

Radiant Power Corp/Dukane Seacom Inc.

Supplier FAI Training

AS9102C

Revision C

January 2024

AS9102 Requirements

- AS9102 is a standard for completing first article inspections or FAIs
- A first article inspection is a process used to determine if the production process was completed to all documented requirements AND shall be representative on the first production run
- This process is to be repeated when changes occur that invalidate the original results; engineering orders (EOs), manufacturing process changes, and tooling changes would require a new FAI. Also, a lapse in production of 24 months from completion of the last production operation to the actual restart of production, a change in mfg. sources (locations), a natural or man-made event, or implementation of a Corrective Action
- The organization shall have a documented process to plan for FAIs. This process shall include to evaluate any changes requirement
- The organization shall verify the revision for embedded or deliverable software

(Some items listed within this guide are not from AS9102 but from Radiant/Dukane processes and the latter shall take precedence)

Types of FAIs

- There are two types of FAIs, Full and Partial (Delta) NOTE: A FAI is **NOT** a product acceptance document
- Full FAIs, see page 2 bullet 3. The customer also can require a full FAI at their discretion.
- Partial (Delta) FAIs are required for any design changes or engineering orders, implementation of a corrective action, changes in processes, inspection methods, tooling. Partial FAIs are also required when changing material sources. For example, a Partial FAI is required when changing from Radiant/Dukane supplied material to material purchased by supplier
- All FAIR forms shall be completed in English and shall be done either electronically or in permanent ink

What parts should an FAI be done on?

- FAIs are required for all Radiant or Dukane designed items
- FAIs are also required for any embedded subassemblies within the part purchased by Radiant/Dukane
 - Example 1, a raw board (PWB, or Printed Wiring Board) FAI must be completed along with completed assemblies (PWA, Printed Wiring Assembly)
 - Example 2, a part painted, or surface treated from a fabricated part
- All subassemblies FAIs are **required** to be sent with the main assembly FAI.
NOTE: Each item shall have a separate FAI
- Definition: Procured standard catalog item, COTS, or deliverable software. When these items are included in an assembly, they shall be documented in the index of part numbers in an assembly FAIR
- FAIs are not required for COTS (Commercial Off The Shelf) parts; examples are electronic components, standard hardware, standard epoxies/adhesives
 - **NOTE:** If supplier is taking a COTS part and performing a modification per Radiant/Dukane requirements, an FAI IS REQUIRED against the modification

Flow Down Requirements (Sub-tiers)

It is the responsibility of the supplier to flow down customer requirements to ensure product conformance

Suppliers are responsible for all accountable characteristics including those generated by their sub-tier suppliers

If sub-tiers do not account for characteristics, the prime supplier is responsible for initiating a separate FAI document

What is included?

- Verification of all design characteristics
- Material and Special Process Certifications
- Nonconformance resolution
- FAI Reports of any subassemblies
- Manufacturing Process Verification
- Digital Product Definition Requirements, (DPD) – When design requirements are in DPD format and traditional 2D drawing info. is not available for all applicable design requirements, DPD design characteristics required for product realization shall be extracted, verified, and included in the FAIR

Why is an FAI required?

- First Article Inspections allow the manufacturer to ensure that all requirements of the drawing have been met
- FAIs allow the manufacturer to verify that tools, production processes, and drawings are accurate
- Performing FAIs reduces quality escapes by ensuring consistency

AS9102 forms

- AS9102 Form 1: Part Number Accountability
 - Used to identify the part that is being inspected and associated subassemblies, detail, and component parts
 - All “Commercial Off The Shelf” (COTS) items are placed on this form
- AS9102 Form 2: Product Accountability – Raw Material, Specifications and Special Process(s), Test Verification
 - Used if any material, special process or functional testing is defined as a requirement
- AS9102 Form 3: Characteristic Accountability, Verification and Compatibility Evaluation
 - Used to record an actual measurement or verification of every design characteristic on the drawing including notes. For each ballooned item, the measuring technique/instrument shall be identified in the “comments” section, including the calibration due date.

AS9102 Form 1

- 1) Enter part number given on Purchase Order/Drawing. (NOTE: Use drawing if it is different than the PO)
- 2) Enter name/part description given on Purchase Order/Drawing. (NOTE: Use drawing if it is different than the PO)

- 3) Enter serial number of unit evaluated (if applicable, if no serial number is required put N/A)

- 4) Enter FAIR Identifier (Number can be based upon Supplier's Internal Process or enter part number and the current revision after "R". For example, Part number 12345, Revision A = 12345RA)

- 5) Enter part revision level given on drawing
- 6) If different from Box 1, enter drawing number. If not, repeat Box 1 (NOTE: Also add here if supplier has an internal drawing number)
- 7) If different from Box 5, enter revision level. If not, repeat Box 5 (NOTE: Also add here if supplier's have internal drawing revision level)
- 8) List any deviations, EO's if applicable otherwise, put N/A
- 9) Enter work order/job order/traveler number/lot number for part being built (Supplier generated)

- 10) Enter Supplier Name
- 11) Enter supplier/vendor code listed on PO
- 12) Enter PO number given by Radiant/Dukane
- 13) Check appropriate box for Detail vs Assembly
- 14a) Check appropriate box for Partial vs Full FAI
- 14b) Baseline Part Number (including revision level). For partial FAIs enter previous FAI part number and revision level
- 14c) Reason for Full / Partial FAI: (This would include any Radiant/Dukane Engineering Orders (EO))

NOTE: On the top right corner on form 1, enter total number of pages of FAI packet, including all required certs, test data, drawing, etc

Sheet _____ of _____			
First Article Inspection Report Form 1: Part Number Accountability			
1. Part Number	2. Part Name	3. Serial Number	4. FAIR Identifier
5. Part Revision Level	6. Drawing Number	7. Drawing Revision Level	8. Additional Changes
9. Manufacturing Process Ref.	10. Organization Name	11. Supplier Code	12. Purchase Order Number
13. (Check One Option) <input type="checkbox"/> Detail <input type="checkbox"/> Assembly	14. (Check One Option) Baseline Part Number (including revision level) Reason for Full / Partial FAI	<input type="checkbox"/> Full FAI <input type="checkbox"/> Partial FAI	

AS9102 Form 1 (Cont'd)

INDEX of part numbers or sub-assembly numbers required to make the assembly noted above.			
15. Part Number:	16. Part Name:	17. Part Type:	18. FAIR Identifier:

15) Enter part number of sub-assemblies, detail parts, and items from engineering and or manufacturing (BOM) included in the drawing, DPD, or next assembly

NOTE 1: Include revision level for software listed on the BOM

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

16) Enter name/description of corresponding part from Field 15

17) Enter whether the part is a detail part, sub-assembly, software, standard catalog item or COTS.

NOTE: Include serial number of corresponding parts from Field 15, when applicable.

18) FAIR identifier (e.g., software generated FAIR identification or number, part no., individual organization FAIR identification name conventions) for the detail parts associated assemblies. If no FAIR identifier is available, input the organization's identifier for the FAI or approved configuration

If all components cannot fit on one page, duplicate blank page and continue completing index

NOTE: Make sure to change the Page # at top when adding additional pages, see Slide 9

AS9102 Form 1 (Cont'd)

19. Does FAIR Contain a Documented Nonconformance(s)? Yes <input type="checkbox"/> No <input type="checkbox"/>	
20. FAIR Verified By:	21. Date:
22. FAIR Reviewed/Approved By:	23. Date:
24. Customer Approval:	25. Date:
26. Comments:	

19) When nonconformance(s) have been documented in the FAIR, check “Yes”

20) A legible signature/identification or an electronic identification of the person verifying the evaluation the FAIR, including lower-level FAIRs, C of C’s, Dimensional analysis etc...

21) Date when field 20 was populated.

22) A legible/identification or an electronic identification of person from the organization who reviewed and approved the FAIR. This Should NOT be the same individual identified in field 20

23) Date when field 22 was populated

Do not complete Field 24 or 25

24) Customer to sign when approved

25) Customer to fill in date when approved

26) Provide any supporting comments (i.e., associated nonconformance information, identification of associated documentation etc...)

AS9102 Form 2

Sheet _____ of _____					
First Article Inspection Report Form 2: Product Accountability - Materials, Special Processes, and Functional Testing					
1. Part Number	2. Part Name	3. Serial Number		4. FAIR Identifier	
5. Material or Process Name	6. Specification Number	7. Code	8. Supplier	9. Customer Approval Verification	10. Certification of Conformance Number

- Fields 1-4 and Number of Total pages will be automatically filled in once data on Form 1 is entered
 - If no raw material or special process are used mark first line in Fields 5-10 N/A
- 5) Enter raw material or special process name
NOTE: If COTS part is modified enter part information onto this form. **NOTE:** Modified COTs REQUIRE a separate FAI
 - 6) Enter raw material part number or special process number, MIL, spec., etc
 - 7) Mark N/A unless otherwise instructed on Purchase Order
 - 8) Enter name of supplier used to procure material or service
 - 9) Enter Yes, No or N/A of a pre-approval status by the customer for any material or processes
 - 10) Enter Certificate of Conformance number for raw material or processes

NOTE: If all items cannot fit on one page, duplicate a blank page and continue (Change Page #)

AS9102 Form 2 (Cont'd)

11. Functional Test Procedure Number		12. Acceptance Report Number	
13. Comments			

- 11) Enter Test Procedure Number (if applicable, if not mark N/A)
- 12) Enter Report number for specific FAI unit or report number for lot of parts where FAI unit was tested
(Mark N/A if not applicable)
- 13) Comments for FAI documentation (Not required to be filled out)

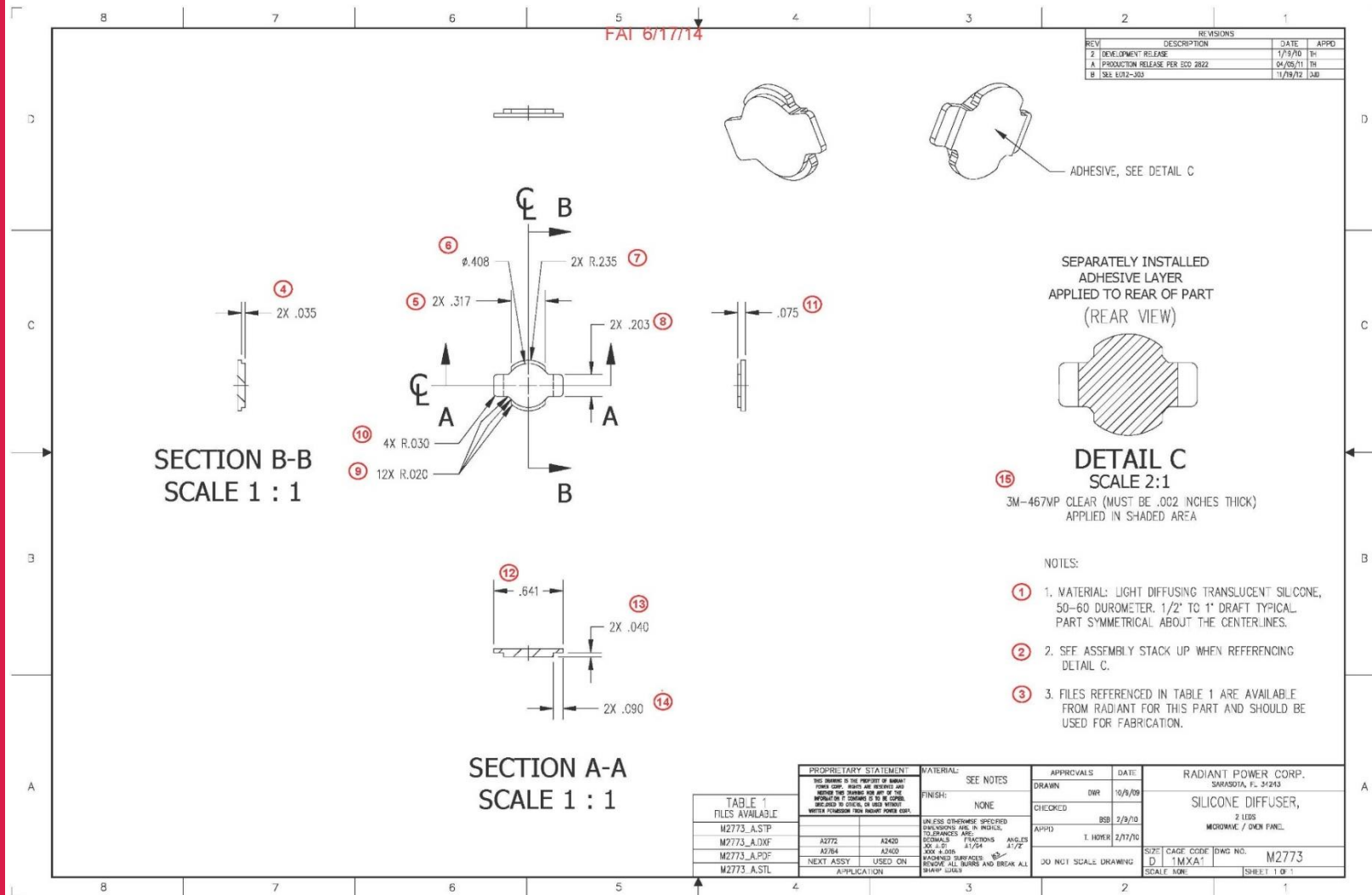
AS9102 Form 3

1. Part Number		2. Part Name			3. Serial Number		4. FAIR Identifier
Characteristic Accountability				Inspection / Test Results			
5. Char. Number	6. Reference Location	7. Characteristic Designator	8. Requirement	9. Results	10. Designed / Qualified Tooling	11. Nonconformance Number	12. Additional Data / Comments

- Fields 1-4, Number of Total pages, and Name and Date will be automatically filled in once data on Form 1 is entered
- If no characteristic verification is required for FAI, mark Fields 5-14 as N/A) **NOTE:** Drawing notes still need to be identified and acknowledged
- 5) Number identified on Balloon (Bubble) Drawing, Ref. page 15 as an example. Drawing notes also get assigned Characteristic Number
- 6) Location of Number from Balloon drawing derived from grid (For example B4, C1, D6, etc.)
- 7) Mark as “Key” or “Critical” or any other designation if defined on drawing, if not identified on drawing mark N/A
- 8) Listed requirement from drawing.
 - 1) For Notes, use of an abbreviation is acceptable; For example: Note 1: Install wires A...
 - 2) For Dimensions/Variable, list requirement and tolerance; For example: 1.500 +/- .005; If dimension is reference replace tolerance value with REF, 1.500 REF
 - 3) Recording software, when applicable
- 9) Results from Box 8
 - 1) For Notes, use Accepted, Acknowledged/Engineering Note, Installed, or Applied
 - 2) For Dimensions/Variable, enter measured valued using calibrated tools.
 - a) If dimension is a reference or basic dimension and can be measured, place measurement in Results box.
 - b) If dimension is a reference and cannot be measured, enter “REF”
 - 3) Indicate validation of software recording

For Variable Data, enter type of inspection tool (Caliper, Micrometer, CMM) used to perform inspection. For Notes on the drawing, mark as “Visual”, “Reference”, “Documentation”, “Software” or type of test equipment when applicable
- 10) Enter non-conformance number (if applicable, if none, mark N/A)
- 11) For Dimensions entered, inspection tool’s identification number and calibration due date. For Notes accepted by documentation, list report/document number

Balloon (Bubble) Drawing



- For Full FAI, all notes, dimensions, and product requirements must be identified and evaluated

- For Partial (Delta) FAI, only the items that changed are required to be verified

How to submit FAIs?

- **Method/Process**

- Scan and email all required documents to Radiant/Dukane buyer, (**PRIOR to shipping ANY parts**) and send a hard copy of the FAIR documents with first run of parts
 - Sending the FAIR in advance of shipping the parts will allow Radiant/Dukane to review the FAIR prior to shipping the parts and make any necessary corrections on the FAIR, if there is an issue.
 - If the FAIR is to be sent to Radiant/Dukane **AFTER** shipping of the parts, notification to Radiant/Dukane's Quality Dept. must be sent prior to receiving the parts.

- *Send FAI documents to FAI@rpcaero.com*

What is required for submission?

- Completed AS9102 Forms (Form 1-3)
- Balloon (Bubble) Drawing, including ALL notes
- Certificate of Conformances for all material listed on Form 1 (in order listed on Form 1) [For any item with an approved FAI, the first signed page from FAI report should be used as the Certificate of Conformance]
- Certificate of Conformances for any material listed on Form 2
 - Raw material certs needed if parts are fabricated
 - For multiple materials listed on one certificate of conformance it is acceptable to submit only 1 copy but the certificate must be annotated to reference the Item numbers from BOM
- Certificate of Conformances for any special process listed on Form 2
- Test data or ATP when required by drawing or PO

Checklist

- Form 1
 - Are all fields 1-14 completed?
 - Is FAI marked as complete or not complete?
 - Are there any nonconformances?
 - Are sub-component FAIR's referenced and attached?
- Form 2
 - Are all raw materials/special processes within the scope of the FAI listed in field 5?
 - Is supplier listed in field 8?
 - Is an approval from the customer provided? This is if the supplier needed any approval from that material/process in advance.
 - Is an identification number from Certificate of Conformance listed in field 10?
 - Are certs attached for any items listed in field 5?
 - Are fields 11 and 12 completed and test results included in packet, where applicable?
- Form 3
 - Are all characteristics (dimensions/notes) within the scope of the FAI listed in field 5?
 - Is a balloon (bubble) drawing showing characteristics listed in field 5 attached?
 - Are reference locations (if applicable) listed in field 6?
 - Are results for dimensions listed a measured values in field 9?
 - Is the type of tool used to perform inspections listed in field 10, where applicable?
 - Is tool ID# and calibration due date listed in field 12, where applicable?

Common (Recurring) Mistakes made when suppliers submit an FAI

- Missing the Balloon (Bubble) Drawing(s)
- Missing the certs. (Ensure all applicable certs are provided with the FAI). Ensure that certs are available for items such as RAW Materials such as Boards, Solder Mask, Copper Weight (broken down by layers then thickness measurements for each layer)
- Certs provided for material that is not applicable (Only provide certs for what is required)
- FAIR missing some or all of the notes. For a full FAI all notes, dimensions, and product requirements must be identified and evaluated. For a partial (Delta) FAI only the items that changed are to be verified.