

GENERAL DYNAMICS Ordnance and Tactical Systems	ST. PETERSBURG, FLORIDA		
	SUPPLIER QUALITY CLAUSE		
TITLE ACCEPTANCE INSPECTION EQUIPMENT	QUALITY CLAUSE S8	REVISION 1	EFFECTIVE DATE JANUARY 11, 2024
Material and/or services supplied to purchase orders must be in accordance with all quality clause requirements and any additional requirements outlined on the Purchase Order.			

1.0 DEFINITIONS

- **Automated Acceptance Inspection Equipment (AAIE):** Equipment for which no (or minimal) human involvement is required in the acceptance determination. This would include equipment employing probes, sensors, and transducers, for example, which is automatically manipulated to perform measuring and detecting functions. If a read-out is provided, the equipment is categorized as automatic even if operator interpretation is needed in the accept or reject decision.
- **Acceptance Inspection Equipment (AIE):** All devices, including laboratory test equipment, used to measure, gage, test, inspect or otherwise examine items to determine compliance with specifications, drawings, and/or purchase order requirements. There are two types of AIE:
 - Government Designs - Government Special Inspection Equipment (SIE) which are detailed drawings furnished by the Government that normally describe all information necessary for the fabrication and use of the item of inspection equipment.
 - Contractor Designs that are required for all inspection equipment for which Special Inspection Equipment designs are not specified. They may include standard commercial equipment which the contractor proposes to use. (Standard commercial equipment is defined as unmodified equipment which is catalogued and available for purchase by the general public.) Contractor designs also include any drawings or special drawings of equipment required to be used with commercial equipment or with SIE designs. Tooling jigs, fixtures and such devices that may be used for inspection as described herein.
- **Gage:** A device or mechanism designed specifically for the acceptance or rejection of the dimensional features of parts.
- **Gage Tolerances:** Tolerances which are applied to gages in order to limit variations in size during the manufacture and use (wear tolerance) of the gages. The direction of the gage tolerance shall always be within the product limits.
- **Gaging Dimensions:** Dimensions which control the location and accuracy of precision gaging surfaces and, therefore, are of the utmost importance. It is imperative that these dimensions be carefully applied and accurately checked.
- **Standard Measuring Equipment (SME):** Common devices, such as calipers or micrometers which provide for a range of dimensional measurements.
- **Test Equipment:** Devices or mechanisms designed specifically for the purpose of appraisal or calibration of the functions, electrical aspects, mechanical properties or other phenomena exhibited by parts to be tested.

2.0 REFERENCES

- ANSI Y14.5M (As specified in the TDPL): Dimensioning and Tolerancing.
- ISO/IEC 17025 (Latest revision unless specified otherwise): International Standard, General Requirements for the Competence of Testing and Calibration Laboratories.
- ISO 10012 (Latest revision unless specified otherwise): International Standard, Measurement Management Systems – Requirements for Measurement Processes and Measuring Equipment.

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- MIL-A-70625 (Latest revision unless specified otherwise): Military Specification, Automated Acceptance Inspection Equipment Design, Testing and Approval, of.
- MIL-HDBK-204 (Latest revision unless specified otherwise): Design of Inspection Equipment for Dimensional Characteristics.
- AIA/NAS 410 (Latest revision unless specified otherwise): NAS Certification and Qualification of Non-Destructive Test Personnel.

3.0 PREFACE

This clause provides the requirements for AIE, AAIE, and the submission requirements that will be utilized by GD-OTS subcontractors or GD-OTS operating facilities to accept product in fulfillment of Purchase Order obligations. This clause contains AIE & AAIE requirements, the format, and content preparation instructions for the data product generated by the specific and discrete task required. This clause applies to all AIE/AAIE, including that which is used for acceptance inspections/tests at subcontractor(s) and sub-tier supplier(s).

4.0 PREPARATION INSTRUCTIONS/INFORMATION

- 4.1 Partial submission of AIE/AAIE designs is permissible and encouraged. The completion date for design review will be based on the date of final submission of designs and the required delivery schedule as stipulated in the Subcontract/ Purchase Order (PO).
- 4.2 When a revision is required to existing approved AIE/AAIE or to AIE/AAIE drawings, for any reason, approval by GD-OTS is required prior to implementation.
- 4.3 A composite inspection equipment matrix by component/sub-assembly part number shall be submitted along with the descriptive information detailed in Section 4.4 below, as appropriate. This matrix will include, as a minimum:
 - 4.3.1 PO number and Prime Contract number.
 - 4.3.2 Contractor name and address, along with the name and contact information of individual(s) responsible for preparation/review of AIE submission.
 - 4.3.3 Specification or Quality Assurance Provision (QAP) number, revision level and date, and amendment number (if applicable).
 - 4.3.4 Any Request for Variance (RFV), Engineering Change Notice (ECN), or Notice of Revision (NOR) if applicable to the component QAP or drawing referenced in the matrix.
 - 4.3.5 Drawing number and revision letter and date of the component being inspected.
 - 4.3.6 Classification of Defect (CD) numbers listed by paragraph number for all inspections of the relevant component/sub-assembly.
 - 4.3.7 Equipment used for each inspection, including any backup/alternate gages (brief description is acceptable, i.e., digital micrometer, height gage, force gage, custom functional gage, etc.).
 - 4.3.8 Gage ID number, drawing number, and revision level and date, for any non-standard test equipment as appropriate.
 - 4.3.9 Gage ID number, manufacturer, and model number of SME. Sufficient information to show

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that it is capable and accurate enough to perform the inspection (i.e., resolution, accuracy, linearity, etc.) shall be included.

- 4.3.10 Operating Instructions/Calibration Instructions (OICI).
- 4.3.11 Recall procedures, as applicable.
- 4.3.12 Any manuals or literature required to operate and maintain the system.
- 4.3.13 Personnel qualifications necessary to perform the inspection or operate the equipment.

4.4 Descriptive Documentation

- 4.4.1 Drawings or descriptions of AIE/AAIE shall be submitted electronically, in the subcontractor's format and, at a minimum, disclose design information sufficient to determine the adequacy and accuracy of the proposed equipment. All such submissions shall include:
 - a. Drawings with a unique number assigned to each design. Each original drawing, including Computer-Aided Design and Drafting (CAD) drawings, shall be dated and signed to verify technical content and adherence to applicable standards. At a minimum, each drawing will have signature blocks "Drawn By" and "Approved By". Each block must be signed by a different person.
 - b. Revisions to any design drawings shall be recognizable by a revision symbol, date, description, and signature or initial in the revision block area. The letters "I", "O", "Q", "S", and "Z" shall not be used in the revision symbol block.
 - c. The unit of measure specified on the drawing shall be utilized on the AIE/AAIE.
 - d. Drawings of equipment or gages that are inspecting features listed in the QAP are required to meet ANSI Y14.5M.
 - e. Additional information on the design of inspection equipment or gages can be found in MIL-HDBK-204.
- 4.4.2 For dimensional characteristic inspection (gages, SME, and set-ups):
 - a. Gaging dimensions, including gage tolerances.
 - b. Material, surface finish, and hardness requirements of gaging elements.
 - c. Manufacturer's specification sheet detailing gage capabilities of any standard measurement equipment to be incorporated in the design.
 - d. Operation, calibration, verification, and set-up instructions, where appropriate.
- 4.4.3 For physical characteristics (electrical, mechanical, nondestructive, environmental, etc.) of test equipment:
 - a. Layout of block diagrams showing overall equipment arrangement and interconnection, including the unit under test.
 - b. Details of adapters, cables, holding fixtures, etc., that may be required.
 - c. Schematics of test circuits and measuring circuits or devices, unless they are standard commercial items. GD-OTS reserves the right to determine what a "standard commercial item" is.
 - d. When test and measuring equipment is computer controlled: (1) The computer test program listing and flowcharts showing accept and reject limits and computer-generated test stimuli (as differentiated from computer controlled standard test equipment stimuli);

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- and (2) The calibration program listing for each item of computer-controlled test equipment and sample printout of an actual test and calibration.
- e. Identification (by manufacturer and model number) of any commercial devices to be incorporated in design.
 - f. Setup, operating, calibration and verification instructions. When test and measuring equipment is computer controlled, a printout of those operating and calibration instructions which are displayed for the operator.
 - g. Test plan to be used to qualify the accuracy of inspection and correctness of accept/reject decisions and actions.
 - h. Results of the test including sample record (e.g., printout) of normally generated test results.
 - i. A “checksum” of other identifying number for any computer program.
 - j. Maintenance procedures and spare parts list, where appropriate.
- 4.4.4 For AAIE designs that are extensive in nature (i.e., computer controlled, numerically controlled, multi-station, etc.) inspection equipment designs shall be submitted for approval in the order as follows:
- a. Concept design - Concept designs shall include, as a minimum:
 - 1) Sketches of the inspecting elements.
 - 2) Theory of operation including computer flow diagrams.
 - 3) Description of the calibration and verification standards to be used.
 - 4) Description of all fail-safe measures to be used (rejection of the unit under test if the tester fails).
 - 5) A draft AIE/AAIE acceptance test plan to be used to assure the accuracy of inspection and correctness of accept/reject decisions and actions.
 - b. Detail proposed design - Detailed proposal designs shall be submitted after concept approval and before any fabrication and shall include at a minimum:
 - 1) Drawings of the inspection elements.
 - 2) Drawings of the standards.
 - 3) Schematic/block diagrams of test and or measuring circuits where applicable.
 - 4) Identification by manufacturer and model number of any commercial devices to be incorporated in the design.
 - 5) Layout of the equipment.
 - 6) Set-up, operation, verification and calibration instructions.
 - c. To be submitted before performing test to quality AIE/AAIE:
 - 1) Final AIE/AAIE acceptance test plan.
 - 2) Computer program listings and revisions, a cross-reference between inspection requirements and related codes, and a flow diagram.
 - d. Final design - Final designs (to be submitted after detailed design approval, fabrication, and successful qualification) shall include, as a minimum:
 - 1) Results of the AIE/AAIE acceptance test including data generated, sample printout of test results (when normally generated), and calibration results.
 - 2) Design depicting the equipment as it was tested.

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- 3) Set-up, operating, verification, and calibration procedures.
 - 4) Computer programs, a cross-reference between inspection requirements and related codes, and flow diagrams.
 - 5) Maintenance procedures and spare parts lists where appropriate.
- e. Automated Acceptance Inspection Equipment (AAIE):
- 1) Submission of AAIE will be in accordance with MIL-A-70625.
 - 2) Approval of the AAIE shall occur in three phases. The first phase will be the design phase. In this phase, designs, either conceptual or detailed, will be submitted for evaluation. Design approval will authorize the subcontractor to proceed with fabrication of the AAIE. The second phase is an acceptance test conducted by the subcontractor at the equipment manufacturer's facility. The third phase will be the equipment evaluation phase, defined as AAIE Prove-Out. During this phase, an acceptance test will be conducted. Final approval of the inspection system will be contingent upon the performance of a successful test. A plan defining the requirements of an acceptable test will be prepared by the subcontractor and submitted for approval. The test will be witnessed by GD-OTS personnel and its customer, as applicable.
 - 3) The AAIE shall accept only conforming material. All characteristics requiring AAIE shall utilize inspection equipment with a minimum demonstrated reliability of 99.8% at a 90% confidence level to detect non-conforming material, unless otherwise specified.
 - 4) AAIE shall utilize failure safe designs whereby the decision-making logic and the material handling devices shall normally operate in a reject mode until an accept mode signal is obtained. AAIE shall be qualified IAW MIL-A-70625. AAIE designs which inspect for metallic contamination of the propellant and utilize eddy current/magnetic inspection are exempt from the requirement to operate in the reject mode until an accept signal is obtained. AAIE designed for inspection of a primer body which utilizes eddy current inspection is exempt from the requirement to operate in the reject mode until an accept signal is obtained.
 - 5) When a verification standard fails, and there is no plan to resolve the failure within the AAIE prove out plan, GD-OTS must be notified immediately. An investigation needs to be performed to determine possible root causes of the failure, then identify the corresponding corrective preventative actions. The results of the investigation must be submitted and approved by GD-OTS.

4.4.5 Tool control as a form of inspection will require as a minimum:

- a. Measurements of form tools (punches, dies, molds, etc.) and correlation data between tool dimension and component dimension.
- b. Inspection frequency and gages used to measure the form tooling.
- c. Process control parameters that affect the component dimension.
- d. Procedures for tool control inspection including out of tolerance tool control dimension procedures, corrective action plans, and segregation of product since last successful inspection.

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- 4.4.6 When 100% inspection is specified, non-operator dependent evaluation equipment should be utilized if/when possible.
- 4.4.7 SME shall be fully described by manufacturer catalog listings, part numbers, model numbers, or other means which provide sufficient information to permit identification and evaluation by GD-OTS and may include illustrations and engineering data along with sufficient information to show that it is capable of performing the inspection. Any modifications to commercial equipment will be documented and submitted for approval in accordance with section 3.5 above. This would include, for example, replacing the standard probe on a dial indicator with a custom probe for inspection of a specific feature.
- 4.5 The subcontractor shall apply a unique identification number to all inspection equipment. The number shall provide positive identification of particular items and permit ready differentiation between like gages or inspection equipment.

5.0 REQUIREMENTS

AIE/AAIE designs shall include sufficient information to permit accurate and timely evaluation by GD-OTS and its customer, if applicable.

Should the subcontractor choose to “roll-over”, or submit previously approved AIE/AAIE designs on the current contract, they shall submit the following to GD-OTS:

- A copy of the previously approved AIE listing
- Any approval documentation associated with the AIE list
- A cover letter with the submission detailing the contract of the previously approved AIE and the current contract for which it is to be applied. As well as a statement on the cover letter ensuring there have been no equipment changes since the last approval.

Prior approval of AIE/AAIE on other contracts does not guarantee roll-over approval of AIE/AAIE on this subcontract. Approval of all AIE/AAIE is required prior to production and/or First Article Acceptance Test (FAAT).

In accordance with ISO/IEC 17025, ISO 10012, or as delineated in the Subcontract/PO, the subcontractor shall maintain a documented system for the identification and approval of AIE/AAIE and shall perform periodic inspections of all acceptance inspection equipment in order to detect deficiencies before wear or tolerance limits are exceeded. The results of all calibration performed shall be documented on the gage record or electronically at the time the inspection is performed.

GD-OTS reserves the right to re-qualify any previously qualified AIE/AAIE used for the performance of this subcontract at any time throughout the life of the subcontract. GD-OTS reserves the right to disapprove at any time the use of any AIE/AAIE not meeting the subcontract requirements.

Qualification and Certification of Non-Destructive Testing (NDT): Personnel operating NDT AIE/AAIE in support of this subcontract shall be certified and qualified in accordance with AIA/NAS 410.

The contractor shall assure critical processes using AIE/AAIE are robust in design such that product and performance are relatively insensitive to design and manufacturing parameters. A robust design anticipates changes and problems.

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An inspection/verification system shall be employed that will verify the robustness of critical processes. Maximum use should be made of AAIE to accomplish verification of product quality. Mistake proofing technique of material handling and inspection systems are strongly encouraged.

6.0 APPROVAL PROCESS

When GD-OTS does not agree with the proposed gage design or inspection method, GD-OTS will provide a listing with the corrective action(s) required by subcontractor.

When the review/approval requirements vary, the Special Instructions within the Subcontract/PO shall take precedence.

The record of AIE/AAIE approval must be maintained on file by the subcontractor and is subject to audit by GD-OTS and/or the GD-OTS customer. The subcontractor shall provide their local DCMA office with a copy of all AIE/AAIE approvals, as applicable. These approval records shall always be readily available.

Any AIE/AAIE drawing, including unlisted characteristics shall be available to GD-OTS and/or the GD-OTS customer for review upon request.

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7.0 QUALITY CLAUSE DELIVERABLES (QCD)

Microsoft Office or PDF formats are preferred. All subcontractor data submittals shall be in English. These data items shall be submitted to GD-OTS in accordance with the QCD as indicated below. The method of submission to GD-OTS St. Petersburg is specified in the General Supplier Quality Clause "S1" located on GD-OTS's Supplier Portal <https://www.gd-ots.com/suppliers/quality-clauses/> under GD-OTS St. Petersburg, FL. **Unless otherwise agreed upon, deliverables required within this QCD contain CUI and must be marked and transmitted in accordance with DoDI 5200.48, "Controlled Unclassified Information (CUI)."**

NO.	TITLE	CUI	GD-OTS APPROVAL REQUIRED	SUBMITTAL TIMING/FREQUENCY
S8-1	AIE/AAIE Plan	Yes	Yes	Unless otherwise directed in the Subcontract/PO or Special Instructions document provided by GD-OTS; QCD is due 120 days after PO acceptance or 30 (CONUS) or 100 (OCONUS) calendar days prior to production, FAAT, or PCA, whichever comes first.
S8-2	AAIE Prove-Out Report	Yes	Yes	Unless otherwise directed in the Subcontract/PO or Special Instructions document provided by GD-OTS; The AAIE Prove-Out Report is to be submitted within 7 calendar days of Prove-Out completion.

8.0 REVISION HISTORY

REV	DATE	CHANGE
0	06/09/2023	ECN23315-Initial Release
1	01/11/2024	CUI Updates