

QCS-4A, January 2019
SUPERSEDES
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GENERAL DYNAMICS
LAND SYSTEMS DIVISION

QUALITY TEST SPECIFICATION

QCS-4A

FOR

CONTROL TEST

REQUIREMENTS FOR TESTING COMPONENTS

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GENERAL DYNAMICS LAND SYSTEMS DIVISION
QCS-4A CONTROL TEST DEFINITION

Requirements for Testing Components

1. DEFINITIONS

1.1. Technical Data Package (TDP)

Dimensional, material, process, environmental, inspections and performance requirements as specified by: the drawing, Quality Assurance Requirement (QAR), Quality Assurance Provision (QAP) document, GDLS specification, military specification, or commercial specification.

1.2. Control Test.

(CT) Periodic testing, including environmental and endurance tests, conducted to verify that the material, processes, tooling, equipment, techniques, standards, personnel and controls used to produce the First Article samples, which received First Article Approval, continue to produce components that meet the TDP Requirements. Control Tests are normally non-destructive, so material can still be used after testing.

1.3. First Article Sample.

A production component submitted as being representative of a specific process using production tooling, equipment, methods, technique, standards, personnel and controls.

1.4. Test Procedure

A document containing the test program methodology for meeting the performance and environmental requirements of the TDP and the GDLS purchase order.

2. APPLICABLE DOCUMENTS

2.1. Government Documents

MIL-HBK-831 - Preparation of Test Reports

MIL-STD-45662 - Calibration System Requirements

3. GENERAL BID REQUIREMENTS AND OPTIONS

The bidder shall include the following requirements, as a minimum, with the Request for Quote (RFQ):

3.1. Control Testing Costs

The entire CT program including: hardware, fixtures, test procedure development and test report preparation shall be costed individually, and separately from the cost of production hardware.

3.2. Test Facilities

Facilities performing CT shall be identified in the quote by facility name, location, contact, and phone number, if known during the RFQ response. Otherwise, the facility information shall be provided no later than 30 days after selecting the facility.

3.3. GDLS Bid Options

GDLS may competitively bid control testing based on geographic location, scheduling, qualifications, and price. Control tests will be performed by the winning bidder.

3.4. Disposition of Fixtures and Equipment Procured for Test Conductance

3.4.1. Identification of Property

Unless required for production test or acceptance test, all test fixtures and ancillary equipment purchased or charged to this contract will be identified as property of the United States Government with brass tags.

3.4.2. Test Fixture and Equipment Maintenance

Except as otherwise expressly provided under this document, the Contractor is responsible for the maintenance and calibration of all inspection and test equipment necessary to assure that supplies and services conform to contract requirements.

3.4.2.1. Commercial, modified commercial, or supplier designed inspection or measuring set ups must be capable of repetitive measurements to an accuracy of 10 percent of the component tolerance. ***If this degree of accuracy cannot be obtained, contact QE&T for disposition.***

3.4.2.2. Calibration of inspection and test equipment shall be in accordance with MIL-STD-45662.

3.4.2.3. A log of instruments and equipment utilized during the entire test program shall be maintained and kept on file at the supplier.

3.4.3. Test Equipment Usage

Unless written approval is provided by GDLS, test equipment furnished by GDLS shall be utilized solely for the tests specified in this contract.

3.4.4. Test Fixture and Equipment Disposal

When test equipment is no longer necessary to support the test program, it will, upon request, be sent to GDLS.

4. PROCEDURE AND FACILITY

4.1. Test Procedure

The supplier shall develop a test procedure based on the TDP control test requirements. GDLS QE&T may request a copy of the test procedure for review prior to the start of the first CT. Questions concerning the test procedure should be forwarded to the QE&T department at the address/phone numbers shown below:

General Dynamics Land Systems
38500 Mound Road
Sterling Heights, MI 48310-3200
Attn.: QE&T Dept., MZ 436-30-44
Telephone: Theresa Burkhart (586) 825-4054, or
Mike Nasser (586) 825-5774

4.2. Government Monitoring

Government representatives have the right to monitor any facet of the testing. If directed by the Government Representative, purchase orders must include government delegation. The Government Representative will give the laboratory a minimum of one week notice to permit scheduling of monitoring activities.

4.3. Test Equipment and Facility Approval

All test set-ups, equipment, lab procedures, and data sheets are subject to approval by GDLS QE&T prior to start of testing.

4.3.1. Automatic Test Equipment (ATE)

4.3.1.1. ATE Validation.

ATE equipment and software used to perform testing will be validated by GDLS prior to its incorporation in the test program. No change to the ATE hardware or software can be made without prior approval of GDLS. A revalidation of the changes made to either the software and/or hardware may be required by GDLS.

4.3.1.2. ATE Software

ATE software must be tracked with a configuration management system, which includes a document number, revision level, revision date, method of change documentation and change approval cycle. The software revision level must be identified in the final test software report.

4.3.1.3. ATE Data Printout

When actual values are not feasible, pass/fail entries shall be acceptable when accompanied by GDLS approved calibration/validation certifications which verify the integrity of hardware and ATE software as it relates to all parameters under test, their specification limits, and resultant input/output values.

5. TEST METHODOLOGY/DOCUMENTATION REQUIREMENTS

5.1. Control Tests can be performed in any order to best meet the test schedule, as long as:

5.1.1. Baseline performance tests are performed for all control testing called out in the TDP.

5.1.2. Endurance or durability testing (i.e.: Vibration and Shock Tests) must be performed after all other specified environmental testing (i.e.: High Temp, Low Temp, and Humidity) is complete.

5.1.3. Performance testing is required before and after environmental, endurance, or durability testing. Performance tests are not required between environmental tests for control testing.

5.2. Test, and measuring equipment accuracy and calibration shall be in accordance with paragraph 3.4.2 of this document. A list of test equipment used for control testing shall be maintained and kept on file at the supplier.

The list shall include the following:

- Item Description
- Manufacturer
- Model Number
- Ranges
- Accuracy
- Calibration Dates (Last and Next Due)

5.3. Unless otherwise specified by the TDP, all performance, dynamic and endurance/durability tests shall be conducted under the following conditions:

Air Temperature	73 ± 18°F
Barometric Pressure	28.5 (+2.0, -3.0) inches of mercury
Relative Humidity	50 ± 30%

These conditions shall be recorded prior to the start of each test specified above.

- 5.4. Unless otherwise specified by the TDP, the tolerances maintained at the control sensor during environmental testing shall be within those specified in paragraph 1.2 of ATPD-2167 (Environmental Test Methods, M1 Tank Program) or paragraph 3.1.2 of MIL- STD-810 (Environmental Test Methods) as applicable.
- 5.5. In the event of a conflict of test requirements, tolerances, or methods within the TDP, the order of precedence shall be as follows: Component (Army Ordnance) Drawing, Product Fabrication Specification, QAR or QAP, Military Standards/Specifications. The supplier shall notify the GDLS Buyer/subcontract administrator in writing when a TDP conflict exists.
- 5.6. Data sheets for all performance tests must include actual recorded values for all inputs and outputs specified by the TDP. Recordings of "pass", "fail" or "OK" without actual data are not acceptable, unless authorized by GDLS QE&T. Data sheets shall be in accordance with paragraph 2.1 of this document.
- 5.7. Test setups, and instrumentation utilized for environmental testing shall be capable of obtaining the following data to document and demonstrate that environmental exposure meets TDP requirements and tolerances.
 - 5.7.1. Temperature Testing

A legible, reproducible record of time versus temperature throughout the storage and operational periods. Records shall be annotated with the part name and number, date of test, point at which storage and operational tests start and finish, explanation of temperature profile anomalies, and signature or stamp of test personnel.
 - 5.7.2. Humidity Testing

Continuous, legible, and reproducible records of time versus temperature, and relative humidity level for elevated humidity, and conditioning cycles. Recording equipment resolution shall be in accordance with paragraph 3.4.1 of ATPD-2167 or paragraph 2.1 of MIL- STD-810, Method 507.1. Charts shall be annotated as indicated in 5.7.1.
 - 5.7.3. Vibration Testing

Legible and reproducible logarithmic plots of acceleration versus frequency from the input accelerometer for at least one sweep in each axis. When performance tests are required during vibration exposure, they shall be performed once in each axis. When the TDP requires monitoring for intermittent operation during vibration, a legible, appropriately annotated record of continuous monitoring of the test must be captured.
 - 5.7.4. Shock Testing

Legible, reproducible photographs or computer plots of calibration pulses and actual test sample pulses shall be generated. Recordings of the calibration pulses and actual test sample pulses for one drop in each direction of each axis must be included in all test reports and maintained on file. The recordings must be of sufficient quality to

demonstrate compliance with the shock pulse tolerance envelope specified by the TDP. When the TDP requires monitoring for intermittent operation during shock, a legible record of continuous monitoring during all shock pulses must be captured and appropriately annotated.

When testing is performed using a computer controlled electro-hydraulic or electro-mechanical shaker system the following applies:

- 5.7.4.1. The actual test item may be used for calibration waveform, if the hardware in use is accessed for the effect of equalization.
- 5.7.4.2. When more than one axis and shock level is required for test, it is acceptable to perform the tests on a "per axis" basis. "Per axis" is defined as performing all levels of shock in one axis, followed by the remaining two axes.
- 5.7.4.3. When shock pulse waveform is used for testing, and the pulse shape deviates from the classical waveform testing must stop. GDLS, QE&T must review the recordings before testing can continue.

6. GENERAL SUPPLIER RESPONSIBILITIES

6.1. Responsibility for Technical Requirements

The supplier may hire an independent laboratory to perform testing. The supplier is responsible for providing the independent laboratory with all the technical documentation it requires to perform the test.

6.2. Laboratory Technical Support by Supplier

The supplier is responsible for providing an independent laboratory selected by GDLS with all the technical documentation it requires to perform the testing.

6.3. Failure Analysis

The supplier is responsible for the failure analysis of its own components. GDLS controls final disposition of failed components.

6.3.1. Hardware Disposition

GDLS may reject any part or the entire lot of material for a test failure of a sample from the lot. GDLS may reject production material until corrective action for the failure is provided, incorporated, and verified.

7. TEST SAMPLE

7.1. Sample Selection

A GDLS Quality representative will select the sample(s) to be tested. The sample will represent the lot it comes from. Once the samples are selected for testing, no repair, adjustment, or modification of the sample or lot is permitted without GDLS approval.

7.2. Disposition of Test Sample

Unless otherwise specified, Control Test samples are considered usable production hardware. **No test samples are allowed back in production without written approval from the GDLS quality representative.**

8. TEST SCHEDULE

The schedule for performance of control tests stated in the purchase order shall be followed unless GDLS Quality Test department approves the change. This schedule is based on the product delivery schedule and testing requirements specified in the product Technical Data Package (T.D.P.).

9. LOT FORMATION

- 9.1. Suppliers will base lot formation on the purchase order delivery schedule.
- 9.2. Lot formations are determined by production delivery dates and quantities specified in either the product fabrication specification, QAR, QAP, or military specification.
- 9.3. The supplier must review any changes to the delivery schedule for impact to the CT schedule. The supplier is responsible for the cost of additional CTs, if they caused the delay that triggered the need for the additional testing.
- 9.4. Lots of material represented by samples that pass CT are approved to ship under any contract, unless the particular contract specifies otherwise.
- 9.5. The CT is not required when the production delivery quantity is less than half of the CT frequency quantity. The remainder of the order will be covered by the last CT.
- 9.6. If the delivery dates or quantities change, control test lots will be reformatted accordingly.

10. TEST MONITORING

- 10.1. GDLS, and the Government reserves the right to be present at and monitor any part of the required control tests.
- 10.2. Monitoring includes activities like: reviewing test set-ups, witnessing tests, and participating in failure analysis activities.
- 10.3. GDLS has the right to audit the facilities used in the manufacture and assembly of the components under test.

11. TEST FAILURES

- 11.1. A test failure occurs when:
 - The sample does not conform to the TDP requirements.
 - The sample sustains physical damage due to the test procedure.
 - GDLS has the final say in whether a test failure occurred.
- 11.2. All failures must be reported to GDLS QE&T by telephone within 1 working day. Telephone notification must be followed by written notification within 2 working days.
- 11.3. Test/Hardware Disposition
When a failure occurs the laboratory must stop all activity until GDLS QE&T approves.
 - Do not continue testing
 - Do not disassemble the test set-up
 - Do not disassemble the sample.
 - Maintain phone contact with GDLS QE&T for failure analysis.

11.4. Flash Report

GDLS QE&T will initiate, and forward to the supplier, a Flash Report containing the status of the test failure, its effect on production hardware shipments, direction for failure analysis, and next step instructions.

11.5. Supplier Failure Analysis

The supplier must submit a written report within two weeks of GDLS' authorization to proceed with the failure analysis. The report must contain root cause, proposed corrective action, and verification tests. The report format is at the supplier's option. This report requires GDLS QE&T approval prior to Flash Report closeout.

11.5.1. Failure Analysis at the Supplier

GDLS reserves the right to be present at the supplier's facilities to observe during failure analysis.

11.5.2. Failure Analysis Method and Location

GDLS reserves the right to select the method and location of failure analysis.

11.5.3. Supplier Responsibility

The supplier shall be responsible for all failure close out actions, re-inspection, and retest when the failure is deemed to be the supplier's responsibility (all activities that are non-T.D.P. related unless the supplier has control of the T.D.P.). These responsibilities will include, but not limited to:

- Test facility charges (i.e., additional test, retest, etc.)
- Implementation of corrective action.
- Replacement of test samples if required.
- GDLS failure analysis on repeat test failures occurring after corrective action incorporation (i.e., travel expenses, man-hours, etc.)

12. CONTROL TEST CERTIFICATION

- 12.1. Upon successful completion of the Control Test, the supplier's authorized representative will submit a "Certification of Control Test Completion" (See Attachment A).

Supplier must maintain test data and records, regardless of test location, as a part of the complete project file, for a period of five years from the completion of the test program. The file will be kept complete and available to GDLS, and the Government. Test data and records must contain the data indicated in paragraph 13.2. ***A formal report in MIL-HBK-831 format is not required.***

- 12.2. Upon receipt of "Certification of Control Test Completion", GDLS QE&T will issue a test approval letter (see attachment B).

13. INVOICE PAYMENT

- 13.1. Invoices for the control test will be approved for payment upon written approval of the control test certification.

GENERAL DYNAMICS
Land Systems

QCS-4A
January 2019
Attachment A

SUPPLIER CONTROL TEST CERTIFICATION

Supplier Name _____

Address _____

Part Name _____

Part No. _____

GDLS Purchase Order No. _____

GDLS (Ordnance) Drawing No. _____

Rev. _____ Dated _____

Assembly Specification* No. _____
(* Product Fabrication Specification, QAR, QAP, Military Standard)

Rev. _____ Dated _____

Control Test Lot No. _____ of _____

Lot Dates _____ to _____
(Mo/Yr) (Mo/Yr)

Lot Qty. _____ Sample S/N _____

First S/N of Lot _____

Supplier Test Report No. _____

Dated _____

Name of Test

QAR/QAP/Spec Paragraph Reference

Signature

Title

Date

GENERAL DYNAMICS LAND SYSTEMS DIVISION TEST PROGRAM APPROVAL		
Supplier <div style="border: 1px solid black; height: 80px; width: 100%;"></div>	PART NUMBER _____ PART NAME _____ DWG. REV. _____ P.O. _____ W/ECF _____	
AS OF THIS DATE _____ YOUR FACILITY IS HEREBY NOTIFIED OF THE FOLLOWING STATUS.		
<input type="checkbox"/> FIRST ARTICLE TEST (FAT) APPROVAL HAS BEEN GRANTED BY		
<input type="checkbox"/> CONTROL TEST APPROVAL IS GRANTED FOR:		
HARDWARE NOW APPROVED THRU: _____ (Applies to Control Test only) LOT # _____ DATE _____		
REFERENCE ASSEMBLY AFFECTED:		
PART NO: _____ PART NAME: _____		
PURCHASE ORDER NO: _____		
LOT # _____ THRU DATE: _____		
DISTRIBUTION: BUYER _____ SUPPLIER _____ SQA SQA MAIL 436-30-44 TLH QUALITY D. JETER 444-00-00		
		MIKE NASSER or THERESA BURKHART GDLS QUALITY ENGINEERING & TEST
		SPI Extension <input type="checkbox"/>
<input type="radio"/> M1A1 <input type="radio"/> M1A2 <input type="radio"/> COMMON <input type="radio"/> M60		