First Article Inspection (FAI) Training for Suppliers AS9102 Rev. C

Supplemental Guide for QP Rider 271

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Introduction and Purpose

Introduction and Purpose

- The purpose of this training is to provide instructions for Teledyne Controls Suppliers on how to conduct and evaluate **First Article Inspection Reports (FAIRs)** following AS9102C.

- The primary purpose of First Article inspection (FAI) is to verify and validate product realization processes capable of producing characteristics that meet engineering and design requirements.
  - Provides objective evidence that the product realization processes are capable of producing conforming product.
  - Demonstrate acknowledgement of requirement understanding.
  - Provides assurance that the product realization process used is validated and repeatable.

Note: An FAI is not a product acceptance document but instead provides objective evidence to verify the product realization processes used.

Definitions

Definitions

- **First Article Inspection (FAI)** - The inspection of a part or article of a new design, a new revision, a new vendor, or a first time buy to verify the design against its specifications, prints, or parts lists for the initial source and any new source.

- **Partial First Article Inspection** - (1) First article inspection performed only on the engineering changes when a successful first article inspection was performed on a previous revision.
  (2) First article inspection performed on the differences (Partial) between a successful first article inspection of an item and a different configuration of the same item.

- **First Article Inspection Report (FAIR)** - Formal documentation of first article inspection results.

- **Inaccessible Characteristic** – A characteristic that cannot be evaluated or verified at any time after it is generated or assembled without destroying or jeopardizing the part. When inspecting or verifying such a characteristic enter the words “unable to verify” in the F.A.I. form.

Definitions

- **Attribute Data** – A result from a characteristic or property that is appraised only as to whether it does or does not conform to a given requirement (e.g., go/no-go, accept/reject, pass/fail).

- **Variable Data** – Quantitative measurements taken on a continuous scale (e.g., the diameter of a cylinder, the gap between mating parts).

- **Design Characteristics** - Dimensional, visual, functional, mechanical, and material features or properties, which describe and constitute the design of the product.

- **Designed Tooling** - Product specific tooling [e.g., check fixtures, Coordinate Measurement Machine (CMM) program] specifically made to validate the design characteristics of a product.

- **Qualified tooling** - Universal calibrated monitoring and measuring equipment used to validate product characteristics. Identified and traceable to calibration records. Not part or item specific (caliper, thread gages, scales, etc.).

Requirements

Requirement Sources

- AS9100D, 8.5.1.3 Product Process Verification for First Article Inspection

And / Or

- Teledyne Controls requirement flow down: QP Rider 271 located at:

https://www.teledynecontrols.com/suppliers/quality

  - Typically, applicable to Teledyne designed products
  - Suppliers with QP Rider 271 applicable to a Purchase Order are expected to follow AS9102 criteria for creating and maintaining FAIRs, following the guidance of this training.
  - Suppliers are responsible to perform, retain, and deliver to Teledyne Controls FAIRs following the criteria in AS9102C and as listed on the next slide.

Requirements

Refer to AS9102C for the full list and description of First Article Inspection Reporting requirements.

A FAIR is to be performed when any of the following occurs:

- Initial manufacturing lot of a part configuration.
- A change in engineering definition affecting design characteristics.
- A use of new manufacturing source(s), process(es), inspection method(s), tooling, materials/alternate materials, or location of manufacture.
- A change in the numerical control program or translation to another media.
- A natural or man-made event, which can adversely affect the manufacturing process.
- An implementation of corrective action required to complete a previous FAI.
- A lapse in production for two years for any characteristics that may be impacted. This lapse is from the completion of the last production operation to the actual restart of production.

A FAIR is required for new part number configuration (e.g. -1, -2, -101, etc.) and new revision of part number configuration (e.g. Rev A, B, C, etc.) per the first bullet criteria above “Initial manufacturing lot of a part configuration”.

- For Conformity purposes, each new part number configuration must have an initial Full FAI on file.
- New revisions of part number configurations may be Partial FAIs if a Partial FAI is applicable to the change.

FAIRs are required to be complete, precise, and accurate.

Requirements

- The FAIR is composed of two categories Full and Partial inspections as:
  - Full FAI is performed on a part or article of a new design, a new revision, a new vendor or the first time buy. This is a method used to verify the product against its specification, prints, and or parts list for the initial source or any new sources.
  - Partial FAI is performed only on the changes when a successful FAI was performed on its previous revision. This FAI is also performed on the differences between a successful FAI of an item and a different configuration of the same item.
    - Partial FAIRs must refer to the prior completed Full FAI and all Partial FAIRs in between.

- AS9102 allows an FAI part to contain a nonconformance and for the FAIR to report it in block 19. After the part nonconformance is corrected, a Partial FAI may be performed to verify the conforming part feature.
  - **Note: This allowance does not allow suppliers to deliver nonconforming product to Teledyne Controls.**

FAIRs and associated parts will be inspected by Teledyne Controls for conformance and accuracy.

FAIRs are required to be complete, precise, and accurate.

First Article Inspection Report (FAIR)
and
Detail Form Requirements and Instruction

First Article Inspection Report (FAIR)

- **First Article Inspection Report (FAIR)** is a formal documentation of the first article inspection results.

- The FAIR is expected to contain the elements from the AS9102 Revision C Standard:
  - Form 1: Part Number Accountability
  - Form 2: Product Accountability
  - Form 3: Characteristic Accountability

- Teledyne Controls Form TCF1365 is available for use upon request. Request the form from the Teledyne Controls Buyer. When using TCF1365, remove the Teledyne Controls logo at minimum. TCF1365 may be used as an input to create a supplier owned internal FAIR form.

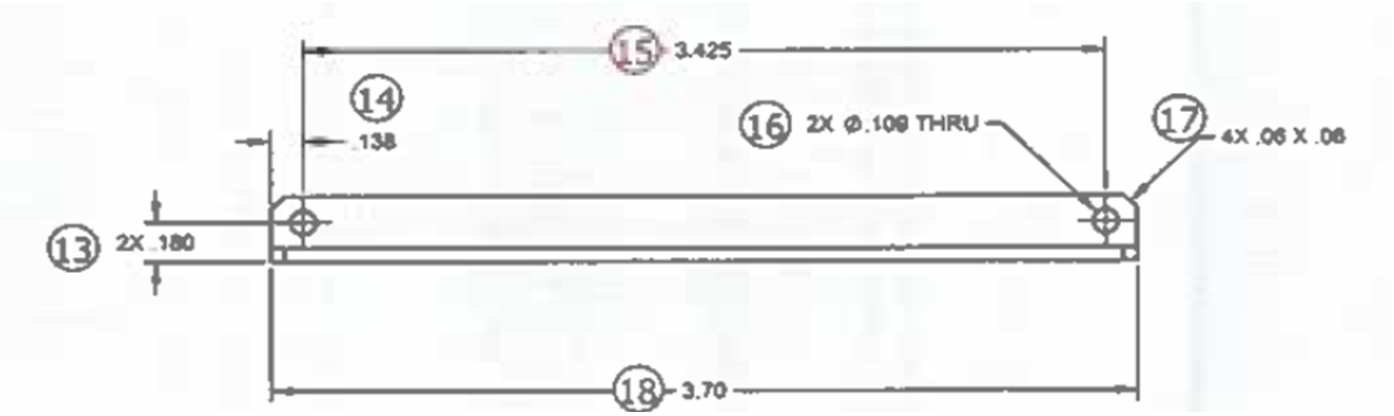
- The forms must be accompanied with all pertaining design data used during the FAI such as Ballooned Drawing, Parts List (PL), Specification Control Drawing (SCD), etc.

First Article Inspection Report (FAIR)

Design Characteristics (Ballooned Drawing or Source Control Drawing)

The Ballooned Drawing is a clear and uniquely identifier for each design characteristic. The unique identifier may be circled or bubbled on each applicable designed characteristic of the dawning for easy visual identification.

The design characteristic shall be documented in FAIR Form 3, Field 5 (Char No.) as a unique assigned number for each design characteristic or Bubble Drawing Number.
NOTE: A single design callout that applies to multiple characteristics may be recorded as one characteristic number.



Ballooned Drawing Example

FAI Forms Description and Instructions

This section provides the instructions to complete Form TCF1365. Each field is identified as:

- **(R) = Required:** This is mandatory information. These are depicted in **bold font**.
- **(CR) = Conditionally Required:** This field shall be completed when applicable to the product (e.g., serial number shall be entered when there is a serial number) or when required by the customer. These are depicted in ***bold italic font*.**
- **(O) = Optional** This field is provided for convenience; if the area is reserved for optional field, mark it "N/A". These are depicted in standard font.
    - For example: If Teledyne is conducting an FAI assembly, subassembly, or unit, the Purchase order Field should be marked N/A.

Important Notes for using the TCF1365 form:

- The FAI Form 2 & 3 has formulas for the part number, part name, serial number & FAIR Identifier. This information is automatically pulled from form 1. Make sure you're on Form 1 when you start typing or you will erase the formulas.

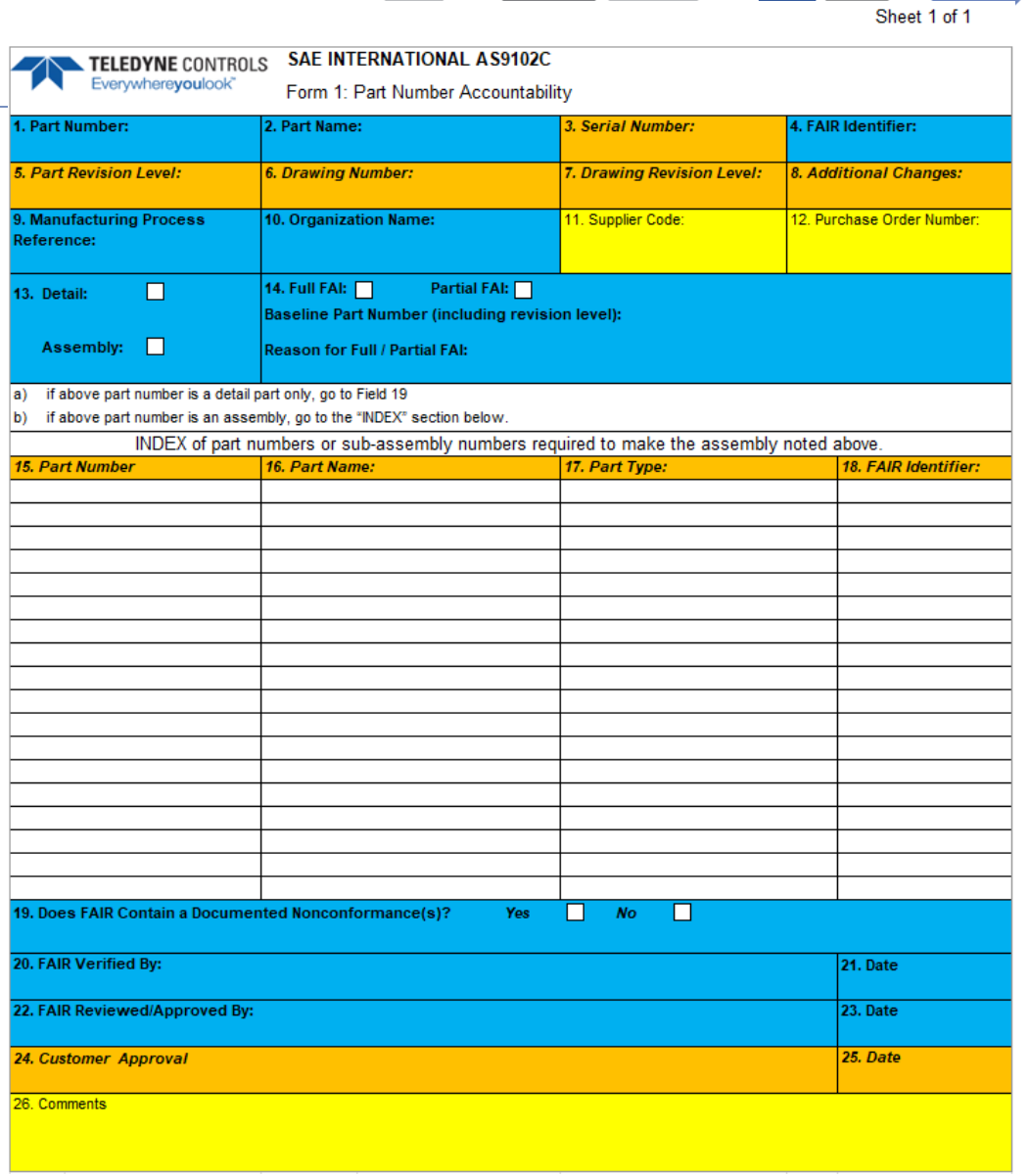
- Add or delete data entry rows as need for Form 1 #15-18, Form 2 #5-10, Form 3 #5-12.

Form 1 Instructions

- Fields highlighted in **BLUE** are Required Fields and completing them accurately is Mandatory.
- Fields highlighted in **ORANGE** are Conditionally Required Fields. They are to be completed when the information is applicable. If the information is not applicable, then enter "N/A".
  - For Fields 15-18, leave Blank for Detail Parts
- Fields in **YELLOW** are optional. If choosing to not populate an optional field, enter N/A.

Fields 1 thru 4 are repeated on all forms for convenience and traceability.

See next slide for detailed instructions.



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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 Reference:	10. Organization Name:	11. Supplier Code:	12. Purchase Order Number:

13. Detail: ☐ Assembly: ☐

14. Full FAI: ☐ Partial FAI: ☐
Baseline Part Number (including revision level):
Reason for Full / Partial FAI:

a) if above part number is a detail part only, go to Field 19
b) if above part number is an assembly, go to the "INDEX" section below.

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:

19. Does FAIR Contain a Documented Nonconformance(s)? Yes ☐ No ☐

20. FAIR Verified By:	21. Date
22. FAIR Reviewed/Approved By:	23. Date
24. Customer Approval	25. Date

26. Comments

FORM 1 INSTRUCTIONS

Field No.	Status	Instructions
1	**(R)Required**	Enter Part Number of Part or Assembly as shown on the Drawing or Source Control Drawing including full dash number configuration.
2	**(R)Required**	Enter Part Name of the FAI part. Use the name on the title block of the Drawing or Source Control Drawing.
3	***(CR) Conditionally Required***	Enter Serial Number of the part used for first article inspection, if applicable.
4	**(R)Required**	Enter a unique FAIR Number that identifies the First Article Inspection Report (FAIR).
5	***(CR) Conditionally Required***	Enter the part Revision from Drawing or Source Control Drawing.
6	***(CR) Conditionally Required***	Enter the Drawing Number from Drawing or Source Control Drawing.
7	***(CR) Conditionally Required***	Enter the Revision level of the drawing or document associated with the FAI part. Will be same as Field 5.
8	***(CR) Conditionally Required***	Enter N/A. Suppliers are not authorized to make changes without Teledyne approval.
9	**(R) Required**	Enter a Manufacturing Reference number that provides traceability to the manufacturing record of the FAI part.
10	**(R) Required**	Enter your Company name.
11	(O) Optional	Enter your Supplier Code from the Purchase Order (optional to be N/A).
12	(O) Optional	Enter the applicable Purchase Order Number for the First Article Inspection part delivery.
13	**(R) Required**	Check box for Detail FAI if the product does not have any assembly process. Detail parts my include processing for finishing. OR Check box for Assembly FAI if the product is produced by joining two or more detail parts, COTS, items, or sub-assemblies into one item.
14	**(R) Required**	(i) Check box for Full FAI OR Check box for Partial FAI. See Slide 8 for criteria. (ii) For "Baseline Part number": Full FAI: Enter N/A. Partial FAI: Enter the FAIR Number(s) of applicable Full and Partial FAIRs tracing back to the most recent Full FAI. (iii) For "Reason for Partial FAI": Full FAI: Enter N/A. Partial FAI: Enter the reason for Partial FAI. (e.g., Minor Change, Manufacturing Location Change).
15	***(CR) Conditionally Required***	Applicable for Assemblies: Enter the part number(s) included in the assembly.
16	***(CR) Conditionally Required***	Applicable for Assemblies: Enter the Name of the part in Block 15
17	***(CR) Conditionally Required***	Applicable for Assemblies: Enter the Part Type of the part in Block 15. (e.g., Detail Part, Sub-Assembly, Standard Catalogue Item, COTS)
18	***(CR) Conditionally Required***	Applicable for Assemblies: Enter FAIR Number of the part in Block 15. Enter "N/A" if not applicable for items such as COTS.
19	**(R) Required**	When a Nonconformances is documented in the FAIR Check " Yes " Box. Include document numbers for all applicable Deviations and Waivers.
20	**(R) Required**	Enter legible signature of the person completing the FAIR (unique identification/stamp is optional). Note: Electronic identification is acceptable.
21	**(R) Required**	Enter the date when field 20 was signed.
22	**(R) Required**	Enter legible signature of the person verifying the FAIR (unique identification/stamp is optional). Note: Electronic identification is acceptable.
23	**(R) Required**	Enter Date when field 22 was populated.
24	***(CR) Conditionally Required***	Teledyne FAIR reviewer will sign or leave field blank, as applicable. NOTE: Electronic identification is acceptable.
25	***(CR) Conditionally Required***	Teledyne FAIR reviewer will enter date or leave field blank, as applicable.
26	(O) Optional	Provide any supporting comments or clarifications if more space was needed for a prior field. Acceptable to leave blank or to enter N/A.

FORM 2 INSTRUCTIONS

- Fields highlighted in **BLUE** are required fields and completing them accurately is mandatory.
- Fields highlighted in **ORANGE** are Conditionally Required fields. They are to be completed when the information is available. If no information is available, then enter "N/A".
  - For Fields 5-10, leave Blank if no Material or Process Name is applicable
- Fields in **YELLOW** are optional and can be left blank or N/A as applicable.
  - For Field 7, it's preferred to enter "N/A" if a Material or Process Name is applicable and if no Code is applicable.

Data fields 1 thru 4 are repeated on all forms for convenience and traceability.

See next slide for detail instruction.

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Form 2: Product Accountability – Material, Special Processes, any 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. *Certificate of Conformance Number:*

11. *Functional Test Procedure Number:*	12. *Acceptance Report Number:*

13. Comments:

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FORM 2 INSTRUCTIONS

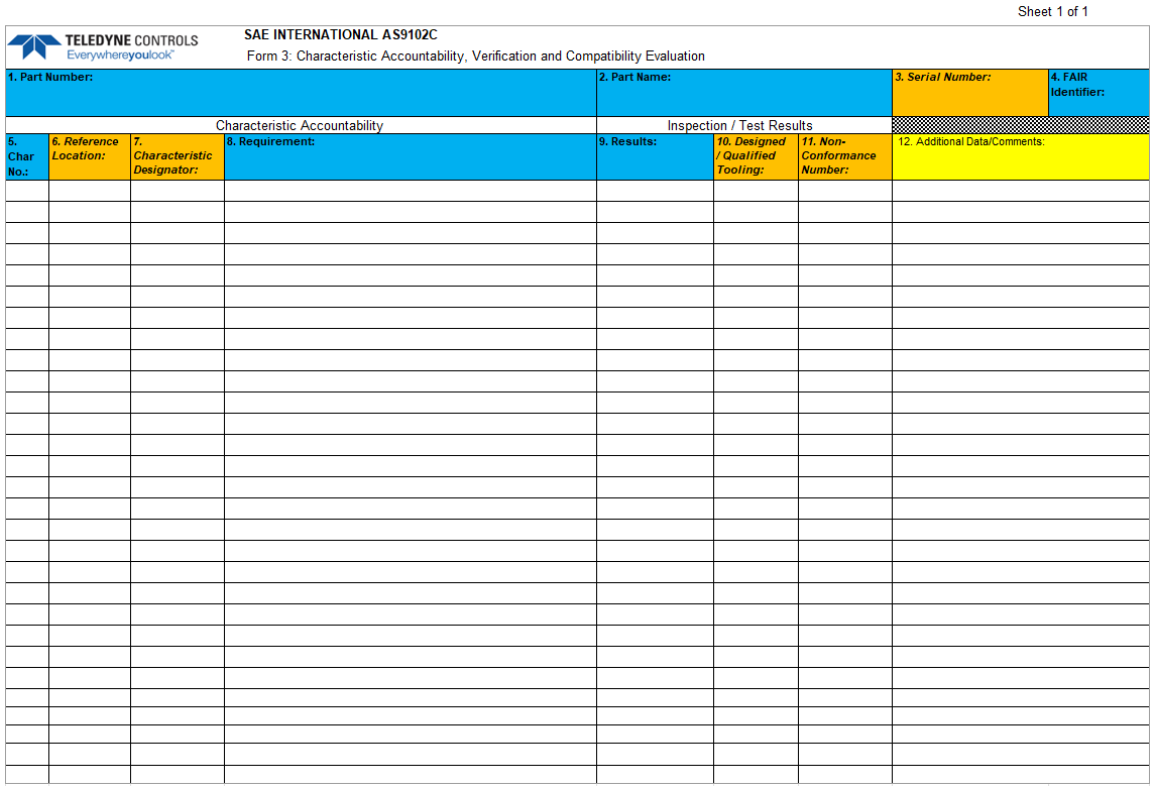
Field No.	Status	Instructions
1	**(R) Required**	Enter Part Number of Part or Assembly from Form 1.
2	**(R) Required**	Enter Part Name of the FAI part from Form 1.
3	***(CR) Conditionally Required***	Enter Serial Number of the part used for first article inspection from Form 1, if applicable.
4	**(R) Required**	Enter the unique FAIR Number that identifies the First Article Inspection Report (FAIR) from Form 1.
5	***(CR) Conditionally Required***	Enter the Name of applicable materials, modified COTS, or special processes. (e.g., raw materials, adhesive, solder, chemical conversion coating)
6	***(CR) Conditionally Required***	Enter the Specification Number: (i) Specification number, OEM product/part number (ii) Special process specifications; including class, if applicable, and permitted substitutions (iii) If standard catalogue items (e.g., fasteners) or COTS are modified (Altered Item Drawings or AIDs), then list that standard hardware or COTS item.
7	(O) Optional	Enter any code specified for the material or process. Enter N/A for lines with Field 5 entry. Leave blank if no materials or processes are applicable.
8	***(CR) Conditionally Required***	Enter the identify supplier name and address performing special processes or supplying material.
9	***(CR) Conditionally Required***	Indicate if the special process(es) or material sources are approved by the customer. Enter “Yes” if approved; “No” if approval is required, but process source is not approved; or “N/A” if customer approval is not required.
10	***(CR) Conditionally Required***	Enter the applicable certificate number (e.g., special process completion certification, raw material test report number, modified standard catalogue item compliance report number, traceability number).
11	***(CR) Conditionally Required***	Enter Functional Test Procedure number identified as a design characteristic (e.g., Acceptance Test Procedure (ATP), Production Test Procedure (PTP), Environmental Stress Screening (ESS), pull test). It is preferred to also enter the test procedure revision.
12	***(CR) Conditionally Required***	If the procedure or document number on Block 11 generates a unique report number, such as a test data sheet with unique number, enter it here, otherwise enter “N/A”.
13	(O) Optional	Provide supporting comments, as applicable.

FORM 3 INSTRUCTIONS

- Fields highlighted in BLUE are required fields and completing them accurately is mandatory.
- Fields highlighted in ORANGE are Conditionally Required fields and
- they are to be completed when the information is available. If no information is available, then enter “N/A”.
- Fields in **YELLOW** are optional and can be left blank or N/A as applicable.

Data fields 1 thru 4 are repeated on all forms for convenience and traceability.

See next slide for detail instruction.



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Form 3: Characteristic Accountability, Verification and Compatibility Evaluation

1. Part Number:				2. Part Name:			3. Serial Number:	4. FAIR Identifier:
Characteristic Accountability				Inspection / Test Results				
5. Char No.:	6. Reference Location:	7. Characteristic Designator:	8. Requirement:	9. Results:	10. Designed / Qualified Tooling:	11. Non-Conformance Number:	12. Additional Data/Comments:	

FORM 3 INSTRUCTIONS

Field No.	Status	Instructions
1	**(R) Required**	Enter Part Number of Part or Assembly from Form 1.
2	**(R) Required**	Enter Part Name of the FAI part from Form 1.
3	***(CR) Conditionally Required***	Enter Serial Number of the part used for first article inspection from Form 1, if applicable.
4	**(R) Required**	Enter the unique FAIR Number that identifies the First Article Inspection Report (FAIR) from Form 1.
5	**(R) Required**	Enter the unique assigned number for each design characteristic from Bubble Drawing. NOTE: A single design callout that applies to multiple characteristics may be recorded as one characteristic number.
6	***(CR) Conditionally Required***	Enter the reference location of the design characteristic. (e.g., drawing sheet and zone or page number and section)
7	***(CR) Conditionally Required***	Enter if applicable the characteristic type. (e.g., critical item, key characteristic, note, dimension)
8	**(R) Required**	Enter the specified requirement for the design characteristic. Start with drawing notes and specification requirements; continue with dimensions. Dimensions shall include the applicable tolerance. Include “Deleted/Removed” drawing notes.
9	**(R) Required**	Enter the results as followed: (i) If the requirement is a variable, enter the quantitative measurement obtained. (ii) If the requirement is an attribute or a go/no-go gauge is used, record results as “Accept/ Fail”. (iii) Additional information/comments can be entered in field 12 to support the results. (iv) For drawing notes with no measurement or output, enter “Conforms” or equivalent. For reference drawing notes, enter “Noted” or equivalent. (v) 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 shall be listed separately with the measured value noted.
10	***(CR) Conditionally Required***	When design tooling or specially designed tooling is used for acceptance of the characteristic, enter the tool name or description here. Record the tool identification number and calibration due date in Field 12.
11	***(CR) Conditionally Required***	For conforming characteristics, put “N/A”. If the characteristic is found to be nonconforming, enter the Rejection Report number or Deviation/Waver Number.
12	(O) Optional	This area is reserved for information listed above or optional content to support evidence of product conformance.