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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
Requirements for Testing Components**

1.0 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 and/or military / commercial specification.

1.2 Control Test Periodic environmental and/or 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, C.T., are normally non-destructive allowing for shipment/use after test approval)

1.3 First Article Sample A production component (s) 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 technical data package and the GDLS purchase order.

2.0 APPLICABLE DOCUMENTS

2.1 Government Documents

MIL-HBK-831	Preparation Of Test Reports
MIL-STD-45662	Calibration System Requirements

3.0 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

Individual costing for the entire Control Test Program including hardware (as applicable), fixtures, test procedure development and test report preparation, shall be quoted separately from cost of production hardware.

3.2 Test Facilities.

Facilities to be utilized in performance of the Control Test, if known at the time of the Request For Quote (RFQ) response, shall be identified in the quotation, giving the facility name, location, contact, and phone number. If the above information is not known at the time of the RFQ response, it shall be provided no later than 30 days after receipt of the Control Test requirement notification, by activation of a purchase order line item requiring final test certification submission to GDLS.

3.3 GDLS Bid Options

It is GDLS's option to obtain competitive bids for Control Testing and to have such testing performed by another independent test laboratory. This bidding will be based on geographical location, scheduling, qualifications, and price. GDLS may then elect to remove testing from the assigned supplier.

3.4 Disposition of Fixtures and Equipment Procured for Test Conductance

3.4.1 Identification of Property All test fixtures and ancillary equipment, not otherwise required for production and/or acceptance test, purchased or charged to this contract will be identified and brass-tagged as the property of the United States Government, and shall be purchased under a separate GDLS tooling contract.

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. 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 Quality Engineering & Test for disposition. Calibration of inspection and test equipment shall be in accordance with MIL-STD-45662. A log of instruments and equipment utilized during the entire test program shall be maintained and included within the final test report.

3.4.3 Test Equipment Usage GDLS furnished test equipment shall be utilized solely for the tests specified in this contract unless written approval is provided by GDLS.

3.4.2 Test Fixture and Equipment Disposal This equipment will be sent to GDLS at upon request, when it is no longer necessary to support the test program.

4.0 PROCEDURE AND FACILITY

4.1 Test Procedure

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

General Dynamics Land Systems
38500 Mound Road
Sterling Heights, MI 48310-3200
Attn.: Quality Engineering & Test Dept., MZ 436-30-44

Telephone: (586) 825-4054, or (586) 825-4424
FAX: (586) 825-4714

4.2 Government Monitoring

Government representatives shall have the right to monitor any and all facets of the testing. Contracted laboratories must have Government delegation included in their purchase orders if so directed by the Government representative. A minimum of one (1) week notification of the test start is to be provided to the Government representative 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 Quality Engineering & Test prior to start of testing.

4.3.1 Automatic Test Equipment (ATE)

4.3.1.1 ATE Validation. ATE equipment and/or software will be validated by GDLS prior to its incorporation in the test program. No change to the ATE hardware and/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 Data Printout When actual values are not feasible, pass/fail entries shall be acceptable when accompanied by GDLS approved calibration/validation certifications which verifies the integrity of hardware and ATE software as it relates to all parameters under test, their specification limits, and resultant input/output values.

4.3.1.3 ATE Software ATE controlling software must be under the control of a configuration management system, which includes a document number, revision level, method of change documentation and change approval cycle. Software configuration level must be identified in the final test report.

5.0 TEST METHODOLOGY/DOCUMENTATION REQUIREMENTS

5.1 Control Tests may be performed in any sequence to best facilitate timely completion of testing, within the following stipulations:

A. Baseline performance testing must be completed for all performance tests (specified for Control Testing) as required by the applicable Technical Data Package (TDP).

B. When endurance or durability testing is required, it must be performed after all other specified environmental testing is complete. Performance testing may be required during or after endurance/durability testing.

C. Performance testing is required as a baseline test prior to environmental/endurance/durability testing, during environmental exposure (as required by the TDP) and at the conclusion of all environmental/endurance/ durability testing. Performance tests are not required between environmental tests for Control Testing.

5.2 Test equipment 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 included in all final test reports. 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 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, unless otherwise specified by the TDP.

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 upon determination that a TDP conflict exists.

5.6 Data sheets for all performance tests must include recorded values for all inputs (as well as resultant outputs) specified by the TDP. Actual data, which demonstrates conformance to the TDP values and tolerance, is required. Recordings of "pass/fail" or "OK" without actual data are not acceptable, unless otherwise authorized by GDLS Quality Engineering & Test (reference paragraph 5.4.1 of this document). Data sheets shall be in accordance with paragraph 5.1.2 of this document.

5.7 The 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 (i.e., circular chart, strip chart, data logger recording) of time versus temperature throughout the storage and operational periods. Charts/recordings shall be annotated with the part name/number, date of test, point at which storage/operational tests start and complete, explanation of temperature profile anomalies and signature or stamp of test personnel.

5.7.2 Humidity Testing Continuous, legible and reproducible records (i.e. circular charts) 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 6.7.1 above.

5.7.3 Vibration Testing. Legible, reproducible logarithmic plots (i.e., "x-y" plotter or computer-generated) of acceleration versus frequency from the input accelerometer for at least on sweep (i.e., 5-500-5 hertz) 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 record of continuous monitoring throughout the test (e.g. strip chart recorder) must be obtained and appropriately annotated.

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 maintained on file and/or included in all test reports. The recordings must be of sufficient size and resolution 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 (e.g. strip chart recorder or oscilloscope recordings) must be obtained and appropriately annotated. The shock testing methods contained in ATPD-2167 and MIL-STD-810 are based on the use of free-fall or pneumatic drop test equipment. When testing is performed using a computer controlled electro-hydraulic or electro-mechanical shaker system the following applies:

5.7.4.1 Use of a dummy test sample or simulated load to achieve the required calibration wave-form may be impractical when equalization is necessary. The actual test item may be used to produce the calibration waveform provided the effect of equalization to the hardware under test is assessed.

5.7.4.2 When more than one axis and shock level is required for test (i.e., Basic, Gunfire, Ballistic), 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 The shock pulse waveform recording requirements remain the same as those specified for free fall/pneumatic methods. Every effort to ensure the shock pulse waveforms fall within the specified tolerance envelope shall be made. Constraints due to limited total shaker displacement may cause the pulse shape to deviate from the required tolerance envelope for the classical waveform. When this occurs, the waveform recordings must be reviewed/approved by GDLS Quality Engineering & Test prior to continuing testing.

6.0 GENERAL SUPPLIER RESPONSIBILITIES

6.1 Responsibility for Technical Requirements

Should the supplier decide to perform all or part of these test requirements at an outside contracted laboratory, the supplier is responsible to provide the laboratory with all the technical documentation required to perform the test, including but not limited to the test procedure, drawings, specifications, QAPs, QARs, Engineering Change Proposals (ECP's), Change Requests (CR's), waivers and/or deviations.

6.2 Laboratory Technical Support by Supplier

The supplier shall support all tests performed at any independent laboratory. The selection of an independent lab by GDLS does not relieve the supplier of any of its responsibility for his product's performance during these tests.

6.3 Failure Analysis

The supplier will have full responsibility for any failure analysis required on his components that fail tests. Final disposition shall be the sole judgment of GDLS.

6.3.1 Hardware Disposition

Failure of a test sample to meet the requirements herein as a result of Control Testing shall be cause for rejection of the assembly and the lot it represents. The procuring activity may refuse acceptance of production assemblies until corrective action is provided, incorporated, and verified.

7.0 TEST SAMPLE

7.1 A GDLS Quality representative will select the sample(s) to be tested. The test sample will be selected from the lot of material that will be represented by the testing. Once the samples are selected for testing, no repair, adjustment, or modification is permitted without GDLS approval.

7.2 Disposition of Test Sample

Control Test samples are considered usable production hardware unless otherwise specified. However, test samples may be returned to production only after written control test approval has been received from GDLS.

8.0 TEST SCHEDULE

8.1 The schedule for performance of control test stated in the purchase order shall be followed unless otherwise approved by GDLS Quality Engineering & Test department. This schedule is based on the product delivery schedule and testing requirements specified in the product Technical Data Package (TDP)

9.0 LOT FORMATION

9.1 Lot formation development by the supplier will be based on the purchase order delivery schedule.

9.1.1 Approval of these control tests shall satisfy all components, regardless of contract, produced during the time frame/interval of the approval unless otherwise indicated.

9.1.2 Any changes to the delivery schedule must be reviewed by the supplier for impact to the control test schedule. Changes/delays that are the fault of the supplier that result in additional control tests and costs to GDLS will be the final responsibility of the supplier.

9.2 Lot formations are determined by (a) calendar time and/or (b) production quantities as specified by the applicable product fabrication specification, QAR, QAP, or military specification.

9.3 If, after lot formation, when the remaining production piece quantity is less than half the control test frequency amount an additional control test is not required. This remaining quantity would be added to the previous lot for coverage. If the delivery schedule and/or the contract quantity is changed, the control test lots will be reformatted accordingly.

10.0 TEST MONITORING

10.1 Visiting GDLS and the Government reserves the right to visit the supplier's facility and/or test laboratory to monitor all or any part of the required control tests.

10.2 Review of testing Monitoring shall include, but not be limited to, reviewing test set-ups, monitoring the conductance of the test and review of/participation in failure analysis activities.

10.3 Audits GDLS also reserves the right to audit the supplier's facilities, upon proper notification, used in the manufacture/assembly of the components under test.

11.0 TEST INCIDENTS/FAILURES

11.1 Definitions of Test Incidents/Failures

A test incident/failure shall be deemed to have occurred when the test unit does not conform to the TDP requirements or it is observed that physical damage or deformation has occurred as a result of testing or other pre-test activities. GDLS reserves the right for final determination as to the occurrence of a test incident/failure.

11.2 Test Incidents/Failure Notification

All incident/failures must be reported by telephone within 24 hours (1 working day) to GDLS Quality Engineering & Test Department. Telephone notification must be followed by written notification within 48 hours (2 working days).

11.3 Test/Hardware Disposition

After an incident/failure, the laboratory **shall not continue testing, disassemble the test set-up and/or the sample** without GDLS Quality Engineering & Test authorization. Phone contact must be maintained with the GDLS Quality Engineering & Test Department for failure analysis and/or test restart.

11.4 Flash Report

Flash Report will be initiated by GDLS Quality Engineering & Test and will be forwarded to the supplier, reporting the status of the test incident, its effect on production hardware shipments as well as direction for failure analysis and retest/restart instructions as they become known.

11.5 Supplier Failure Analysis

The supplier must submit a written failure analysis report outlining root cause, proposed corrective action and verification tests within two weeks of GDLS authorization to proceed with the failure analysis. The report format is at the supplier's option. This report requires GDLS Quality Engineering & Test approval prior to Flash Report closeout.

11.5.1 During the failure analysis process, GDLS reserves the right to review/audit the supplier's facilities used in the manufacture/assembly of the components under test.

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 incident/failure close out actions, re-inspection, and retest when such test 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:

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

12.0 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).

12.2. Test data and records will remain on file at the supplier and must, as a minimum, contain the data indicated in paragraph 13.2. A formal report in MIL-HBK-831 format is not required.

12.3. Upon receipt of "Certification of Control Test Completion", GDLS Quality Engineering & Test will issue a test approval letter (see attachment B).

12.4 Test Data Retention. Test data and records of the test performed by the supplier (laboratories) and the complete project file including all documentation shall be kept complete and available to GDLS and the Government for a period of five (5) years following the completion of the test program.

13. INVOICE PAYMENT

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

SUPPLIER CONTROL TEST CERTIFICATION

Supplier Name _____ VCN _____

Address _____

Part Name _____ Part No. _____

GDLS Purchase Order No. _____ Supplement No. _____

GDLS (Ordnance) Drawing No. _____ Rev. _____ Dated _____

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

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 _____

Test Environment

QAR/QAP/Spec Paragraph Reference

Signature

Title

Date

GENERAL DYNAMICS
LAND SYSTEMS DIVISION

TEST PROGRAM APPROVAL

Supplier

Supplier information box (empty)

PART NUMBER _____
PART NAME _____
DWG. REV. _____ P.O. _____
W/ECF _____

AS OF THIS DATE _____
YOUR FACILITY IS HEREBY NOTIFIED OF THE FOLLOWING STATUS.

FIRST ARTICLE TEST (FAT) APPROVAL HAS BEEN GRANTED BY

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	S. SAYEEDUDDIN	436-30-44
TLH QUALITY	J. KENNEDY	444-00-00
TLH MAT'LS	G. RENSHAW	444-00-00
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