



# MFC Supplier First Article Inspection Guidebook 2024 Edition

# APPLICABILITY

This document applies to Lockheed Martin Missiles and Fire Control (LMMFC) procured material.

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# INTRODUCTION

## Purpose

This guidebook provides best practices on how to identify, plan for and satisfy Lockheed Martin Missiles and Fire Control (LMMFC) specific requirements for completing a compliant First Article Inspection (FAI). It is based on the latest revision of AS9102, Lockheed Martin Purchase Order (PO) Text Notes: MFC-IN-003, MFC-IN-004, MFC-IN-021, and MFC-IN-022, Legacy Purchase Order (PO) Text Notes: TCR823, TCR848, and 1818, and overall LMMFC expectations.

This guidebook is a reference only resource and is not a contractually binding document.

A FAI is performed to provide objective evidence that:

- All engineering, design, contractual and specification requirements are correctly understood, accounted for, verified and recorded.
- Materials, tooling, processes, documentation and personnel are capable of consistently producing compliant hardware.
- Part/assembly is 100% compliant, defined, base-lined and repeatable.

This document applies when MFC-IN-003, MFC-IN-004, MFC-IN-021, or MFC-IN-022; or Legacy TCR823, TCR848, or 1818 is required by the Purchase Order or any reference documents (such as a Statement of Work) and applies to all sub-tiers who produce design characteristics and/or sub-assemblies and detail parts including but not limited to casting, forgings, and modifications to Commercial-Off-the-Shelf (COTS) items.

## Benefit

The benefit acquired from this guidebook will result in improved 1st pass yield of first article document reviews in association with continuous deliveries of compliant material that enhance a supplier's reputation.

## Target Audience

The guidebook is addressed to MFC Suppliers - External Teammates such as: Supplier Quality managers, Quality Engineers, and Manufacturing Engineers.

## REFERENCES

### Reference Documents

- International Aerospace Standard 9102 Latest Released Revision
- LMMFC PO Requirement MFC-IN-003, MFC-IN-004, MFC-IN-021, or MFC-IN-022
- LMMFC Legacy PO Requirement TCR823, TCR848 or 1818

### Forms

Description AS9102 Forms or Equivalent Forms:

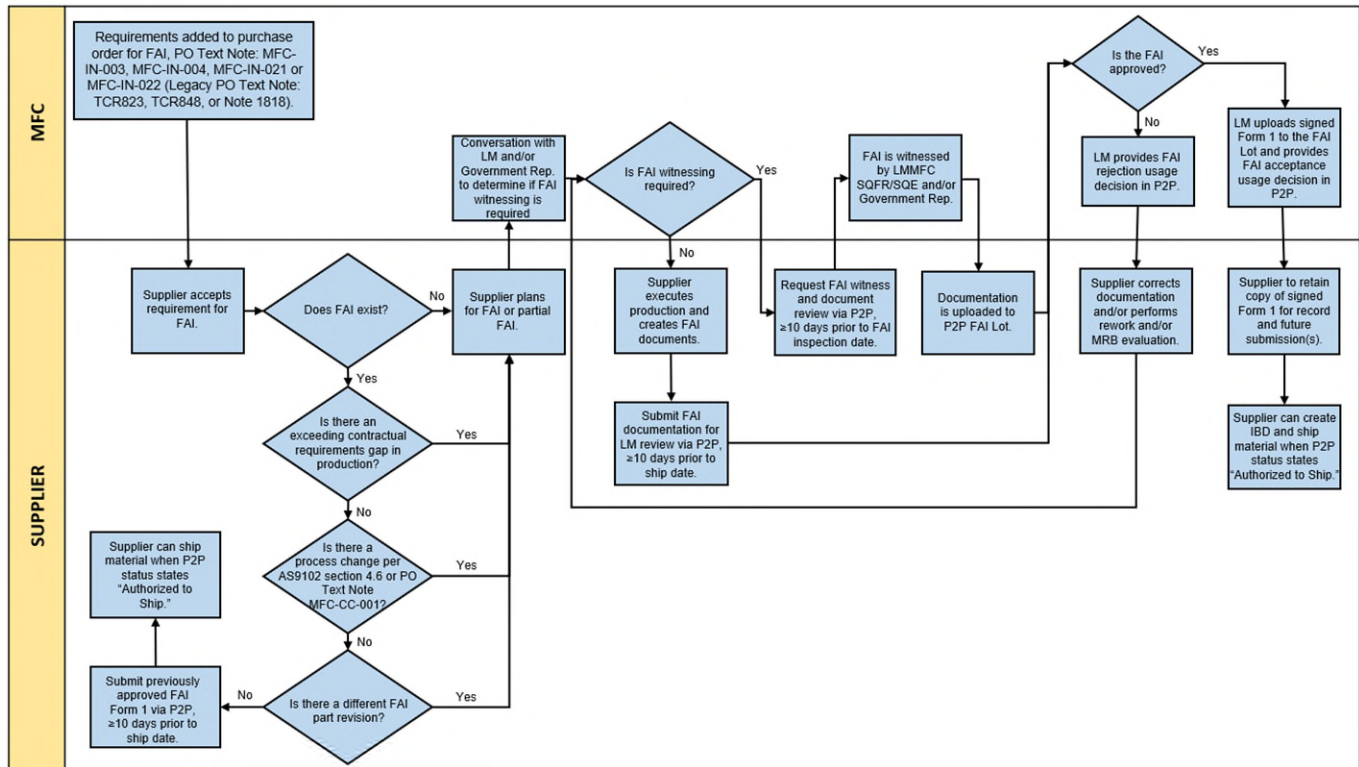
- **AS9102 Form 1: PART NUMBER ACCOUNTABILITY**
  - This form is used to identify the product that is having the First Article Inspection (FAI) conducted on (e.g., detail part, subassembly, assembly) referred to as “FAI part.”
- **AS9102 Form 2: PRODUCT ACCOUNTABILITY - MATERIALS, SPECIAL PROCESSES, AND FUNCTIONAL TESTING**
  - This form is used if any materials, special processes, or functional testing is defined as a design characteristic.
- **AS9102 Form 3: CHARACTERISTIC ACCOUNTABILITY, VERIFICATION and COMPATIBILITY EVALUATION**
  - This form is used to record inspection results for the design characteristics and to document any applicable non-conformances.

### Online Resources:

- LM P2P Quick Reference Guide for Suppliers: [Ship to LMC](#)
- LM P2P Help Videos: [LM P2P Videos](#)
- AS9102 FAQ: [9102 First Article Inspection Requirement – IAQG](#)
- [MFC Procurement Website](#): Hosts templates, forms, and resources
- [eAuditNet](#)
- IPC Validation Services: <https://www.ipc.org/standards/ipc-validation-services>
- Exostar: <http://portal.exostar.com>
- International Aerospace Quality Group: <http://www.sae.org/aaqg/publications/>

# REQUIREMENTS.

## The LMMFC First Article Process



### Purchase Order FAI Requirement

MFC-IN-003, MFC-IN-004, MFC-IN-021, or MFC-IN-022 (Legacy TCR823, TCR848 or 1818): A FAI should be conducted by the seller and the documented results are to be accepted by a LMMFC supplier quality representative prior to any material shipment per the applicable PO Text Note, when levied on the purchase order contract. First Article Inspection is a LMMFC requirement that conforms to AS9102.

- FAI should be performed when a break in production exceeds time specified in contractual requirements per the applicable PO Text Note.
  - Production is defined as an active manufacturing process that changes the state of raw material, or components, or the assembly of components (Date of Work commencement).
  - Activities such as ordering material and issuing travelers DO NOT constitute production.
  - All other change requirements per AS9102 section 4.6 and MFC-CC-001 apply. Questions regarding FAI requirements should be directed to the buyer/procurement representative.

Program(s) may have requirement to conduct on-site FAI witnessing at supplier's facility.

- In accordance with MFC-IN-003, MFC-IN-004, MFC-IN-021, and MFC-IN-022 a request to conduct New or Partial/Delta First Article Inspection must be received at least 10 working days in advance of the planned inspection to allow for Buyer's participation if required.



- In cases where "FAI Required" is displayed within the Exostar Ship to Module, and the supplier is submitting a previously approved FAI Form 1, the supplier should request FAI Review no less than 10 days and no more than 120 days prior to the PO delivery date for each line item.
- Legacy PO Note 1818 requires 10 days advance notice prior to FAI witnessing.
- Legacy PO Note TCR823/TCR848 requires 5 days advance notice prior to the desired shipment date.

## FAI Planning

The following items are to be taken into consideration prior to manufacturing compliant hardware and completing a FAI:

### *Pre-Planning Activities:*

- Ensure that the process, planning and tooling that will produce the part being presented is one that is repeatable enough to consistently yield compliant hardware.
- Ensure that the Engineering package utilized is "Released," and the revision is per the Purchase Order requirement.
- Hardware utilized for a FAI should be part of the first production run and may be part of the first lot of deliverable units. This FAI part should not be a qualification unit since ordinarily qualification is completed prior to FAI.
- Ensure all parts and materials included on Parts List are part of the FAI package and include a Certificate of Conformance for each.
- Verify 100% of drawing characteristics, notes, embedded specifications and subassemblies are achievable and supported with objective evidence. Ensure all process measurements are accounted for and verified prior to final assembly.
- Identify special processes for Lockheed Martin approved Special Processors in accordance with Purchase Order requirements. For LM unique special processes, such as, welding, brazing, or additive manufacturing requirements, that include industry specifications for which Nadcap or IPC does not provide accreditation, Exostar must be used to view current approvals. For Nadcap special processes accepted by Lockheed Martin, verify that the vendor is accredited and current for the special process(es) specified by using eAuditNet. For IPC special processes accepted by Lockheed Martin, verify that the vendor is accredited and current for the special process(es) specified by using [eAuditNet](https://www.ipc.org/standards/ipc-validation-services) or <https://www.ipc.org/standards/ipc-validation-services>.
- Ensure applicable FAI requirements are flowed down to sub-tiers and reviewed for compliance upon completion.
- Ensure controls and documented processes are in place to fulfill drawing requirements such as:
  - Quality Management Systems
  - Documented Production Processes
  - Qualification
  - Testing
  - Counterfeit Part Prevention
  - Inspection and acceptance tooling
  - Sub-tier Management
  - Appropriate training of all personnel
  - Approved Acceptance Test Procedure (ATP)/Verification Test Procedure (VTP)

- Ensure production baseline process controls are in place to achieve and maintain compliance to PO process change control requirements as defined by Purchase Order Text Note MFC-CC-001 – Supplier Process Change Control.
  - MFC-CC-001: Supplier or contractor is to notify LMMFC of any changes to “material change” (any alteration to the design, technical specifications, materials, component sourcing, production process, facilities or location) whether instigated by seller or its sub-tier suppliers per the applicable PO Text Note, when levied on the purchase order contract.
- Purchase Order Text Note MFC-SS-004 Purchase Order Review: The seller should request Purchase Order Review upon receipt of the PO or prior to commencing performance and/or fabrication of the product under the PO per the applicable PO Text Note, when levied on the purchase order contract.
- Purchase Order Text Note MFC-SS-005 Source Inspection: Buyer reserves the right to perform in-process inspection, in-process surveillance and/or audits at any time during the life of the PO.

### **Equipment**

- Have appropriate measurement equipment/methodology listed for each characteristic. Ensure all equipment is calibrated.
- Ensure equipment accuracy and ensure it is capable of performing the measurement. Supplier should always consider measurement system analysis studies for close tolerances such as Gage R&R.

### **Electronic Media Software**

- Ensure use of LMMFC supplied models (this should be the latest approved model, revision, and version provided in accordance with the Purchase Order), software, etc.
- Referenced model is not to be used for manufacturing or acceptance.
- Software/Firmware – If applicable, the PO lists the Statement of Work (SOW), which contains the FAI software/firmware requirements. The SOW provides detailed instructions on the process and methods that are to be used when conducting a FAI for software/firmware requirements. Software/firmware revisions must comply with appropriate forms and specifications.
- Include document required Model/Software/Gerber file revision in Form 2 (Product Accountability – Materials, Special Processes and Functional Testing).

### **FAI Submittal**

#### **In accordance with MFC-IN-003, MFC-IN-004, MFC-IN-021, or MFC-IN-022 First Article Inspection:**

- FAI items that do not require source inspection require documentation be provided to Lockheed Martin per MFC-IN-003, MFC-IN-004, MFC-IN-021, or MFC-IN-022 no less than 10 working days prior to the planned inspection date.
- Questions regarding FAI submittals should be directed to the Buyer's procurement representative listed on the Purchase Order.



- The FAI report is to be reviewed and approved by a LMMFC supplier quality representative prior to any material shipment per the applicable PO Text Note, when levied on the purchase order contract. Permission to ship comes after the FAI has been reviewed and approved by a supplier quality team member, and supplier has received authorization via P2P Ship-To module.
- For parts that require FAI and Source Inspection, requests must be made no less than 10 working days prior to the planned inspection date. Scheduling will accommodate any in process inspections identified during PO review. Requests are made by accessing your Exostar account at <http://portal.exostar.com>.

## Partial FAI

The FAI requirement, once invoked, will continue to apply even after initial compliance.

The FAI requirements may be satisfied by a partial FAI that addresses differences between the current configuration and prior approved configurations. When a partial FAI is performed, the organization is to complete only the affected fields in the FAI forms. FAI requirements may also be satisfied by previously approved FAI(s) performed on identical characteristics of similar parts produced by identical means. When FAI requirements (partial or complete) are satisfied in this manner, identify the approved configuration in the index of part numbers on Form 1.

### A Partial FAI is required when:

**NOTE: An asterisk (\*) before the item indicates an LMMFC requirement in addition to the AS9102 forms.**

- A change in design potentially affects form, fit or function.
- A change in manufacturing source, process, inspection method, location of manufacturer, tooling, or material potentially affects form, fit or function.
- \*For LMMFC designed products, a change in design (including Software/Firmware), technical specifications, component sourcing, manufacturing source(s), process(es), inspection method(s), tooling, material, facilities or location (from original manufacturing location).
- A change to numerical control program(s) or translation to another media potentially affects form, fit or function.
- A natural or man-made event which may adversely affect the manufacturing process.
- An implementation of a corrective action required to complete a previous FAI.

## FIRST ARTICLE INSPECTION EXAMPLE

### Ballooning an Engineering Drawing

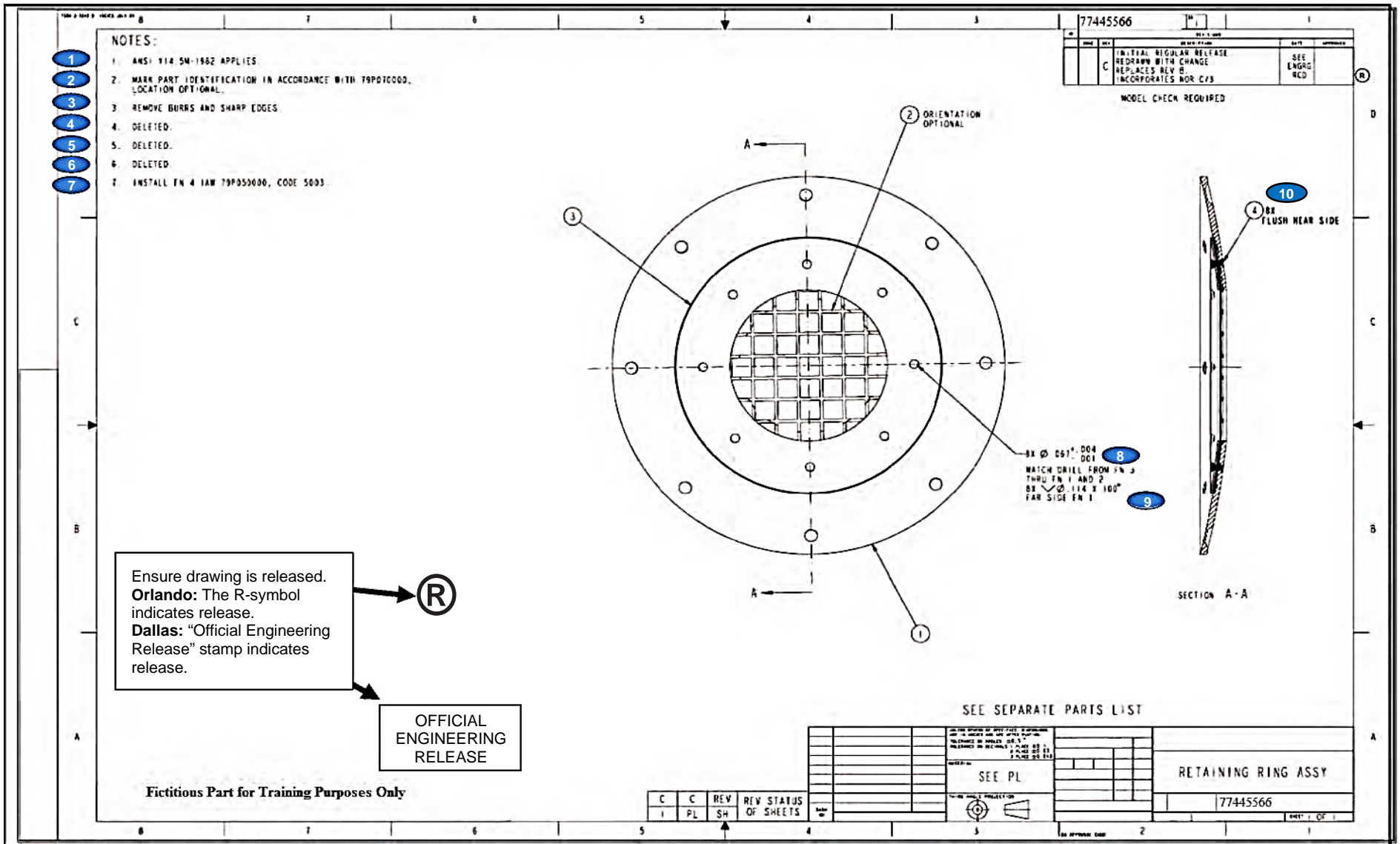
While conducting the FAI a common technique called “ballooning” is used to identify each characteristic on the drawing; this establishes an organized method to capture objective evidence that each drawing requirement is met. Ballooning is strongly recommended to ensure accuracy and completeness. It is preferred if a ballooned drawing of the accepted FAI is submitted as part of the officially documented FAI package. An alternate method to “ballooning” is to reference drawing sheet and zone location(s).

The below example highlights a top assembly drawing (with one sub-assembly) and illustrates how each required FAI form is filled out based on the example drawing requirements.

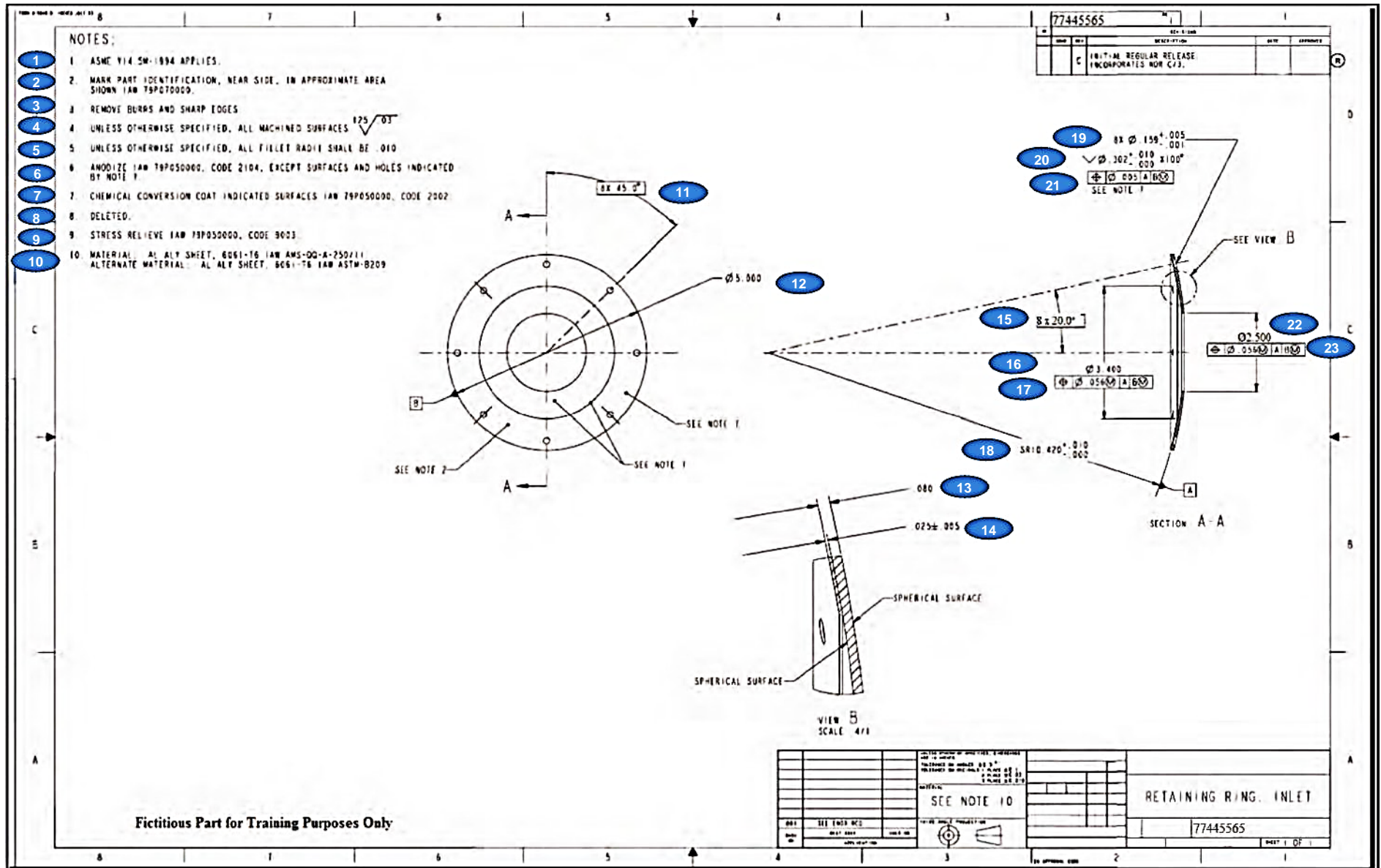
*NOTE:* Assembly and sub-assembly FAIs are required for all LMMFC designed details, and sub-assemblies that constitute the end item as demonstrated in the example. First Article Inspection for LMMFC designed details and sub-assemblies should be performed as required by the LMMFC PO.

The example FAI contained herein will map from initial drawing ballooning all the way through completion of the FAI. The “balloons” in the example below are used to reference the item numbers listed on Form 3 (Characteristic Accountability, Verification and Compatibility Evaluation).

# Top Assembly



# Sub-Assembly



## FAI FORM EXAMPLES

Each field in the forms below will be identified as:

- **(R) Required:** This is mandatory information. (These fields are depicted in bold font.)
- ***(CR) Conditionally Required:*** This field must be completed when applicable to the product. When not applicable, may be left blank. (These fields are depicted in bold italic font.)
- **(O) Optional:** This field is provided for convenience; the field may be left blank. (These fields are depicted in standard font.)

NOTE: Data fields 1 thru 4 are repeated on all forms for convenience and traceability. Any subsequent changes to “date fields” 1 thru 4 need to be made to all pages.





## MFC Expectation for Proper Form AS9102 Form 1 Completion

1. **(R) Part Number:** Number of the FAI part [e.g., customer part number contained on the purchasing documents; part number from the associated Bill of Materials (BOM); manufacturer part number from internal parts, when customer part number is not available].
2. **(R) Part Name:** Name of the FAI part.
3. **(CR) Serial Number:** Serial number of the FAI part; unique identifier assigned to a detail part, sub-assembly, or assembly by the organization or customer.
4. **(R) FAIR Number:** Identifier for the First Article Inspection Report (FAIR).
5. **(CR) Part Revision Level:** The revision level of the FAI part being inspected. When the part is controlled by a part revision and the part has not been revised, indicate as such (e.g., N/C, No Change).

*NOTE 1:* The latest drawing or DPD revision (see field 7) does not always affect all parts contained on a drawing or DPD.

*NOTE 2:* This is the revision level that is identified on the part. Not all organizations use a part revision level for tracking configuration.

*LM EXAMPLE:* PO Part Revision Number to Part Revision Level

PO Product Revision	Part Revision Level
-C000--	-
-D001-A	A
A/001	N/A
H	N/A
K/K	K

6. **(CR) Drawing Number:** Drawing and/or DPD number associated with the FAI part; drawing may be from customer, internal system, or design definition.

*NOTE:* This field identifies all the drawings (including parts list), that contain design characteristics needed for product realization. There may be more than one drawing listed in this field.

7. **(CR) Drawing Revision Level:** The revision level of the drawing or DPD associated with the FAI part. If the drawing has not been revised, indicate as such (e.g., N/C, No Change).

*NOTE:* This field identifies the revision levels of the drawings or DPD sets listed in field 6. When there is more than one entry in field 6, the entries in this field need to correspond to the entries presented in field 6.

*LM EXAMPLE:* PO Part Revision Number to Drawing Revision Level

PO Product Revision	Drawing Revision Level
-C000--	C000
-D001-A	D001
A/001	A001
H	H
K/K	K

8. **(CR) Additional Changes:** Provide reference numbers of any changes that are incorporated in the product, but not reflected in referenced drawing/part revision level (e.g., change in design, engineering changes, manufacturing changes, deviation or exclusion from certain drawing or DPD requirements).
9. **(R) Manufacturing Process Reference:** Reference number that provides traceability to the manufacturing record of the FAI part (e.g., router number, manufacturing plan number). Additional information such as lot number, batch number, date code, or line number may be included, as needed, to provide traceability to the specific manufacturing lot.
10. **(R) Organization Name:** Name of the organization responsible for producing the design characteristics of the product and performing the FAI.
11. (O) Supplier Code: A unique number given by customer to the organization; sometimes referred to as Vendor Code, Vendor Identification Number, or Supplier Number.  
  
*LM NOTE:* This unique code begins with LM and is followed by a distinct grouping of numbers for each supplier (LMXXXXXX).
12. (O) Purchase Order Number: Customer Purchase Order number, as applicable.
13. **(R) Detail Assembly:** Type of FAI; check, as appropriate.
14. **(R) Full FAI/Partial FAI:** Check, as appropriate box (Full FAI or Partial FAI).

For a partial FAI, provide the previous part number, including revision level. For partial FAIs based on similar parts (reference AS9102, 4.6), provide the approved configuration FAI part number, including revision level.

**Baseline Part Number (including revision level):** For a partial FAI, provide the previous FAI part number or approved configuration (including revision level).

**Reason for Full/Partial FAI:** Describe the reason (e.g., new part number; lapse in production; changes in design, process, or manufacturing location reference AS9102, 4.6) for the full or partial FAI.

Data Fields 15, 16, 17, and 18: This section is only required if the part number identified in field 1 is an assembly. All BOM parts (e.g., detail parts, sub-assemblies, COTS) that are part of the assembly, identified in field 1, must be listed in this section.

15. **(CR) Part Number.** Part number included in the assembly and items from the engineering and/or manufacturing BOM included in the drawing, DPD, or next level assembly. Typically, these are the part numbers, standard catalog items numbers, deliverable or embedded software identification, or sub-assembly numbers required to complete the product noted in field 1.

*NOTE 1:* Include revision level of software listed on the BOM.

*NOTE 2:* Materials and processes listed on Form 2 do not need to be restated on Form 1.

16. **(CR) Part Name:** Name or description of the part number entered in field 15 that is installed in the assembly.

17. **(CR) Part Type:** Enter whether the part is a detail part, sub-assembly, software, standard catalog item, or COTS (or equivalent).
18. **(CR) FAIR Identifier:** FAIR identifier (e.g., software generated FAIR identification or number, part number, individual organizational FAIR identification naming conventions) for the detail parts and associated assemblies. If no FAIR identifier is available, input the organization's identifier for the FAI or approval configuration.
19. **(R) Does FAIR Contain a Documented Nonconformance(s)?:** When a nonconformance(s) has been documented in the FAIR. check "Yes" (reference AS9102, 4.5).
20. **(R) FAIR Verified By:** Legible identification of the person verifying the evaluation activities in AS9102, 4.4 were completed.  
*NOTE:* Electronic identification is acceptable.
21. **(R) Date:** Date when field 20 was populated.
22. **(R) FAIR Reviewed/Approved By:** Legible identification of the person from the organization who reviewed and approved the FAIR. Should not be the same individual identified in field 20.  
*NOTE:* Electronic identification is acceptable.
23. **(R) Date:** Date when field 22 was populated.
24. **(CR) Customer Approval:** Used by customer to record approval.  
*NOTE:* Electronic identification is acceptable.
25. **(CR) Date:** Date when field 24 was populated.
26. **(O) Comments:** Provide any supporting comments (e.g., associated nonconformance information, identification of associated documentation).

# AS9102 Form 2: Product Accountability – Materials, Special Processes and Functional Testing

## FORM 2 – PRODUCT ACCOUNTABILITY - MATERIALS, SPECIAL PROCESSES, AND FUNCTIONAL TESTING

Sheet 2 of 3

<b>1. Part Number:</b> 77445566-001	<b>2. Part Name:</b> Retainer Ring Assembly		<b>3. Serial Number:</b> 1		<b>4. FAIR Identifier:</b> 12345-67
<b>5. Material or Process Name:</b>	<b>6. Specification Number:</b>	<b>7. Code:</b>	<b>8. Supplier:</b>	<b>9. Customer Approval Verification:</b>	<b>10. Certificate of Conformance Number:</b>
Rivet Solid CS 1000	MS20426L	N/A	ABC Rivets, 10 Elm St., Boston, MA LM004321	N/A	PO 98765
Sealant	MIL-PRF-2333777D	N/A	Sam's Sealants, 99 43rd St., San Jose, CA LM006789	N/A	PO 98769
<b>11. Functional Test Procedure Number:</b>			<b>12. Acceptance Report Number:</b>		
<b>13. Comments</b>					

## **MFC Expectation for proper AS9102 Form 2 Completion**

1. **(R) Part Number:** Number of the FAI part [e.g., customer part number contained on the purchasing documents; part number from the associated Bill of Materials (BOM); manufacturer part number for internal parts, when customer part number is not available].
2. **(R) Part Name:** Name of the FAI part.
3. **(CR) Serial Number:** Serial number of the FAI part; unique identifier assigned to a detail part, sub-assembly, or assembly by the organization or customer.
4. **(R) FAIR Number:** Identifier or identification number for the First Article Inspection Report (FAIR).
5. **(CR) Material or Process Name:** Name of materials (e.g., raw materials, paint, primer adhesives, weld filler) or special processes.

*NOTE:* List material certifications and any special process referenced on the engineering drawing.

6. **(CR) Specification Number:** Provide the following information:
  - Material specifications and material form (e.g., sheet, bar) for all materials incorporated into the FAI part (e.g., weld, braze filler).
  - Special process specifications: including class, if applicable, and permitted substitutions.
  - If Commercial-Off-the-Shelf (COTS)/standard catalog item(s) are modified, then list the non-modified standard hardware or COTS item part number.
7. **(O) Code:** Any code specified for material or process.
8. **(CR) Supplier:** Identify organization (internal or external) performing special process(es) or supplying material.
  - Name
  - Address
  - Code (when available)

*LM NOTE:* For Nadcap special processes, verify that the vendor is accredited and current for the special process(es) specified in block 5 by using eAuditNet.

*LM NOTE:* For LMMFC unique processes, such as, welding, brazing and additive manufacturing, verify that the vendor is approved and current for the special process(es) in block 5 by using Exostar. Please refer to PO Note MFC-DC-020 or MFC-DC-021.

9. **(CR) Customer Approval Verification:** Indicate if the special process(es) or material sources are approved by Nadcap or the Customer. Enter "Yes" if approved; "No" if approval is required, but process source is not approved; or "NA" if Customer approval is not required.

*NOTE:* A "No" would be handled in accordance with AS9102, 4.5.

10. **(CR) Certificate of Conformance Number.** The applicable certificate number (e.g., special process completion certification, raw material test report number, modified standard catalog item compliance report number, traceability number, P.O. number, lot number, job number etc.).
11. **(CR) Functional Test Procedure Number.** Functional Test Procedure number identified as a design characteristic.
12. **(CR) Acceptance Report Number.** The functional test certification indicating that test requirements have been met.

*NOTE:* When software is uploaded as part of a test procedure, record the software and revision level and acceptance report number.

13. **(O) Comments:** Provide supporting comments, as applicable.





## AS9102 Form 3: Characteristic Accountability, Verification and Compatibility Evaluation (Sub-Assembly)

### FORM 3 - CHARACTERISTIC ACCOUNTABILITY, VERIFICATION, AND COMPATIBILITY EVALUATION

Sheet 3 of 3

1. Part Number 77445565-001		2. Part Name Retainer Ring		3. Serial Number N/A		4. FAIR Number 12345-89	
Characteristic Accountability				Inspection / Test Results			
5. Char. No.	6. Reference Location	7. Characteristic Designator	8. Requirement	9. Results	10. Designed / Qualified Tooling	11. Nonconformance Number	12. Additional Data / Comments
1	Note 1		ANSI Y14.5.1982 applies and dimensions were taken after all special processes (Chem Film & Anodizing)	Accept			
2	Note 2		Parts marked 123456-01 in designated area Mark IAW 79P070000	Accept			Visual
3	Note 3		Removed burrs & sharp edges	Accept			Visual
4	Note 4		All machined surfaces exhibit $\sqrt{.03}$	Surface Finish $\sqrt{.32}$	Gauge P1234		Profilometer
5	Note 5		Unless otherwise specified (UOS) fillet radii .010	Less than 0.01	.010 - .500"		Radius Gage
6	Note 6		Anodized IAW 79P050000 Code 2104	Accept			CoC from Plating Supplier
7	Note 7		Chemical Filmed IAW 79P050000 Code 2002	Accept			CoC from Plating Supplier
8	Note 8		Deleted	N/A			
9	Note 9		Stress Relief IAW 79P050000 Code 9003	Accept			CoC from Heat Treat Supplier
10	Note 10		Material AL ALV Sheet 6061-76 IAW AMS-QQ-250/SS used doe parts	Accept			CoC from Material Supplier
11	Sheet 1 Zone C5		8 x 45.0° (Basic Dimension)	44.7 - 45.3°	CMM001		CMM
12	Sheet 1 Zone C4		∅ 5.000 (+/- .010)	5.004	CMM001		CMM
13	Sheet 1 Zone B3		0.080 (+/- .010)	0.087	CMM001		CMM
14	Sheet 1 Zone B3		0.025 (+/- .005)	0.027	CMM001		CMM
15	Sheet 1 Zone C3		8 x 20.0° (Basic Dimension)	20.3 - 20.5°	CMM001		CMM
16	Sheet 1 Zone C2		∅ 3.400 (+/- .010)	3.405	CMM001		CMM
17	Sheet 1 Zone C2		∅ .056/A/B	.003	CMM001		CMM
18	Sheet 1 Zone B2		SR 10.420 (+ .010)	10.428	CMM001		CMM
19	Sheet 1 Zone D2		8 x ∅ .169 (+ .005/- .001)	0.16	.061 - .250"		Pin Gage
20	Sheet 1 Zone D2		8 x $\sqrt{\text{∅ .302} (+ .010/- .000) \times 100^\circ}$ (+/- .5°)	.311 x 100° - .302 x 100°	0.160 - .360" x 100°		CSK Micrometer
21	Sheet 1 Zone D2		8 x ∅ .005/A/B	.002 - .003	CMM001		CMM
22	Sheet 1 Zone C1		∅ 2.500 (+/- .010)	2.505	0 - 6"		Caliper
23	Sheet 1 Zone C1		∅ .056/A/B	.009	CMM001		CMM

### Sub-Assembly Example

## **MFC Expectation for Proper AS9102 Form 3 Completion**

1. **(R) Part Number:** Number of the FAI part [e.g., customer part number contained on the purchasing documents; part number from the associated Bill of Materials (BOM); manufacturer part number for internal parts, when customer part number is not available].
2. **(R) Part Name:** Name of the FAI part.
3. **(CR) Serial Number:** Serial number of the FAI part; unique identifier assigned to a detail part, sub-assembly, or assembly by the organization or customer.
4. **(R) FAIR Number:** Identifier or identification number for the First Article Inspection Report (FAIR).
5. **(R) Char. No.:** Unique assigned number for each Design Characteristic.
  - The ballooned design characteristic must clearly be traceable to the characteristic number listed in field 5.
  - Automated inspection methods/tooling measurements report/results, must all be clearly linked to the characteristic number in field 5, ballooned drawing, and associated measurement report/results.

*NOTE:* A single design callout that applies to multiple characteristics (reference AS9102, 3.16) may be recorded as one characteristic number.
6. **(CR) Reference Location:** Location of the Design Characteristic [e.g., drawing zone (page number and section), Digital Product Definition (DPD) model location callout].

*LM NOTE:* If drawing is not ballooned, reference locations are required.
7. **(CR) Characteristic Designator:** As applicable, a unique identification for special requirements [e.g., Key Characteristics (KC), Critical Item (CI), items requiring additional design or process control] defined by customer (reference AS9100 and AS9103).

*NOTE:* Reference AS9102, 4.1.c.5.
8. **(R) Requirement:** Specified requirement for the Design Characteristic (e.g., drawing or DPD dimensional characteristics with associated nominal dimension and tolerances, drawing notes, requirements).
  - The organization should record the requirements in the units (e.g., metric, imperial systems) specified on the drawing, DPD, or specification, unless otherwise approved by the customer (reference AS9102, 4.7.3.a).
  - The organization should record the software revision for embedded or deliverable software.
9. **(R) Results:** List measurement(s) obtained for the Design Characteristics.

The organization should record results in the units (e.g., metric, imperial systems) specified on the drawing, DPD, or specification, unless otherwise approved by the customer (reference AS9102, 4.7.3.a).

  - For Multiple Characteristics, list each characteristic as individual values or list once with the minimum and maximum of measured values attained. If a characteristic is

found to be nonconforming, then that characteristic should be listed separately with the measured value noted.

- When qualified tooling (e.g., radius gauges) is used as a go/no-go gage (reference AS9102, 4.7.3.b), record the results as an attribute (e.g., pass/fail).
  - When automated inspection equipment produces measurement results, those results may be referenced on AS9102 Form 3, identified as pass/fail, and attached only when:
    - The characteristic numbers are clearly linked in the attached report [e.g., characteristic identification on Coordinate Measurement System (CMS) report is the same as on AS9102 Form 3].
    - The results in the attached reports are clearly traceable to the characteristic numbers.
    - The results are directly comparable to the design characteristic.
  - A CMS Report only depicting deviation from nominal in multiple axes is not acceptable; the report should reflect an actual geometric value.
  - If a Design Requirement requires verification testing, record the actual results on the form. If a laboratory report or certificate of test is included in the FAIR, the results may be recorded as an attribute (e.g., pass/fail) and the test reference number recorded on the forms. The laboratory report or certificate of test should show specific values for requirements and actual results.
  - For characteristics with visual verification requirements that are rated against standard photographs/master samples/standards, list the unique identifier of the closest comparison. A statement of conformance is acceptable; record the reference number on the forms.
  - For processes that require verification per Design Characteristic, include statement of conformance (e.g., certification of compliance, verification indicator - accept).
  - For characteristics verified by attribute inspection, include statement of conformance (e.g., accept).
10. **(CR) Designed/Qualified Tooling:** When designed tooling or specially designed tooling, including Numerically Controlled (NC) programming as a media of inspection, is used for attribute acceptance of the characteristic; record the tool identification number. When qualified tooling is used for attribute acceptance, record the gauge value or range (e.g., minimum/maximum value), as applicable.
11. **(CR) Nonconformance Number:** If the characteristic is found to be nonconforming, record a nonconformance document reference number.

*LM NOTE:* Any nonconformances must be dispositioned and closed out per internal requirements (i.e., MRB, RC/CA, etc.). Supporting documents should be added to FAI package. If this is a Lockheed Martin part number, MRB authority must be granted by Lockheed Martin.

12. (O) Additional Data/Comments: This area is reserved for optional fields; add additional columns, as required, by the organization or customer.

## COMMON ERRORS WHICH CAUSE FAI REJECTION

The topics listed below are common mistakes found in submitted FAI packages.

- All Dimensions and/or notes not accounted for.
  - Any notes that contain a dimension should have a physical measurement recorded. The use of “accept” or “OK” is not permitted.
- Incorrect or missing special process flow down requirements such as:
  - Special process supplier(s) are to be LMMFC approved per purchase order requirements.
  - Supplier should build to Model Based Data Set Engineering Requirements per purchase order.
- Incorrect tolerances assigned to dimension resulting in part non-conformance.
  - Standard dimension tolerances such as .100 (three place decimal meaning +/- .005) are found in the tolerance block located in the lower right part of the drawing as shown below.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.	
TOLERANCE ON ANGLES	$\pm 0.5^\circ$
TOLERANCE ON DECIMALS	1 PLACE $\pm 0.1$
	2 PLACE $\pm 0.01$
	3 PLACE $\pm 0.005$

- Incorrect Raw material/adhesives information provided.
  - Shelf life cannot be expired; appropriate adhesive(s) are to be used on labels, etc.
  - Raw Material required to be indicated on AS9102 Form 2.
- Parts for an assembly identified on the wrong form.
  - Parts for an assembly are required to be indicated on AS9102 Form 1.
- Incorrect revision level.
  - Ensure PO revision matches released engineering specified for item(s) on FAI report. If part revision is not identified on the PO, contact Buyer's procurement representative prior to initiating FAI submittal.
  - Verify the required revision of LMMFC specifications, like 79P050000, by using the link provided on the PO or by contacting the Buyer's procurement representative. Indicate all revision levels in block 6 of AS9102 Form 2.
  - Ensure through LMMFC Procurement that you are working to the latest released engineering.
    - NOTE:* There are many types of drawings and release processes. Most drawings will have an (R) (Orlando)/or “Official Engineering Release” (Dallas) symbol normally at the top right of the first page of the drawing indicating released. If this does not appear, check with LMMFC Procurement.
  - Special Process certifications should be to the latest revision. This is a standard PO Note for all PO's (MFC-PR-001).
- Incorrect inspection equipment used or not noted on FAI report.
  - When inspection equipment is listed, ensure that inspection equipment has sufficient measurement accuracy for requirements being measured and ensure it is recorded on AS9102 Form 3. Use of Gage Repeatability and Reproducibility (R&R) to validate measurement repeatability should be a part of the process development effort.
- Wrong part number identified on FAI form(s).



- The part number listed on the FAI is to be the Lockheed Martin part number listed on the purchase order, not a COTS or manufacturer's part number.
- There are to be no typo's, missing dash numbers, and/or missing designators such as Q1, D1, TPSS, etc.  
  - Example: If the purchase order requires P/N 7979797-003 Q1 the FAI form is to read the full P/N: 7979797-003 Q1.
- Missing Certificates of Conformance, test reports, and FAI forms as part of the FAI package.
  - Ensure there is no Missing/Incomplete sub-tier supplier data such as:
    - Improper material alloy listed.
    - Incorrect special process used.
    - Incorrect specification revision levels listed.
  - Ensure supplier equivalent forms meet the AS9102 form requirements.
- FAI form(s) not signed/approved by appropriate representatives and/or dated.
  - AS9102 Form 1 should be signed by the preparer of the FAI and witnessed/approved by a second individual.
- Incomplete recording of "multiple actuals."
  - A feature that is required multiple times requires recording multiple actuals.  
    - Example: FIN #6 must be installed in 12 places (need to indicate 12 places or measurements as defined by engineering). This can include a range with max/min indicated.
- Incorrect special processes type or class.
  - Ensure that the special process type and/or class is the same as called out on the drawing.

## FREQUENTLY ASKED QUESTIONS

The items listed below describe and answer FAQs concerning Supplier First Article Inspection.

- What forms are required for a partial First Article Inspection?
  - AS9102 Forms 1 through 3 are required for all First Article Inspections. Complete only the affected fields for the characteristics that need to be revalidated.
- Do drawing notes that contain dimensions need to have a measurement recorded?
  - Yes. All dimensions should have a measurement, tolerance and inspection method recorded per AS9102.
- Will use of unapproved Lockheed Martin Special Processors cause my First Article to be rejected?
  - Yes. This is also considered a part nonconformance.
- Why was the equipment or instrument recorded rejected?
  - The Supplier Quality Engineer reviewing the First Article does not have confidence a valid, repeatable and reproducible measurement is obtainable.
- What are the most common documentation errors that cause a First Article Inspection Report to Fail?
  - Typo errors: (inverted numbers and tolerances, etc.)
  - Part numbers and subassembly parts missing (form 1)
  - Incorrect revision level (form 1)
  - Missing specification revision (form 2)
  - Visual inspection method used for a dimension (form 3)
  - Special process hierarchy not complete (form 2)
  - Special process supplier code & supplier missing (form 2)
- When a feature indicates multiple places are measurements required for each place?
  - Yes. A feature that is required multiple times requires multiple actual.
- If material certifications, test reports are not included will my first article be rejected?
  - Yes. All documentation is required for objective evidence to demonstrate the First Article meets requirements.
- Can I develop my own acceptance tooling for use without Lockheed Martin approval?
  - No. All supplier self-developed acceptance tooling must be approved by Lockheed Martin.
- What is the best process to ensure a measurement process will produce repeatable and reproducible results?
  - A Gage Repeatability and Reproducibility study.
- What should I do if a P2P FAI lot is rejected?
  - Select the line with the rejected FAI lot in the P2P Ship-To Portal.
  - Select "Lot Attachments" and the bottom on the page.
  - Select the line with rejection comments and select "Display."

- Once rejection comments have been addressed, a new FAI lot will need to be initiated for the line item in the P2P Ship-To portal with uploaded documentation.
- How do I know if documentation successfully uploaded to the P2P FAI lot?
  - After uploading documentation, return to the P2P Supplier PO and FQR List page.
  - Select "Refresh Selection."
  - Documentation was successfully uploaded if an "X" appears in the "Lot Attachment" column of the FAI inspection lot line.
  - If there is no "X," select the FAI lot line item and select "Lot Attachments."
  - Upload documentation again.
- What is the limit on P2P upload attachment size?
  - 100 MB
- Does an FAI Lot apply to all line items of the same material on a PO?
  - No, each line item requires its own FAI lot and uploaded documentation.
- What if I have additional questions concerning the completion of a First Article Inspection?
  - Questions can be directed to Lockheed Martin Procurement.
- For any additional questions, please go to <https://iaqg.org/standard/9102-first-article-inspection-requirement/>.

## DEFINITIONS

- **Approved FAI:** Documented approval from LMMFC Supplier Quality representative. Approval is required to ship material unless otherwise directed by LMMFC.
- **Ballooning:** This technique establishes an organized method to capture objective evidence that each drawing requirement is met. Ballooning is recommended to ensure accuracy and completeness. It is preferred if a ballooned drawing of the accepted FAI is submitted as part of the officially documented FAI package.
- **Certificates of Conformance (C of C):** The Seller should submit with each shipment, a Certificate of Conformance which is to be dated and bear the signature, electronic equivalent, or electronically generated title of an authorized contractor's Representative, stating that the materials furnished to Lockheed Martin are in conformance with applicable requirements of the Contract, drawings, and specifications, and that supporting documentation is on file and will be made available to Lockheed Martin or Government Representatives upon request. Certification should include at a minimum: name of contractor of materials being supplied, quantity shipped, and Buyer Purchase Order Number, per the applicable PO Text Note MFC-DC-003, when levied on the purchase order contract.
  - An example of an acceptable statement of Certification of Conformance is as follows:  
“This is to certify that all items noted are in conformance with the Contract, drawings, specification and other applicable documentation, that all process certifications, chemical and physical test reports, are on file at this facility and are available for review by Lockheed Martin.”
- **Change Control:** Formal process used to ensure that changes to a product or system are introduced in a controlled and coordinated manner throughout the life cycle. This includes flowing the change through the appropriate channels within Lockheed Martin before incorporation.
- **Corrective Action:** Action(s) to eliminate the cause(s) of a detected nonconformity or other undesirable situation in order to prevent recurrence. The FAI is not complete until the organization closes all non-conformances affecting the part and implements corrective actions. The organization should implement corrective action(s) and perform a partial FAI for all affected characteristics on the next production run, after implementation of the associated corrective action(s). If the partial FAI does not clear all identified nonconformances, the FAI is still “not complete” and the requirement to complete the FAI is still in effect per AS9102.
- **Equivalent Form:** Interchangeable AS9102 or company specific AS9102 equivalent forms.
- **First Article Inspection:** A procedure that provides objective evidence that all engineering, design and specification requirements are correctly understood, accounted for, verified, recorded, and that the combination of material, tooling, processes, documentation and personnel is capable of producing compliant hardware. FAI includes the manufacturing/inspection planning, manufacturing processes, tooling and software, (Numerical Control (N/C) tapes and Coordinate Measuring machine programs), test, inspection methods and equipment used in the fabrication of products.

- **FAI Plan:** A documented plan for the company's FAI procedure. Preparation requires gathering all source documents including Contract requirements (Purchase Order), Ballooned engineering drawings, specifications referenced in drawings, embedded or layered specifications, raw material certifications, Capability Maturity Model data, planning/shop routers, documentation validating integrity, production processes (i.e., soldering, plating, heat treating, etc.)
- **FAI Rejection:** First Article Inspection Reports where nonconformance/s are identified will have Form 1 marked as "Not Complete." Nonconforming product cannot be delivered to the Buyer without being reworked, Material Review Board approval (Buyer approved Waiver or other document) or covered by drawing change. The FAI will remain in a not complete status until the corrective actions associated with nonconformance have been completed, a subsequent build has been accomplished and an acceptable FAI has been completed. Any non-conformances must be dispositioned and closed out per internal requirements (i.e., MRB, RC/CA, etc.). Supporting documents should be added to the FAI package.
- **Manufacturing Suffix Part Number:** A part number with a qualifier at the end (such as Q1, D1, TPSS). Part numbers with a manufacturing suffix have additional documentation indicating the part will deviate from engineering in some way. Ensure the technical data or engineering package received includes the required documentation. Contact the Buyer's procurement representative if the documentation is missing.
- **Partial FAI** (See MFC-IN-003/MFC-IN-004/MFC-IN-021/MFC-IN-022): See above section on partial/delta or complete re-accomplishment of a FAI.
- **Source Inspection:** LMC supplier quality reserves the right to perform in- process inspection, in-process surveillance and/or audits at any time during the life of the purchase order. Parts, assemblies, processes and tests are subject to detailed inspection by the LMC quality representative prior to assembly, test and/or delivery when required. Such inspections, tests and mandatory inspection points (MIPs) should be identified during the purchase order review process, and failure to comply with agreed upon MIPs with LMC supplier quality can be cause for rejection of completed end items per the applicable PO Text Note MFC-SS-005, when levied on the purchase order contract.
- **Special Process:** A documented method used to manufacture products where a product undergoes a physical, chemical or metallurgical transformation where conformance to the specification cannot be readily verified by normal inspection methods, and the quality of the product depends on use of specific equipment operated in a specific manner, under controlled conditions, by trained personnel with instructions, procedures and standards. All special processes must be performed in accordance with LMMFC PO Text Note MFC-DC-020, MFC-DC-021 and/or MFC-DC-023.
- **Sub-tier:** Any and all suppliers that the contracted supplier uses for products and/or services.
- **Variables Data:** Quantitative measurements taken on a continuous scale.
  - For example, the diameter of a cylinder or the gap between mating parts.





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