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Tooling Supplier
Quality Operating Requirements

D6-56202 Revision U

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(All future revisions to this document shall be approved by the content owner prior to release.)

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Abstract

The purpose of this document is to establish Quality requirements for Boeing-approved tooling suppliers.

Definitions:

Boeing Quality: For the purpose of this document, a generic term to describe the quality group responsible for supplier quality management system approval/surveillance. The title for each Boeing division's Quality department performing this task will vary.

1.0 General Information

- 1.1 Suppliers must comply with all of the requirements outlined in this document, as applicable to the types of products or processes they provide. Exceptions require prior written approval from Boeing.
- 1.2 Supplier approval is valid until notified by Boeing that said approval has been withdrawn. Periodic audits will be conducted by Boeing Quality to maintain supplier's approval.
- 1.3 Suppliers are solely responsible for the quality of their products, including any features or processes contracted to a sub-tier supplier. If the product specification includes a Qualified Products List (QPL), or Qualified Manufacturers List (QML) then the manufacturer of the product must be listed on the QPL/QML. If supplier is a distributor or other than the manufacturer, then the manufacturer's name and location (city and state) shall be identified within supplier's shipping documentation.
- 1.4 All supplier inspections shall be complete prior to submitting notification to Boeing Quality of completion. All non-conformances shall be documented per supplier's QMS. Suppliers are expected to be cognizant of design and safety requirements, and shall resolve all discrepancies prior to final tool acceptance. Boeing Quality will assist when requested.
- 1.5 Poor quality performance and non-compliance to requirements noted in this document may result in the revocation of approval status.
- 1.6 Supplier shall promptly notify Boeing's authorized Procurement Representative of any occurrence of natural disaster that diminishes supplier's ability to deliver conforming goods or services.

2.0 Quality Organization

The supplier is required to have a Quality Representative and a documented system that assures adequate control of quality is maintained throughout all manufacturing processes, including receiving, packaging, and shipping. The Quality Representative must be empowered to identify quality problems and initiate corrective actions to resolve them.

3.0 Quality Manual

Suppliers are required to have a quality manual, approved by top management, documenting the processes and responsibilities used to ensure the integrity of the products and services provided to Boeing.

- 3.1 Supplier's quality manual must have a controlled revision system to ensure the most recent information is incorporated into the Quality Manual and is being used by inspection personnel.

- 3.2 Supplier shall make quality data and/or approved design data available in the English language. Supplier shall maintain an English language translation of (1) its quality manual, (2) operating instructions that implement quality manual requirements, and (3) an index of supplier's procedures that contain quality requirements. Boeing may require additional documentation to be translated, including but not limited to: shop orders, technical specifications, certificates, reports, and nonconformance documents.

4.0 Accountability and Retention of Quality Records

Suppliers must maintain inspection records on work performed for Boeing. These records must include acceptance records, tool configuration non-conformance forms (with dispositions), and any material or critical process certifications (e.g. heat treat, etc. reference section 7.0).

- 4.1 All records shall be complete, accepted, and accounted for prior to product delivery. All entries, signatures, and stamp impressions shall be complete and legible.
- 4.2 Records for Boeing tools must be maintained on all discrepancies that require a disposition. The documentation is to be on supplier non-conformance forms and shall include, at a minimum, a description of the discrepancy, corrective action taken, and name(s)/signature(s)/stamp(s).
- 4.3 Inspection records for Boeing tools are to be maintained by the supplier for seven (7) years or per contract requirements. Copies of original inspection records are acceptable if the original records are sent to, or taken by, Boeing. Electronic copying and storage is acceptable. Ensure that all completed records are stored and protected in a secure location.
- 4.4 All dimensional inspection results shall be reported in inches.

5.0 Handling of Tools

The supplier is required to have procedures in place to adequately control the handling of tooling and Boeing supplied materials. This includes receiving, storage, and shipment.

- 5.1 The supplier is to have an adequate area to store Boeing provided tools and raw materials in a manner that will prevent their damage.
- 5.2 If a Master Tool is received from Boeing for tool fabrication purposes, the following procedures will be followed:

- Receiving: The "sealed" storage box will be opened in the presence of Boeing Quality for a visual check for damage, inventory of component parts, general appearance, and compliance to current tool drawing revisions.
- Storage: Tools are to be stored in a building that will prevent atmospheric or physical damage to the tools. Under no circumstances are the tools to be stored outside.
- Shipping:
- A. Appropriate corrosion resistant material will be applied to all critical surfaces subject to corrosion.
 - B. Preserved gaging surfaces will be separated from any contact with the wooden container members.
 - C. Boeing Quality will verify part inventory and "seal" the storage box prior to shipment.
 - D. Tool containers will be protected from inclement weather.

6.0 Equipment

All suppliers are to have adequate equipment to inspect the tooling they fabricate. Any equipment used for tool inspection must be calibrated and certified with standards traceable to the National Institute of Standards Technology or national standards of other countries that are correlated with US national standards.

- 6.1 The calibration methods/standards of inspection equipment must be in accordance with ANSI/NCSSL-Z540 standards and/or ISO/IEC/EN 17025, including a mandatory recall system to remove any equipment with expired certifications from use. All equipment must have a sticker and/or certification record indicating calibration date, expiration date and name of person responsible for internal calibration process or calibration source.
- 6.2 Equipment certifications are to be maintained and available to Boeing upon request. An inventory of the supplier's inspection equipment and its certification status, as well as the method of calibration, must be maintained.
- 6.3 Certified inspection equipment must be controlled, adequately stored, and protected from adverse environmental conditions.

7.0 Subcontracting

Supplier must flow down the requirements of this document and any other applicable specifications when sub-contracting work. Sub-tier suppliers must be approved and listed on supplier's Approved Supplier List (ASL). Supplier must also monitor the performance of sub-tier suppliers to assure compliance with process and quality requirements.

Suppliers must provide documented evidence of compliance for processes, including all elements involved in the process (e.g. certification of equipment, certification/qualification of operators, material, time/temp charts, etc.). Process certifications and/or test records must be traceable to the Tool, Unit, Detail, etc., and acceptance stamped (or equivalent) and dated.

Material processing such as plating, heat treating, stress relieving, etc., utilized in the fabrication of tooling must be performed by a processor possessing an industry certification such as ISO 9001, Nadcap, ASME, etc.

8.0 Non-Destructive Examination (NDE)

Supplier personnel performing NDE on Boeing tools are required to maintain at least a Level II ASNT or equivalent certification to perform the specified Non-Destructive test. The NDE inspector must be knowledgeable of Boeing NDE requirements per D32028-1 through -5.

Supplier Inspectors performing NDE must have a steel stamp to signify acceptance on Boeing metal tags when required. NDE stamps will have a prominent identifier indicating the inspection type, as well as the company initials/logo and inspector identifier.

9.0 Supplier Welding Requirements

All welders performing work on Boeing tools must demonstrate proficiency by qualifying to a recognized welding code or specification (ref. D32028-1).

- 9.1 The supplier must maintain qualification records on each of its welders per AWS requirements.
- 9.2 Boeing Quality must be provided copies of Welder Qualification Records upon request.
- 9.3 All welds, except Level 3, must be visually inspected by an AWS QC1 CWI (Certified Welding Inspector) or equivalent, as required per D32028-1 Table 1 (Visual Inspection

Requirements). All welds, except Level 3, will be inspected prior to being painted or concealed. Note: Level 3 welds are Supplier Shop Responsibility per D32028-1.

- 9.4 All Non-Destructive Evaluation shall be conducted in accordance with D32028-1 through -5. A copy of the certification card of the individual performing the test must be available upon request (ref: 8.0).
- 9.5 The CWI, or equivalent, and/or NDE inspector shall provide evidence of all inspections performed.

10.0 Inspection Areas

The supplier shall have adequate space to conduct inspection (preferably separate from the fabrication environment). Each area shall have proper storage for inspection equipment (reference section 6.3) and be kept sufficiently clean to conduct safe and accurate inspections.

11.0 Digital Product Definition (DPD) Capabilities

- 11.1 Suppliers using Boeing digital data must be DPD approved per D6-51991.
- 11.2 Coordinate Measurement Systems (CMS) used for product acceptance must be approved for use by Boeing Quality (Ref section 6.0 and/or D6-51991).

12.0 Tool Inspection

1. Suppliers are required to adhere to the following requirements in the acceptance of tools.
 - a. Tools will be inspected per the most current released drawings, models, orders, specifications, and documents. When inspection is performed to preliminary design data, the inspection data/report must be validated to released data prior to final acceptance. Validation results must be documented.
 - b. Evidence of inspection of all features, material, processes, etc., is required. Statistical sampling and sampling plans are not allowed.
 - c. Inspections must be performed at the supplier's facility. If circumstances dictate that inspection be performed at another site, prior written approval must be obtained from Boeing Quality Management or designee. (Ref section 1.1)
2. Inspection Records or Tool Build Logs (TBL), as applicable, must be produced on all tooling, indicating the status of both progressive and final inspection of a tool. Records must be kept current, legible, neat and accurate.
3. The supplier shall establish and maintain a process for identifying the inspection status of critical tooling details with a tolerance of (+/- .015 and less), including all GD&T features which equate to +/- .015 or less.
4. Inspection Records/TBL will include the following, as applicable: Supplier Name; name of person performing the inspection; date of inspection; tool number, unit number and applicable detail/assy numbers; configuration (drawing/model) revision level; measurement device ID and calibration expiration date; field check, scale bar and drift points recorded at start and end of inspection; descriptive point labels; nominal and actual values (+/- .015 or less); an indication of 'out of tolerance' conditions; and any other relevant information.

- a. A copy of these records must accompany the tool upon shipment to the designated Boeing facility.
 - b. When the tool is being delivered to a non-Boeing facility, copies shall be delivered to the designated Boeing facility and accompany the tool.
 - c. A separate certificate for all tools requiring Load Test is required. The certification will be on the Supplier's letterhead and include all relevant information noted above.
5. Prior to final acceptance of a tool, the supplier's tool inspection will:
- a. Review the Inspection Records or Tool Build Log, as applicable, for completeness, accuracy and legibility, ensuring all critical dimensions (+/- .015 and less) on the tool are recorded with actuals, acceptance stamped, and dated as described in 12.1.b. above.
 - b. Assure that details are inspected and bear proof of acceptance.
6. Tool Acceptance Stamping (Ref. D6-56202-2)
- a. Supplier may only use a Boeing issued acceptance stamp on tools that accompany either a Boeing tooling work order or purchase contract issued through the Boeing Tooling Procurement Organization.
 - b. Under no condition is a Suppliers Tooling Stamp ever to be used on a Boeing production part or its accompanying paperwork.
 - c. The use of supplier's Boeing-issued acceptance stamp in an unauthorized manner can result in revocation of the supplier's authority and subsequent removal from the Boeing Approved Tooling Supplier List.

NOTE: Contact your Procurement Agent to obtain forms to satisfy the preceding requirements. See "References" section below for form numbers/names. Supplier has the option to use equivalent forms to those listed in the references section.

13.0 Supplier Quality Manager's/Designee's Responsibilities

- 13.1 The supplier's Quality Manager is responsible for assuring compliance with this document and all applicable Boeing documents and procedures.
- 13.2 The Supplier's Quality will assure all applicable process and material certifications are available to Boeing Quality upon request. (Reference section 7.0)
- 13.3 The Supplier's Quality is responsible for the quality acceptance of all materials received by the supplier (e.g. Tool Material Request (TMR) items, purchased items, etc.). Material substitutions are not permitted without Boeing Tool Engineering authorization (i.e. D33181-105 listed on drawing, or documented disposition). Boeing Quality will verify materials used when needed.
- 13.4 The Supplier's Quality must notify Boeing Quality when source inspection is required following the acceptance of a tool by his/her department. It is the responsibility of the Supplier's Quality to coordinate with Boeing Quality far enough in advance to assure the source inspection will be performed in a timely manner.
- 13.5 The Supplier's Quality is responsible for providing documentation, verification, certification of all critical processes and "safety items" (e.g. lifting hardware), prior to final acceptance of tooling hardware by Boeing Quality.
- 13.6 The Supplier's Quality is responsible for assuring that current, up-to-date Boeing Design and Tooling Documents are used during inspection.

- 13.7 The Supplier's Quality must be directly available to assist Boeing Quality during Source inspection.

14.0 Audits

Boeing Quality will periodically perform Compliance and Capability Audits at Supplier's facilities.

- 14.1 Audits include a comprehensive evaluation of Supplier's adherence to its Quality System and D6-56202 Requirements.
- 14.2 All audit activities will be coordinated with Supplier Quality Manager or Designee.
- 14.3 Non-compliances identified during a Boeing audit will be documented in Boeing Quality's supplier data system. Supplier will provide corrective action responses in the Boeing Quality supplier data system.

15.0 Document Hierarchy Relationship

- 15.1. D6-56202 is used to establish quality requirements for tooling suppliers.
- 15.2. D6-56202-2 outlines the requirements for delegation of inspection authority, including tool audits.
- 15.3 D6-56202-1 has been cancelled, and D6-56202-3 has been incorporated into D6-56202-2.

References

- A. D1-4426, "Boeing Approved Process Sources"
- B. D6-56202-2, "Tooling Supplier Inspection Delegation"
- C. D32028-1 through -5, "Requirements for Tooling Welding"
- D. D33181, "Tooling Procedures Standards" (TPS)
- E. ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment – General Requirements"
- F. ISO 10012-1, "Quality Assurance Requirements for Measuring Equipment"
- G. NIST, "National Institute of Standards Technology" H. AWS, "American Welding Society"
- I. D6-51991, "Quality Assurance for Digital Product Definition at Boeing Suppliers"
- J. MAC1147S - Tool Build Log Summary
- K. MAC1147DA - Tool Build Log Detail Accountability
- L. MAC1147CS - Tool Build Log Construction Point Sketch
- M. MAC1147DB - Tool Detail Information
- N. MAC1147E - Tool Build Log Hole Pattern
- O. MAC1147D - Tool Build Log Documentation
- P. MAC5420 - Quality Calibration Log
- Q. AM0044 - Laminate Tool Build Log
- R. Z36544 – Certificate of Proof Load
- S. TQOP 14.1 for St Louis tooling reference
- T. ASNT, "American Society for Nondestructive Testing"

Revision Record			
Revision	Description	Date	Approval
Revision A	Deleted B&W inspection record requirements Deleted in process inspection record requirements for non-design tools Deleted "Notes" page & exhibits A & B Reformatted and repaginated document	3/15/95	
B	Added System Audit and responsibilities for audit.	5/13/96	
C	Added non conformance forms to section 3.0 and 4.0 Added section 17.0 through 17.2 document relationship	6/10/96	
D	Renumbered D6-56202-1 to D6-56202	8/2/96	
E	Modified 3.0 by changing "tooling" section <i>mandatory</i> to <i>suggested</i> . Added NOTE: to end of section 11. Added Computer Aided Measuring System 12.0 and renumbered document from 12.0 through 18.0. Modified 13.3 by changing the word <i>recommended</i> to <i>required</i> . Modified 14.0 to read qualifying to a recognized weld code. Modified 14.5 by adding written authorization and the NOTE: Added 100% tool inspection required and sampling not allowed to 15.0 B. Moved 16.10 to 15.0 C and modified with specific requirements. Moved 16.11 to 15.0 D and modified with specific requirements. Changed area code in section 16.4 and mileage in 16.6 & 16.7. Modified 16.0 numbering after moving 16.10 and 16.11. Removed "Approved Pending" from section 16.12. Added ASTM E 18 to reference page. Reformatted and repaginated document.	7/31/98	

Revision Record			
Revision	Description	Date	Approval
Revision F	<p>Text was added and deleted throughout the document to improve grammar and clarify intent.</p> <p>Added 1.5 to clarify how exceptions to the requirements of this document are handled.</p> <p>Revised Section 4 to clarify Inspection Record Requirements and changed Record retention requirement from 7 years to 3, in 4.2. Modified 5.2 to improve grammar. Added detail to Critical Process Certification requirements in 8.0.</p> <p>Section 14 (Weld Inspection Surveillance) was moved and renumbered as Section 10. Modified 10.5 and NOTE to clarify requirements for delegation of weld inspection. Revised 10.7 by adding "Supplier" and adding a note to clarify certification requirements.</p> <p>Section 10.0 re-numbered to 11.0 Section 11.0 re-numbered to 12.0 Section 12.0 re-numbered to 13.0 Section 13.0 re-numbered to 14.0</p> <p>Added 13.2 & 13.3 to describe requirements for submitting 3D data to QA for evaluation and deleted NOTE.</p> <p>Reformatted paragraphs in Sect 15. Revised 15.1.A to clarify intent.</p> <p>Moved text in 16.2 to Sect 8.0. Added optional notification method in 16.4 Deleted paragraphs 16.5, 16.6, and 16.7. (Advance notification for inspection). Added NOTE 16.6.A & B to cover Manual Revision verification.</p>	6/22/99	

Revision Record			
Revision	Description	Date	Approval
	<p>Deleted 17.A (Auditor responsibility) Moved 17.C to 17.1 to describe System Audit. Reformatted paragraphs in Sect 17. Revised 17.3 to eliminate 'Pickup' form reference. Revised 17.5 to clarify Audit Frequency requirements.</p> <p>Deleted reference to D6-56202-1 in 18.1 & D6-56202-3 in 18.2. Added 18.3 to show deletion of D6-56202-1 and incorporation of D6-56202-3 requirements into D6-56202-2.</p> <p>Revised REFERENCES list on last page.</p>		
G	<p>Revised the document Title to more accurately reflect content. Moved paragraph 16.9 'notification requirement' to 1.6. Added "designated person" to Sect 2.0. Deleted the requirement to have inspection stamps in Sect 5.0 and added Paragraph 4.2 to compensate. Changed title of Sect 5.0 to NDI Stamps. Added "approved companies" to 8.0. Deleted all references to delegation of weld inspection in Sect 10.0. Changed title of Sect 12.0 to describe more accurately the content. Revised Sect 13.0 to add requirements for CMS approval and use. Revised text throughout Sect 15.0 in improve grammar. Revised 15.1.D. to clarify intent. Deleted requirement to steel stamp tools and tool details in 15.2.D. Deleted requirement to use a Packaging Slip Invoice (PSI).</p>	6/1/00	

Revision Record			
Revision	Description	Date	Approval
	Revised 16.6 to simplify Manual Update Process. Revised 16.9 and moved 'notification requirement' to 1.6. Added detail to supplier requirements during Compliance Audits. Revised "References" on last page.		
H	Complete Revision. General revision to update verbiage and clarify requirements. Added "Definitions" Updated and rearranged verbiage in Sections 1.0 through 4.0. Incorporated Section 5.0 into Section 9.0. Updated verbiage in Sections 6.0 through 8.0. Expanded Section 9.0 to include info from 5.0. Updated verbiage in Sections 10.0 and 11.0. Moved Section 12.0 to Appendix A. Changed Title and updated verbiage in Section 13.0. Moved 13.4 to Appendix B. Incorporated Section 14.0 into Section 7.4. Updated verbiage in Section 15.0. Eliminated requirement for Supplier to stamp Boeing paperwork. Updated verbiage and eliminated redundancies in Section 16.0. Updated verbiage in Section 17.0. Added Appendix A (formerly Section 12.0) and Appendix B (formerly Section 13.4).	Date 10/1/01	Signature of approvals Gina Beal
J	Textual changes throughout for clarity. Corrected errant "Ref." callouts throughout document. Revised "References" list. Added PCMM usage requirements in Sect 11. Clarified CMM Volumetric Evaluation requirements in 6.4. Added Software/Version requirements in Appendix A. Revise data format requirements in Appendix B. Revised QA to Quality	Date 10/14/02	ORIGINAL SIGNED

K	Updated Title page Updated Table of Contents 1.3 Revised to process of notification. 3.0 Deleted superfluous examples. 4.0 Added "material" to types of certs 4.4 Revised retention period back to (7) years 9.5 & 9.7 Revised inspection requirement to comply with D33028 12.1 Grammatical/textual clarification 13.2 & 13.3 Textual clarification 13.4 Removed requirement for written notification of designee 13.6 Revised to current process 13.8 & 13.9 Removed "management" – not required for this level of authorization 14.3 Revised to current process Appendix A Grammatical correction References Text Clarification Updated active page record		
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Revision Letter

L

Changes in This Revision

Updated Content Owner name and org, and added Boeing trademark info
 Grammatical edits for clarification in 1.1, 2.0, 4.2
 Deleted 4.2
 Removed Volumetric Evaluation requirement from 6.4 and deleted Appendix A
 Revise Appendix B to be Appendix A
 Clarified stamp requirement in 8.0
 Replaced "Boeing Quality" with "CWI" in Section 9
 Added Delegation requirement to 11.1
 Added inspection requirement to 12.2
 Added note to 14.4

Authorization for Release

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Revision Letter
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M

Revised 11.1 by removing delegation requirement.

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Revision Letter
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N

Revised Title to current naming convention
 Revised 1.2 – Audit frequency
 Revised 7.0 – Allows use of ISO certified processors
 Revised 8.0 – Revised naming convention
 Revised 9.0 – Incorporates D32028 requirements
 Revised 11.4 – Requires Boeing Quality presence at CMS final inspection
 Revised 11.5 – Specifies Inspection Report format requirements
 Revised 12.1 – Update verbiage to clarify intent
 Revised 12.2 – Clarify rules for in-process inspection acceptance
 Revised 14.0 – Update to new Audit naming convention

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Revision Letter

P

Changes in This Revision

Revised 1.3, 1.4 – 1.3 split into two sub-paragraphs
 Revised 7.0 – Removed requirement to use D1-4426
 Revised 7.0 – Exception added for Welding
 Revised 7.0 – Added requirement to flow down Boeing specs
 Revised 9.0 – Removed superfluous language already specified in AWS specs
 Revised 11.2 – Removed exception for CMM (Coordinate Measuring Machine)
 Revised 12.1.H – Removed reference to CSN's (obsolete)

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Q

Changes in This Revision

Added QPL/QML requirements to 1.3
 Added 1.6 to address natural disasters
 Added 3.2 to add English language requirement
 Revised 7.0 to add sub-tier performance monitoring requirement
 Revised 11.1 to update DPD Approval requirement
 Added 12.4 to specify BDS TBL requirements

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R

Changes in This Revision

Deleted 11.7 (Supplier notification to Boeing for use of PCMS)
Re-numbered section 11 due to deletions
Updated 12.3 to current process
Added "Note" to 12.4 to provide info regarding forms
Re-formatted 12.4.D – bullets were not clear
Updated section 13 for clarity of intent
Deleted 13.8 (obsolete)
Deleted 13.9 – requirement covered in section 14
Updated 14.3.A to current process
Updated "References" section

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Revision Letter

S

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Revised Table of Contents
Revised 1.7 for clarity
Revised 3.2 for clarity
Added 4.4 to specify inches

Revised 12.1.A & B due to misinterpretation of intent by suppliers
 Revised 14.1 & 3 for clarity

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**Revision Letter
 Changes in This Revision**

T
 Revised Table of Contents
 Revised 1.4 & 1.5 to clarify intent
 Added Reference to 4.1
 Updated Calibration Standards in 6.1
 Revised "Exception" in 7.0 to specify when/where welding may be subcontracted
 Added verbiage in 8.0 to clarify intent
 Added reference standard to 9.0
 Deleted 11.3 and 11.6
 Moved 11.4 and 11.5 to 12.1 (D & E)
 Deleted Torque Witness requirement in 12.1 (was E)
 Reorganized 12.1.A thru I for clarity
 Revised 12.4 to clarify intent, including use of Boeing issued acceptance stamps
 Added "Manager" to 13.1 to specify responsibility

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Revision Letter **U**
Changes in This Revision
 Revised Table of Contents
 Revised Abstract to clarify intent and correct grammar
 Textual revisions made to most sections to correct grammar and clarify intent
 Deleted 1.7 (already a contract requirement)
 Revised title from Configuration to Quality in 4.0
 Revised title from Processes to Subcontracting in 7.0
 Removed Welding exception in 7.0
 Reformatted section 12.0 to combine BCA and BDS requirements

Authorization for Release

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