

DATA ITEM DESCRIPTION

Title: DESIGN DATA AND CALCULATIONS

Number: DI-SESS-82318

AMSC Number: N10181

DTIC Applicable: No

Preparing Activity: AS

Applicable Forms: N/A

Approval Date: 20200514

Limitation: N/A

GIDEP Applicable: No

Project Number: SESS-2020-031

Use/relationship: The Design Data and Calculations package shall provide information on equipment to be cataloged, tested, used and disposed. The purpose of this data is to enable the Government to verify that the equipment being furnished and represented by this data is in accordance with the requirements of the contract. The data is to be applied to the contract when the Government requires evaluation of the design capabilities of the equipment furnished under the contract. The design data package shall be marked with the contract number.

This Data Item Description (DID) contains format and content, and intended use information for the data deliverable resulting from the work task described in the contract.

Requirements:

1. Reference Documents. None.
2. Format. The contractor determined format for the Design Data and Calculations must be readable by the Government. The report shall be viewed and searchable with Microsoft® Office or Adobe® products.
3. Content. The content for Design Data and Calculations shall be as follows:
 - 3.1. Sonobuoy Design Data and Calculations Title Page to include:
 - 3.1.1. Title.
 - 3.1.2. Date of Submission and Revision Number.
 - 3.1.3. Contractor's Name and Address.
 - 3.1.4. Contractor's Point of Contact(s), Phone Number(s), and Email(s).
 - 3.1.5. Contract Number and CDRL
 - 3.1.6. Distribution Statement.
 - 3.2. Sonobuoy Design Data and Calculations Table of Contents.
 - 3.3. Theory of Operations consisting of a narrative describing the timing of events from setting the unit until the end of the operating life including timing diagrams of the Electronic Function Select (EFS)

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setting, water entry through deployment, operational life timing, response to commands, modes of operation including description of sensors, and scuttling.

3.4. Safety of operation consisting of a narrative describing the possible danger to any Navy personnel or property if any device in the unit fails, and any testing or backup device that can identify and/or circumvent this problem.

3.5. Timing and programming consisting of a narrative describing the software contained in the unit, the names of all programs and subroutines, their commands, i/o, use and timing diagrams.

3.6. Complete schematic diagram including all interface diagrams and an IC cross reference from the contractor's part numbers to the vendor's part number.

3.7. Mechanical drawing package, mechanical for sonobuoy and packaging, including a single top level unit (sonobuoy) for Navy cataloging request, all manufacturer's drawings that show devices (and device locations) that are hazardous or contain hazardous material or their interfaces such as Electrically Initiated Device (EID), Electro Explosive Device (EED), batteries, compressed gas bottles (including weight of compressed gas in grams), or any device that stores energy that will be released within the unit's life.

3.8. Proper termination procedures including part numbers and part values to terminate the transmitter, lower electronics, acoustic sensor or any potentially hazardous device.

3.9. Overall functional block diagram with a minimum of 20 to 40 blocks depending on the unit's complexity.

3.10. Contractor conducted tests and reports including:

3.10.1. A complete list of, and reports for, all Contractor testing in support of all ECP's submitted since the configuration was qualified.

3.10.2. A complete list of and reports for all Contractor conducted tests at Government provided facilities and/or test ranges (ie. San Clemente Island, Crane Lab/Env, etc.).

3.11. Handling and disassembly safety precautions listing of potentially harmful electrical voltages and currents, materials or devices that contain harmful materials such as EID, EED, batteries, compressed gas (including gas volume and pressure at 70°C), compressed springs, or explosives and provide the vendor's name, part number and the specification under which the part was procured.

3.12. Lithium Battery Design Data and Calculations.

3.12.1. For lithium batteries, the contractor shall supply the contractor or vendor specifications, electrical and mechanical drawings of the lithium battery area. Electrical drawings shall show all characteristics of the battery pack including manufacturer of cells, weight of lithium in grams, model of cells, number of cells in pack and method of connection, physical dimensions, open circuit voltage of the battery pack, ampere-hour rating of cells, type and rating of overcurrent protection circuit, simple schematics showing connection of the battery pack to sonobuoy electronics, and normal load placed on the battery during operation of the sonobuoy.

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3.12.2. Mechanical drawings shall show the physical location of the battery pack in the sonobuoy. The drawings shall include battery pack container, type of material, dimensions, wall thickness, pressure relief location and size of feed through, and location of overcurrent protection circuit wiring and switches of the battery pack.

3.12.3. A description shall be provided of the sequence of events which will occur if a lithium battery or batteries vent. A detailed procedure for the safe removal of charged or discharged batteries with all safety precautions noted shall also be provided.

3.12.4. All drawings or data that have changed from the last approved lithium battery Production Configuration Identification (PCI) shall be identified.

3.13. Air Descent System Design Data and Calculations.

3.13.1. The contractor shall supply air descent control system mechanical drawings and air descent data. The drawings shall include the decelerator, activator, captivator, retainer, sonobuoy outer housing, and parts required to ultimately interconnect the preceding hardware to the sonobuoy outer housing. The data shall include sonobuoy weight, center of gravity along the major axis, and ballistic coefficient calculation in accordance with specification. Other special test data (e.g. static pull test data) may be required.

3.13.2. Structural materials shall be procured in accordance with current industry or government material specification(s). As a minimum, material procurement specifications shall include chemical composition, mechanical properties, quality assurance, and dimensional requirements. Material procurement specifications shall be listed on applicable component or assembly drawings. Types, grades, classes, alloys, hardness and supplementary specification requirements shall be listed on the drawings to assure that chemical composition, mechanical properties, quality assurance, and dimensional requirements are recognized as material requirements and provided with material certifications.

3.13.3. System function critical components not defined by a contractor drawing shall be procured in accordance with a government or industry standard. Fasteners, pins, rings, and seals are examples of components requiring procurement in accordance with government or industry standards.

3.13.4. Manufacturing processes shall be controlled using appropriate standards with non-destructive inspection methods and acceptance criteria appropriate for the component functional criticality and loading. Welding, if used, shall be in accordance with American Welding Society (AWS) specification(s) appropriate for the type of weld(s) employed. Type, grade, class and weld spacing requirements shall be listed on the assembly drawing.

3.13.5. All drawings or data that have changed from the last approved air descent control system PCI shall be identified.

3.14. Suspension System Design Data and Calculations.

3.14.1. For the suspension system, the contractor shall supply mechanical drawings and data showing all characteristics of the sonobuoy suspension system.

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3.14.2. The information shall include compliance type, length, location, material and construction and drogue type, size, location, material and construction. Also, an estimate of the suspension system performance, based on the computer program FF2E shall be provided for each depth of the sonobuoy design.

3.14.3. All drawings or data that have changed from the last approved suspension system PCI shall be identified.

3.15. Sub-Assembly Performance Design Data and Calculations.

3.15.1. In order to evaluate performance of the sonobuoy system, the contractor shall provide sub-assembly performance limits prior to production and in accordance with the contract. The sub-assembly performance shall be evaluated after exposure to any combination of the operating and storage conditions stated in the sonobuoy specification. Any parameters and/or tolerances provided shall be justified by analysis provided with the data showing the relationship to meeting the overall sonobuoy system performance. The following information shall be provided:

3.15.1.1. Launch altitude required to achieve terminal velocity with contractor calculations.

3.15.1.2. At the maximum water entry velocity possible, the maximum time after water entry at which the sonobuoy will never return to the surface if the sonobuoy flotation system does not inflate.

3.15.1.3. The power output and tolerance of the Very High Frequency (VHF) transmitter, measured when transmitting into a test load having an impedance electrically equivalent to the sonobuoy antenna and transmission line impedance. The test load shall be identified.

3.15.1.4. For passive acoustic buoys, the spectrum level in dB of any noise generated by the transmitter relative to 25 kilohertz deviation for the frequency range of 5-500 Hz. The input of the transmitter shall be terminated in an impedance equivalent to the output impedance of the previous stage and the sonobuoy shall be subjected to the operating sea environment in the sonobuoy specification.

3.15.1.5. For buoys equipped with a compass, the maximum compass accuracy error in degrees when tested in accordance with NAVAIR 4.5.14.3 SOP-004; (General Test Procedure for Compass Tests).

3.16. Hazardous Materials Design Data and Calculations.

3.16.1. Hazardous Materials Drawing package, including a single top level unit for Navy cataloging request, handling and disassembly safety precautions listing of potentially harmful materials or devices that contain harmful materials, all manufacturer's drawings that show devices (and device locations) that are hazardous or contain hazardous material or their interfaces such as EID, EED, batteries, compressed gas bottles (including gas volume and pressure at 70°C), or any device that stores energy that will be released within the unit's life.

3.16.2. Safety Data Sheets; The contractor shall provide Safety Data Sheets, OSHA form 174 or equivalent form containing identical data items communicating to users the chemical, physical, and hazardous properties of their product. Safety Data Sheets are not required for all products used in the manufacture of the final product. Safety Data Sheets are required for any item contained in the final

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product which require special disposal or handling during operational use or de-mil operations. This form shall comply with the OSHA Hazard Communication Standard, Title 29 CFR 1910.1200. In addition to the instructions IAW NAVAIR Clause 5252.223-9501. SDS shall not include Contractor Proprietary markings.

3.17. Data list, the contractor shall supply a complete data list that will establish the baseline configuration of the equipment delivered for test. Initial Engineering Change Proposal (ECP) performance evaluations shall also identify changes from the previous PCI.

3.18. For Hazards of Electromagnetic Radiation to Ordnance (HERO) and Electro-Magnetic Interference (EMI) certification, the contractor shall supply:

3.18.1. A sonobuoy upper unit schematic to include the EFS circuitry.

3.18.2. The contractor or vendor specification and description for all EIDs and EEDs, mechanical drawings of the EEDs and EIDs locations and associated electrical drawings. Bruceton Analysis Test Data shall be supplied for each EID and EED device showing the device characterization using the Franklin Research Center Bruceton Analysis Program. Electrical drawings shall show all characteristics of the EEDs and EIDs wiring from the power source. EID and EED characteristics to be provided (as available); All-Fire current/No-Fire current, ESD qualification test reports, level of ESD testing during manufacturing, EID current and power rating.

3.18.3. A description shall be provided of the sequence of events that will occur if an EID or EED activates to include safety concerns and effects.

3.18.4. Type of shipping container and loading procedures for intended aircraft, if special procedures are required.

3.18.5. All drawings or data that have changed from the last approved HERO SAFE Certification PCI shall be identified. Data shall be provided in accordance with NAVSEAINST 8020.7. For designs which are similar to an existing HERO SAFE approved design, design records of the similar design shall be provided to support an analysis based on commonality.

3.19. For Electro Static Discharge (ESD) certification the contractor shall supply:

3.19.1. The contractor or vendor specification, electrical and mechanical drawings of EIDs, EEDs, detonators, and explosives with a description and composition of each device including potential activation energy and released energy.

3.19.2. Electrical drawings shall provide all characteristics of the EIDs and EEDs and their connections to the power source. EID and EED characteristics to be provided (as available); All-Fire current/No-Fire current, ESD qualification test reports, level of ESD testing during manufacturing, EID current and power rating.

3.19.3. A description shall be provided of the sequence of events, that will occur if a device fails for ESD to include safety concerns and effects.

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3.19.4. Mechanical drawings shall show the physical location of the EIDs, EEDs, detonators, explosives, the containers that protect these devices and the composition of the containers.

3.19.5. All drawings or data that has changed from the last approved ESD certification PCI shall be identified. For designs that are the same as or similar to an existing ESD approved design, certification correspondence and design records and of the same or similar design shall be provided to support a certification based on commonality.

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