3		Metallic impurity concentrations of Fe, Cr+3, Cu, and Ni.	Manual		Once per week		n/a
G4.4		Time	Manual		After any program changes.		n/a
G4.5		Agitation or Circulation	Automatic		At start of each shift		n/a
G4.6	6.3, 6.4	Current/Voltage	Automatic or Manual		Once every 8 hours		n/a
G4.7		Ramp Schedule (If applicable)	Automatic or Manual		Per process sheet		n/a
G4.8		Solution Level	Automatic or Manual		Once every 8 hours		n/a
G4.9	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a

Proceed to PT - Embrittlement Bake (If required)

PROCESS TABLE H- Electroless Nickel

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
		STEEL					
1.0		**Alkaline Soak Cleaner**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
H1.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
H1.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day		n/a
H1.3	1.4; 2.11; 2.13	Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H1.4		Agitation	Automatic		Per process sheet		n/a
H1.5		Solution Level	Automatic or Manual		Once every 8 hours		n/a
H1.6	2.15	Flowing Rinse	Automatic or Manual		Once every 8 hours		n/a
2.0		**Alkaline Electrocleaner**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H2.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
H2.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once per day		n/a
H2.3	1.4; 2.11; 2.13	Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H2.4		Agitation	Automatic		Per process sheet		n/a
H2.5	4.1, 4.4	Current/Voltage	Automatic or Manual		Per process sheet and TDS Once every 8 hours*		n/a
H2.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
H2.7	2.15, 4.2	Flowing Rinse	Automatic		Once every 8 hours		n/a
3.0		**Acid Activation**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
H3.1	1.4; 2.11; 2.13	Temperature (if applicable)	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
H3.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 8 hours*		n/a
H3.3		Metallic impurity concentration. Obtain metallic impurity limits from chemical supplier with required corrective actions.	Manual		Once per month		n/a

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H3.4	1.4; 2.11; 2.13	Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H3.5		Agitation	Automatic		Per process sheet		n/a
H3.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
H3.7	2.15, 4.2	Flowing Rinse	Automatic		Once every 8 hours		n/a
		ALUMINUM					
4.0		**Soak Cleaner**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
H4.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
H4.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 8 hours*		n/a
H4.3	1.4; 2.11; 2.13	Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H4.4		Agitation	Automatic		Per process sheet		n/a
H4.5		Solution Level	Automatic or Manual		Once every 8 hours		n/a
H4.6	2.15, 4.2	Flowing Rinse	Automatic		Once every 8 hours		n/a
5.0		**Etch**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H5.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify daily.		n/a
H5.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 8 hours*		n/a
H5.3		Metallic impurity concentrations of Al and Cu. Obtain limits from chemical supplier with required corrective actions.	Per process sheet and TDS		Once per month		n/a
H5.4	1.4; 2.11; 2.13	Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H5.5		Agitation	Automatic		Per process sheet		n/a
H5.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
H5.7	2.15, 4.2	Flowing Rinse	Automatic		Once every 8 hours		n/a
6.0		**Deoxidizer/Desmutter**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					

PROCESS TABLE H- Electroless Nickel

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H6.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify once every 8 hours.		n/a
H6.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 8 hours*		n/a
H6.3	1.4; 2.11; 2.13	Metallic impurity concentrations of Al and Cu. Obtain limits from chemical supplier with required corrective actions.	Per process sheet and TDS		Once per month		n/a
H6.4		Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H6.5		Agitation	Automatic		Per process sheet		n/a
H6.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
H6.7	2.15, 4.2	Flowing Rinse	Automatic		Once every 8 hours		n/a
7.0		**Zincate (and second Zincate)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					

PROCESS TABLE H- Electroless Nickel

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H7.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify once every 8 hours.		n/a
H7.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 8 hours		n/a
H7.3	1.4; 2.11; 2.13	Metallic impurity concentrations of Al. Obtain limits from chemical supplier with required corrective actions.*	Per process sheet and TDS		Once per month		n/a
H7.4		Time	Automatic or Manual		Per process sheet and TDS		n/a
H7.5		Agitation	Automatic or Manual		Per process sheet and TDS		n/a
H7.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
		Dump Schedule	Manual		Manually measure impurities once every 8 hours*		n/a
H7.7	2.15, 4.2	Flowing Rinse	Automatic		Once every 8 hours		**n/a**
8.0		**Zincate Strip (when double Zincate)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
H8.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify once every 8 hours.		n/a
H8.2	1.4; 2.11; 2.13	Concentration(s)	Manual		Once every 8 hours*		n/a
H8.3	1.4; 2.11; 2.13	Metallic impurity concentrations of Al. Obtain limits from chemical supplier with required corrective actions.	Per process sheet and TDS		Once per month		n/a

PROCESS TABLE H- Electroless Nickel

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H8.4		Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H8.5		Agitation	Automatic		Per process sheet		n/a
H8.6		Solution Level	Automatic or Manual		Once every 8 hours		n/a
H8.7	2.15, 4.2	Flowing Rinse	Automatic		Once every 8 hours		n/a
9.0		**EN Strike (optional process)**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
H9.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify every 30 minutes while running.		n/a
H9.2	1.4; 2.11; 2.13	Nickel Concentration	Automatic or Manual		Prior to production start-up. Automatic: verify daily. Manually: once every 30 minutes while running.		n/a
H9.3		Time	Automatic or Manual		Per process sheet and after program changes.		n/a
H9.4	1.4; 2.11; 2.13	Agitation	Automatic		Per process sheet		n/a
H9.5		Hypophosphite concentration	Manual		Once every 8 hours*		n/a
H9.6		Solution loading (surface area of parts per volume plating solution)	Manual		Per process sheet and TDS		n/a

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H9.7		Solution Level	Automatic or Manual		Once per hour		n/a
H9.8		pH	Automatic or Manual		Once every 30 minutes while running*		n/a
H9.9		Filtration	Continuous per process sheet & TDS		Once every 8 hours		n/a
H9.10		Bath life (metal turnovers) (calculate by specific gravity or orthophosphite or nickel adds made)	Manual		Per process sheet and TDS		n/a
H9.11	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a
10.0		**Electroless Nickel**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
H10.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify every 30 minutes while running.		n/a
H10.2	1.4; 2.11; 2.13	Nickel Concentration	Automatic or Manual		Prior to production start-up. Automatic: verify daily. Manually: once every 30 minutes while running.		n/a
H10.3	1.4; 2.11; 2.13	Time	Manual		Per process sheet and after program changes.		n/a
H10.4		Agitation	Automatic		Per process sheet		n/a
H10.5		Hypophosphite concentration	Manual		Once every 8 hours		n/a

PROCESS TABLE H- Electroless Nickel

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Process Line Identification:

Type of Line: Rack or Barrel

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			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H10.6		Solution loading (surface area of parts per volume plating solution)	Manual		Per process sheet and TDS		n/a
H10.7		Solution Level	Automatic or Manual		Once per hour		n/a
H10.8		Bath life (metal turnovers) (calculate by specific gravity or orthophosphite or nickel adds made)	Manual		Once per day		n/a
H10.9		pH	Automatic or Manual		Once every 30 minutes while running*		n/a
H10.10		Filtration	Continuous per process sheet & TDS		Once every 8 hours		n/a
H10.11	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a
H10.12		Hardness Test (if applicable)	Manual		Per process sheet and TDS		n/a
H10.13		Phosphorous content (if applicable)	Manual		Per process sheet and TDS		n/a
11.0		**Specialty Electroless Nickel Alloys and Composites**					
		Type:					
		Size, volume:					
		Proprietary name:					
		Chemical supplier:					
H11.1	1.4; 2.11; 2.13	Temperature	Automatic		Continuous monitoring by controller. Manually verify every 30 minutes while running.		n/a

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
H11.2	1.4; 2.11; 2.13	Nickel Concentration	Automatic or Manual		Prior to production start-up. Automatic: verify daily. Manually: once every 30 minutes while running.		n/a
H11.3	1.4; 2.11; 2.13	Time	Manual		Per process sheet and after program changes.		n/a
H11.4		Agitation	Automatic		Per process sheet		n/a
H11.5		Reducing agent concentration	Manual		Once every 8 hours*		n/a
H11.6		Specialty Electroless Nickel Alloy and Composite concentrations	Manual		Per process sheet and TDS		n/a
H11.7		Solution loading (surface area of parts per volume plating solution)	Manual		Per process sheet and TDS		n/a
H11.8		Solution Level	Automatic or Manual		Once per hour		n/a
H11.9		Bath life (metal turnovers) (calculate by specific gravity or orthophosphite or nickel adds made)	Manual		Once per day		n/a
H11.10		pH	Automatic or Manual		Once every 30 minutes while running*		n/a
H11.11		Filtration	Per process sheet & TDS		Once every 8 hours		n/a
H11.12	2.15	Flowing Rinse	Automatic		Once every 8 hours		n/a

PROCESS TABLE H- Electroless Nickel

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Process Line Identification:

Type of Line: Rack or Barrel

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
12.0		**Heat Treatment for Hardness (if applicable)**					
H12.1		Oven temperature set point(s) and limits are verified and documented.	Manual		Start of bake cycle and every batch change.		n/a
H12.2		Oven temperature is monitored and recorded.	Automatic		A continuous chart recorder must be used with a temperature control alarm.		n/a
H12.3		Temperature uniformity surveys are performed yearly.	Manual		Uniformity survey must show that ovens were tested with a full production load. The applicator shall demonstrate that the time from plating to baking temperature can be reached within the time limit set by customer requirements.		n/a
H12.4		Thermocouples are checked and/or replaced quarterly.	Manual		Supplier shall have preventative maintenance system that is documented and implemented.		n/a
H12.5		Inert gas pressure set point(s) and limits are verified and documented.	Manual		Start of bake cycle and every batch change.		n/a
H12.6		Time is electronically recorded or mechanically recorded (not hand-written).for start of bake cycle,and end of bake cycle.	Automatic/Manual		Every baking batch.		n/a

Proceed to PT I - Embrittlement Bake (If required)

PROCESS TABLE I - Hydrogen Embrittlement Relief Bake Process

All requirements given below are subordinate to applicable customer/OEM specific requirements.

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Process Line Identification:

Type of Oven: Batch or Continuous

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
1.0							
I1.1		Process must be in place that limits the acid immersion time in the plating process.	Automatic	Automatic	No more than ten minutes. If more than ten minutes, parts need to be quarantined, and follow customer reaction plan.	7 minutes	pass
I1.2		All parts for hydrogen embrittlement relief must reach bake temperature at the center of the load within two hours after plating.	Automatic/Manual	Automatic	If requirement or procedure is not met, parts need to be quarantined, and follow customer reaction plan.	Requirement met	pass
I1.3		Oven temperature set point(s) and limits are verified and documented.	Manual	manual	Start of bake cycle and every batch change.	every batch	pass
I1.4		Oven temperature is monitored and recorded.	Automatic	Automatic	A continuous chart recorder must be used with a temperature control alarm.	continuous	pass
I1.5		For hydrogen embrittlement relief ovens, are temperature uniformity surveys performed yearly?	Manual	manual	Uniformity survey must show that ovens were tested with a full production load. The applicator shall demonstrate that the time from plating to baking temperature can be reached within the time limit set by customer requirements.	WI-0036 MA 78 Annual Survey of Furnaces & Draws	pass

PROCESS TABLE I - Hydrogen Embrittlement Relief Bake Process

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Process Line Identification:

Type of Oven: Batch or Continuous

ITEM #	Related PSA Question #	Category/Process Steps	Type of Control		Monitoring Frequency		Observation/Comments
			Minimum Requirement	Actual Condition	Minimum Requirement	Actual Condition	(Pass / Fail / N/A)
I1.6		For hydrogen embrittlement relief ovens, are thermocouples checked and/or replaced quarterly?	Manual	manual	Plater shall have preventative maintenance system that is documented and implemented.	FMMBO0092 MA78 Calibration Verification Record	pass
I1.7		Time and date out of plating line, start of bake cycle, and end of bake cycle, is electronically or mechanically recorded (not hand-written).	Automatic/Manual	automatic/manual	Every baking batch.	every batch	pass
I1.8		Air filter (if used) change is scheduled.	Manual	N/a	Per oven manufacturer, filter supplier recommendation	N/A	N/A
I1.9		Bake oven logs for each batch are reviewed and verified.	Manual	manual	Before shipment of each batch an independent inspector (other than operator) shall verify that time and date out of plating line, start of bake cycle, temperature and end of bake cycle meet process specification.	Performed by supervisor before next process step	pass
I1.10		Hydrogen embrittlement relief must performed per customer requirements before re-work.			Hydrogen embrittlement relief is a time sensitive process. In the case of re-work, the parts must be baked immediately. This shall be reflected in the re-work process control documents.	Shop log & customer paperwork	pass

PROCESS TABLE J - Process Control and Testing Equipment

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ITEM #	EQUIPMENT TYPE	Zinc/Zinc Alloy	Decorative Plating	Electroless Nickel	Hard Chrome	Electropolish	Chrome flash	Verification Frequency	Calibration / Certification Frequency	Observation/Comments (Pass / Fail / N/A)
1.0	**LABORATORY EQUIPMENT**									
J1.1	**Wet Analysis:** Before use, chemicals must be checked for shelf life and/or expiration date	X	X	X	X	X	X	Daily	N/A	pass
J1.2	pH / Conductivity Meter	X	X	X		X		Daily	Yearly	pass
J1.3	pH / Conductivity Probes Solution compatible probes must be used. Dedicated probes must be used for chromates / passivates.	X	X	X		X		Before each use	N/A	pass
J1.4	Laboratory Balance (Weight Scale) (Optional)	X	X	X	X			Monthly	Yearly	N/A
J1.5	Atomic Absorption (AA)*	X	X	X				Before each use	Yearly	pass
J1.6	X-Ray Fluorescence (XRF)	Alloy Only						Thickness and alloy verification daily	Yearly	N/A
J1.7	Hardness Tester*		X		X			Daily	Yearly	N/A
J1.8	Profilometer				X			Daily	Yearly	N/A
J1.9	Lab Rectifier	X	X		X			When applicable	Yearly	pass

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2.0	**TESTING EQUIPMENT**									
J2.1	Salt Spray Cabinet	X			X			Daily	Yearly	pass
J2.2	Thickness Tester	X	X	X	X		X	Daily	Yearly	pass
J2.3	Coulometric (STEP) Tester		X					Daily	Yearly	N/A
J2.4	CASS Cabinet		X		X		X	Daily	Yearly	N/A
J2.5	Microscope (Min 100X) with calibrated grid reticle for Pore/Crack Count		X		X			N/A	Yearly	N/A
J2.6	Freezer		X					Daily	Yearly	N/A
J2.7	Lab Oven	X	X				X	Daily	Yearly	N/A

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3.0	**PROCESSING EQUIPMENT**									
J3.1	Rectifier	X	X		X	X	X	Ripple checked every 12 months	N/A	pass
J3.2	Amp Meter/Volt Meter	X	X		X	X	X	Checked every 12 months	N/A	pass
J3.3	Plating Solution Filters	X		X				Daily	N/A	pass
J3.4	Plate filters (bright and semi-bright nickel tanks)		X					Daily	N/A	N/A
J3.5	Oven Temperature recorder							Every 3 months	Yearly	pass
J3.6	Data/Chart recorder for deembrittlement or EN hardness oven	X	X	X				Yearly	N/A	pass
J3.7	Thermocouples	X	X	X				Every 3 months		pass
J3.8	**Controllers:** (If Used)	X	X	X	X	X	X	Set points and/or feed rates are verified (if applicable)		pass
J3.9	Automatic feeders							Daily		pass
J3.10	Timers							Daily		pass
J3.11	Temperature	X	X	X	X	X	X	Daily	Yearly	pass
J3.12	Volume							Daily		pass
J3.13	pH / Conductivity							Daily		pass

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J3.14	**Agitation type:**	X	X	X		X				
J3.15	Air							Daily		pass
J3.16	Cathode rod							Daily		N/A
J3.17	Eductor							Daily		N/A
J3.18	**Water source:**	X	X	X	X	X	X			
J3.19	POTW									pass
J3.20	RO							Daily		N/A
J3.21	Well									N/A
J3.22	Deionized			X				Daily		N/A
J3.23	**Drying type:**	X	X	X	X	X	X			N/A
J3.24	Spin Dryer							Daily		pass
J3.25	Forced Air Drying							Daily		N/A
J3.26	Belt Oven							Daily		N/A
J3.27	Box Oven							Daily		N/A

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