NMG Supplier Quality Flow Down Overview

Our Guiding Values

integrity • commitment • partnership • teamwork • innovation
respect • continuous improvement

QP-7.4.1-003

Supplier Quality and Procurement Requirements

Rev. 01/30/2026

Located on NMG website: https://www.nmgaerospace.com/supplier-portal/

and

Collins Aerospace

LS-SBU-A001-SQM LS Supplier and Product Quality Requirements

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Purpose

Defines and explains quality requirements for supplier and supplier's sub-tiers on product purchased by NMG Aerospace.

Scope

This document is invoked by direct reference on the purchase order.
-No deviation from these requirements is permitted unless specifically authorized in writing by NMG VP of Quality or NMG Director of Quality Assurance
-Supplier and processors shall comply with and flow down all applicable requirements to all sub-tier suppliers and/or processors.
-See Appendix A for Collins end user parts and Appendix B when PO specifies LS-SBU-A001-SQM LS Supplier Product Quality Requirements (02)

Acceptance Authority Media (media used to record the status of tasks/operations)

The supplier will assure that:

- Processes are accomplished prior to signing the process documentation ("stamp/sign as you go")
- Processes are performed by those that are qualified/trained
- Assure that documentation is complete and correct per industry standards
- Stamps used to approve product are appropriately controlled to prevent unintended/unapproved usage
- Staff is trained on the above criteria

Acceptance Test Reports

Acceptance Test Reports

Acceptance test reports shall be maintained per record retention requirements and provided to NMG Aerospace upon request or as specified below.

- **Special Processor:** Each shipment must include one (1) legible and reproducible copy of a certificate showing each process performed. The certificate(s) shall include the name and current revision level of the process, the specification to which it conforms, the signature and title of an authorized representative of the seller. When parts are serialized, serial numbers must appear on the certification.
- **Certification of x-ray** - All parts requiring radiographic certification will be submitted to NMG Aerospace and processed in accordance with applicable NMG Aerospace and Government specifications and standards. The x-ray film and one (1) legible and reproducible copy of the report must accompany the material. When parts are serialized, serial numbers must appear on the certification and x-ray film.
- **Raw Material Analysis**- Raw Material orders require chemical and physical analysis for all raw materials used in the manufacturing of this product. Acceptance of raw material(s) utilizing "Typical Analysis Report" will only be accepted if the report specifies the lot, batch, heat, mill, and name of the producer.
- **Synthetic Rubber Components and Raw Material** - Each package of synthetic rubber components shall be marked with date of cure, part number, quantity, compound number, and manufacturer's identification (if different from part number). Date of cure on O-rings shipped to NMG Aerospace shall not be older than is permissible under Bulletin SAE-ARP5316. Synthetic rubber raw materials shall be identified with date of cure, compound, and manufacturer's name.
- **Hazardous Material**-Certification and appropriate data sheets defining chemical composition, safety and health hazards, first-aid measures and storage requirements for materials supplied with this order shall be forwarded to the buyer at a minimum of three (3) days prior to delivery and accompany shipment. FAR 52.223-3.

Certificate of Conformance (C of C)

C of C, signed by the Supplier's authorized representative, shall accompany all materials shipped against this order. As a minimum, the certificate shall include the following:

- The NMG Aerospace Purchase Order number.
- Supplier name and address
- Ship to address
- Part number.
- Revision level
- Part Name
- Quantity
- Quantity Accepted/Rejected (Special Process Suppliers Only)
- Serial number, when applicable.
- Shelf Life, when applicable.
- Lot number, when applicable.
- A statement that certifies compliance to the drawing / specification.
- The applicable chemical / physical and/or mechanical test data is on file and available for NMC/NMG's customer review.
- **Reference any approved DMR's/Waivers/Deviations, etc. for non-conforming product.**
- Statement of Conformity
- Signature, date and title of the seller's responsible representative.

Communication

All communication regarding any Purchase Order from NMG shall flow through suppliers assigned NMG Supply Chain Representative and/or NMG Quality. At no time "unless formally instructed by NMG in advance" shall any supplier contact NMG's customer regarding any work covered by an NMG Purchase Order. If NMG's customer contacts the supplier regarding any work covered by an NMG Purchase Order, NMG shall be notified immediately. The supplier will notify NMG of any changes in management, ownership, location, MRP system or certification status. The supplier shall notify NMG prior to outsourcing of any product originally produced by the supplier. The supplier will ensure their employees are aware of their contribution to product/service conformity, product safety and the importance of ethical behavior.

Competence: Supplier employees will have the required competence and training to consistently provide quality products/services. The supplier will identify required training/competence of employees and assure requirements are met. Inspectors will be trained in metrology and GD&T as required.

First Article Inspection

First article inspection (FAI) shall be completed and maintained by the supplier per current revision of AS 9102 (see appendix C for Collins Landing Systems requirements). The supplier will notify NMG Aerospace when any changes are made that require an FAI. The supplier shall perform a full FAI or partial (Delta) for affected characteristics, when any of the following occur:

- First production runs for the NMG part (Full FAI required).
- A change in design characteristics affecting form, fit or function.
- A change in manufacturing source(s), process(es), inspection method(s), location of manufacture, tooling, or materials that can potentially affect form, fit or function. (i.e. – location of manufacture change, NMG specified sub-tier supplier change). (Delta FAI may be acceptable).
- A change in numerical control program or translation to another media that can potentially affect form, fit or function.
- A natural or man-made event, which may adversely affect the manufacture process.
- An implementation of corrective action required to complete previous FAI, as described in AS9102, section 4.4.
- A lapse in production for two years shall require an update for any characteristics that may be impacted by the inactivity. This lapse is from the completion of last production operation to the actual restart of production.

Note: NADCAP Special Processors shall be identified on Form 2 with special process and NADCAP/PRI certification number.

Foreign Object Debris/Damage

Contact NMG Aerospace if product damage or obvious non-conformances are identified upon receipt. If instructed to process, document non-conformance on the C of C. Supplier will maintain a FOD program that is compliant with NAS 412 Foreign Object Damage / Foreign Object Debris (FOD) Prevention. Process will be implemented to prevent parts from touching each other or other hard surfaces. Preventive Maintenance will be performed as planned on material handling equipment to assure continued product protection.

Identification and Traceability Product:

- Non-serialized parts must be identified with a lot/batch and or date of manufacture. The traceability number must be on the shipping paperwork and traceable back to supplier's production and product conformity.
- The supplier shall retain evidence to document that items furnished under this contract conform to contract requirements. Evidence will generally include information tracing the items back to the manufacturing source or its authorized distributor. At a minimum, evidence shall be sufficient to establish the identity of the item, its manufacturing source, and conformance to the item description. Documentation will be kept indefinitely.
- Identification must be legible after all finishes with the unaided eye.

Inspection

- Sampling permissible to ASQ H1331 Zero Acceptance Number Sampling Plans initial minimum requirements C=0, AQL 1.0.
- 100% inspection is required for all identified key characteristics until verification of acceptable Gauge Repeatability and Reproducibility and >/= 1.33 CPK capability is obtained.
- When/If a CPK of >/= 1.33 cannot be obtained, the supplier will continue with 100% inspection and create an improvement plan per AS9103.
- Critical characteristics flowed down to suppliers via NMG and/or Customer drawings. 100% inspection of critical characteristics and provision of inspection records are sent in with each shipment. Inspection records shall list individual measurement results for each critical characteristic for each part shipped. Measurements which produce a variable measurement shall include variable measurement result rather than attribute pass/fail.

Material Review Board (MRB) / Nonconforming Material Disposition Authority:

- The supplier may disposition any product where they are the design authority except the top-level part where NMG or NMG's customer requires approval.
- Supplier may disposition nonconforming material as "scrap" for supplier owned materials without NMG Aerospace approval.
- Supplier may disposition nonconforming material "rework to print" within normal process controls prior to outside processing without NMG Aerospace approval unless product is governed by Customer specifications (DOC 300, Pride Manual, etc.).
- Any nonconformance to a build to print design that cannot be eliminated and brought back into conformance to NMG Aerospace/customer design shall be presented to NMG Aerospace for approval (i.e. "use as is" or "repair") **prior to shipment**. (QFRM 8.3 – 001 Request for Deviation Waiver)
- Suppliers cannot deviate from P.O. without NMG approval. A Request for Deviation/Waiver (QFRM 8.3-001) must be submitted to NMG Engineering via the NMG Buyer within 24 hours of first awareness of a nonconforming condition.

Non-conforming Product

- Scrap dispositions apply only to supplier supplied material. When replacement of product is necessary to fulfill the deliverable quantity on lot-controlled items, such replacements shall be from the same material lot, batch or heat lot, as applicable. In the event that the scrap disposition renders the deliverable quantity short, notify NMG Aerospace buyer immediately.
- The supplier shall notify NMG Aerospace promptly (within 24 hours) of discovery of any nonconformity affecting product already delivered. Notification shall include a clear description of the discrepancy; parts affected (Serial Number, lot number or manufacturing date, as applicable), quantity, and delivery date(s). Supplier shall support NMG Aerospace with additional data and parts, if necessary, per contract, to resolve customer concerns. The Supplier will provide a timely and effective corrective action to prevent non-conformances.
- Suppliers with the poorest DPPM and escape performance or those with repeat escapes will be evaluated for potential third-party Source Inspection at the supplier's expense. If enforced, 3rd party source inspection will be added to the Supplier Improvement Plan The 3rd party source inspector will sign the supplier's C of C as evidence of the source inspection and will provide NMG source inspection results as planned. Third party source inspection can be removed after three consecutive acceptable receipts or other NMG defined criteria. Source inspection does not relieve the supplier of any responsibility and/or liability for full compliance with all contract requirements.

WAIVER FORM

SUPPLIER: A HARDCOPY OF THE APPROVED REQUEST FOR DEVIATION/ WAIVER MUST BE PLACED WITH SHIPPED PRODUCT.

NMG AEROSPACE	REQUEST FOR DEVIATION/WAIVER Check one: ☐ Supplier Requested ☐ NMG Requested	
1. NAME AND ADDRESS OF REQUESTER & CONTACT INFO:	2. ORIGINATOR	3. WAIVER/DEV # (NMG ONLY)
	4. PURCHASE ORDER NO.	5. DATE
	4a. PURCHASE ORDER LINE NO.	6. DEVIATION ☐ WAIVER ☐ AND/OR
DEVIATION = PRIOR TO MANUFACTURE	WAIVER = DURING OR AFTER MANUFACTURING	

7. DESCRIPTION OF DEVIATION AND/OR WAIVER

Engineering Drawing / Specification No.:	
Sheet – Rev. – Blueprint Zone:	
Requirement per Drawing / Specification*:	
Discrepancy / Actual*:	
List all special processes completed:	
Additional Comments:	

*If multiple discrepancies reported or multiple readings complete Multiple Discrepancies / Readings Table

8. SUGGESTED DISPOSITION and JUSTIFICATION		
9. IMPACT TO DELIVERY SCHEDULE Date schedule will be impacted:		10. PRODUCTION EFFECTIVITY (LOT, BATCH, SN, DATES)
11. QUANTITY:	12. RECURRING DEVIATION/WAIVER: YES ☐ NO ☐	13. Requestor's SIGNATURE/TITLE & DATE
14. CORRECTIVE ACTION Planned CA Impl. Date:		
Root Cause:		
Corrective Action:		

MRB DISPOSITION ONLY BELOW

MRB DISPOSITION:	
DESIGN AUTHORITY ENG APPROVAL (Repair):	DESIGN AUTHORITY QA APPROVAL (Repair):
NMG PROCESS ENG APPROVAL (Rework):	NMG PROCESS QA APPROVAL (Rework):
CUSTOMER (Repair):	CUSTOMER DEV/WAIVER # (Repair):

Part Packaging and Preservation

- Parts must be packaged, stored and shipped in a manner to prevent damage and preserves product conformity. (LGPS 1000)
- Reference ASTM-D3951-10 for :Standard Practice for Commercial Packaging”
- Reference MIL-STD-2073 (current revision) for Standard Practices for Military Packaging”
- Reference LGPS1000 Corrosion Control

Record Retention

- Must be controlled indefinitely.
- Suppliers must have process for record storage, retention and retrieval.
- Supplier shall not destroy the records without first providing NMC the opportunity to retain the records and obtaining NMG written permission for destruction.
- Cloud servers used to store records need to be ITAR compliant
- Changes to records provided by the supplier have been revised correctly (single line, initials and date, correct entry).

Right of Access

- The supplier and processor shall provide access for NMG personnel, government and civil aviation authorities, and customers to their facilities, personnel and records when requested as required for quality and management systems reviews, product / process validation evaluations, or investigations. The supplier and processor shall flow down this requirement to all of their sub-tier suppliers.

Shelf Life

- Materials or articles having definite age degradation characteristics (shelf life) shall be identified with manufacturing date, and/or cure date, shelf life, expiration date, storage condition requirements and any other data pertinent to the supplied materials or articles.
- NMG reserves the right to reject and/or return any material with less than 80% of shelf life remaining.

Superseding Requirements

- Special Processes supplied shall be produced in accordance with PO, applicable drawing and specifications. Any deviation (including the use of superseding specifications), must be authorized and approved by the Design Authority.

Special Process

Special Process certification for build-to-print parts: The below special processes shall require Nadcap accreditation. All suppliers of build-to-print parts performing these special processes (regardless of tier) shall be Nadcap accredited for each special process, unless granted a waiver or exemption by the design authority:

- Chemical Processing
  - Plating/Electro-Deposition
  - Electroless Plating
  - Anodizing
  - Wet paint Application
  - Passivation
  - Chemical Conversion Coatings
  - Dry Film Lubrication
- Coatings-effective
  - Thermal or Plasma Spray
  - Vapor Deposition of metals
- Heat Treating
  - Heat Treating
  - Annealing
  - Furnace, Vacuum, and Dip Brazing
  - Hot Isostatic Pressing (HIP)

Special Process continued:

- Materials Testing Laboratories (Accreditation by either Nadcap or by signatories to the ILAC e.g., ISO 17025 is required for materials testing laboratories) 12/7/23
  - Material Testing
  - Chemical Testing
- Non-conventional Machining and Surface Enhancement and when Special Process Provisions are indicated by Drawing or Specification
  - Electrical Discharge Machining (EDM)
  - Laser Beam Machining (LBM)
  - Shot Peening
- Non-destructive Testing
  - Radiographic Testing
  - Penetrant Inspection
  - Magnetic Particle Inspection
  - Ultrasonic testing
  - Eddy Current Testing
- Welding
  - Fusion Welding
  - Torch and Induction Brazing

Note: Special process categories are defined by Performance Review Institute (PRI). Nadcap or International Laboratory Accreditation Cooperation (ILAC). Special processes within the above categories (e.g., Chemical Processing) but not listed above are out of scope and Nadcap is not required.

Collins Aerospace

LS-SBU-A001-SQM LS Supplier and Product Quality Requirements

Purpose and Scope

- 1.1 This document defines Collins Aerospace Landing Systems (LS) quality requirements for Suppliers, sub-tier Suppliers, processors, and sub-tier processors, referenced in this document as: Supplier or Suppliers. Collins Aerospace Landing Systems, referenced in this document as: Buyer.
- Landing Systems includes; Landing Gear (LG) and Wheels and Brakes (WB).
- This document augments the requirements noted in ASQR-01 and or COL-ASQR-PRO-0003.
- 1.2 This document applies to all LS Suppliers when LS-SBU-A001-SQM is invoked by direct reference on the purchase order.
- Wheels and Brakes specific requirements herein are identified (*WB) and Landing Gear specific requirements herein are identified (*LG).
- No deviations from these requirements are permitted unless specifically authorized in writing by LS Supplier Quality Management (e.g., LS-SBU-F010-SQM, Quality Alert, ASQR-01 Form 3, Buyer's Contractual Letter or Coordination Memo).

Responsibility

- **2.1 LS Supplier Quality Management (SQM)**
- In collaboration with LS Supply Chain Management (SCM), are responsible for the management and administration of the requirements contained within this document.
- **2.2. Suppliers**
- The use of Collins Approved Special Processors or receipt of Collins approvals (e.g., FAI Approvals, Source Inspection) does not relieve the Supplier of any responsibility and / or liability for full compliance with all contract and quality requirements.
- Supplier ***shall*** submit ASQR-01 Form 3, Supplier Request for Information, to Buyer and Supplier Quality Representative when a deviation from requirements noted herein has been determined to exist.
- **Note:** ASQR-01 Form 3 is used for communication only; it is not used for disposition of product non-conformances to engineering requirements.

Material Substitutions

- 5.2.1 Material substitutions ***shall*** not be allowed unless authorized by engineering drawing / model, material specification or supersession, or LS Material Review Board (MRB) disposition. This applies to but is not limited to:
  - Material grade or stock (e.g., bar, rod, tube, extrusion, and flat)
  - Material condition (e.g., heat treat)
  - Material size (e.g., diameter, thickness)

Documented Information and Record Retention

- 5.4.1 Suppliers ***shall*** retain the documented information necessary to provide evidence of contractual conformity and the effective operation the Supplier's QMS. Methods and records ***shall*** be made available for review by Buyer's representatives, customers, and regulatory authorities.
- 5.4.2 Suppliers ***shall*** maintain manufacturing records which provide traceability to all manufacturing, processing, servicing, and inspection operations. These records ***shall*** clearly indicate material status and acceptability. Manufacturing records will be kept for the life of the program plus 10 years minimum.
- 5.4.3 The Supplier and their sub-tier Suppliers ***shall*** have a defined process for control of records to ensure identification, storage, protection, retrieval, retention, disposition, and availability of the records.

Engineering Data

- 6.2.1 Unless effectivity is specifically defined within a document's release, product shall be manufactured / processed to the latest process specification revisions and manufacturing control drawings in effect at the time of Purchase Order / Contract acceptance.
- 6.2.2 Suppliers are responsible for ensuring they have the current and or latest drawing and specification requirements per current purchase order(s) requirements.
- 6.2.3 Use of an older revision drawing, specification, or manufacturing control drawings is not acceptable unless authorized on Purchase Order.

Engineering Change Proposal Requests (ECPRs)

- 6.5.1.1 (*LG) Suppliers may request an engineering clarification by completing an Engineering Change Proposal Request (ECPR), form LS-LG-F-014-ENG. Instructions for completion and submittal of the ECPR, LSLG- W309-ENG, is available on the supplier portal.
- 6.5.1.3 An accepted submittal is not acceptance to commence manufacturing until the design authority is formally changed to reflect the request. Suppliers ***shall*** follow an approved MRB disposition (e.g., (*LG) quality notification or (*WB) Form 815) process until the design authority is formally changed.

Microsoft Word Document

ECPR Example

ENGINEERING CHANGE PROPOSAL REQUEST (ECPR)

➤➤ Incomplete forms will be returned to the originator - please ensure form is complete to avoid delays! ➤➤

➤➤ Refer to the latest release of **LS-LG-W-309-ENG** for instructions on completing this form. ➤➤

ECPR#		AIRCRAFT PROGRAM:	F16
DATE INITIATED:	30-Nov-17	**UTAS** DWG/MODEL/DOC #:	2007025-1
ORIGINATOR NAME:	Gerry Balski	DWG/MODEL/DOC #DESCRIPTION:	Rod End
ORIGINATOR EMAIL:	gbalski@nmgaerospace.com	DWG/MODEL/DOC Rev.:	E
SUPPLIER NAME:	NMG	DWG SHT / CAPTURE:	1
UTAS BUYER NAME:	Chad Riche	DWG ZONE:	C6
ECPR CLASS	Please select one	IMPACT	Please select one
REF. QN(s) or OTHER:			

NOTE: THIS DOCUMENT IS AN ENGINEERING REQUEST ONLY AND DOES NOT INDICATE APPROVAL TO A DESIGN OR PROCESS. AN ENGINEERING RESPONSE TO AN ECPR ONLY INDICATES INTENT TO CHANGE A DRAWING/DOCUMENT.

THIS DOCUMENT IS NOT TO BE USED FOR MANUFACTURING OR INSPECTION PURPOSES.

APPROVALS
See PLM System for signature authority and release status.

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ECPR Example

PROBLEM
Flag note 6 "apply detail part no. and serial no. on noted surface with pneumatic vibrating pencil" TM1040 is the process specification for identification Legibility and depth is difficult to maintain with this process
RECOMMENDATION
FROM: 3.2.2.6 Engraving 3.2.2.6.1 Engraving shall be used only when specified on the Goodrich engineering drawings. TO: Add: 3.2.2.6.1 Engraving is authorized as an acceptable alternate part marking method to Vibrating Pencil Markings.

BENEFITS	
Price Reduction (per Unit):	
Lead-time Reduction:	
Additional Comments:	

Identification: Part Marking and Serialization

- 7.2 Part Marking and Serialization:
- 7.2.1 Part marking and serialization shall be clearly identified in the supplier's control plan/manufacturing documentation for all parts.
- 7.2.1.1 All identification shall be applied prior to final inspection.
- 7.2.1.2 Suppliers shall have a process in place to ensure no duplication of serial numbers on any given part number regardless of revision or configuration changes.
- 7.2.1.3 If products are of opposite configuration, left and right-handed product, the same serial number shall not be used on both opposing hand configurations.
- 7.2.1.4 Suppliers shall maintain a serialization record for each serialized component manufactured. Identification and traceability is required for all material, per design requirements
- 7.2.1.6 When serialization is required by design requirements, applicable serial numbers ***shall*** be identified on all Supplier and Supplier's sub-tier quality, inspection, and manufacturing records (e.g., travelers and process certifications).
  - Serialization required by design requirements ***shall*** include a prefix.
  - Prefix codes will be assigned by LS SQM.
- 7.2.1.7 Suppliers of the detail items shall provide cross-reference traceability to the original forging, casting, swaging, and raw material forging serial numbers if new serial numbers are assigned.

Identification: Part Marking and Serialization

- 7.2.1.8 The Supplier ***shall*** identify the serial number of the forging used for the resultant part on the appropriate quality and shipping documents.
- 7.2.1.9 Identify product with the appropriate design activity code per the engineering drawing / model requirements.
- 7.2.1.10 The LS manufacturer's identification codes are as follows:
  - Oakville, Canada MFR02121
  - Fort Worth, Texas MFR6K4C8
  - Troy, Ohio MFR97153
- 7.2.1.11 Supplier manufacturing codes ***shall*** not be used unless specifically called out on the released engineering, drawing, and / or part marking specification.

- LGPS 1600:
- 3.2.15 A part number and inspection stamp shall be applied to each individual part. When the marking is not possible due to part size, the identification method will be called out in the drawing (i.e., bag and tag or other options).
- LGPS 1603:
- 5.1.18 A part number and inspection stamp shall be applied to each individual part.

Manufacturing Planning Documents

- 7.5.1.1. Suppliers ***shall*** generate and control manufacturing plans for all individual components and assemblies.
- 7.5.1.2. The planning ***shall*** include all engineering data references (specification, flag note, etc.) necessary to control and produce the parts and include all the machining, processing, testing, and inspection operations necessary to complete the parts to the purchase order and engineering requirements. This includes applicable satellite plans and techniques from sub-tier Suppliers and processors.
- 7.5.1.5. Supplier is responsible to review and approve all manufacturing and process plans associated with the LS purchase order, including those of its sub-tiers affiliated with LS product realization.
- 7.5.1.6. The manufacturing plan(s) ***shall*** be retained on file at the Supplier's or sub-tier's manufacturing facilities, when applicable, and ***shall*** be available upon request by LS.

Manufacturing Planning Documents

- 7.5.1.7. The plan documentation ***shall*** be available in English and include the following details,
- as a minimum:
  - Name of applicable manufacturer with facility address.
  - Full part number including dash number. When purchase orders refer to part numbers other than the design engineering part number, the planning ***shall*** clearly reference both part numbers.
  - Engineering drawing / model revision level.
  - Planning revision table including revision dates, descriptions of changes, and traceability to the individual making the change. All planning changes ***shall*** be documented, including editorial changes to correct typographical errors or minor editorial changes.
  - Raw material (including forging part number if applicable), raw material specification, raw material size, and heat treat condition.
  - All operations ***shall*** be noted in their proper manufacturing sequence, including all inspection and test points. The number of parts accepted or rejected at each completed operation. Rejected serial numbers, if serialization is a requirement, and rejection documents / reports ***shall*** be noted within the applicable operation / inspection record.
  - Part identification description including method and text.
  - Operations that are required to be performed per a particular specification ***shall*** list that specification as part of the operation description in the planning.
  - Special process operations ***shall*** list the name and location of the processor, the applicable specification(s) and revision(s), as well as the necessary certifying information (e.g., Types, Class, Method, Grade, etc.).
  - Special processes sources ***shall*** be approved on DOC 200, as well as customer approved processor listings as required. Evidence of verification and validation activities for externally provided services.

Manufacturing Planning Documents

- 7.5.1.8. Maximum section thickness at time of heat treat ***shall*** be noted.
- 7.5.1.9. All thermal processing operations ***shall*** be listed independently (e.g., embrittlement relief, stress relief, etc.) All required times, conditional delay requirements and temperatures ***shall*** be documented.
- 7.5.1.10. Nonconventional machining techniques which impart significant localized heating (e.g., EDM, ECM, plasma application, and laser use) ***shall*** only be used when authorized by engineering requirements or MRB disposition.
- 7.5.1.11. All manufacturing plans and techniques ***shall*** be reviewed by the Supplier at least every five years to ensure compliance to current engineering and specification requirements.
- Supplier ***shall*** have a process to control the frequency, documentation, and adequacy of the reviews.
- 7.5.1.12. All NDT techniques ***shall*** be approved by a recognized NDT Level III authority.
- 7.5.2.1. Manufacturing Process Sheet (MPS) requiring LS approval *shall* be submitted and approved by LS prior to start of manufacturing.

Manufacturing Planning Documents

- 7.5.2.2. Unless otherwise specified, the following specifications and part designations require MPS and processing technique submission for LS review and approval when invoked on purchase order, engineering, or contractual requirements.
  - Minimum ultimate tensile strength (UTS) 180 KSI (HRC 40) and above, except springs and bushings.
  - “Flight safety”, “Mission”, “Mission / Safety Critical”, “Safety of Flight”, or “Fracture Critical Traceable”, “Fatigue Critical”, “Maintenance Critical”, “Fracture Critical”, etc.
  - CPC6400 – UTAS (Goodrich) Shot Peen
  - D581-25629-1 – Requirements for Die Forgings and Parts Made from Die Forging – Boeing
  - D6-1276 – Boeing o Plans / techniques for D6-1276 designated parts must also comply with Collins LGPS 8002
  - D8-0965 – Control for Fabricators of Critical Parts- Boeing
  - DPS 4.804 – FABRICATION HIGH STRENGTH LOW ALLOY STEEL – Boeing Material certificates ***shall*** be provided for DPS 4.804 plans.
  - DPS 4.747 – Penetrant Inspection- Boeing
  - PS21201 Boeing document for F18 and F15 parts noted as “Maintenance Critical”, “Fracture Critical”, “Safety of Flight”, or “Fracture Critical Traceable”
  - LGPS 1301 – Application of HVOF Thermal Coatings – Collins
  - LGPS 7000 – Collins Grinding of Bare, High Strength, Low Alloy Steel
  - LGPS 7010 – Grinding and Finishing of HVOF Thermal Spray Coatings on High Strength Steel- Collins
  - LGPS 8000 – Fabrication of Designated Parts – Collins
  - LGPS 8002 – Delegated Approval Supplier Specification – Collins
  - Welding

Manufacturing Planning Documents

- 7.5.2.3. Where any of the following special processes are used in planning that is required to be submitted to LS for review (see above), processing techniques ***shall*** be submitted as a portion of the manufacturing planning submittal:
  - Chrome grind
  - Heat treat, including straightening (if applicable)
  - HVOF
  - HVOF grind
  - Belt grind (Chrome / HVOF)
  - Shot peen
  - Welding
- 7.5.3.7. Manufacturing plans submitted for LS review and approval ***shall*** be complete and officially 'released' by the Supplier and consistent with the requirements of Manufacturing planning documents herein. Any subsequent changes (including, but not limited to the addition, removal, or modification of notes, operations, processing parameters, sequencing, etc.) require the Supplier to roll-up the revision level and document these changes within the revision table. This requirement is applicable to all controlled process instructions.
- 7.5.3.8. Planning ***shall*** be revised as applicable, and revisions documented until fully approved by LS.
- 7.5.4.2. The Supplier ***shall*** retain evidence of planning approval status for all past and current revisions.
- 7.5.4.3. Once planning is approved by LS it ***shall*** be considered frozen. Any changes to approved planning ***shall*** be resubmitted for review and approval.
- 7.5.4.4. All changes to planning, including editorial changes, ***shall*** be documented in a revision table as defined herein.

Manufacturing Planning Documents

- 7.5.4.5. ALLOWED CHANGES (unless controlled by specification or Customer):
- The following are allowed changes to an approved MPS and do not require Landing Systems M&PT and QA approval:
  - Editorial changes
  - Clarification of existing instructions
  - Documentation of changes to drawing revision level for parts
  - Typographical errors
  - Unplanned rework which meets all the following:
    - Rework not in violation of any specific provisions of the manufacturing plan
    - Is in accordance with the applicable process specification
    - Does not result in any change to sequence of special processes
    - Does not adversely affect the final product quality and integrity
  - Rerouting (offloading, sub-contracting) activity that does not involve the following:
    - Heat treatment / Stress relieving
    - Shot or glass bead peening
    - NDI, including magnetic particle inspection, ultrasonic inspection, and x-ray inspection, proof load testing
    - Plating processes
    - Thermal spray coatings
    - Welding
    - Grinding of Chromium plating
    - Grinding and superfinishing of HVOF coatings

Suppliers use of Approved Processors

- 7.7.4.1. Supplier's utilization of Collins LS approved or Nadcap accredited sources does not relieve the Supplier from the obligations to ensure subcontracted sources are in full compliance with applicable process specifications and to deliver conforming items.
- 7.7.4.2. When product is required to be processed to a LS customer-controlled specification (e.g., Boeing BACxxxx, DPSx.xx, PSxxxxx, Lockheed 5PTPxxx, etc.), the selected process source ***shall*** be approved on the LS customer's Approved Supplier List (e.g., Boeing D1-4426, Lockheed QCS-001, etc.) and within LS DOC 200 for the following:
  - Aerospace accredited quality system (AS9100, AC 7004)
  - Equivalent / comparable industry special process specification relative to the LS customer's specification(s).

- 7.7.4.3. The Supplier's purchase order ***shall*** flow down to the processor the information to meet all applicable contractual, engineering, specification, and customer requirements.
- At a minimum, the purchase order ***shall*** clearly specify the following:
  - Full scope of processing to be performed
  - MRB actions required
  - Applicable specification number(s), revision(s), addendum(s) or modifications
  - Part numbers, quantity, serial numbers (if applicable)
  - Applicable program, prime customer
  - Identify LS as the Supplier's direct customer

Special Inspection Requirements / Techniques

- 7.8.1.3. Maximum Material functional acceptance to a GO thread gage per ANSI / ASME B1.3, Column A1, Row 1.1, of Table 1 or Table 2 as applicable. Use a thread plug gage per ANSI / ASME B1.2 section 4.1 for internal threads. Use a thread ring gage per section 5.1 for external threads. Suppliers ***shall*** procure and maintain calibrated gages for functional product verification before and after any plating. After plate gauges ***shall*** be used for final product acceptance as applicable to design requirements.

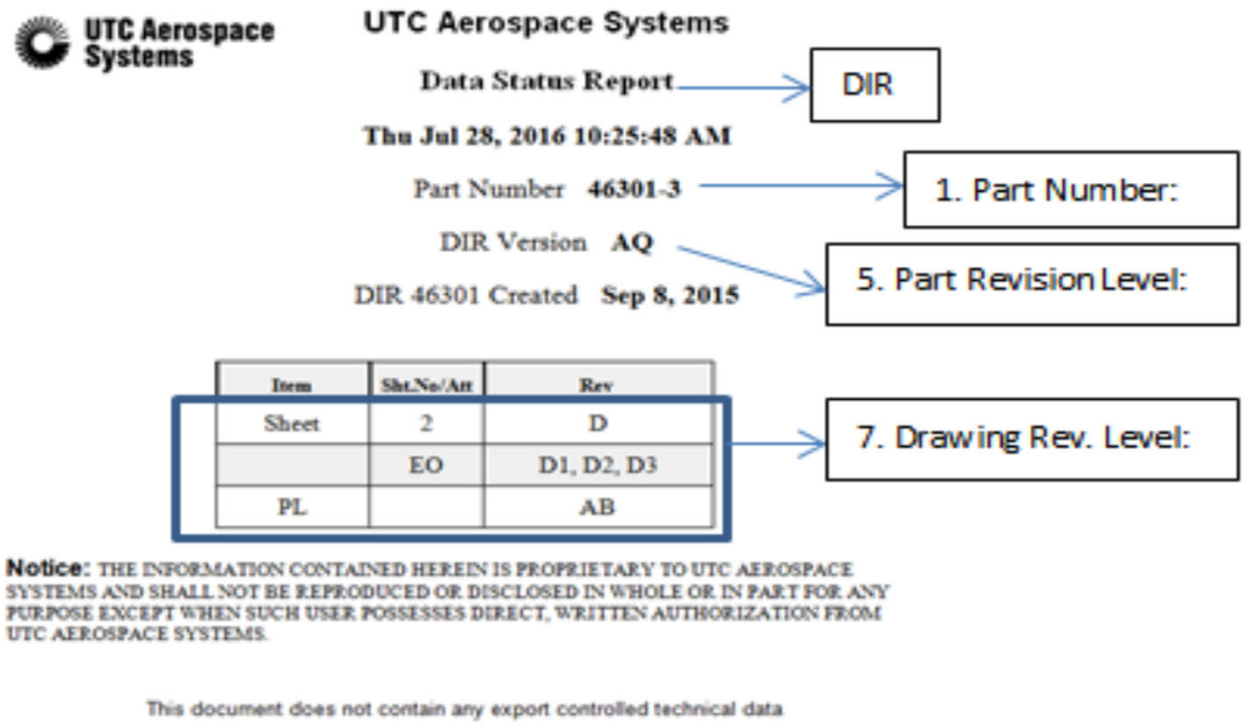
First Article

- **Open LS-SBU-A001-SQM section 7.10 page 22**

First Article

- **Form 1, Block 5**: Part Revision Level: For COLLINS part if the DIR is flown down by PO, COLLINS DIR revision should be provided. Please see below for DIR example fig 1.

Figure 1



First Article

- **Form 1, Block 5**: Part Revision Level: Enter the revision as stated on the purchase order line item. When applicable, use the DIR revision(s) for lower-level part numbers (*LG).
- **Form 1, Block 7**: Drawing Revision Level: Complete breakdown of all associated engineering documents (such as PL, NL, PSDL, MPL EO, NIEOs, etc.) as defined in DIR revision block shown in fig 1.
- **Form 1, Block 8**: Additional Changes: Enter reference number(s) of any changes that are incorporated into the product as supplement or exclusion from mandatory drawing requirements. Dispositioned QN and/ or approved ECPR (for clarification purpose only).
- **Form 1, Block 14**: Full FAI or Partial FAI: For a full FAI state reason. For a partial FAI, provide the baseline part number including revision level to which a previous FAI was performed. Include the reason for the partial (e.g., released engineering, changes in process, changes in manufacturing, etc.).
- **Form 1, Blocks 15-18:** If a Detail FAI, unless using a casting or forging, enter "N/A" in all fields. Castings and Forgings are considered detail parts to the next level machining and shall be listed as details. ***Note: **Castings and Forgings MUST have evidence of both a Collins LS approved dimensional and metallurgical FAIR Form 1. If Casting or Forging has been supplied by NMG or Collins LS – supplier to request and NMG to supply evidence of approved FAI. If serialized, cross reference to machine serial number must be maintained and provided upon request.**
- **Form 1, Blocks 20-23:** Must be signed and dated. Signature in Field 20 SHALL NOT be the same as in Field 22. Electronic identification is acceptable.
- **Form 1, Block 26:** Enter comments if needed or N/A

First Article

- **Form 2, Block 5**: Material or Process Name: Enter drawing note, flag note number, name of materials (e.g., raw materials, paint, primer adhesives, weld filler) or special processes. If processes are performed multiple times (e.g., 2x MPI), each occurrence ***shall*** be listed in separate rows with all information included. When multiple items appear in the same note they must be separated out.
- **Form 2, Block 6**: Enter raw material or special process specification number and the revision. If listed in the engineering note, also include the applicable type, class, grade, etc. If process specification is cancelled or superseded list superseded specification (AMS-S-13165 S/S by AMS 2430U).
- **Form 2, Block 8**: Enter complete and full supplier name and address to include zip code. For Collins LS defined special processes, enter the Collins LS assigned Processor Number as found in Collins LS Doc 200 (326 – Embee ------).
- **Form 2, Block 9**: Field should only be “Yes”, “No”, “N/A” – No other information to be entered into this field.
- **Form 2, Block 10**: Enter material heat/lot, lab test report or process certification number

First Article

- **Form 3, Block 5**: Each design characteristic shall have a unique identifier. If note has multiple design characteristics, each characteristic within the note shall have a unique identifier assigned. A copy of ballooned sections of applicable specifications ***shall*** also be included.
- **Form 3, Block 6**: Reference Location: (e.g., drawing/specification page number and location of feature, e.g., E4-2 for Zone E4 on Sheet 2, DPD model location). If a drawing or specification does not include zone locations, enter the page number.
- **Form 3, Block 7**: Characteristic Designator: Enter the characteristic classification(e.g., key, flight safety, critical, major, minor, etc.). **Enter minor if not classified**.
- **Form 3, Block 8**: Enter the complete drawing characteristics, features, notes, symbols, and specifications EXACTLY as they are stated. All notes and flag notes are to include the note number and complete text, including flag notes ballooned on the drawing(s). Drawing default notes are also to be included.
- **Form 3, Block 9**: List measurement obtained. For general notes the statement “Not Reportable” or “Noted” shall be used.
- **Form 3, Block 10**: Designed Tooling: Enter specially designed tooling, including CNC programming or any other COLLINS approved special tooling as a means of inspection, making sure this tooling is traceable to a controlling number and itis under calibration control. If no special tooling is required, then enter N/A.

First Article

- **Form 3, Block 11**: Non-Conformance Number: Record any non-conformance control document number for any characteristic outside of the tolerance or requirement (e.g., QN). If there is no non-conforming features enter N/A.
- **Form 3, Block 12**: Describe the inspection equipment (caliper, micrometer, scale, etc.) and the traceability identification (MIC #123, Caliper # 456, Scale #789, etc.) for the inspection equipment used for the product acceptance. For requirements with no measurable characteristics which list a specification (e.g., Part mark per LGPS 1600), enter the specification number. For requirements met by means of certification, enter the certification number. For informational drawing notes with no measurable characteristics, enter "Information" and/or "Visual", as applicable. Also, enter the identification (initials, stamp, etc.) of each inspector responsible for each result recorded in Field 9.

Attachments / Objective Evidence

Attachments / Objective Evidence		
[R]	Collins PO [R]	Collins LS purchase order – minimum page 1 & page(s) showing line item and revision.
[CR]	DIR (*LG) [CR]	DIR(s) applicable at time of PO acceptance. Assembly DIR(s) ***shall*** show all lower-level DIRs.
[CR]	Customer Engineering [CR]	Ballooned engineering – drawing(s), parts list(s), model(s), control drawing(s), specifications, etc.
[CR]	Supplier Engineering [CR]	Source control or proprietary engineering and evidence of approval or review from Collins LS.
[CR]	MPS Memo(s) (*LG) [CR]	MPS approval memos approved by Collins
[CR]	Test Procedure(s) [CR]	Copy of Acceptance Test Plans / Procedure(s) approved by Collins LS.
	Material [CR]	Material certs for all raw material(s).
	Hardware [CR]	C of C for all fasteners and standard hardware (COTS).
	Processes [CR]	C of C for all special processes with revision(s) used.
	Sealants [CR]	C of C for all sealant, grease, torque seal, etc.
	Finishes [CR]	Material certs from manufacture(s) of all primer, paint, finishes, etc.
	Finish Application [CR]	C of C for application of primer, paint, finishes, etc.
	BAC 5008 [CR]	C of C for BAC 5008 approved fluids / coolants used.
	Test Report(s) [CR]	Copy of completed and accepted Acceptance Test Report(s).
	Stress Memo(s) (*LG) [CR]	Copy of stress engineering memo(s) approved by Collins LS.
	QNs / MRBs [CR]	Any / all QNs / MRBs associated with FAI part.
	ECPR(s) (*LG) [CR]	Any / all ECPRs associated with FAI part.
	Product Photos [R]	Color photo(s) of overall part showing all sides / views.
	Part Marking [R]	Color photo(s) of all part identification, including serial number.
	Metallurgical Reports [CR]	Results of all metallurgical and quality evaluations for Forgings, Castings and Swagings.
	Qualification Testing [CR]	Evidence of Collins LS Engineering approved qualification test plan(s).

Nonconforming Product

- 7.11.1 Suppliers ***shall*** not ship nonconforming material unless authorized in writing by MRB disposition.
- 7.11.3 For a discrepancy discovered that may be reworked into a conforming condition **prior to subsequent processing**, the supplier's standard internal rework process shall be followed. Rework records shall be maintained as per the Records of Manufacturing
- 7.11.3.1. Unless specifically authorized by the engineering drawing / specifications or LS MRB disposition, welding on any LS assemblies or machined / formed detail components for the purpose of repair is prohibited**.**
- 7.11.4 For a discrepancy discovered within a special process, the guiding specification for that specific special process may provide rework guidelines. If guidance is not provided in the specification, LS must approve any rework through the MRB process.
- 7.11.5 The use of special processes not specified on the applicable engineering drawings is not permitted unless authorized by LS.
- 7.12.2.1 Suppliers shall document the discrepancy on a LS Quality notification(QN) form (LG DIV SQA FORM 2963)
- 7.12.2.3 Once disposition is obtained from LS MRB each element of the disposition shall be stamped off and dated as evidence of completion.
- 7.12.2.5 If any special processes are used in conjunction with the MRB decision, the Supplier ***shall*** list the processor used, specification performed, the certification number, and date.
- Note - **Dispositioned QN's shall be treated as a repair router and follow the part(s) through the entire repair process, stamped and dated as the operations are in fact completed**.

Disclosures / Notice of Escape (NOE)

- 10.1.1 Suppliers ***shall*** provide written notification to LS within 24 hours when a nonconformance is determined to exist, or is suspected to exist, on product already delivered to LS or LS customers.
- 10.1.2 Suppliers ***shall*** use the Notice of Escape AS9131 form

QUALITY NOTIFICATIONS

QN, VENDOR MATERIAL REVIEW REQUEST, (V1): 297281
FORM NO. F-2972
GOODRICH LANDING GEAR - OAKVILLE OE

Date: 04/15/2020 Page: 1

SUPPLIER CODE 109915	SUPPLIER NAME NMG AEROSPACE	PO NUMBER/ITEM /	
SUPPLIER ADDRESS 4880 HUDSON DR,STOW,OH,44224-1799,USA			
SUPPLIER PHONE 3306886494	SUPPLIER FAX 18882356006	FINAL ACCEPT STAMP / DATE NMC 49 - 6/8/20.	
VMRR QTY 2.000	MATERIAL # 46570-5		
MATERIAL DESCRIPTION PISTON - RETRACT ACTUATOR			

WORK CENTER VENDOR V1 Work Centre Default	PROJECT	RESPONSIBILITY Validated Vendor	CREATE DATE 04/13/2020
MRB ENG PETER ISSARIOTIS	DATE 04/15/2020	MRB QA	DATE 00/00/0000
STRESS ENG	DATE 00/00/0000	CUSTOMER	DATE 00/00/0000

ATTACHMENTS? No	INITIATOR	COORDINATOR	WBS ELEMENT	FAX RESPONSE TO:
REF. NOTIFICATION	REFERENCE # DMR 26999 & 27006	INSP. LOT # 000000000000	SERIAL # See below	BATCH #
CUSTOMER SIGNATURE				DATE

STATUS: OSNO Outstanding notification
NOTE Notification (external)
OSTS Outstanding task(s) exist(s)
PEND Pending Review
REL Released for processing

Assigned Serial Numbers:
NMC1337 | NMC1343

NOTES:
* 04/13/2020 11:30:06 PST Jobin John (8353307)
* Program/Project Name DHC-8/-400
* Engineering Drawing number or offload operation part number 46570
* Engineering Drawing Revision Level or offload operation revision A
* Serial Number(s) of Nonconforming Part Number NMC1337 <(>&<)> NMC1343
* Previous Quality Notification(s) or Previous Rejections for this Part/Serial Number NO

NUMBER OF ITEMS: 1

QUALITY NOTIFICATIONS

QN, VENDOR MATERIAL REVIEW REQUEST, (V1): 297281
FORM NO. F-2972
GOODRICH LANDING GEAR - OAKVILLE OE

Date: 04/15/2020 Page: 2

ITEM: 0001 DEFECT: DCERI-DA DA02 Tooling type damage (gouges) ZONE: SLT
DEFECT CLASS: None REFERENCE DESIGNATOR:
SPECIFICATION: DEFECT LOCATION: COL-MECH 2410
MATERIAL # 46570-5 DESCRIPTION: PISTON - RETRACT ACTUATOR

ASSIGNED OBJECTS:

SERIAL NO.	BATCH	ORDER	EXT. SERIAL NO.	OPERATION
NMC1337				
NMC1343				

STATEMENT OF CONDITION:
DEFECT QTY: 1
* 04/13/2020 11:30:40 PST Jobin John (8353307)
* Non-conforming Part Number(detail) including configuration (-#),,46570-5
* Part Description of rejected detail Part Number,,PISTON RETRACT ACTUATOR ASSEMBLY, MLG
* Serial Number(s) of Nonconforming Part Number,,NMC1337 & NMC1343
*
* Engineering Drawing number or offload operation part number,,46570
* Sheet #; Rev (#/L), Zone#, Capture (3D - Model) or offload operation number and Rev,,SHEET 2 - REV. A - ZONE B-6
*
* Attachment(s),,YES
*
* Requirement Per Drawing and/or Offload operation:,,DIAMETER 2.369/2.371 32Ra
*
* Discrepancy Per Drawing and/or Offload operation:,,"NMC1337 HAS A SCRATCH APPROXIMATELY .003 DEEP BY .375 LONG BY .003 WIDE
/ NMC1343 HAS SEVERAL SCRATCHES, LARGEST SCRATCH IS APPROXIMATLEY .002 DEEP BY .100 LONG BY .002 WIDE; TWO (2) LOCATIONS APPROXIMATELY 150 DEGREES APART FROM ONE ANOTHER (PHOTO ATTACHED)
/ BASE MATERIAL OR OTHER COATINGS ARE AFFECTED."
*
* Quantity Discrepant:,,2
* List the last three operations completed: (give names),,MAGNETIC PARTICLE INSPECTION, CHROME GRIND, CHROME PLATE
* Is Heat Treat completed for Part Number listed,,YES
*

CAUSE CODE CAUSCODZ231
DESCRIPTION: SUPPLIER ERROR
SHORT/LONG TEXT: SLT
* 04/13/2020 11:31:39 PST Jobin John (8353307)
* WORKING WITH PLATING PERCEPTIONS TO DETERMINE
*

ITEM DISPOSITION	AUTHORIZATION	APPROVAL	STATUS	CLOSE DATE	SHORT TEXT
COORDINATION REQUIRED	PETER ISSARIOTIS		OPEN	04/15/2020	MRB QA

* 04/13/2020 12:23:31 PST A. Sinclair (907005081) Phone 905 825 1515 X3295
*
* FOR DEFECT ITEM 0001.
*
* ENGINEERING NOTES THE FOLLOWING,
* A) REPORTED CONDITION AFFECTS TWO (2) PISTON RETRACT ACTUATOR
* ASSY, MLG, P# 46570-5, S#s NMC1337 AND NMC1343.
*
* B) PARTS ARE REPORTED TO HAVE COMPLETED MPI, CHROME GRIND

QUALITY NOTIFICATIONS

QN, VENDOR MATERIAL REVIEW REQUEST, (V1): 297281
FORM NO. F-2972
GOODRICH LANDING GEAR - OAKVILLE OE

Date: 04/15/2020 Page: 3

* AND CHROME PLATE.
*
*
* REWORK AS FOLLOWS,
*
* 1. SET UP AS REQD AND LOCALLY BLEND/POLISH REPORTED LOCN(S)
* PER LGPS7000 TO REMOVE EVIDENCE OF REPORTED DEFECTS
* AND ACHIEVE SMOOTH TRASNISTION(S), WHILE MAINTAINING DRW
* DIM AND SURFACE FINISH REQTS.
* - MIN MATL REMOVAL, DO NOT DEEPEN.
* (REF DRW DIA 2.369 - 2.371, 32RA)
*
*
* 2. INSPECT - ENSURE ALL EVIDENCE OF REPORTED DEFECTS HAS BEEN
* REMOVED AND DRW DIM REQTS HAVE BEEN ACHIEVED, WITH A
* SMOOTH TRANSITION(S).
* (REF DRW DIA 2.369 - 2.371, 32RA)
*
*
* 3. MASK AS REQD AND LOCALLY LIQUID PENETRANT INSPECT REWORK
* LOCN IN LIEU OF MAGNETIC PARTICLE INSPECT PER ASTM E1444.
* - DEFECTS NOT TO EXCEED MIL-STD-1907 GRADE A LIMITS.
*
*
* 4. INSPECT -
* 4.1 - ENSURE ALL EVIDENCE OF REPORTED DAMAGE HAS BEEN REMOVED
* WHILE MAINTAINING ALL DRW DIM AND SURFACE FINISH REQTS.
* (REF DRW DIA 2.369 - 2.371, 32RA)
*
*
* 5. COMPLETE PARTS PER DRW AND APPROVED MANUFACTURE PLAN
* REQTS.
*
*
*
*
* 04/15/2020 12:58:44 PST PETER ISSARIOTIS (0040558)
QA MRB Concurs

NMC 49 - 5/29/20 - NMC.

NMC 103 6/2/20

NMC 49 - 6/5/20 - Element Mat. #20-304321-PT.

NMC 49 - 6/8/20 - Conforms.

NMC 49 - 6/8/20.

PLANNING/IP REVISED

EXPORT CONTROL

Note: Ensure this QN is export classified as required and appropriate jurisdiction and classification markings are applied prior to transfer.

Questions