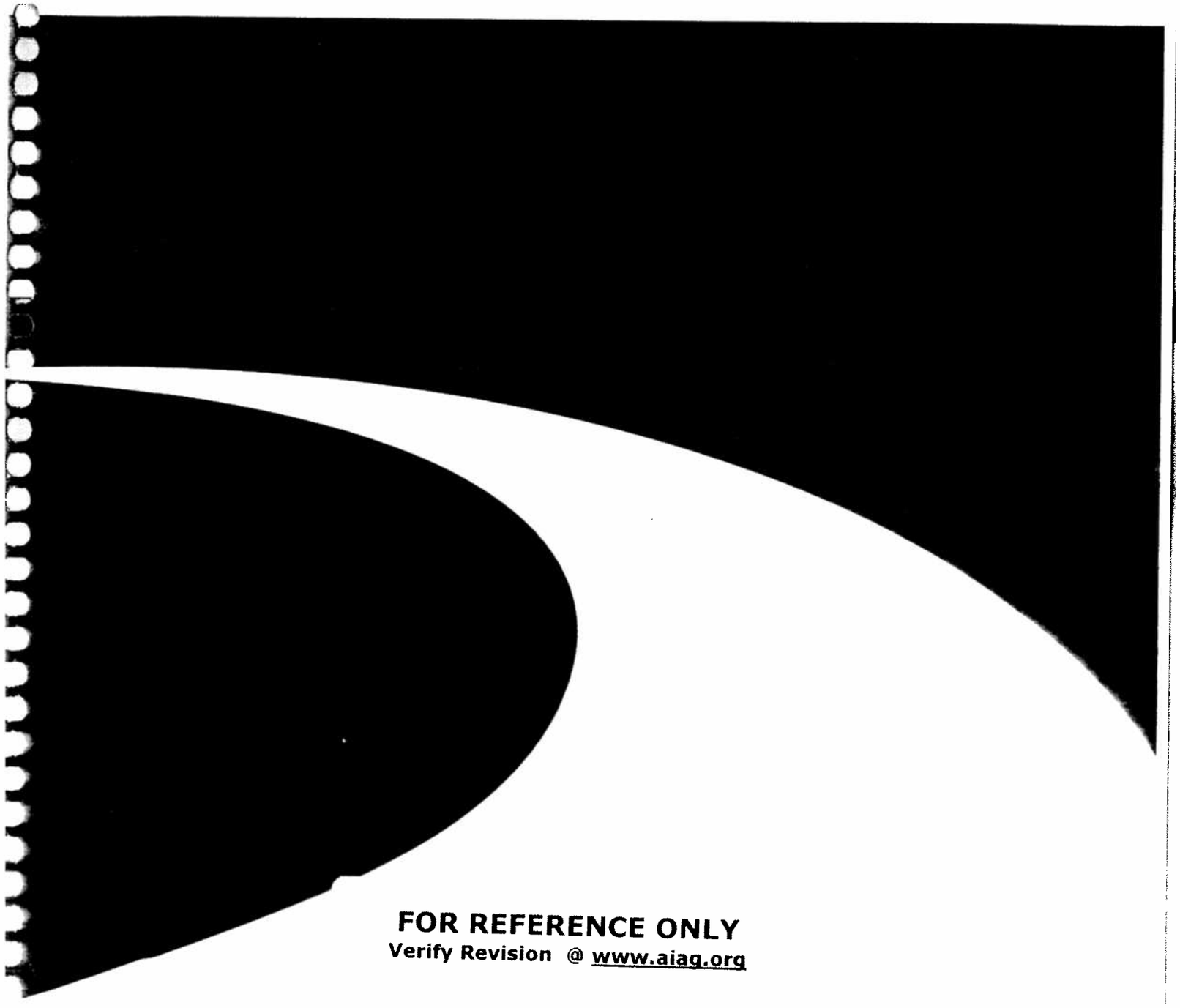
AIAG

Automotive Industry Action Group

CQI-17

Special Process: Soldering System Assessment



ABOUT AIAG

Purpose Statement

Founded in 1982, AIAG is a globally recognized organization where OEMs and suppliers unite to address and resolve issues affecting the worldwide automotive supply chain. AIAG's goals are to reduce cost and complexity through collaboration; improve product quality, health, safety and the environment; and optimize speed to market throughout the supply chain.

AIAG Organization

AIAG is made up of a board of directors, an executive director, executives on loan from member companies, associate directors, a full-time staff, and volunteers serving on project teams. Directors, department managers, and program managers plan, direct and coordinate the association's activities under the direction of the executive director.

AIAG Projects

Volunteer committees focus on business processes or supporting technologies and methodologies. They conduct research and develop, publish, and provide training on standards, conventions, standard business practices, white papers, and guidelines in the areas of automatic identification, CAD/CAM, EDI/electronic commerce, continuous quality improvement, health focus, materials and project management, occupational health & safety, returnable containers and packaging systems, transportation/customs and truck & heavy equipment.

AIAG PUBLICATIONS

An AIAG publication reflects a consensus of those substantially concerned with its scope and provisions. An AIAG publication is intended as a guide to aid the manufacturer, the consumer and the general public. The existence of an AIAG publication does not in any respect preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the publication.

CAUTIONARY NOTICE

AIAG publications are subject to periodic review and users are cautioned to obtain the latest editions.

MAINTENANCE PROCEDURE

Recognizing that this AIAG publication may not cover all circumstances, AIAG has established a maintenance procedure. Please refer to the Maintenance Request Form at the back of this document to submit a request.

Published by:
Automotive Industry Action Group
26200 Lahser Road, Suite 200
Southfield, Michigan 48033
Phone: (248) 358-3570 • Fax: (248) 358-3253

APPROVAL STATUS

The AIAG Quality Steering Committee and designated stakeholders approved this document for publication in March 2010.

ISBN #: 978 1 60534 209 2

FOREWORD

Automotive Industry Action Group (AIAG) committees are made up of volunteers from member companies in the automotive industry. The work of preparing process audits is done by AIAG technical committees.

The main task of technical committees is to prepare Automotive Standards and System Requirements. Draft documents adopted by the technical committees are circulated to the Steering Committee for review and consensus approval. Publication of the documents requires approval by the Quality Steering Committee.

The Quality Steering Committee would like to acknowledge and thank the following individuals and their companies who have contributed time and effort to the development of this document.

ACKNOWLEDGEMENTS

Core Members:

Pasquale M. Presti (Chairman) ..... Chrysler Group LLC
Tom Karvounis ..... General Motors Corporation
Dave Ahlers ..... Honda of American Manufacturing, Inc.
Robert Vaughn ..... Toyota Motor Engineering & Manufacturing, North America
Joe Shi ..... Visteon Corporation
Virender Choudhri ..... Delphi Corporation

TABLE OF CONTENTS

INTRODUCTION

General

The work of preparing CQI-17: *Special Process: Soldering System Assessment* (SSA) was carried out through the AIAG Soldering Work Group. These soldering requirements are complementary to customer and product standards.

The SSA can be used to assess an organization's ability to meet the requirements in this assessment, as well as customer, regulatory, and the organization's own requirements. The SSA can also be used between an organization and its suppliers.

In the SSA, the word "shall" indicates a requirement for purposes of the self assessment. Failure to meet the requirements results in an assessment that is either "Not Satisfactory" or "Needs Immediate Action". The word "should" indicates a recommendation. Where the term "such as" is used, any suggestions given are for guidance only.

Process Approach

The SSA supports the automotive process approach as described in ISO/TS 16949.

Soldering System Assessment Goals

The goal of the SSA is the development of a soldering management system that provides for continual improvement, emphasizing defect prevention and the reduction of variation and waste in the supply chain.

The SSA, coupled with an internationally recognized quality management system and applicable customer-specific requirements, defines the fundamental requirements for soldering management systems.

The SSA is intended to provide a common approach to a soldering management system for automotive production and service part organizations.

Assessment Process

Ongoing assessments shall be conducted annually, unless otherwise specified by the customer, to re-examine the continuing compliance with the SSA. Each assessment shall include a review of the organization's systems using the SSA. Successive Job Audits (Section 4.0 of this document) shall sample parts from different automotive component manufacturers that require compliance to the SSA document.

The assessment shall use the process approach to auditing as identified by the requirements of ISO/TS 16949.

Assessor Qualifications

Assessor(s) shall have the following specific experience to conduct the SOLDERING SYSTEM ASSESSMENT:

1. Be an experienced quality management system (QMS) internal auditor (for example, ISO/TS 16949, ISO 9001.)
2. Assessor shall possess soldering knowledge. Evidence shall include a minimum of 5 years experience in soldering or a combination of formal metallurgical training and soldering experience totaling a minimum of 5 years.
3. Assessor shall possess knowledge of and be familiar with the application of automotive quality core tools including statistical process control, measurement systems analysis, part approval, failure mode and effects analysis, and advanced quality planning.

Note: If more than one assessor is required to meet the above qualifications, the lead assessor shall be the person meeting the requirements in item #1.

Other Requirements

The organization shall keep records as evidence of compliance to the requirements identified in the SSA, as well as all appropriate action plans to address any unsatisfactory ratings. These records shall be readily available for review by any customer requiring compliance to the requirements within this document.

SCOPE

1.1 General

This document specifies process requirements for an organization or its suppliers performing applicable soldering, who need to:

- demonstrate ability to consistently provide product that meets customer and applicable regulatory requirements, and
- enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system.

The Soldering System Assessment is applicable to sites where customer-specified parts for production and/or service are processed throughout the automotive supply chain.

1.2 Application

All requirements of the SSA are generic and are intended to be applicable to all organizations performing the soldering operations addressed in this document, regardless of type, size, and product.

Nineteen Process Tables have been developed and the appropriate table(s) is to be referenced during the assessment. The Process Tables are specific to soldering processes as noted below:

- Process Table A – Paste Printing
- Process Table B – Inspection
- Process Table C – Surface Mount Device Placement
- Process Table D – Reflow
- Process Table E – Glue Dispensing
- Process Table F – Flux Application for Wave Soldering
- Process Table G – Pre-Heat
- Process Table H – Wave
- Process Table I – Fountain
- Process Table J – Dip
- Process Table K – Selective
- Process Table L – Automated Iron
- Process Table M – Manual Iron
- Process Table N – Laser and Soft Beam
- Process Table O – Induction
- Process Table P – Conformal Coat and Test
- Process Table Q – PCB Separation
- Process Table R – In-Circuit Testing
- Process Table S – Rework

These Process Tables contain requirements for:

1. Process and Equipment
2. Process Monitor Frequencies

The Process Tables specify the tolerances of process parameters and the frequencies for checking process control parameters and parts. The Requirements and Guidance in the SSA form will notify the assessor when to refer to the Process Tables.

1.3 Reference

The following standards are referenced in this document. The applicability is limited to the subject matter referenced.

Standard Number	Title	Standard's Organization
IPC J-STD-001D Copyright Feb 2005	Joint Industry Standards ; Requirements for Soldered electrical and electronic assemblies	IPC - www.ipc.org
IPC-A-610D	Acceptability of Electronic Assemblies	IPC - www.ipc.org
IPC-7711/7721	Rework of Electronic Assemblies/Repair and Modification of Printed Boards and Electronic Assemblies	IPC - www.ipc.org
ANSI/ESD S20.20-2007	For the Development of an Electrostatic Discharge Control Program for – Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)	ESD Association

2 THE SOLDERING SYSTEM ASSESSMENT PROCEDURE

1. Obtain current copy of CQI-17 Special Process: Soldering System Assessment from AIAG.
2. Identify all soldering processes to which CQI-17 Special Process: Soldering System Assessment applies (see CQI-17, 1.2). Record these processes on the SSA.
3. Complete the SSA, determining the level of compliance. A minimum of one job audit (Section 4) shall be performed during each assessment.
4. Address each "Not Satisfactory" item and determine corrective action, including root cause analysis and implementation of the corresponding corrective action(s). The corrective action(s) shall be completed within 90 days. Records of the corrective action, including verification, shall be maintained.
5. "Needs Immediate Action" requires immediate containment of suspect product. Address each "Needs Immediate Action" item and determine corrective action(s), including root cause analysis and implementation of the corresponding corrective action(s). The corrective action(s) shall be completed within 90 days. Records of the corrective action, including verification, shall be maintained.
6. Assessments shall be conducted annually unless otherwise specified by the customer.

3 SPECIAL PROCESS: SOLDERING ASSESSMENT

Instructions for completing the Cover Sheet

1. **Facility Name**: Name of the facility being assessed.

   One form shall be used for each facility. The facility may have several buildings or physical locations in the same general area. If there is a separate management team or different management system, then these locations shall be considered as separate facilities.

2. **Address**: The street address of the facility being assessed; P.O Box numbers may be given as additional information.

3. **Phone Number**: The phone number of the facility.

   If there is no common phone number for the facility, the phone number of the Operations Manager or Quality Manager shall be used.

4. **Fax Number:** The fax number of the facility.

5. **Number of Soldering Employees at this Facility:** The number of employees, salaried and hourly, associated with the soldering operation at this facility.

6. **Captive Soldering Organization (Y/N):** Enter "Y" if this facility solders components for their own company. Enter "N" if the company does not solder any components for their own company.

7. **Commercial Soldering Organization (Y/N)**: Enter "Y" if this facility solders components for companies other than their own company. Enter "N" if this facility does not solder any components for other companies.

8. **Date of Assessment**: Enter the date(s) of the assessment. An alphanumeric format shall be used to avoid confusion with different numeric formats.

   i. Example: May 3 – 4, 2010

9. **Date of Previous Assessment**: List the date of the previous CQI-17 Special Process: Soldering System Assessment of this facility.

10. **Type(s) of Soldering at this Facility:** Place a checkmark to designate all soldering process(es) performed at this facility. This information determines the appropriate Process Table that shall be used during the assessment. Processes not listed on the cover sheet are not part of the Soldering System Assessment.

11. **Current Quality Certification(s):** The soldering organization shall list their current quality certifications, e.g., ISO/TS 16949, ISO 9001:2008. Certifications may be from 3rd party sources or customer quality certifications. If customer quality certification is given, then the year of the last assessment by the customer shall also be given.

12. **Date of Re-assessment (if necessary):** If "Not Satisfactory" findings were observed from the original assessment, then the soldering organization shall address each item and determine correct action, including root cause analysis and implementation of the corresponding corrective action(s).

    The date of the re-assessment shall be given here, and the appropriate Question(s) from Sections 1 – 4, in the original assessment, shall be modified to reflect that the evidence, relating to the implementation of the corrective action(s), has been observed. Also, the "Number of Not Satisfactory Findings" shall be modified as appropriate.

13. **Personnel Contacted:** List the name(s), title(s), phone number(s), and email address(es), if available, of the principal participants from the soldering organization.

14. **Auditors/Assessors:** List the name(s), Company(ies), phone number(s) and email address(es), if available, of the auditor/assessor(s).

15. **Number of "Not Satisfactory" Findings:** Enter the number of "Not Satisfactory" findings observed during the assessment. Number of "Needs Immediate Action" Findings: Enter the number of "Needs Immediate Action" findings observed during the assessment.

16. **Number of "Needs Immediate Action" Findings**: Enter the number of "Needs Immediate Action" findings observed during the assessment.

17. **Number of "Fail" Findings in the Job Audit(s)**: Enter the number of "Fail" findings observed from the job audit.

Special Process: Soldering System Assessment

Facility Name:	
Address	
Phone Number	
Fax Number	
Number of Soldering Employees at this Facility:	
Captive Soldering Organization (Y/N)	
Commercial Soldering Organization (Y/N)	
Date of Assessment:	
Date of Previous Assessment:	

Type(s) of Soldering at this Facility:	
Process Table A -	Process Table K -
Process Table B -	Process Table L -
Process Table C -	Process Table M -
Process Table D -	Process Table N -
Process Table E -	Process Table O -
Process Table F -	Process Table P -
Process Table G -	Process Table Q -
Process Table H -	Process Table R -
Process Table I -	Process Table S -
Process Table J -	

Current Quality Certification(s)

Date of Re-assessment (if necessary):

Personnel Contacted:

Name	Title	Phone	Email

Auditors/Assessors

Name	Company	Phone	Email

Number of "Not Satisfactory" Findings

Number of "Needs Immediate Action" Findings

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

Instructions for completing Sections 1 – 3

Sections 1 - 3 contain questions and the requirements and guidance for each question. The Sections are:

- Section 1 – Management Responsibility & Quality Planning
- Section 2 – Floor and Material Handling Responsibility
- Section 3 – Equipment

The assessor shall assess the soldering organization's compliance to Sections 1 – 3 by comparing the evidence presented by the soldering organization to the requirements listed in the "Requirements and Guidance" column.

NOTE 1: In the "Requirements and Guidance" column, the word "shall" indicates a requirement and the term "such as" indicates that any suggestions given are for guidance only.

NOTE 2: The "Requirements and Guidance" column will indicate to the assessor when the Process Tables are pertinent to the Questions. When the Process Tables are pertinent to the Question, the assessor shall assess the soldering organization's compliance to the specified section(s) in the Process Tables.

NOTE 3: If the question is not applicable to the soldering organization, then the assessor shall place a checkmark in the "N/A" Assessment column. If the observed evidence is in compliance to the question, the assessor shall note the evidence in the "Objective Evidence" column and place a check mark in the "Satisfactory" column. If the observed evidence is not in compliance to the question, then the assessor shall note the non-compliance in the "Objective Evidence" column and place a check mark in the "Not Satisfactory" column.

NOTE 4: Where nonconforming product/process is identified in the assessment of a given question the assessor shall place a check mark in the "Needs Immediate Action" (NIA) column. NIA requires immediate containment of suspect product/process.

Special Process: Soldering 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 soldering expert on-site?	To ensure readily available expertise, there shall be a dedicated and qualified soldering expert on 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 metallurgical and soldering knowledge. The qualifications shall include a minimum of 5 years experience in soldering operations or a combination of a minimum of 5 years of formal metallurgical education and soldering experience.					
1.2	Does the soldering organization perform advanced quality planning?	The organization 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 organization. After the part approval process is approved by the customer, no process changes are allowed unless approved by the customer. The soldering organization shall contact the customer when clarification of process changes is required. This clarification of process changes shall be documented.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
13	Are soldering FMEA's up to date and reflecting current processing?	The organization shall incorporate the use of a documented Failure Mode and Effects Analysis (FMEA) procedure and ensure the FMEA's 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 soldering process parameters as defined by the organization. A cross-functional team shall be used in the development of the FMEA. All special characteristics, as defined by the organization and its customers, shall be identified, defined, and addressed in the FMEA.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.4	Are soldering process control plans up to date and reflecting current processing?	The organization 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 solder process parameters as defined by the organization. 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 FMEA's. All special characteristics, as defined by the organization 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.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
15	Are all soldering related and referenced specifications current and available? For example: IPC, SAE, AIAG, ASTM, General Motors, Honda, Ford, and Chrysler.	To ensure all customer requirements are both understood and satisfied, the organization shall have all related solder 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 IPC, SAE, AIAG, ASTM, General Motors, Honda, Ford, and Chrysler. The organization shall have a process to ensure the timely review, distribution, and implementation of all customer and industry engineering standards / specifications and changes based on customer-required schedule. Timely review should be as soon as possible and shall not exceed two working weeks. The organization 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 organization, how the current status is established, and how the relevant information is cascaded to the shop floor within the two-week period. The organization shall identify who is responsible for performing these tasks.					

Special Process: Soldering Process Assessment (General Facility Overview)							
				Assessment			
Question Number	Question	Requirements and Guidance	Objective Evidence	N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.6	Is there a written process specification for all active processes?	The solder organization 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, atmosphere or gas flow settings, belt speeds, etc. Such parameters shall not only be defined, they shall have operating tolerances as defined by the organization in order to maintain process control. These process specifications may take the form of work instructions, job card, computer-based recipes, or other similar documents.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
17	Has a valid process capability study been performed initially and after process equipment has been relocated, or had a major rebuild?	To demonstrate each process is capable of yielding acceptable product the organization shall perform process capability studies for the initial validation of each process, after relocation of any process equipment, & after a major rebuild of any equipment. The organization shall define what constitutes a major rebuild. Initial process capability studies shall be conducted for all solder processes per manufacturing line defined in scope of work & in accordance with customer requirements. A manufacturing line may include a combination of equipment that is integrated in the performance of a solder process, e.g., printing, placement, and reflow. Capability study techniques shall be appropriate for the solder product characteristics, e.g., paste height and thermal profiling. Any specific customer requirements shall be met, in the absence of customer requirements, the organization shall establish acceptable ranges for measures of capability. An action plan shall exist to address the steps to followed in case capability indices fall outside customer requirements or established ranges.					
18	Does the solder organization 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 organization 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 product or process parameters. The organization shall determine which parameters to include in such analysis.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.9	Is management reviewing the soldering process data every 24 hours?	Management shall review the soldering process data at intervals not to exceed 24 hours. The soldering process data includes but is not limited to thermal profiles, SPC, set up sheets and maintenance logs, through-put, etc. The management review shall include efforts to detect out-of-control conditions or alarm conditions. The process of reviewing the soldering process data shall be documented and this requirement also applies to computerized data.					
1.10	Are internal assessments being completed on an annual basis, at a minimum, using AIAG SSA?	The organization shall conduct internal assessments on an annual basis, at a minimum, using the AIAG SSA.					
1.11	Is there a system in place to authorize rework or repair and is it documented?	The quality management system shall include a documented process for rework and repair that shall include authorization from a designated individual, a recognized team of experts, or customer requirement. The rework and repair procedures shall describe product characteristics for which rework and repair is allowed as well as those characteristics for which rework is not permissible. Any rework or repair activity shall require a processing control sheet issued by qualified technical personnel denoting the necessary solder rework or repair. Records shall clearly indicate when and how any material has been reworked or repair. Repaired parts shall meet inspection standards, and must be verified by a secondary process such as in-circuit test.					

Special Process: Soldering Process Assessment (General Facility Overview)							
				Assessment			
Question Number	Question	Requirements and Guidance	Objective Evidence	N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.12	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.					
1.13	Is there a continual improvement plan applicable to each process defined in the scope of the assessment?	The solder organization shall define a process for continual improvement for each solder process identified in the scope of the SSA. 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 organization shall show evidence of program effectiveness.					
1.14	Does the Quality Manager or designee authorize the disposition of material from quarantine status?	The Quality Manager is responsible for authorizing and documenting appropriate personnel to disposition quarantine material, such as components that are out of tolerance					
1.15	Are there procedures or work instructions available to the solder personnel that define the soldering process?	There shall be procedures or work instructions available to soldering personnel covering the soldering 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					

AIAG
Automotive Industry Action Group

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.16	Is management providing employee training for soldering?	The organization shall provide employee training for all soldering operations. All employees associated with the soldering process, 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.					
1.17	Is there a responsibility matrix to ensure that all key management and supervisory functions are performed by qualified personnel?	The organization 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 organization). This matrix shall be readily available to management at all times.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
1.18	Is there a preventive maintenance program? Is maintenance data being utilized to form a predictive maintenance program?	The organization shall have a documented preventive maintenance program for key process equipment (as identified by the organization). 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. Furnaces and generators shall be scheduled for burn-out at frequencies determined by the organization. Maintenance data shall be collected and analyzed as part of a predictive maintenance program.					
1.19	Has the soldering organization developed a critical spare part list and are the parts available to minimize production disruptions?	The soldering organization shall develop and maintain a critical spare parts list and shall ensure the availability of such parts to minimize production disruptions.					
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.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
2.2	Is product clearly identified and staged throughout the manufacturing soldering 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 soldering process. Unsoldered product, in-process, and finished product shall be properly segregated and identified. All material shall be staged in a dedicated and clearly defined area.					
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. Traceability should include bulk packed components used for manual insertion processes.					
2.4	Are procedures adequate to prevent movement of non-conforming product/material into the production system?	The control of suspect or non-conforming product/material 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. The soldering organization shall have documented procedures to identify and segregate improperly soldered parts for each process/equipment resulting from equipment failures/e-stop/loss of power.					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
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 soldered parts or inappropriate material contaminate the finished lot.					
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.					
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.					
2.9	Is the handling, storage and packaging adequate to preserve product quality?	The soldering organization loading/unloading systems, in process handling and shipping process shall be assessed for risk of part damage or other quality concerns for proper ESD prevention and detection (example proper operator ESD protection, work station and storage grounding). Also all material storage must meet supplier recommendation (example humidity, temperature and expiration date).					

Special Process: Soldering Process Assessment (General Facility Overview)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
2.10	Are plant cleanliness, housekeeping, environmental and safe working conditions conducive to control and improved quality?	Plant cleanliness, housekeeping, environmental, and working conditions shall be conducive to controlling and improving quality. The soldering organization shall 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, temperature and humidity controlled per customer expectation.					
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.					
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?					
2.13	Are In-Process / Final Test Frequencies performed as specified in Process Tables?	In-Process / Final Test Frequencies shall be performed as specified for critical/function characteristics identified in Process Tables. Refer to Process Tables.					
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.					

Special Process: Soldering Process Assessment (Equipment)							
				Assessment			
Question Number	Question	Requirements and Guidance	Objective Evidence	N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
Section 3 - Equipment							
3.1	Does each stage of the soldering operation have proper process controls?	Refer to Process Tables for requirements.					
3.2	Are process and testing equipment calibrations and/or verification certified, posted, and current?	A system shall be used by the soldering 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.					
3.3	Are PCB magazines, screen printer stencils, solder pallets, and other tooling maintained?	Supplier shall have preventative maintenance system that is documented and implemented.					
3.4	Are thermal profile requirements of soldering operations being monitored?	Supplier shall have adequate temperature controls ensuring that PCB assemblies are only exposed to temperatures within the thermal requirements of components.					

Special Process: Soldering Process Assessment (Equipment)

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
3.5	For re-flow ovens and preheating zones for wave soldering, are temperature monitoring devices checked and/or replaced regularly?	Supplier shall have preventative maintenance system that is documented and implemented.					
3.6	Do you have a process to monitor your regulatory requirements and safety of your employees?	Supplier shall have implemented and documented evidence of regulatory requirements and safety.					
3.7	Is manual soldering and/or re-work equipment calibrated?	Supplier shall have set-up parameters and calibration routines documented and established.					
3.8	Is there post soldering inspection station?	Supplier shall have inspection method to evaluate solder quality and feedback to previous process.					
3.9	Are ESD or EOS equipment standards established?	All equipment shall be properly grounded.					

Instructions for completing the Job Audit

The organization is to complete a minimum of one soldering process audit during each assessment. This should be done preferably on a process identified for one of the customers requiring compliance to this document. More process audits may be done if time permits.

The process audit is not the only or main focus of the SSA. The other three sections on Management Responsibility and Quality Planning, Floor and Material Handling Responsibility, and Equipment are equally if not even more important. The audit of one soldering process is not sufficient to use as a basis to complete the other sections of the complete SSA.

The audit is a compliance type audit/review of a specific process and its related paperwork and processing, including soldering equipment and processing records for that process from the beginning receipt of a blank Printed Wiring Board (PWB) through processing in the soldering operation and inspection to packaging. If an automotive manufacturer's part is not available or identifiable, then parts from other customers requiring compliance with this document shall be used for the assessment.

The specific soldering processing parameters (applies to 4.7 in the Job Audit) that are required in the job audit shall be added to the job audit form. This can be done by reviewing the customer specification(s), the Control Plan, the FMEA, and the floor work/job order. Each processing step shall be reviewed for proper production records/compliance/inspection. These steps can be compared to those in the Soldering System Assessment for the actual job/soldering process being reviewed for compliance. The soldering records for the actual time frame/shift etc. that the job was processed shall also be checked. The actual soldering equipment and instrumentation certification shall be verified as being in compliance to the appropriate equipment requirements in the equipment section.

Section 4 - Job Audit

This section includes final product and final product assembly and packaging

Job Identity:
Customer: _____
Shop Order Number: _____
Part Number: _____
Part Description: _____
Material: _____
Soldering Requirements: _____

Question #	Job Audit Question	Related SSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
4.1	Are contract review, advance quality planning, FMEA, control plans, etc., performed by qualified individuals?	1.2 1.3 1.4 1.17		N/A		
4.2	Does the solder organization have the proper customer specifications for the part?	1.5		N/A		
4.3	Does the soldering organization have a confirmation method to ensure correct parts and components are installed per customer requirements?	1.6 2.1				
4.4	Is material identification (part numbers, lot numbers, contract numbers, etc.) and process sequencing (repair, rework, etc.) traceable to the part throughout the soldering process?	2.2 2.3 2.4				
4.5	Is there documented evidence of a material certification with final inspection?					

Section 4 - Job Audit

This section includes final product and final product assembly and packaging

Job Identity:
Customer: _____
Shop Order Number: _____
Part Number: _____
Part Description: _____
Material: _____
Soldering Requirements: _____

Question #	Job Audit Question	Related SSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
4.6	Are final packaging requirements indentified per customer specifications?	1.6 2.7 2.9				
4.7	Is the proper procedure or process specification used for the soldering process? 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				

Section 4 - Job Audit

This section includes final product and final product assembly and packaging

Job Identity:
Customer: _____
Shop Order Number: _____
Part Number: _____
Part Description: _____
Material: _____
Soldering Requirements: _____

Question #	Job Audit Question	Related SSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
4.8	What are the product inspection requirements?	2.13	Each part may have one or more requirements determined by the soldering specification. Parts must meet each requirement. List each requirement below and validate.			
	Functional?					
	Dimensional?					
	Acceptability?					
4.8.1	Requirement: Functional Test					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.2	Requirement: Dimensional Requirements					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.3	Requirement: Environmental Test					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.4	Requirement: Illumination Test					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					

Section 4 - Job Audit

This section includes final product and final product assembly and packaging

Job Identity:
Customer: _____
Shop Order Number: _____
Part Number: _____
Part Description: _____
Material: _____
Soldering Requirements: _____

Question #	Job Audit Question	Related SSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
	Specification:					
4.8.5	**Requirement: In-Circuit Test**					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.6	**Requirement: Conformal Coating Conformation**					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
Note: Section 4.8.7 - 4.8.12 Reserved for Auditor Observations						
4.8.7	**Requirement:**					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.8	**Requirement:**					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					

Section 4 - Job Audit

This section includes final product and final product assembly and packaging

Job Identity:
Customer: _____
Shop Order Number: _____
Part Number: _____
Part Description: _____
Material: _____
Soldering Requirements: _____

Question #	Job Audit Question	Related SSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
4.8.9	Requirement:					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.10	Requirement:					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.11	Requirement:					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					
4.8.12	Requirement:					
	Test Method:					
	Test frequency or quantity:					
	Selection of samples:					
	Specification:					

Section 4 - Job Audit

This section includes final product and final product assembly and packaging

Job Identity:
Customer: _____
Shop Order Number: _____
Part Number: _____
Part Description: _____
Material: _____
Soldering Requirements: _____

Question #	Job Audit Question	Related SSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
Operator or Inspector Responsibilities						
4.9	Were appropriate process steps signed off?	1.4 2.2 2.3 2.11				
4.10	Are ESD preventive methods applied (i.e., operator apparel) and functionally verified?	2.9				
4.11	Were all inspection steps, as documented in the control plan performed?	1.2 1.4				
4.12	Were steps/operations performed that were not documented in the control plan?	1.2 1.4 1.6				
4.13	If additional steps were performed, were they authorized?	1.2 1.4 1.6 1.11 1.17				
4.14	If the order was certified, did the certification accurately reflect the process performed?	2.11 2.13				
4.15	Was the certification signed by an authorized individual?	1.17				
4.16	Are the parts and containers free of foreign objects or contamination?	2.6				

Section 4 - Job Audit

This section includes final product and final product assembly and packaging

Job Identity:
Customer: _____
Shop Order Number: _____
Part Number: _____
Part Description: _____
Material: _____
Soldering Requirements: _____

Question #	Job Audit Question	Related SSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation Requirement	Actual Condition (Objective Evidence)	Pass / Fail / N/A
	Packaging Requirements					
4.17	Are packaging requirements identified?	2.9				
4.18	Are parts packaged to minimize mixed parts (parts packed over height of container)?	2.9				
	Shipping Requirements					
4.19	Were the parts properly identified?	2.3				
4.20	Were the containers properly labeled?	2.3 2.9				

APPENDIX A – PROCESS TABLES

PROCESS TABLE A - Solder Paste Printing

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Printed Wiring Board Cleaning (Dry Wipe)**			
1.1	1.6	Lint Free Cloth	Per Spec	Continuous	
1.2		Replacement Frequency	Per Control Plan	Quality Audit	
1.3	1.6	Proper Cleaning Area	Per Product Spec	Quality Audit	
1.4	1.16	Proper Operator Handling	Operator Training	Operator Certification	
2.0		**Material Handling**			
2.1	2.2-2.9	**Paste:** **Size,Volume,Container:** **Paste Supplier:**			
2.1.1		Correct Material	Bar Code or Manual	Continuous	
2.1.2		Expiration Date/Lot Control	Bar Code or Manual	Continuous	
2.1.3		Properly Mixed	Manual	Continuous	
2.1.4		Stabilize to Operation Temperature	Bar Code or Manual	Continuous	
2.1.5		Open Container Disposition	Bar Code / Check list	Continuous	
2.1.6		Excess solder paste run-out management	Manual remix / discard	Per Control Plan	
2.2		**Printed Wiring Board (PWB)** **Board Supplier:**			
2.2.1		Correct Material	Bar Code or Manual	Lot (first and last piece)	
2.2.2		Expiration Date/Lot Control	Bar Code or Manual	Lot (first and last piece)	
2.2.3		Environmental Control (exposure)	Bar Code or Manual	Lot	
2.2.4		Contamination Control	Work Instruction	Every Piece	
2.2.5		Orientation	Automatic or Manual	Every Piece	
3.0	1.4 2.11 2.12	**Solder Paste Equipment** **Type:** **Equipment Supplier:**			
3.0.1	1.18	Preventive Maintenance (PM) Cleaning	PM schedule	PM Completion Report	
3.0.2		Stencil separation speed	Automatic	Continuous	
3.1		**Stencil Control** **Supplier:** **Manufacturing Method:** **Thickness:**			
3.1.1		Correct Stencil	Bar Code or Manual	Every Change Over	
3.1.2		In process Bottom Side Cleaning Type of Cleaning Method: Chemical(s) Used: Frequency:	Automatic or Manual	Per Control Plan	
3.1.3	1.18 3.3	Preventive Maintenance Cleaning Type: Chemical(s) Used: Frequency Confirmation method:	Automatic or Manual	Per Control Plan	
3.1.4	3.3	Life Cycle Date	Bar Code or Manual	Continuous	
3.1.5		Stencil Alignment Accuracy to Machine	Automatic or Manual	Start up or Change Over	
3.2		**PWB Registration to Stencil**			
3.2.1		Proper Alignment	Automatic	Continuous	
3.2.2		PWB Securing	Automatic	Continuous	

PROCESS TABLE A - Solder Paste Printing

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.3		**Squeegee Type: Shape: Hardness: Material:**			
3.3.1	1.6	Squeegee Material Compatibility with Solder Past	Design Spec	Design Review	
3.3.2		Correct Squeegee	Manual	1/shift or Change Over	
3.3.3		In process (underside wipe) cleaning	Manual or Automatic	Per Control Plan	
3.3.4		Pressure of Squeegee	Manual or Automatic	1/shift or Change Over	
3.3.5		Angle of Squeegee	Manual or Automatic	1/shift or Change Over	
3.3.6		Squeegee Speed	Manual or Automatic	1/shift or Change Over	
3.3.7		Squeegee Stroke	Manual or Automatic	1/shift or Change Over	
3.3.8	1.18	Preventive Maintenance Cleaning/Replace	PM schedule	PM Completion Report	
3.4		Pro Flow Cartridge			
3.4.1		Solder Flow Pressure	Automatic	1/shift or Change Over	
3.4.2		Correct Cartridge (Pb or Pb Free)	Bar Code or Manual	1/shift or Change Over	
3.4.3		Angle of Cartridge	Manual or Automatic	1/shift or Change Over	
3.4.4		Cartridge Speed	Manual or Automatic	1/shift or Change Over	
3.4.5		Cartridge Stroke	Manual or Automatic	1/shift or Change Over	
3.4.6	1.18	Preventive Maintenance Cleaning	PM schedule	PM Completion Report	
4.0	1.4 2.11 2.12	**Post Print Inspection**			
4.1		Method	Manual or Automatic	Per Control Plan	
4.2		Frequency	Manual	Per Control Plan	
4.3		Reaction of Defects	Per Process Controls	Per Control Plan	
4.4	1.6	Proper solder paste height	Per Product Spec	Per Control Plan	
4.5	1.6	Proper solder pad coverage	Per Product Spec	Per Control Plan	
5.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
5.1	2.8	Power failure reaction plan	Control plan	Continuous	
5.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
5.3	2.8	Part jam reaction plan	Control plan	Continuous	
5.4	2.8	Drop part reaction plan	Control plan	Continuous	
5.5	2.8	In-Process Delay Reaction Plan	Control plan	Continuous	
5.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE B - Inspection

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Post Print Inspection**			
1.1		**Manual**			
1.1.1	1.15, 1.16	Proper Operator training	Operator Certification	Annual Certification	
1.1.2		Boundary Sample Available	Good and Bad	Calibration Certification	
1.1.3		Proper Magnification for pitch size	Per IPC A 610	Annual Certification	
1.1.4		Proper illumination at inspection station	Per IES	Set-up	
1.1.5	2.11 2.13	Frequency of sampling	Per Customer Requirement	Check-sheet	
1.2		**Automatic**			
1.2.1	1.7	CPK	Per Customer Requirement	Continuous	
1.2.2	1.7	Boundary Sample Available	Good and Bad sample run at change-over and beginning of shift	Calibration Certification	
1.2.3		Calibration or verification method set	Per control plan	Calibration Certification	
1.2.4	1.14 2.4	Non-conforming material disposition	Per Customer Requirement	Continuous	
2.0	1.4 2.11 2.12	**Post Component Placement**			
2.1		**Automatic Vision System:**			
2.1.1		Calibration Standard Available	Per manufacture recommendation	Calibration Certification	
2.1.2		Part Present	Yes/No	Per Control Plan	
2.1.3	1.6	Orientation	Per Specification	Per Control Plan	
2.1.4	1.6	Polarity	Per Specification	Per Control Plan	
2.1.5	1.6	Skew Angle	Per Specification	Per Control Plan	
2.1.6	1.6	Off-centered	Per Specification	Per Control Plan	
2.1.7	1.6	Raised	Per Specification	Per Control Plan	
2.2		**Manual Inspection:**			
2.2.1	1.15, 1.16	Proper Operator training	Operator Certification	Annual Certification	
2.2.2		Boundary Sample (e.g., orientation, polarity, skew angle, off-centered, raised, and part present)	Good and Bad	Calibration Certification	
2.2.3		Proper Magnification for pitch size	Per IPC A 610	Annual Certification	
2.2.4		Proper illumination at inspection station	Per IES (Illumination Engineering Standard)	Set-up	
2.2.5		Frequency of sampling	Per control plan	Check-sheet	
2.2.6	3.9	Proper ESD protection (work surface and operator)	Per ANSI S20.20	Continuous	
2.3	1.14 2.4	Non-conforming material disposition	Per control plan	Continuous	

PROCESS TABLE B - Inspection

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.0	1.4 2.11 2.12 3.8	**Post Reflow Inspection**			
3.1		**Automatic Optical Inspection (AOI)**			
3.1.1	1.6	Solder volumes	Per Specification	Per Control Plan	
3.1.2	1.6	Solder ball	Per Specification	Per Control Plan	
3.1.3	1.6	Solder bridge	Per Specification	Per Control Plan	
3.1.4	1.6	Solder skip	Per Specification	Per Control Plan	
3.1.5	1.6	Part present	Per Specification	Per Control Plan	
3.1.6	1.6	Component accuracy to solder pads	Per Specification	Per Control Plan	
3.1.7	1.6	Tombstoning	Per Specification	Per Control Plan	
3.1.8	1.6	Billboarding	Per Specification	Per Control Plan	
3.1.9	1.6	Lifted part	Per Specification	Per Control Plan	
3.1.10	1.6	Good/Bad Samples Used	Per Specification	Per Control Plan	
3.2		**X-ray (Recommended for BGA/Flip chip)**			
3.2.1	1.6	Solder volumes	Per Specification	Per Control Plan	
3.2.2	1.6	Solder ball	Per Specification	Per Control Plan	
3.2.3	1.6	Solder bridge	Per Specification	Per Control Plan	
3.2.4	1.6	Solder skip	Per Specification	Per Control Plan	
3.2.5	1.6	Part present	Per Specification	Per Control Plan	
3.2.6	1.6	Component accuracy to solder pads	Per Specification	Per Control Plan	
3.2.7	1.6	Tombstoning	Per Specification	Per Control Plan	
3.2.8	1.6	Billboarding	Per Specification	Per Control Plan	
3.2.9	1.6	Lifted part	Per Specification	Per Control Plan	
3.2.10	1.6	Void detection	Per Specification	Per Control Plan	
3.2.11	1.6	Good/Bad Samples Used	Per Specification	Per Control Plan	
3.3		**Manual Inspection**			
3.3.1	1.6	Solder volumes	Per Specification	Per Control Plan	
3.3.2	1.6	Solder ball	Per Specification	Per Control Plan	
3.3.3	1.6	Solder bridge	Per Specification	Per Control Plan	
3.3.4	1.6	Solder skip	Per Specification	Per Control Plan	
3.3.5	1.6	Part present	Per Specification	Per Control Plan	
3.3.6	1.6	Component accuracy to solder pads	Per Specification	Per Control Plan	
3.3.7	1.6	Tombstoning	Per Specification	Per Control Plan	
3.3.8	1.6	Billboarding	Per Specification	Per Control Plan	
3.3.9	1.6	Lifted part	Per Specification	Per Control Plan	
3.3.10	1.6	Void detection	Per Specification	Per Control Plan	
3.3.11	1.15, 1.16	Proper Operator training	Operator Certification	Annual Certification	
3.3.12		Boundary Sample (e.g., orientation, polarity, skew angle, off-centered, raised, and part present)	Good and Bad	Calibration Certification	
3.3.13		Proper Magnification for pitch size	Per IPC A 610	Annual Certification	

PROCESS TABLE B - Inspection

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.3.14		Proper illumination at inspection station	Per IES (Illumination Engineering Standard)	Set-up	
3.3.15	2.11 2.13	Frequency of sampling	Per control plan	Check-sheet	
3.3.16	3.9	Proper ESD protection (work surface and operator)	Per ANSI S20.20	Continuous	
3.3.17	1.6	Blow hole detection	Per Specification	Per Control Plan	
3.3.18	1.6	Confirmation of jig removal	Per Specification	Per Control Plan	
3.4	1.14 2.4	Non-conforming material disposition	Per control plan	Continuous	
4.0	**1.4 2.11 2.12 3.8**	**Post Wave/Selective Solder Inspection**			
4.1		**Automatic Optical Inspection (AOI)**			
4.1.1	1.6	Solder volumes	Per Specification	Per Control Plan	
4.1.2	1.6	Solder ball	Per Specification	Per Control Plan	
4.1.3	1.6	Solder bridge	Per Specification	Per Control Plan	
4.1.4	1.6	Solder skip	Per Specification	Per Control Plan	
4.1.5	1.6	Part present	Per Specification	Per Control Plan	
4.1.6	1.6	Component accuracy to solder pads	Per Specification	Per Control Plan	
4.1.7	1.6	Tombstoning	Per Specification	Per Control Plan	
4.1.8	1.6	Billboarding	Per Specification	Per Control Plan	
4.1.9	1.6	SMT Glue on pad	Per Specification	Per Control Plan	
4.1.10	1.6	Lifted part	Per Specification	Per Control Plan	
4.1.11	1.6	Excess Flux/flux residue	Per Specification	Per Control Plan	
4.1.12	1.6	Proper polarity	Per Specification	Per Control Plan	
4.1.13	1.6	Icicling	Per Specification	Per Control Plan	
4.1.14	1.6	Good/Bad Samples Used	Per Specification	Per Control Plan	
4.2		**X-ray**			
4.2.1	1.6	Solder volumes	Per Specification	Per Control Plan	
4.2.2	1.6	Solder ball	Per Specification	Per Control Plan	
4.2.3	1.6	Solder bridge	Per Specification	Per Control Plan	
4.2.4	1.6	Solder skip	Per Specification	Per Control Plan	
4.2.5	1.6	Part present	Per Specification	Per Control Plan	
4.2.6	1.6	Component accuracy to solder pads	Per Specification	Per Control Plan	
4.2.7	1.6	Tombstoning	Per Specification	Per Control Plan	
4.2.8	1.6	Billboarding	Per Specification	Per Control Plan	
4.2.9	1.6	Lifted part	Per Specification	Per Control Plan	
4.2.10	1.6	Void detection	Per Specification	Per Control Plan	
4.2.11	1.6	Icicling	Per Specification	Per Control Plan	
4.2.12	1.6	Good/Bad Samples Used	Per Specification	Per Control Plan	
4.3		**Manual Inspection**			

PROCESS TABLE B - Inspection

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
4.3.1	1.6	Solder volumes	Per Specification	Per Control Plan	
4.3.2	1.6	Solder ball	Per Specification	Per Control Plan	
4.3.3	1.6	Solder bridge	Per Specification	Per Control Plan	
4.3.4	1.6	Solder skip	Per Specification	Per Control Plan	
4.3.5	1.6	Part present	Per Specification	Per Control Plan	
4.3.6	1.6	Component accuracy to solder pads	Per Specification	Per Control Plan	
4.3.7	1.6	Tombstoning	Per Specification	Per Control Plan	
4.3.8	1.6	Billboarding	Per Specification	Per Control Plan	
4.3.9	1.6	Lifted part	Per Specification	Per Control Plan	
4.3.10	1.6	Void detection	Per Specification	Per Control Plan	
4.3.11	1.16	Proper Operator training	Operator Certification	Annual Certification	
4.3.12		Boundary Sample (e.g., orientation, polarity, skew angle, off-centered, raised, and part present) as needed.	Good and Bad	Calibration Certification	
4.3.13		Proper Magnification for pitch size	Per IPC A 610 or organizations internal requirements	Annual Certification	
4.3.14		Proper illumination at inspection station	Per IES (Illumination Engineering Standard) or organizations internal requirements	Set-up	
4.3.15	2.13	Frequency of sampling	Per control plan	Check-sheet	
4.3.16	3.9	Proper ESD protection (work surface and operator)	Per ANSI S20.20	Continuous	
4.3.17		Blow hole detection			
4.3.18	1.6	Icicling	Per Specification	Per Control Plan	
4.3.19	1.6	Excess Flux/flux residue	Per Specification	Per Control Plan	
4.3.20	1.6	SMT Glue on pad	Per Specification	Per Control Plan	
4.3.21	1.6	Confirmation of jig removal	Per Specification	Per Control Plan	
4.3.22	1.6	No foreign material	Per Specification	Per Control Plan	
4.3.23	1.6	Trace delamination	Per Specification	Per Control Plan	
4.3.24	1.6	Solder mask degradation	Per Specification	Per Control Plan	
4.4	1.14 2.4	Non-conforming material deposition	Per control plan	Continuous	

PROCESS TABLE C - Surface Mount Device Placement

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Cassette/Feeder Loading**			
1.1		**Manual Control**			
1.1.1	1.15, 1.16	Correct loading	Operator Training	Per Training Plan	
1.1.2	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.1.3		Correct Part per Feeder Location	Set-up Sheet	Supervisor Audit	
1.1.4		Operator/Traceability Control	Check Sheet	100%	
1.1.5		Component supply management (part shortage prevention)	Check Sheet	Per Control Plan	
1.1.6	1.6 2.10	Humidity (MSD) Control	Per Manufacturer Spec	Per Control Plan	
1.2		**Automatic Control**			
1.2.1	1.15, 1.16	Correct loading	Operator Training	Per Training Plan	
1.2.2	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.2.3		Correct Part per Feeder Location	Bar Code and BOM	100%	
1.2.4		Operator/Traceability Control	Bar Code Scan	100%	
1.2.5		Component supply management (part shortage prevention)	Machine Programming (Placement Count)	Continuous	
1.2.6	1.6 2.10	Humidity (MSD) Control	Per control plan	Continuous	
2.0	1.4 2.11 2.12	**Splicing**			
2.1	1.15, 1.16	Correct Splicing	Operator Training	Per Training Plan	
2.2	3.9	ESD Control	Per ANSI S20.20	Continuous	
2.3	1.6	Correct Orientation	Per Machine Spec	100%	
2.4		Traceability Control	Check Sheet/Bar Code	100%	
2.5	1.6 2.10	Humidity Control	Per control plan	Continuous	
2.6	1.6	Correct Tape	Per Spec	100%	
2.7		Correct Splice	Operator Training	Per Training Plan	

PROCESS TABLE C - Surface Mount Device Placement

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.0	1.4 2.11 2.12	**Placement Nozzles**			
3.1		**Manual Operation**			
3.1.1	1.15, 1.16	Correct nozzle selection	Operator Training	Per Training Plan	
3.1.2		Vacuum testing	Per check sheet	Per change over	
3.1.3		Correct placement stroke & force	Per set up sheet	Per change over	
3.1.4		Trigger for First Pass Yield (FPY) Maintenance	Per control plan	100%	
3.2		**Automatic Operation**			
3.2.1	1.15, 1.16	Correct magazine carrousel loading	Operator Training	Per Training Plan	
3.2.2		Correct placement program	Per control plan	Per change over	
3.2.3		Initial nozzle vacuum confirmation	Per program	100%	
3.2.4		Trigger for FPY Maintenance	Per control plan	100%	
4.0	1.4 2.11 2.12	**Vision System**			
4.1	1.15, 1.16	Proper set up	Operator Training	Per training plan	
4.2		Proper inspection criteria (placement accuracy, polarity, rotation/skewing)	Per control plan	100%	
4.3	1.6	Proper focusing	Per product spec	100%	
4.4		Proper illumination	Per requirement	100%	
4.5		Correct operation	Per golden sample	Per Control Plan	
4.6		Calibration	Per NIST	Per Control Plan	
5.0	1.4 2.11 2.12	**Bottom Side Placement**			
5.1		Must adhered to Items 1.0 - 4.6 above			
5.2		Board flex (if top side soldered)	Per IPC-A-610	Process Set-up	
6.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE D - Reflow Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Reflow ovens**			
1.1	3.4	Temperature controller	Automatic	Continuous	
1.1.1	3.4	Lead Solder	Correct Profile	Continuous	
1.1.2	3.4	Lead Free Solder	Correct Profile	Continuous	
1.2	1.18	Heating element	Proper PM	PM Completion Report	
1.3		Atmosphere control	Automatic	Continuous	
1.3.1		Ventilation	Automatic	Continuous	
1.3.2		Nitrogen supply system (if used)	Automatic	Continuous	
1.3.3		Oxygen monitoring system (if used)	Automatic	Continuous	
1.4		Conveyer width control	Per set-up	Per control plan	
1.5		Conveyer speed control	Automatic per Control Plan	Continuous	
1.6		Conveyer infeed cover	In place	Continuous	
1.7	**3.5**	**M.O.L.E. / Surveyor**			
1.7.1	3.5	Thermal couple board placement	Based on board layout	Per control plan	
1.7.2	3.5	K.I.C. system (if used)	Automatic	Continuous	
1.7.3	3.4 3.5	Profile confirmation verification	Per control plan	Per control plan	
1.7.4	3.4 3.5	Process Window (PWI)/Capability Index	Per control plan	Per control plan	
1.8	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.9		Lead/Lead free changeovers	Proper oven cleaning	Per control plan/changeover	
2.0	**1.4 2.11 2.12**	**Loading**			
2.1		Correct Orientation	Automatic/operator training	Continuous	
2.2	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	Continuous	
2.3		Correct Spacing	Automatic/operator training	Continuous	
2.4	1.15, 1.16	Proper placement in pallet (if used)	Operator Training	Continuous	
3.0	1.4 2.11 2.12	**Unloading**			
3.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
3.3		**Cooling/Ion Blowers**			
3.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
3.3.2		Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
3.3.3		Blower/ionizer power-on indicator	Per control plan	Daily Check Sheet	
3.4	**3.3**	**Magazines / Unloading racks**			

PROCESS TABLE D - Reflow Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
3.4.2		Correct width and height for product	Per control plan	Continuous	
3.4.3		Correct loading sequence for contamination control (top down)	Per control plan	Continuous	
3.4.4		Covered for transportation and storage	Per control plan	Continuous	
3.5	1.14	Rejected / inspected part returned to production line and inserted at the removal point.	Written policy	Control Plan	
4.0	1.4 2.11 2.12	**Component Compatibility**			
4.1	1.6	Components compatible with temperature profile	Component Spec	Design Review	
4.2	1.6	Components compatible with solder	Component Spec	Design Review	
5.0	1.4 2.11 2.12	**Board Twist Control**			
5.1		Maximum diagonal twist meets standard	Per IPC-TM-650, Section 2.4.22	Changeover/profile modification	
6.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE E - Glue Dispensing

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Glue:** **Supplier:** **Size, Volume, Container:**			
1.1		Correct Material	Bar Code or Manual	Every Container	
1.2		Expiration Date/Lot Control	Bar Code or Manual	Every Container	
1.3		Properly Mixed	Manual	Every Container	
1.4		Stabilize to Operation Temperature	Bar Code or Manual	Every Container	
1.5		Open Container Disposition	Control plan	Continuous	
2.0	1.4 2.11 2.12	**Glue Dispensing Equipment**			
2.1		**Pin Transfer:**			
2.1.1		PWB Registration to Equipment	Automatic	Every Piece	
2.1.2		PWB Securing	Automatic	Every Piece	
2.1.3	1.18	Preventive Maintenance	PM schedule	PM Completion Report	
2.1.4		Stabilization and control of glue reservoir	Automatic/Manual	Continuous	
2.2		**Screen Printing:** Stencil Supplier:			
2.2.1		PWB Registration to Equipment	Automatic	Every Piece	
2.2.2		PWB Securing	Automatic	Every Piece	
2.2.3	3.3	Correct Stencil	Bar Code or Manual	Every Change Over	
2.3		**In-process Bottom Side Cleaning:** Chemical(s) Used:			
2.3.1		Type of Cleaning Method	Automatic or Manual	Cycle	
2.3.2		Frequency	Automatic or Manual	Per Control Plan	
2.4	1.18	**Preventive Maintenance Cleanin g** Chemical(s) Used: Methods Used:	PM schedule	PM Completion Report	
2.5		**Life Cycle Date**	Bar Code or Manual	Continuous	
2.6		**Stencil Alignment Accuracy to Machine**	Automatic or Manual	Start up or Change Over	
2.7		**Syringe:**			
2.7.1		PWB Registration to Equipment	Automatic	Every Piece	
2.7.2		PWB Securing	Automatic	Every Piece	
2.7.3	1.18	Preventive Maintenance Cleaning Chemical(s) Used: Method Used:	PM schedule	PM Completion Report	

PROCESS TABLE E - Glue Dispensing

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.0	1.4 2.11 2.12	**Glue Curing Process** Equipment type:			
3.1	3.4	Correct Thermal Profile	Automatic or Manual	1/shift or Change Over	
3.2		Conveyer Speed	Per Control Plan	Start up or Change Over	
3.3		Rail Width	Per Control Plan	Start up or Change Over	
4.0	1.4 2.11 2.12	**Post Glue Inspection**			
4.1		Glue Volume	Per Control Plan	Per Product Spec.	
4.2		Glue Placement	Per Control Plan	Per Product Spec.	
4.3		Verify Curing is Complete	Per Control Plan	Per Product Spec.	
4.4		Glue Contamination on Component Pad	Per Control Plan	Per Product Spec.	
5.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
5.1	2.8	Power failure reaction plan	Control plan	Continuous	
5.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
5.3	2.8	Part jam reaction plan	Control plan	Continuous	
5.4	2.8	Drop part reaction plan	Control plan	Continuous	
5.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
5.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE F - Flux Application for Wave Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Integrated Equipment**			
1.1		**Bubble/Foam**			
1.1.1		Flux coverage area	Sample Board	Once per shift/change over	
1.1.2		Exclusion zones	Sample Board	Once per shift/change over	
1.1.3		Uniformity	Sample Board	Once per shift/change over	
1.1.4		Via hole penetration	Actual Board	Once per shift/change over	
1.1.5		Density of Flux/Viscosity	Flux density meter/Zahn Cup	Once per shift/change over	
1.1.6		Air Knife Location: Gap: Air Pressure:	Set-up Sheet	Once per shift/change over	
1.1.7	1.18	Bubbler/Air Stone PM	PM schedule	PM Completion Report	
1.2		**Spray**			
1.2.1		Flux coverage area	Sample Board or Glass Plate	Once per shift/change over	
1.2.2		Exclusion zones	Sample Board or Glass Plate	Once per shift/change over	
1.2.3		Uniformity	Sample Board or Glass Plate	Once per shift/change over	
1.2.4		Via hole penetration	Actual Bare Board	For process initial set-up or process troubleshooting only	
1.2.5	1.18	Preventive Maintenance Cleaning Chemical(s) Used: Method Used:	PM schedule	PM Completion Report	
1.2.6		Prevention of air introduction into flux lines during supply change/addition of flux	Automatic	Continous	
2.0	1.4 2.11 2.12	**Stand Alone Equipment**			
2.1		**Bubble/Foam**			
2.1.1		Flux coverage area	Sample Board	Once per shift/change over	
2.1.2		Exclusion zones	Sample Board	Once per shift/change over	
2.1.3		Uniformity	Sample Board	Once per shift/change over	
2.1.4		Via hole penetration	Actual Board	Once per shift/change over	
2.1.5		Density of Flux/Viscosity	Flux density meter/Zahn Cup	Once per shift/change over	
2.1.6		Air Knife Location: Gap: Air Pressure:	Set-up Sheet	Once per shift/change over	
2.1.7	1.18	Bubbler/Air Stone PM	PM schedule	PM Completion Report	
2.2		**Spray**	Correct Profile	Continuous	
2.2.1		Flux coverage area	Sample Board	Once per shift/change over	

PROCESS TABLE F - Flux Application for Wave Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
2.2.2		Exclusion zones	Sample Board	Once per shift/change over	
2.2.3		Uniformity	Sample Board	Once per shift/change over	
2.2.4		Via hole penetration	Actual Board	Once per shift/change over	
2.3	2.4	Rejected / inspected part returned to production line and inserted at the removal point.	Written policy	Control Plan	
2.4	1.18	Preventive Maintenance Cleaning Chemical(s) Used: Method Used:	PM schedule	PM Completion Report	
3.0	1.4 2.11 2.12	Manual Flux Application			
3.1		**Brush**			
3.1.1		Flux coverage area	Sample Board	Once per shift/change over	
3.1.2		Exclusion zones	Sample Board	Once per shift/change over	
3.1.3		Uniformity	Sample Board	Once per shift/change over	
3.1.4		Via hole penetration	Actual Board	Once per shift/change over	
3.1.5		Brush Replacement Frequency	Control Plan	Per Control Plan	
3.2		**Dip**			
3.2.1		Flux coverage area	Sample Part	Once per shift/change over	
3.2.2		Exclusion zones	Sample Part	Once per shift/change over	
3.2.3		Uniformity	Sample Part	Once per shift/change over	
3.2.4		Via hole penetration	Sample Part	Once per shift/change over	
3.2.5		Flux tank volume level control	Automatic / Manual	Continuous / Check sheet	
3.3		**Sponge**			
3.3.1		Flux coverage area	Sample Board	Once per shift/change over	
3.3.2		Exclusion zones	Sample Board	Once per shift/change over	
3.3.3		Uniformity	Sample Board	Once per shift/change over	
3.3.4		Via hole penetration	Actual Board	Once per shift/change over	
3.3.5		Sponge Replacement Frequency	Control Plan	Per Control Plan	
4.0	1.4 2.11 2.12	**Loading (Integrated/Stand alone)**			
4.1		Correct Orientation	Automatic/operator training	100%	
4.2	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	100%	
4.3		Correct Spacing	Automatic/operator training	100%	
4.4	1.15, 1.16	Proper placement in pallet (if used)	Operator Training	100%	
4.5	3.9	ESD Control	Per ANSI S20.20	Continous	
4.6	1.15, 1.16	Proper Handling	Operator Training	100%	
4.7	1.18	Equipment Cleanliness	PM schedule	PM Completion Report	
5.0	1.4 2.11 2.12	**Unloading (Stand alone)**			
5.1	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	

PROCESS TABLE F - Flux Application for Wave Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
5.2	1.6	Conveyor width set properly	Per spec/set-up	Daily Check Sheet	
5.3	1.6	Conveyors covered	Per spec/set-up	Daily Check Sheet	
6.0	**1.4 2.11 2.12**	**Component Compatibility**			
6.1	1.6	Flux Type correct for solder in use	Component Spec	Design Review	
6.2		Flux Type matches Bill of Material (BOM)	BOM	Daily Check Sheet	
6.3		Proper flux storage condition/environment	Manufacturer Specification	Supervisior review	
6.4		Proper flux for specified solder	Control Plan	Per changeover/replenishment	
7.0	**1.4 2.11 2.12**	**Abnormal Condition Reaction**			
7.1	2.8	Power failure reaction plan	Control plan	Continuous	
7.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
7.3	2.8	Part jam reaction plan	Control plan	Continuous	
7.4	2.8	Drop part reaction plan	Control plan	Continuous	
7.5	2.8	In-Process Delay Reaction Plan	Control plan	Continuous	
7.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	
8.0	**1.4 2.11 2.12**	**Manual Flux Application Handling**			
8.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
8.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	

PROCESS TABLE G - Pre-Heat for Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Pre-Heat Equipment**			
1.1	3.4	Temperature controller	Automatic	Continuous	
1.1.1	3.4	Lead Solder	Correct Profile	Continuous	
1.1.2	3.4	Lead Free Solder	Correct Profile	Continuous	
1.2	1.18	Zone Heating element	Proper PM	PM Completion Report	
1.3		Atmosphere control	Automatic	Continuous	
1.3.1		Ventilation	Automatic	Continuous	
1.3.2		Nitrogen supply system (if used)	Automatic	Continuous	
1.3.3		Oxygen monitoring system (if used)	Automatic	Continuous	
1.4		Conveyer			
1.4.1		Conveyer width control	Per set-up	Per control plan	
1.4.2		Conveyer speed control	Automatic	Continuous	
1.4.3		Conveyer Finger Cleaner	Per control plan	Continuous	
1.5		Temperature Profile Verification			
1.5.1	3.5	M.O.L.E. / Surveyor	Per control plan	Per control plan	
1.5.2	3.5	Thermal couple board placement	Based on board layout	Per control plan	
1.6	3.9	ESD Control	Per ANSI S20.20	Continuous	
2.0	1.4 2.11 2.12	**Loading**			
2.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
2.2		Correct Orientation	Automatic/operator training	100%	
2.3	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	100%	
2.4		Correct Spacing between Boards	Automatic/operator training	100%	
2.5	1.15, 1.16	Proper board placement in pallet (if used)	Operator Training	100%	
2.6		Conveyer infeed cover (if required)	In place	100%	

PROCESS TABLE G - Pre-Heat for Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.0	1.4 2.11 2.12	**Transferring**			
3.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
3.3		Conveyer cover (if required)	In place	Continuous	
4.0	1.4 2.11 2.12	**Component Compatibility**			
4.1	1.6	Components compatible with temperature profile	Component Spec	Design Review	
5.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
5.1	2.8	Power failure reaction plan	Control plan	Continuous	
5.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
5.3	2.8	Part jam reaction plan	Control plan	Continuous	
5.4	2.8	Drop part reaction plan	Control plan	Continuous	
5.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
5.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE H - Wave Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Equipment**			
1.1		Flux Application - See Process Table F			
1.2		Pre-heat Process - See Process Table G			
1.3		Wave Solder Machine			
1.3.1		Solder Pot Temperature controller	Automatic	Continuous	
1.3.2		Lead Solder	Correct Temperature Profile	Continuous	
1.3.3		Lead Free Solder	Correct Temperature Profile	Continuous	
1.3.4	1.18	Pot Heating element	Proper PM	PM Completion Report	
1.3.5		Atmosphere control	Automatic	Continuous	
1.3.5.1		Ventilation	Automatic	Continuous	
1.3.5.2		Nitrogen supply system (if used)	Automatic	Continuous	
1.3.5.3		Oxygen monitoring system (if used)	Automatic	Continuous	
1.3.6		Conveyer width control	Per set-up	Per control plan	
1.3.7		Conveyer speed control	Automatic per Control Plan	Continuous	
1.3.8		Conveyer in-feed cover	In place	Continuous	
1.3.9		Conveyer Finger Cleaner	Per control plan	Continuous	
1.4		Temperature Profile Verification			
1.4.1		M.O.L.E. / Surveyor	Per control plan	Per control plan	
1.4.2		Thermal couple board placement	Based on board layout	Per control plan	
1.5		Wave Height Control			
1.5.1		Solder pump RPM	Per control plan	Continuous	
1.5.2		Wave Vibrational Control (if used)	Per control plan	Continuous	
1.5.3		Solder Pump Wave Control (Pump off if no product present)	Product sensor / timer	Continuous	
1.5.4		Solder pot level control	Automatic	Continuous	
1.6	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.7		Lead/Lead free changeovers	Proper equipment cleaning	Per control plan/changeover	
1.8	1.6	Equipment lead-free compatible	Per equipment specification	Design Review	
1.9		Dross Removal Frequency	Per control plan	Check sheet	
2.0	1.4 2.11 2.12	**Loading**			
2.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
2.2		Correct Orientation	Automatic/operator training	100%	
2.3	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	100%	
2.4		Correct Spacing between Boards	Automatic/operator training	100%	
2.5	1.15, 1.16	Proper board placement in pallet (if used)	Operator Training	100%	

PROCESS TABLE H - Wave Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
2.6		Conveyer cover (if required)	In place	100%	
3.0	**1.4 2.11 2.12**	**Unloading**			
3.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
3.3		Cooling/Ion Blowers			
3.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
3.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
3.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
3.4		Magazines / Unloading racks			
3.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
3.4.2		Correct width and height for product	Per control plan	Continuous	
3.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
3.4.4		Covered for transportation and storage	Per control plan	Continuous	
3.5		Pallet Cleaning	Per control plan	Per Control Plan	
4.0	**1.4 2.11 2.12**	**Component Compatibility**			
4.1	1.6	Components compatible with solder temperature	Component Spec	Design Review	
4.2	1.6	Components surface finish compatible with solder	Component Spec	Design Review	
4.3	1.6	Solder Pot Elemental Analysis	Product specification	Pb-free; Quarterly Lab Results, Pb; annual lab results	
4.4		Prevention of Pb/Pb-free solder bar mix	Proper error-proofing	100%	
5.0	**1.4 2.11 2.12**	**Board Twist Control**			
5.1		Maximum diagonal twist meets standard	Per IPC-TM-650, Section 2.4.22, or per customer requirement	Changeover/profile modification	
6.0	**1.4 2.11 2.12**	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE I - Fountain Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Equipment**			
1.1		Flux Application See Process Table F			
1.2		Pre-heat Process See Process Table G			
1.3		Selective Soldering Machine			
1.3.1		Solder Pot Temperature controller	Automatic	Continuous	
1.3.2		Tin-Lead Solder	Correct Temperature	Continuous	
1.3.3		Lead Free Solder	Correct Temperature	Continuous	
1.3.4	1.18	Pot Heating element	Proper PM	PM Completion Report	
1.3.5		Atmosphere control			
1.3.5.1		Ventilation	Automatic	Continuous	
1.3.5.2		Nitrogen supply system (if used)	Automatic	Flow Meter	
1.3.5.3		Oxygen monitoring system (if used)	Automatic	Continuous	
1.3.6		Conveyer width control	Per set-up	Per control plan	
1.3.7		Conveyer index speed control	Automatic per Control Plan	Continuous	
		Conveyer Dwell Time	Automatic per Control Plan	Continuous	
1.3.8		Conveyer infeed cover	In place	Continuous	
1.3.9		Conveyer Finger Cleaner	Per control plan	Continuous	
	1.6	Conveyer Vertical Index Distance (if movable)	Per machine spec	Set-up Sheet	
1.4		Temperature Profile Verification			
1.4.1		M.O.L.E. / Surveyor	Per control plan	Per control plan	
1.4.2		Thermal couple board placement	Based on board layout	Per control plan	
1.5		Fountain Height Control			
1.5.1	1.6	Nozzle Vertical Index Distance (if movable)	Per machine spec	Set-up Sheet	
1.5.2		Solder pump RPM	Per control plan	Continuous	
1.5.3	1.18	Nozzle cleanliness	Proper PM	PM Completion Report	
1.5.4		Solder pot level control	Automatic	Continuous	
1.6	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.7		Lead/Lead free changeovers	Proper equipment cleaning	Per control plan/changeover	
1.8	1.6	Equipment lead-free compatible	Per equipment specification	Design Review	
1.9		Dross Removal Frequency from Solder Pot	Per control plan	Check sheet	
1.10		Dross Removal Frequency from Nozzle area	Per control plan	As needed	
2.0	1.4 2.11 2.12	**Transferring**			
2.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
2.2	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	Continuous	
2.3	1.15, 1.16	Correct Spacing between Boards	Automatic/operator training	Continuous	

PROCESS TABLE I - Fountain Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
2.4	1.15, 1.16	Proper board placement in pallet (if used)	Operator Training	Continuous	
2.5		Conveyer cover (if required)	In place	Continuous	
3.0	**1.4 2.11 2.12**	**Unloading**			
3.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
3.3		Cooling/Ion Blowers			
3.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
3.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
3.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
3.4		Magazines / Unloading racks			
3.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
3.4.2		Correct width and height for product	Per control plan	Continuous	
3.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
3.4.4		Covered for transportation and storage	Per control plan	Continuous	
3.4.5		Proper ESD control	Per ANSI S20.20	Continuous	
3.5		Pallet Cleaning	Per control plan	Per Control Plan	
4.0	**1.4 2.11 2.12**	**Component Compatibility**			
4.1	1.6	Components compatible with solder / pre heat temperature	Component Spec	Design Review	
4.2	1.6	Components surface finish compatible with solder	Component Spec	Design Review	
4.3	1.6	Solder Pot Elemental Analysis	Product specification	Pb-free; Quarterly Lab Results, Pb; annual lab results	
4.4		Prevention of Pb/Pb-free solder bar mix	Proper error-proofing	100%	
5.0	**1.4 2.11 2.12**	**Warpage Control**			
5.1		Maximum diagonal warpage meets standard	Per IPC-TM-650, Section 2.4.22, or per customer requirement	Changeover/profile modification	
6.0	**1.4 2.11 2.12**	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE J - Dip Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Dip Solder Equipment**			
1.1		Flux Application See Process Table F			
1.2		Pre-heat Process See Process Table G			
1.3		Dip Soldering Machine			
1.3.1		Solder Pot Temperature controller	Automatic	Continuous	
1.3.2		Tin-Lead Solder	Correct Temperature	Continuous	
1.3.3		Lead Free Solder	Correct Temperature	Continuous	
1.3.4		Pot Heating element	Proper PM	PM Completion Report	
1.3.5		Atmosphere control			
1.3.5.1		Ventilation	Automatic	Continuous	
1.3.5.2		Nitrogen supply system (if used)	Automatic	Flow Meter	
1.3.5.3		Oxygen monitoring system (if used)	Automatic	Continuous	
1.3.6		Conveyer width control	Per set-up	Per control plan	
1.3.7		Conveyer index speed control	Automatic per Control Plan	Continuous	
1.3.8		Conveyer Dwell Time	Automatic per Control Plan	Continuous	
1.3.9		Conveyer Finger Cleaner	Per control plan	Continuous	
1.3.10		Conveyer Vertical Index Distance (if movable)	Per machine spec	Set-up Sheet	
1.4		Temperature Profile Verification			
1.4.1		M.O.L.E. / Surveyor	Per control plan	Per control plan	
1.4.2		Thermal couple board placement	Based on board layout	Per control plan	
1.5.1		Solder circulation pump (if used)	Per control plan	Continuous	
1.5.2		Solder pot level control	Automatic	Continuous	
1.6	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.7		Lead/Lead free changeovers	Proper equipment cleaning	Per control plan/changeover	
1.8	1.6	Equipment lead-free compatible	Per equipment specification	Design Review	
1.9		Dross Removal Frequency from Solder Pot (if required)	Per control plan	Check sheet	
2.0	1.4 2.11 2.12	**Transferring**			
2.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
2.2	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	Continuous	
2.3	1.15, 1.16	Correct Spacing between Boards	Automatic/operator training	Continuous	
2.4	1.15, 1.16	Proper board placement in pallet (if used)	Operator Training	Continuous	
2.5		Conveyer cover (if required)	In place	Continuous	

PROCESS TABLE J - Dip Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.0	**1.4 2.11 2.12**	**Unloading**			
3.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
3.3		Cooling/Ion Blowers			
3.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
3.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
3.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
3.4		Magazines / Unloading racks			
3.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
3.4.2		Correct width and height for product	Per control plan	Continuous	
3.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
3.4.4		Covered for transportation and storage	Per control plan	Continuous	
3.5		Pallet Cleaning	Per control plan	Per Control Plan	
4.0	**1.4 2.11 2.12**	**Component Compatibility**			
4.1	1.6	Components compatible with solder / pre heat temperature	Component Spec	Design Review	
4.2	1.6	Components surface finish compatible with solder	Component Spec	Design Review	
4.3	1.6	Solder Pot Elemental Analysis	Product specification	Pb-free; Quarterly Lab Results, Pb; annual lab results	
4.4		Prevention of Pb/Pb-free solder bar mix	Proper error-proofing	100%	
5.0	**1.4 2.11 2.12**	**Warpage Control**			
5.1		Maximum diagonal warpage meets standard	Per IPC-TM-650, Section 2.4.22, or per customer requirement	Changeover/profile modification	
6.0	**1.4 2.11 2.12**	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE K - Selective Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Equipment**			
1.1		Flux Application See Process Table F			
1.2		Pre-heat Process See Process Table G			
1.3		Temperature controller	Automatic	Continuous	
1.3.1		Tin-Lead Solder	Correct Profile	Continuous	
1.3.2		Lead Free Solder	Correct Profile	Continuous	
1.4		Heating element	Proper PM	PM Completion Report	
1.5		Atmosphere control			
1.5.1		Ventilation	Automatic	Continuous	
1.5.2		Nitrogen supply system (if used)	Automatic	Continuous	
1.5.3		Oxygen monitoring system (if used)	Automatic	Continuous	
1.5.4		Solder pot level control	Automatic	Continuous	
1.6		Conveyers			
1.6.1		Width control	Per set-up	Per control plan	
1.6.2		Speed control	Automatic per Control Plan	Continuous	
1.6.3		Infeed cover	In place	Continuous	
1.6.4		Finger Cleaner	Per control plan	Continuous	
1.7		M.O.L.E. / Surveyor			
1.7.1		Thermal couple board placement	Based on board layout	Per control plan	
1.7.2		Frequency of sampling	Per control plan	Per control plan	
1.8		Solder supply control			
1.8.1		Solder pump RPM (if used)	Per control plan	Continuous	
1.8.2		Wave Vibrational Control (if used)	Per control plan	Continuous	
1.9	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.10		Lead/Lead free changeovers	Proper equipment cleaning	Per control plan/changeover	
1.11	1.6	Equipment lead-free compatible	Per equipment specification	Design Review	
1.12		Dross Removal Frequency	Per control plan	Check sheet	
2.0	1.4 2.11 2.12	**Loading**			
2.1		Correct Orientation	Automatic/operator training	Continuous	
2.2	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	Continuous	
2.3	1.15, 1.16	Correct Spacing	Automatic/operator training	Continuous	
2.4	1.15, 1.16	Proper placement in pallet (if used)	Operator Training	Continuous	

PROCESS TABLE K - Selective Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.0	1.4 2.11 2.12	**Unloading**			
3.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
3.3		Cooling/Ion Blowers			
3.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
3.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
3.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
3.4		Magazines / Unloading racks			
3.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
3.4.2		Correct width and height for product	Per control plan	Continuous	
3.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
3.4.4		Covered for transportation and storage	Per control plan	Continuous	
3.5		Pallet Cleaning	Per control plan	Per Control Plan	
4.0	1.4 2.11 2.12	**Component Compatibility**			
4.1	1.6	Components compatible with solder / pre heat temperature	Component Spec	Design Review	
4.2	1.6	Components compatible with solder	Component Spec	Design Review	
4.3	1.6	Solder Pot Elemental Analysis	Product specification	Pb-free; Quarterly Lab Results, Pb; annual lab results	
4.4		Prevention of Pb/Pb-free solder bar mix	Proper error-proofing	100%	
5.0	1.4 2.11 2.12	**Warpage Control**			
5.1		Maximum diagonal warpage meets standard	Per IPC-TM-650, Section 2.4.22, or per customer requirement	Changeover/profile modification	
6.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE L - Automated Iron Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Equipment**			
1.1		Flux Application (if used) See Process Table F			
1.2		Pre-heat Process (if used) See Process Table G			
1.3		Conveyer			
1.3.1		Width control	Per set-up	Per control plan	
1.3.2		Speed/index control	Automatic per Control Plan	Continuous	
1.3.3		Infeed cover	In place	Continuous	
1.4		Soldering Iron			
1.4.1		Temperature controller	Correct Temperature	Continuous	
1.4.2	1.18	Heating element	Proper PM	PM Completion Report	
1.4.3	1.6	Iron tip temperature calibration	Per specification	Per control plan	
1.4.4	1.6	Correct Tip (shape/size/material)	Per specification	Per control plan	
1.4.5		Iron tip cleaner	Per control plan	Continuous	
1.4.6	1.18	Iron tip maintenance	Proper PM	PM Completion Report	
1.5		Solder			
1.5.1	1.6	Correct Solder (type/size/core)	Per specification	Per control plan	
1.5.2		Solder Lot Control	Bar Code or Manual	Per control plan	
1.6		Atmosphere control			
1.6.1		Ventilation	Automatic	Continuous	
1.6.2		Nitrogen supply system (if used)	Automatic	Continuous	
1.6.3		Oxygen monitoring system (if used)	Automatic	Continuous	
1.7	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.8		Pb/Pb free changeovers	Proper equipment cleaning	Per control plan/changeover	
1.9		Solder ball control	Solder preparation per customer agreement (e.g., V-groove cutter)	100%	

PROCESS TABLE L - Automated Iron Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
2.0	**1.4 2.11 2.12**	**Automated Solder Process Control**			
2.1	1.6	Tip contact position	Per product spec	Continuous	
2.2	1.6	Tip contact dwell time	Per product spec	Continuous	
2.3	1.6	Solder contact position	Per product spec	Continuous	
2.4	1.6	Solder feed rate	Per product spec	Continuous	
2.5	1.6	Angle of contact	Per product spec	Continuous	
3.0	**1.4 2.11 2.12**	**Loading**			
3.1	1.15, 1.16	Correct Orientation	Automatic/operator training	Continuous	
3.2	1.15, 1.16	Stiffeners (if used) correct placement	Operator Training	Continuous	
3.3	1.15, 1.16	Correct Spacing	Automatic/operator training	Continuous	
3.4	1.15, 1.16	Proper placement in pallet (if used)	Operator Training	Continuous	
4.0	**1.4 2.11 2.12**	**Unloading**			
4.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
4.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
4.3		Cooling/Ion Blowers			
4..3.1		Filters presence	Per control plan	Per Preventative Maintenance	
4.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
4.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
4.4		Magazines / Unloading racks	Per product spec	Per Changeover	
4.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
4.4.2		Correct width and height for product	Per control plan	Continuous	
4.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
4.4.4		Covered for transportation and storage	Per control plan	Continuous	
4.5		Pallet Cleaning	Per control plan	Per Control Plan	

PROCESS TABLE L - Automated Iron Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
5.0	1.4 2.11 2.12	**Component Compatibility**			
5.1	1.6	Components compatible with iron temperature	Component Spec	Design Review	
5.2	1.6	Components compatible with solder	Component Spec	Design Review	
6.0	1.4 2.11 2.12	**Warpage Control**			
6.1		Maximum diagonal warpage meets standard (warpage of the PCB cannot be affected by this process).	Per IPC-TM-650, Section 2.4.22	Changeover/profile modification	
7.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
7.1	2.8	Power failure reaction plan	Control plan	Continuous	
7.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
7.3	2.8	Part jam reaction plan	Control plan	Continuous	
7.4	2.8	Drop part reaction plan	Control plan	Continuous	
7.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
7.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE M - Manual Iron Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Equipment**			
1.1		Flux Application (if used) See Process Table F			
1.2		Pre-heat Process (if used) See Process Table G			
1.3		Soldering Iron			
1.3.1		Temperature controller	Correct Temperature	Continuous	
1.3.2		Heating element	Proper PM	PM Completion Report	
1.3.3	1.6	Iron tip temperature calibration	Per specification	Per control plan	
1.3.4	1.6	Correct Tip (shape/size/material)	Per specification	Per control plan	
1.3.5		Iron tip cleaner	Per control plan	Continuous	
1.3.6		Iron tip maintenance	Proper PM	PM Completion Report	
1.3.7		Iron tip cleaner	Per control plan	Continuous	
1.4		Solder			
1.4.1	1.6	Correct Solder (type/size/core)	Per specification	Per control plan	
1.4.2		Solder Lot Control	Bar Code or Manual	Per control plan	
1.5		Atmosphere control			
1.5.1		Ventilation	Automatic	Continuous	
1.5.2		Nitrogen Soldering Protection (if used)			
1.6	3.9	ESD Control	Per ANSI S20.20	Continuous	
1.7		Pb/Pb free changeovers	Proper equipment cleaning	Per control plan/changeover	
1.8		Solder ball control	Solder preparation per customer agreement (e.g., V-groove cutter)	100%	

PROCESS TABLE M - Manual Iron Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
2.0	1.4 2.11 2.12	**Manual Solder Process Control**			
2.1		Soldering techniques, such as; dwell times, methods of iron application to joint.	Retraining provided when quality issues indicate	Post solder inspection	
3.0	1.4 2.11 2.12	**Loading/Unloading**			
3.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
3.3		Ionizers			
3.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
3.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
3.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
3.3.4		Proper maintenance	Proper PM	PM Completion Report	
3.4	1.6	Magazines / Unloading racks	Per product spec	Per Changeover	
3.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
3.4.2		Correct width and height for product	Per control plan	Continuous	
3.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
3.4.4		Covered for transportation and storage	Per control plan	Continuous	
3.5		Pallet Cleaning	Per control plan	Per Control Plan	
4.0	1.4 2.11 2.12	**Component Compatibility**			
4.1	1.6	Components compatible with iron temperature	Component Spec	Design Review	
4.2	1.6	Components compatibie with solder	Component Spec	Design Review	

PROCESS TABLE M - Manual Iron Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
5.0	1.4 2.11 2.12	**Warpage Control**			
5.1		Maximum diagonal warpage meets standard	Per IPC-TM-650, Section 2.4.22	Changeover/profile modification	
6.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE N - Laser - Soft Beam Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Laser - Soft Beam Solder Equipment**			
1.1		Automated Flux Application See Process Table F			
1.2		Manual Flux Application			
1.2.1	1.15, 1.16	Correct Flux Type	Operator Training	Per Training Plan	
1.2.2	1.15, 1.16	Correct Applicator	Operator Training	Per Training Plan	
1.2.3	1.15, 1.16	Correct Amount and Location	Operator Training	Per Training Plan	
1.2.4		Time			
1.3		Conveyer			
1.3.1		Conveyer width control	Per set-up	Per control plan	
1.3.2		Conveyer speed control	Automatic per Control Plan	Continuous	
1.3.3		Conveyer infeed cover	In place	Continuous	
1.4		Pre-heat Process (if used) See Process Table G			
2.0	1.4 2.11 2.12	**Laser Equipment Controls**			
2.1		Correct Laser Wave Length	Per Control Plan	Per Specification	
2.2		Correct Laser Power	Per Control Plan	Per Set-Up Sheet	
2.3		Correct Laser Alignment	Per Control Plan	Per Set-Up Sheet	
2.4		Correct Laser Exposure Time	Per Control Plan	Per Set-Up Sheet	
2.5		Correct Laser Focus (Spot Size)	Per Control Plan	Per Set-Up Sheet	
3.0	1.4 2.11 2.12	**Soft Beam Equipment Controls**			
3.1		Correct Xenon Lamp	Per Control Plan	Per Specification	
3.2		Correct Power Setting	Per Control Plan	Per Set-Up Sheet	
3.3		Correct Alignment	Per Control Plan	Per Set-Up Sheet	
3.4		Correct Exposure Time	Per Control Plan	Per Set-Up Sheet	
3.5		Correct Focus (Spot Size)	Per Control Plan	Per Set-Up Sheet	
3.6	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.7		Lead/Lead free changeovers	Proper equipment cleaning	Per control plan/changeover	

PROCESS TABLE N - Laser - Soft Beam Soldering Process

All requirements given below are subordinate to customer specific requirements.

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

4.0	1.4 2.11 2.12	**Loading/Unloading**			
4.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
4.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
4.3		Cooling/Ionizer Blower			
4.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
4.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
4.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
4.3.4		Proper maintenance	Proper PM	PM Completion Report	
4.4	1.6	Magazines / Unloading racks	Per product spec	Per Changeover	
4.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
4.4.2		Correct width and height for product	Per control plan	Continuous	
4.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
4.4.4		Covered for transportation and storage	Per control plan	Continuous	
4.5		Pallet Cleaning	Per control plan	Per Control Plan	
5.0	1.4 2.11 2.12	**Component Compatibility**			
5.1	1.6	Components compatible with temperature profile	Component Spec	Design Review	
5.2	1.6	Components compatible with solder	Component Spec	Design Review	
6.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
6.3	2.8	Part jam reaction plan	Control plan	Continuous	
6.4	2.8	Drop part reaction plan	Control plan	Continuous	
6.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE O - Induction

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Solder Paste Control (Pre-mixed only)**			
1.1	1.6	Correct solder paste	Specification	Start-up and changeover	
1.2	1.6	Correct storage conditions	Specification	Continuous	
1.3	1.6	Correct stabilization	Specification	Start-up and changeover	
1.4	1.6	Ambient temperature exposure	Specification	Continuous	
2.0	1.4 2.11 2.12	**Solder Paste Application**			
2.1	1.6	Dispensed volume	Specification	Start-up and changeover	
2.2	1.6	Correct dispense location	Specification	Continuous	
2.3		Nozzle condition	Control Plan	Start-up and changeover	
3.0	1.4 2.11 2.12	**Part Placement**			
3.1	1.6	Stationary part accuracy	Per Set-Up Specification	Continuous	
3.2	1.6	Placement verification	Per Set-Up Specification	Once per Day	
3.3	1.6	Movable part accuracy	Per Set-Up Specification	Continuous	
3.4	1.6	Movable part verification	Per Set-Up Specification	Once per Day	
3.5	1.6	Gap between parts to be soldered	Per Set-Up Specification	Once per Day	
4.0	1.4 2.11 2.12	**Equipment Control**			
4.1	1.6	Power Supply Frequency	Per Specification	Start-up and changeover	
4.2	1.6	Inductive Head Position (Hot Spot position control)	Per Specification	Start-up and changeover	
4.3	1.6	Inductive Head to Part Gap	Per Specification	Start-up and changeover	
4.4	1.6	Power Profile	Per Specification	Start-up and changeover	
4.5	1.6	Power Duration per Soldering Cycle	Per Specification	Start-up and changeover	
4.6	1.6	Inductive Head Cooling Air Flow Rate	Per Specification	Start-up and changeover	
4.7	1.6	Magnetic Flux Monitoring	Per Specification	Start-up and changeover	
5.0	1.4 2.11 2.12	**Final Inspection**			

PROCESS TABLE O - Induction

All requirements given below are subordinate to customer specific requirements.

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

5.1	1.6	Quality Inspection Audit	Per Specification	Per Control Plan	
5.2		Non-conforming part disposition	Reaction plan	Per Control Plan	
6.0	**1.4 2.11 2.12**	**Loading/Unloading**			
6.1	3.9	ESD Control	Per ANSI S20.20	Continuous	
6.2	1.15, 1.16	Proper Handling	Operator Training	Continuous	
6.3		Cooling/Ionizer Blower			
6.3.1		Filters presence	Per control plan	Per Preventative Maintenance	
6.3.2	1.6	Proper location on conveyor	Per spec/set-up	Daily Check Sheet	
6.3.3		Blower Operation indicator	Per control plan	Daily Check Sheet	
6.3.4	1.18	Proper maintenance	Proper PM	PM Completion Report	
6.4	1.6	Magazines / Unloading racks	Per product spec	Per Changeover	
6.4.1		Correct Type for product (Pb/Pb free)	Per control plan	Continuous	
6.4.2		Correct width and height for product	Per control plan	Continuous	
6.4.3		Correct loading sequence (top down)	Per control plan	Continuous	
6.4.4		Covered for transportation and storage	Per control plan	Continuous	
6.5		Pallet Cleaning	Per control plan	Per Control Plan	
7.0	**1.4 2.11 2.12**	**Component Compatibility**			
7.1	1.6	Components compatible with temperature profile	Component Spec	Design Review	
7.2	1.6	Components compatible with solder	Component Spec	Design Review	
8.0	**1.4 2.11 2.12**	**Abnormal Condition Reaction**			
8.1	2.8	Power failure reaction plan	Control plan	Continuous	
8.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
8.3	2.8	Part jam reaction plan	Control plan	Continuous	
8.4	2.8	Drop part reaction plan	Control plan	Continuous	
8.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
8.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE P - Conformal Coating

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Conformal Coating**			
	1.6	Type Used:	Per Specification	Error-Proofing Check Sheet	
	1.6	Curing Method:	Per Specification	Error-Proofing Check Sheet	
2.0	1.4 2.11 2.12	**Preparation**			
2.1		**Pre-Mixed:**			
2.1.1	1.6	Correct Storage Conditions	Per Specifications	Continuous	
2.1.2	1.6	Stabilized to operating temperature	Per Specifications	Check sheet	
2.1.3		Correct Material	Bar Code or Manual	Every Container	
2.1.4		Expiration Date/Lot Control	Bar Code or Manual	Every Container	
2.1.5		Expired Material Handling	Per Control Plan	Per Control Plan	
2.2		**On-site Mixed:**			
2.2.1	1.6	Correct Storage Conditions for Components	Per Specifications	Per Control Plan	
2.2.2	1.6	Correct mixing temperature	Per Specifications	Check sheet	
2.2.3		Correct Material	Bar Code or Manual	Every Container	
2.2.4		Ingredient Expiration Date/Lot Control	Bar Code or Manual	Every Container	
2.2.5		Expired ingredients handling	Per Control Plan	Per Control Plan	
2.2.6		Mixing tools calibrated	Per Control Plan	Per Calibration Cycle	
2.2.7		Cleanliness of mixing containers and work area	No foreign materials	Per Control Plan/Work Instructions	
2.2.8	1.6	Mixing time	Per Specifications	Check sheet	
2.2.9	1.6	Viscosity confirmation	Per Specifications	Check sheet	
2.2.10	1.6	Prepared conformal coating expiration date	Per Specifications	Check sheet	
3.0	1.4 2.11 2.12	**Coating Application**			
3.1		**Spray - Automatic or Manual**			
3.1.1	1.6	Correct Coverage Area	Per Specification	Set-up Sheet	
3.1.2	1.6	No Coating / Overspray In Exclusion Zone	Per Specification	Set-up Sheet	
3.1.3	1.6	Correct Thickness / Uniformity	Per Specification	Set-up Sheet	
3.1.4		Solution Flow Rate (if 3.1.3 not applicable)	Per Control Plan	Set-up Sheet	
3.1.5		Solution Pressure Rate	Per Control Plan	Set-up Sheet	
3.1.6		Nozzle Movement Speed	Per Control Plan	Set-up Sheet	
3.1.7	1.18	Nozzle Maintenance	Per Preventive Maintenance Schedule	Maintenance Check Sheet	
3.1.8	1.6	Masking (Manual Spray Only)	Per Specification	Continuous	
	1.6	Board and Solution Temperature	Per Product Specification	Continuous	

PROCESS TABLE P - Conformal Coating

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.2		**Dip - Automatic or Manual**			
3.2.1	1.6	Correct Coverage Area	Per Specification	Set-up Sheet	
3.2.2	1.6	Correct Thickness / Uniformity	Per Specification and Control Plan	Set-up Sheet	
3.2.3		No Foreign Material in Pot	Proper Filtering	PM Schedule per customer requirement	
3.2.4	1.6	Uniform viscosity maintenance	Per Product Specification	Set-up Sheet	
3.2.5		Insert and Withdraw Rate / Soak Time	Per Control Plan	Set-up Sheet	
3.2.6	1.6	Correct board orientation	Per Specification	Continuous	
3.2.7	1.6	Board and Tank Temperature	Per Product Specification	Continuous	
3.2.8	1.6	Drip Time	Per Product Specification	Continuous	
3.3		**Brush**			
3.3.1	1.6	Correct Brush Type	Per Specification	Set-up Sheet	
3.3.2	1.6	Correct Coverage Area	Per Specification	Set-up Sheet	
3.3.3	1.6	No Coating / Oversplash In Exclusion Zone	Per Specification	Set-up Sheet	
3.3.4	1.6	Correct Thickness / Uniformity	Per Specification	Set-up Sheet	
3.3.5	1.6	Masking (If Required)	Per Specification	Continuous	
3.3.6	1.6	Uniform viscosity maintenance	Per Product Specification	Set-up Sheet	
3.3.7	1.6	No Foreign Material in Pot	Per Specification	Set-up Sheet	
3.3.8	1.6	Board and Tank Temperature	Per Product Specification	Continuous	
3.3.9		Proper ESD Control	Per ANSI S20.20	Continuous	
3.4		**Selective Coverage Area**			
3.4.1	1.6	Correct Coverage Area	Per Specification	Set-up Sheet	
3.4.2	1.6	No Coating / Drips In Exclusion Zone	Per Specification	Set-up Sheet	
3.4.8	1.6	Board and Solution Temperature	Per Product Specification	Continuous	
3.4.9	1.15, 1.16	Proper Coverage for Manual Applications with controls as above	Proper Operator Training	Visual Control	

PROCESS TABLE P - Conformal Coating

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
4.0	1.4 2.11 2.12	**Curing**			
4.1		**Ultra Violet (UV) Cure**			
4.1.1	1.6	Proper UV Source	Per Specification	Set-up Sheet	
4.1.2	1.6	Proper Exposure Time	Per Specification	Set-up Sheet	
4.1.3	1.6	Debris Control	Per Specification	Set-up Sheet	
4.1.4	1.6	Correct Orientation	Per Specification	Continuous	
4.1.5		Proper UV Source Maintenance	Per Preventive Maintenance Schedule	Maintenance Check Sheet	
4.1.6	1.6	Humidity Control	Per Coating Specifications	Plant Level: Equipment Level:	
4.2		Humidity Cure			
4.2.1	1.6	Correct Temperature / Humidity Range	Per Specification	Set-up Sheet	
4.2.2	1.6	Proper Exposure Time	Per Specification	Set-up Sheet	
4.2.3	1.6	Debris Control	Per Specification	Set-up Sheet	
4.2.4	1.6	Correct Orientation	Per Specification	Continuous	
4.3		**Heat Cure**			
4.3.1	1.6	Correct Temperature Level	Per Specification	Set-up Sheet	
4.3.2	1.6	Proper Exposure Time	Per Specification	Set-up Sheet	
4.3.3	1.6	Debris Control	Per Specification	Set-up Sheet	
4.3.4	1.6	Correct Orientation	Per Specification	Continuous	
4.3.5	1.6	Proper Humidity Level	Per Specification	Continuous	
4.4		**Ambient Cure**			
4.4.1	1.6	Correct Temperature / Humidity Range	Per Specification	Set-up Sheet	
4.4.2	1.6	Proper Cure Time	Per Specification	Set-up Sheet	
4.4.3	1.6	Debris Control	Per Specification	Set-up Sheet	
4.4.4	1.6	Correct Orientation	Per Specification	Continuous	

PROCESS TABLE P - Conformal Coating

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
5.0	**1.4 2.11 2.12**	**Inspection**			
5.1	1.15, 1.16	Proper Coverage Area	Operator Training	Continuous	
5.2		No Bubbles, Voids, or Inconsistencies	None Allowed	Continuous	
5.3		Thickness Check	Per Product Specification	Per Sampling Plan	
5.4	1.15, 1.16	Curing Completion	Operator Training	Continuous	
5.5	3.9	Proper ESD Control	Per ANSI S20.20	Continuous	
6.0	**1.4 2.11 2.12**	**General**			
6.1		Fixture cleaning frequency	Per Control Plan	Per Schedule	
6.2		Appropriate operator protective equipement	Per work area requirement	100%	
7.0	**1.4 2.11 2.12**	**Abnormal Condition Reaction**			
7.1	2.8	Power failure reaction plan	Control plan	Continuous	
7.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
7.3	2.8	Part jam reaction plan	Control plan	Continuous	
7.4	2.8	Drop part reaction plan	Control plan	Continuous	
7.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
7.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE Q - PCB Separation

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Router**			
1.1	1.6	Correct router pattern	Specification	Continuous	
1.2	1.6	Correct bit	Specification	Start-up or change over	
1.3	1.6	Correct bit alignment	Specification	Start-up or change over	
1.4	1.6	Correct RPM	Specification	Start-up or change over	
1.5		Correct debris removal	Proper vacuum level	Continuous	
1.6		No abnormal board flex	Per Customer requirement	Start of production or equipment change/modification	
1.7	3.9	ESD control	Per ANSI S20.20	Continuous	
1.8	1.15, 1.16	Proper seating of PCB	Operator training	Continuous	
1.9	1.6	Proper support for separated panels	Specification	Start-up or equipment change-over	
1.10	1.15, 1.16	Proper handling during loading and unloading	Operator training	Continuous	
1.11	1.18	Established bit preventive maintenance	Per Preventive Maintenance Schedule	Maintenance Check Sheet	
1.12		Reaction plan to broken bit	Per Control Plan	Continuous	
2.0	1.4 2.11 2.12	**Die/Punch**			
2.1		Correct die/punch	Set-up Sheet	Start-up or change over	
2.2	1.6	Correct PCB to die/punch alignment	Specification	Start-up or change over	
2.3	1.6	Correct force	Specification	Start-up or change over	
2.4		Correct debris removal	Per control plan	Continuous	
2.5		No abnormal board flex	Per Customer requirement	Start of production or equipment change/modification	
2.6	3.9	ESD control	Per ANSI S20.20	Continuous	
2.7	1.15, 1.16	Proper seating of PCB	Operator training	Continuous	
2.8	1.6	Proper support for separated panels	Specification	Start-up or equipment change-over	
2.9	1.15, 1.16	Proper handling during loading and unloading	Operator training	Continuous	
2.10	1.18	Established die/punch preventive maintenance	Per Preventive Maintenance Schedule	Maintenance Check Sheet	
2.11		Reaction plan to broken die/punch	Per Control Plan	Continuous	

PROCESS TABLE Q - PCB Separation

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.0	1.4 2.11 2.12	**Blade (V-cut)**			
3.1		Correct blade	Set-up Sheet	Start-up or change over	
3.2	1.6	Correct PCB to blade alignment	Specification	Start-up or change over	
3.3	1.6	Correct PCB to blade gap	Specification	Start-up or change over	
3.4		Correct debris removal	Pre control plan	Continuous	
3.5		No abnormal board flex	Per Customer requirement	Start of production or equipment change/modification	
3.6	3.9	ESD control	Per ANSI S20.20	Continuous	
3.7	1.15, 1.16	Proper seating of PCB	Operator training	Continuous	
3.8	1.6	Proper support for separated panels	Specification	Start-up or equipment change-over	
3.9	1.15, 1.16	Proper handling during loading and unloading	Operator training	Continuous	
3.10	1.18	Established blade preventive maintenance	Per Preventive Maintenance Schedule	Maintenance Check Sheet	
3.11		Reaction plan to damage blade	Per Control Plan	Continuous	
4.0	1.4 2.11 2.12	**Manual Separation**			
4.1		Correct debris removal	Pre control plan	Continuous	
4.2		No abnormal board flex	Per Customer requirement	Start of production or equipment change/modification	
4.3	3.9	ESD control	Per ANSI S20.20	Continuous	
4.4		Procedure in place to ensure separation method meets customer requirements	Per Customer requirement	Continuous	
4.5		Proper handling during separation activity	Per Customer requirement	Continuous	
4.6		Proper tools specified	Per Customer requirement	Continuous	
5.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
5.1	2.8	Power failure reaction plan	Control plan	Continuous	
5.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
5.3	2.8	Part jam reaction plan	Control plan	Continuous	
5.4	2.8	Drop part reaction plan	Control plan	Continuous	
5.5	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
5.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE R - In-circuit Testing (ICT)

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**Automatic**			
1.2		Conveyer width control	Per set-up	Per control plan	
1.3		Conveyer index control	Automatic per Control Plan	Continuous	
1.4		Conveyers covered	Covers in place	Continuous	
1.5		Proper positioning for test	Per set-up	Per control plan	
1.6		Correct test set-up: Software Hardware	Per set-up	Per control plan	
1.7		Correct pin set-up: Clearance between pins Height Pressure Type	Per set-up	Per control plan	
1.8		Correct dwell (test/set) time	Per set-up	Per control plan	
1.9		Good/bad boundary sample confirmation	Start-up/changeover and last off	Per control plan	
1.10		Proper test equipment calibration	Per calibration frequency	Per equipment manufacturer	
1.11		Failed part data logging	Per each failed part	Per control plan	
1.12		Failed part traceability	Per identification method	Continuous	
1.13		Reaction plan to high level of false-fails	Per reaction plan	Per control plan	
1.14		Reaction plan to defective part limits	Per reaction plan	Per control plan	
1.15	1.18	Preventative maintenance performed (confirm pogo pin inspection/replacement criteria)	Per Preventive Maintenance	Maintenance Check Sheet	
1.16	3.9	ESD control	Per ANSI S20.20	Continuous	
1.17		No abnormal board flex	Per Customer requirement	Start of production or equipment	
2.0	1.4 2.11 2.12	**Manual**			
2.1	1.15, 1.16	Correct loading/unloading	Operator training	Per control plan	
2.2		Proper positioning for test	Per set-up	Per control plan	
2.3		Correct test set-up: Software Hardware	Per set-up	Per control plan	

PROCESS TABLE R - In-circuit Testing (ICT)

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
2.4		Correct pin set-up: Clearance between pins Height Pressure Type	Per set-up	Per control plan	
2.5		Correct dwell (test/set) time	Per set-up	Per control plan	
2.6		Good/bad boundary sample confirmation	Start-up/changeover and last off	Per control plan	
2.7		Proper test equipment calibration	Per calibration frequency	Per equipment manufacturer recommendation	
2.8		Failed part data logging	Per each failed part	Per control plan	
2.9		Failed part traceability	Per identification method	Continuous	
2.10		Reaction plan to high level of false-fails	Per reaction plan	Per control plan	
2.11		Reaction plan to defective part limits	Per reaction plan	Per control plan	
2.12	1.18	Preventative maintenance performed (confirm pogo pin inspection/replacement criteria)	Per Preventive Maintenance Schedule	Maintenance Check Sheet	
2.13	3.9	ESD control	Per ANSI S20.20	Continuous	
2.14		No abnormal board flex	Per Customer requirement	Start of production or equipment change/modification	
3.0	**1.4 2.11 2.12**	**Abnormal Condition Reaction**			
3.1	2.8	Power failure reaction plan	Control plan	Continuous	
3.2	2.8	Emergency-stop reaction plan	Control plan	Continuous	
3.3	2.8	Part jam reaction plan	Control plan	Continuous	
3.4	2.8	Drop part reaction plan	Control plan	Continuous	
3.5	2.8	In-Process Delay Reaction Plan	Control plan	Continuous	
3.6	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	

PROCESS TABLE S - Solder Re-work

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
1.0	1.4 2.11 2.12	**On-line Re-work**			
1.1		Confirmation of defective part	Defect class defined per customer agreement	Automatic test	
1.2		Procedure to track defective part from the process through re-work	Written procedure	Control Plan	
1.3		Traceability linked to part repair history	Written procedure	Control Plan	
1.4		Identify effective area of defect	Quality confirmation systems	Control Plan	
1.5		Identify defective component	Quality confirmation systems	Control Plan	
1.6		Identification method for reworkable components. (Proper IC orientation / part polarity)	Written policy or customer requirements	Control Plan	
1.7		Removal of conformal coating, if required (not recommended)	Written procedure	Control Plan	
1.8	1.15, 1.16	Operator certification for diagnostic and repairs	Operator training	Training matrix with annual management review.	
1.9		Repair confirmed by certified supervisor/team leader	Written policy or customer requirements	Control Plan	
1.10		Repaired part returned to production line and inserted prior to defect identification/reject point	Written policy	Control Plan	
1.11	3.9	ESD handling procedure in place	Per ANSI S20.20	Continuous	
1.12		Solder ball control	Solder preparation per customer agreement (e.g., V-groove cutter)	100%	
2.0	1.4 2.11 2.12	**Off-line Repair Procedure**			
2.1		Confirmation of defective part	Defect class defined per customer agreement	Automatic test	
2.2		Defective parts tracked from the process through re-work	Written procedure	Control Plan	
2.3		Traceability linked to part repair history	Written procedure	Control Plan	
2.4		Off-line part handling and storage procedure	Written procedure	Control Plan	
2.5		Identify effective area of defect	Inspection results	Control Plan	
2.6		Identify defective component	Inspection results	Control Plan	

PROCESS TABLE S - Solder Re-work

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
2.7		Identification method for reworkable components.	Written policy or customer requirements	Control Plan	
2.8		Removal of conformal coating, if required (not recommended)	Written procedure	Control Plan	
2.9	1.15, 1.16	Operator certification for diagnostic and repairs	Operator training	Training matrix with annual management review.	
2.10		Repair confirmed by certified supervisor/team leader	Written policy or customer requirements	Control Plan	
2.11		Repaired part returned to production line and inserted prior to defect identification/reject point	Written policy	Control Plan	
2.12	3.9	ESD handling procedure in place	Per ANSI S20.20	Continuous	
3.0	**1.4 2.11 2.12**	**Repair Equipment and Material**			
3.1		Work stations identified for Pb versus Pb-free material	Visual identification and documentation	Continuous	
3.2		All tools indentified for Pb versus Pb free	Visual identification and documentation	Continuous	
3.3		**Solder iron**			
3.3.1		Correct Iron Temperature	Per specification	Quality audit	
3.3.2		Heating element	Per specification	Per PM Schedule	
3.3.3		Iron tip temperature calibration	Per specification	Per control plan	
3.3.4		Correct Tip (shape/size/material)	Per specification	Per control plan	
3.3.5		Correct Solder (type/size/core)	Per specification	Per control plan	
3.3.6		Solder Lot Control	Bar Code or Manual	Per control plan	
3.3.7		Atmosphere control	Automatic	Continuous	
3.3.8		Ventilation	Automatic	Continuous	
3.3.9	3.9	ESD Control	Per ANSI S20.20	Continuous	
3.3.10		Iron tip cleaner	Per control plan	Continuous	
3.3.11		Iron tip maintenance	Per Preventive Maintenance Schedule	Maintenance Check Sheet	

PROCESS TABLE S - Solder Re-work

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.4	1.4 2.11 2.12	**BGA/Flip Chip/Bumped Die/Controlled Collapse Chip Connection (C4) Repair Equipment**			
3.4.1		Removal - Localized pre-heat control	Automatic based on part requirements	Continuous	
3.4.2		Removal - Pre-heat temperature set point	Automatic based on part requirements	Continuous	
3.4.3		Removal - Pre-heat time control	Automatic based on part requirements	Continuous	
3.4.4		Proper pad inspection post-removal	Operator training	Continuous	
3.4.5		Insertion - Pre-heat control	Automatic based on part requirements	Continuous	
3.4.6		Insertion - Reflow temperature control	Automatic based on part requirements	Continuous	
3.4.7		Insertion - Reflow time control	Automatic based on part requirements	Continuous	
3.4.8		Post insertion - Cooling profile	Automatic based on part requirements	Continuous	
3.4.9		Heater head cleaning procedure	Per equipment OEM specifications	PM completion reports	
3.5	1.4 2.11 2.12	**Component Control**			
3.5.1		Replacement component match bill of material	BOM verification / crosscheck	Continuous	
3.5.2		Proper moisture sensitive device (MSD) environmental control/tracking	Per component requirements	Continuous	
3.5.3		Component matches solder type used	BOM verification / crosscheck	Continuous	
3.5.4		Disposition of defective components	Scrap / non-conforming part procedure	Continuous	

PROCESS TABLE S - Solder Re-work

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
3.6	1.4 2.11 2.12	**Conformal Coat removal and replacement**			
3.7.1		Solvent removal	Procedure in place	Supervisor confirmation	
3.7.2		Correct solvent for coating used	Procedure / checksheet	Supervisor confirmation	
3.7.3	1.15, 1.16	Mechanical dam installed around component	Procedure / Operator training	Supervisor confirmation	
3.7.4	1.15, 1.16	Filler used for solvent to prevent run out	Procedure / Operator training	Supervisor confirmation	
3.7.5	1.15, 1.16	Board cleaned before re-work	Procedure / Operator training	Supervisor confirmation	
3.8		Micro-abrasive removal			
3.8.1	1.15, 1.16	Only nonconductive abrasive allowed	Procedure / Operator training	Supervisor confirmation	
3.8.2	1.15, 1.16	Mask used to protect surrounding components	Procedure / Operator training	Supervisor confirmation	
3.8.3	1.15, 1.16	Board cleaned before re-work	Procedure / Operator training	Supervisor confirmation	
3.9		Mechanical removal			
3.9.1	1.15, 1.16	Proper tool	Procedure / Operator training	Supervisor confirmation	
3.9.2	1.15, 1.16	No damage allowed to solder resist	Procedure / Operator training	Supervisor confirmation	
3.10	1.15, 1.16	De-soldering removal	Procedure / Operator training	Supervisor confirmation	
3.10.1	1.15, 1.16	Proper iron temperature to vaporize coating	Procedure / Operator training	Supervisor confirmation	
3.10.2	1.15, 1.16	Proper ventilation for operator protection	Procedure / Operator training	Supervisor confirmation	
3.11		Reapplication			
3.11.1	1.15, 1.16	Silicone paste conformal coat only one part moisture cured solution allowed	Procedure / Operator training	Supervisor confirmation	
3.11.2	1.15, 1.16	Non-silicone paste adhesion promoter should be used as needed	Procedure / Operator training	Supervisor confirmation	
3.11.3	1.15, 1.16	All repairs require at least 3 millimeters overlap of demarcation edges of existing coatings	Procedure / Operator training	Supervisor confirmation	

PROCESS TABLE S - Solder Re-work

All requirements given below are subordinate to customer specific requirements.

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

ITEM #	Related SSA Question	Category/Process Steps	Control	Monitoring	Auditor Notes
4.0	1.4 2.11 2.12	**Encapsulated / Potted Component Rework**	Not recommended		
5.0	1.4 2.11 2.12	**Proper work station cleanliness**	Operator training	Supervisor confirmation	
6.0	1.4 2.11 2.12	**Abnormal Condition Reaction**			
6.1	2.8	Power failure reaction plan	Control plan	Continuous	
6.2	2.8	Drop part reaction plan	Control plan	Continuous	
6.3	2.8	In Process Delay Reaction Plan	Control plan	Continuous	
6.4	1.11	Repair/rework procedures	Based on IPC-7711, 7721	Continuous	
6.5	1.11	Maximum number of repairs allowed per board	Per customer product specification	Effective tracking system	

GLOSSARY

AIAG – Automotive Industry Action Group

ANSI – American National Standards Institute

AOI – Automated Optical Inspection

Boundary Sample – Part samples created as an inspection aid. Samples are typically created at a specification limit or at the worst-possible acceptable condition.

Control Plans – Written descriptions of the system for controlling processes for production of parts or bulk materials. Control Plans are written by organizations to address the important characteristics and engineering requirements of the product. Each part must have a Control Plan, but in many cases, "family" Control Plans can apply to a number of parts produced using a common process.

Customer – The recipient of the organization's or supplier's product or service.

Customer Requirements – This term refers to the requirements or specifications from the original equipment manufacturer (typically the automobile company). These may be identified in the contract or purchase order, in engineering standards, part specifications, etc.

Dip Soldering - Dip soldering (DS) is accomplished by submerging parts to be joined into a molten solder bath.

EOS – Electrical over-stress

ESD – Electrostatic Discharge

FLUX - Flux is a chemical cleaning agent which facilitates soldering, brazing, and welding by removing oxidation from the metals to be joined.

FMEA – Failure Mode and Effect Analysis

Fountain Soldering – A form of selective soldering

Icicling – Formation of solder spikes resulting from poor drain-off of liquid solder following wave or dip soldering.

IR – Infrared

IPC – Institute of Printed Circuits

M. O. L. E./Surveyor – Multichannel Occurrent Logger Evaluator

MS – Moisture Sensitive

MSD – Moisture Sensitive Device

Oxygen Analyzer/Probe – An in-situ measuring probe/device that determines the concentration of oxygen in atmospheres.

NIST - National Institute of Standards and Technology

Pb – Chemical symbol for lead

Pb Free – Without lead

ProFlow – An enclosed printhead technology developed by DEK.

PCB – Printed Circuit Board

PWB – Printed Wiring Board

Reflow soldering - Is a process in which a solder paste (a sticky mixture of powdered solder and flux) is used to temporarily attach one or several electrical components to their contact pads, after which the entire assembly is subjected to controlled heat, which melts the solder, permanently connecting the joint.

Selective soldering - Is the process of selectively soldering components to printed circuit boards, molded modules, etc. that could be damaged by the heat of a reflow oven in a traditional SMT assembly process.

SMT – Surface mount technology

Solder Balls – Small spheres of solder that have separated from the main body of solder.

Solder Bridge – An unwanted formation of a conductive path of solder between contacts.

Solder Dross – Mass of impurities flowing on molten solder

Soldering Iron - A tool normally used for applying heat to two or more adjoining metal parts such that solder may melt and flow between those parts, binding them securely, conductively and hermetically.

Solder Pads – An area on which solder paste is printed and a component is placed.

Solder Pot - Solder pot also known as soldering pots are portable and primarily used for melting solder, dip soldering small circuit boards, tinning the ends of wire leads, re-tinning soldering iron tips.

Solder Skip – As related to printing, skips are components pads that were missed during the printing process.

Squeegee – A plastic, metal, or fiber blade used to push solder across the stencil surface while filling the stencil apertures.

Stencil – A screen used to print solder paste on to electronic assemblies.

Tombstoning – The raising up of one end of a leadless component from solder past as a result of torque applied by the surface tension of solder as it wets.

Billboarding – A discrete component with both terminations soldered but laying on its edge.

Wetting – Formation of an inter-metallic allowing the spread of molten solder over a base metal.

Wave soldering - Large-scale soldering process by which electronic components are soldered to a printed circuit board (PCB) to form an electronic assembly.

Work Instructions – Instructions that describe work conducted in one function in a company, e.g., setup, inspection, Soldering operation, process parameter tolerances, etc. The term "work instructions" is synonymous with the term "job instructions."