

## Low Mu Battery Specification

This is not a request for proposals. This synopsis is for information and planning purposes only and it not to be construed as a commitment by the Government. This is not a solicitation announcement for proposals and no contract will be awarded from this announcement. Reimbursement will not be made for any costs associated with providing information in response to this announcement and any follow-up information requests. The Naval Explosive Ordnance Disposal Technology Division, Indian Head, Maryland is searching for sources who can respond in writing with 60 days of this announcement.

The Government is searching for sources that can meet the specification outlined below. All companies that can meet the specification are encouraged to provide a capability statement, company literature, brochures, or any other information that demonstrates that the specification can be met.

Any questions concerning the magnetic signature aspect of the specification or the screening of samples should sources wish to provide them should be directed to Mr. Art Prosper at [prosperraj@eodpoe.navsea.navy.mil](mailto:prosperraj@eodpoe.navsea.navy.mil) or Mr. Steve Vallandingham at [vallandinghamsg@eodpoe.navsea.navy.mil](mailto:vallandinghamsg@eodpoe.navsea.navy.mil). All other questions should be directed to Ms. Jessica Maddox at [maddoxjd@ih.navy.mil](mailto:maddoxjd@ih.navy.mil). Any capability statements, company literature, brochures or any other information should be sent to NAVSEA Indian Head, 101 Strauss Ave., Building 1558, Attn: Jessica Maddox, Code 1143I, Indian Head, Maryland 20604-5035.

The following is the specification for low Mu battery.

1. **Battery cell type:** prismatic stack-layered, rechargeable battery, utilizing extremely low or non-magnetic media. A basic lead acid battery is non magnetic when there is no current flow.
2. **Batter cell electrical configuration:** Any combination of series or series/parallel cells; with a final two terminal output (Impulse connector type IERD2F-BC shall be used, dust proof caps are required); an additional connector for recharge is acceptable if needed. An automatic re-settable over current fuse shall be provided and an over temperature cutoff in line with the battery power output shall be required if needed to meet the operating and storage temperature or basic safety requirements. An automatic internal heater shall be integral with the battery if required to warm overall cell stack for use in low temperatures.
3. **Battery/equipment operating voltage:** 18 volts, max. 10.5 volts, min. (The battery is to supply voltage within this range)
4. **Battery capacity (performance):** The minimum capacity shall be 52 watt-hours (13 watts for 4 hrs at 32°F after a minimum of 300 recharge cycles). Minimum required capacity for temperature conditions are listed in the table below:

Required Output (Capacity)	Temperature	Condition
N/A	-65°F to 160°F	Storage/Transport
13 watts for 30 minutes	0°F to 125°F	In-air operation
13 watts for 4 hours	32°F to 100°F	In-water operation

5. **Battery current:** Varies according to supplied voltage for constant power load (e.g., 1.1 amps @ 12 volts for 13 watt load).
6. **Recharge time:** 8 hours or less over the temperature range of 50°F to 100°F for discharged battery (e.g., 4 hrs @ 1.1 Amp). Manufacturer shall specify, and demonstrate, the optimum battery charge and condition cycles to be used on a commercial, programmable, automatic battery charger, for the battery. A program shall also be developed for the automatic charger to predict usable life. Primary power for the battery charger shall be 120 Volts AC, 60 Hz, nominal.
7. **Recharge cycles:** 300 cycles minimum for 4 hr depth of discharge capacity cycle while meeting the minimum performance values in item 4.
8. **Magnetic signature** (Ref MIL-M-19595C for non-contact items): The battery shall be constructed of low or non-magnetic materials. Internal electrodes, wiring, and circuits shall be constructed to minimize or cancel current induced magnetic fields. Production batteries will require 100% magnetic signature screening for Navy acceptance. Maximum magnetic signature values (at all times between battery start life and 300 recharge cycles) when measured in accordance with MIL-M-19595C are listed below:
  - Passive: 5 gamma or less @4.5 in. (maximum)
  - Active: 5 gamma or less @4.5 in. (maximum)
  - Eddy current: 5 gamma or less @4.5 in. (maximum)
9. **Packaging and Transport Container:** The manufacturer shall provide DOT and IATA approved packaging for shipping, dependent on the battery chemistry; and as a result of that chemistry, required by the airline or trucking freight industry. The container shall be configured to ship one or more batteries in their individual transport containers, from the factory to the “port of staging area” or “forward supply point.” The manufacturer shall also provide battery transport containers suitable for military transport of individual batteries (such as metal ammunition case) to the “port of staging area” or “point of use.”
10. **Transport Vibration** (Ref MIL-STD-810F): The battery packaged in an approved transport container shall be able to function at required capacity after exposure to vibration that could occur during transportation and handling in accordance with Procedure I of MIL-STD-810F Method 514.5 as listed below:

- Four hrs per axis for a total of 12 hrs of common carrier transportation vibration (equivalent to 6000 miles of combined shipping by air, land and sea between the manufacturer or depot and the "port of staging area").
- Forty minutes per axis for a total of 2 hrs of field transportation vibration for the 1.25 ton M1009 truck, 2.5 ton M36 truck, 5 ton M813/M814 truck and 12 ton M127 semi-trailer. (The 2 hr total is equivalent to 500 miles of travel primarily on improved roads between the "port of staging area" and the "forward supply point.").
- Thirty-two minutes per axis for a total of 96 minutes of field transportation vibration for the 1/4 ton M416 and 1.5 ton two-wheeled trailer. (The 96 minute total is equivalent to 32 miles of travel on surfaces ranging from off-road to paved roads between the "forward supply point " and the "point of use.").

11. **Transportation Shock** (REF MIL-STD-810F): The battery packaged in an approved transport container shall be able to function at required capacity after exposure to shock forces that could occur during transport and handling in accordance with Procedure IV of MIL-STD-810F Method 516.5 as listed below.

- A total of 26 drops at 48 inches with the maximum number of batteries packaged in the shipping container.
- A total of 8 drops at 24 inches with the batter outside the shipping container.

12. **Temperature** (REF MIL-STD-810F): The battery shall be able to function at required capacity after storage/transport temperatures between -65°F and 160°F in accordance with the three cycle engineering design exposure condition in Procedure I of MIL-STD-810F Method 503.4. The battery shall be able to function at required capacity in ambient air temperatures between 0°F and 125°F in accordance Procedure II of MIL-STD-810F Methods 501.4 (1 Hr hot) and 502.4 (72 Hrs cold). The battery shall be able to function at required capacity in water temperatures between 32°F and 100°F.

13. **Pressure test:** The maximum operating depth of the battery shall be 300 feet of seawater. A pressure test to 225 psi shall also be performed on the battery to certify the design is capable of withstanding maximum operational depth water pressure with a demonstrated safety factor of 1.5. The test shall be for ten cycles in tap water, cycles one through nine shall be of ten minutes duration at 225 psi with cycle ten lasting an hour at 225 psi. Physical measurements and electrical tests shall be performed prior to testing and repeated after the test to assure functionality. Failure of the battery to operate, evidence of leakage or structural deformation of the battery shall be considered test failure.

14. **Low Pressure Altitude** (REF MIL-STD-810F): The battery shall be able to function at required capacity after transportation at an altitude of 39,000 feet above sea level in accordance with Procedure I of MIL-STD-810F Method 500.4.

15. **Salt Fog Humidity** (Ref MIL-STD-810F): The battery shall be able to function at required capacity after being subjected to a salt fog environment in accordance with MIL-STD-810F Method 509.4. With dust cap or dummy connector installed.

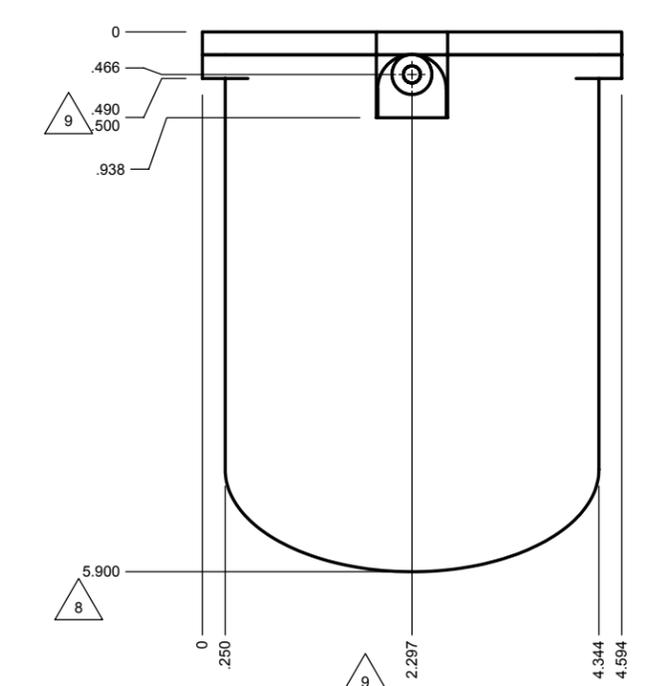
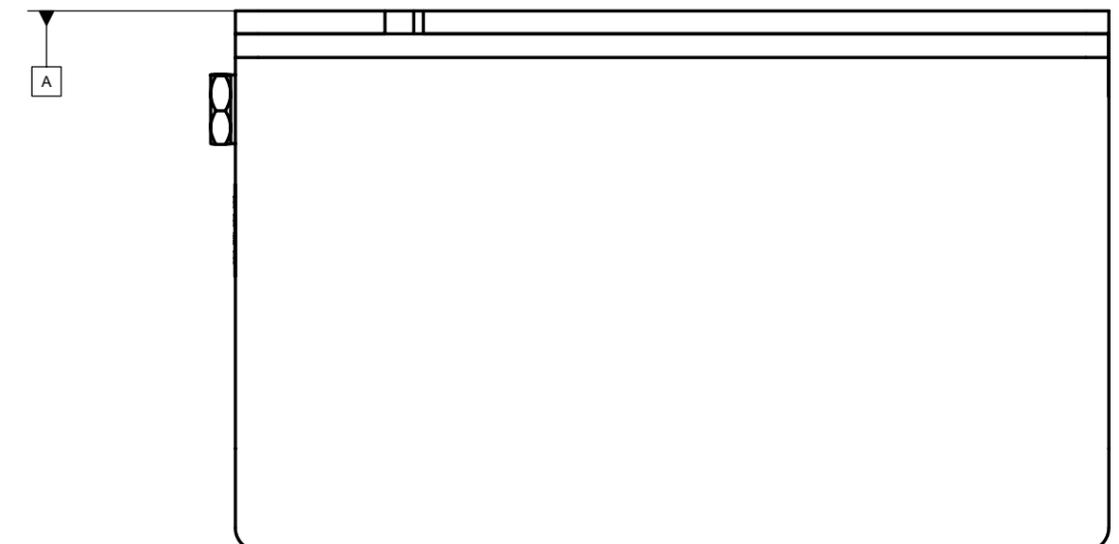
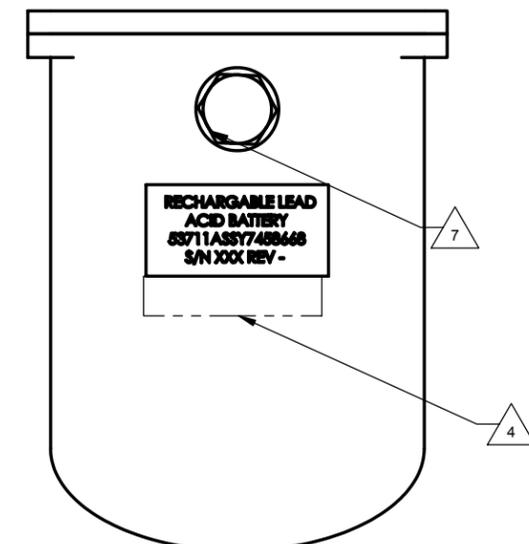
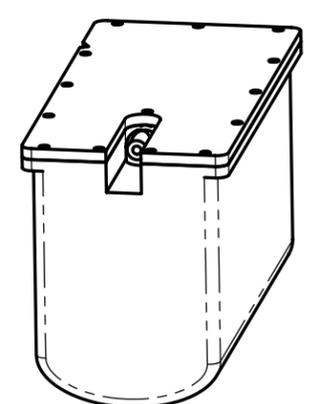
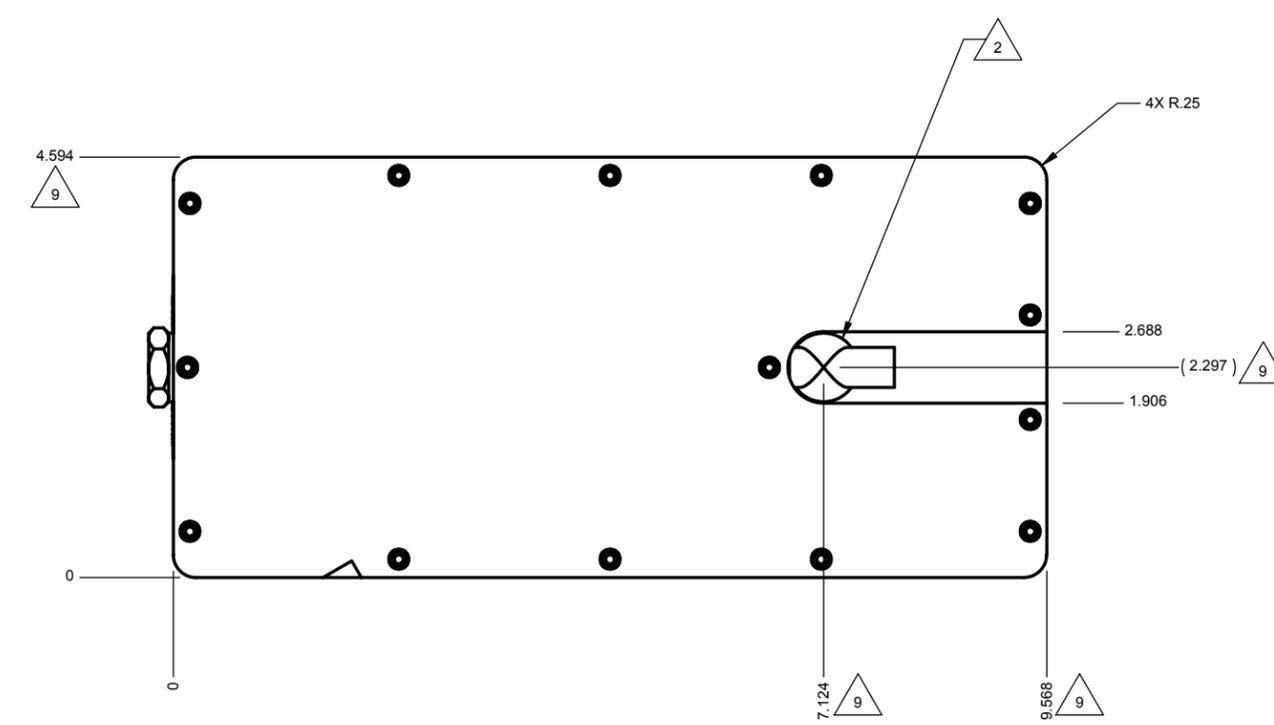
16. **Dust** (Ref MIL-STD-810F): The battery shall be able to function at required capacity after exposure to blowing dust that could occur in storage conditions at a rate of 300 ft/min for 6 hrs at 160<sup>0</sup> F in accordance with Procedure I of MIL-STD-810F method 510.4. with dust cap or dummy connector installed.
17. **Hazards of Electromagnetic Radiation to Ordnance** (Ref MIL-STD-464): The battery shall be able to function at required capacity after exposure to the electromagnetic radiation listed in MIL-STD-464 Table 1A (battery in a power-off condition).
18. **Electrostatic Discharge (ESD)** (Ref MIL-STD-464): The battery shall be able to function at required capacity after exposure to helicopter-borne ESD in accordance with MIL-STD-464 paragraph 5.7.1 (1 nanofarad charged to 300kVDC and discharged through 1 ohm). The battery shall be able to function at required capacity after exposure to human-borne ESD in accordance with MIL-STD-464 paragraph 5.7.3 (500 picofarads charged to 25kVDC and discharged through 500 ohms into each external contact with external surfaces at ground potential). Testing to be conducted in the transport case.
19. **Physical Description:** The battery cell structure and circuits shall be contained in a pressure compensated housing with interface features described in attached drawing (7458755 Low Mu Rechargeable Battery). This drawing shall be used as a reference to establish the necessary requirements for mechanical attachment and electrical connection. Case material, internal components, electronic connections and other internal features shall be determined by the manufacturer, as required, to achieve: Neutral buoyancy, Pressure tolerance, and Appropriate cell geometry. Changes to the external features and dimensions may be done by the manufacturer only with ARL:UT approval. The weight in air shall be 7.0 lbs maximum and, in seawater, shall be 0 +1.0 -0.0 pounds.
20. **Safety:** Manufacturer shall develop this product in manner consistent with the workmanship requirements of MIL-HDBK-454 and all industry "best-practices." Every effort should be made through design and common safety devices (fuse) to prevent catastrophic failure, high rate venting, and discharge or fire.
21. **Identification:** Each battery shall be identified by the manufacturer in accordance with MIL-STD-130. Marking shall include the following:
  - Item Nomenclature and Part number (to be issued by ARL:UT)
  - Manufacturer's name and/or Commercial and Government Entity (CAGE) code and item serialization number
  - Design activity name and/or CAGE code and item part number
  - National Stock Number
22. **Product Markings:** Appropriate low-mu markings shall be applied to the battery assembly after successful magnetic screening in accordance with MIL-M-19595C.

23. **MSDS Statement:** Manufacturer shall generate a recognized Material Safety Data Sheet (MSDS) for the Battery Assembly to be available for shipping, the end user and disposition.
24. **Serviceable Life Estimate:** Manufacturer shall develop an in-field procedure to predict and indicate the battery's overall condition as related to the number of discharge/recharge cycles remaining and the useable power per cycle that the battery is capable of delivering. (see sec. 6 Recharge Time)
25. **Failures and Corrective Action:** Manufacturer shall list potential battery failure modes and present troubleshooting procedures and suggested corrective actions.
26. **Assembly Drawings:** Manufacturer shall produce drawings for the Battery Assembly, including overall dimensions, interior components, materials used and a complete parts list. The drawing shall also include all testing, recommended usage, recharging and conditioning requirements, shipping, handling, environmental limitations, precautions, and disposal procedures. The drawing shall include all factory acceptance tests, both physical and electronic. Fabrication shall not commence without ARL:UT approval of this drawing.

Drawing number 7458755 can be found under Sources Sought on the Contracts Division web page located at <http://www.ih.navy.mil/contracts>.

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REVISION HISTORY			
ZONE	REV	DESCRIPTION	DATE
	0	EXAMPLE FOR RFP.	

- NOTES:
- INTERPRET PER MIL-DTL-31000A.
  - MATERIAL OF EXAMPLE SHOWN  
CASE: 75 SHORE D CAST URETHANE.  
HARDWARE: BRASS.  
INTERNAL BULKHEADS: FOAM CORE PVC.  
ORINGS: FLUOSILICONE & SILICONE 40/60 DURO.  
CONNECTOR: BRASS/NEOPRENE.  
P/N IERD2F-BC  
SOURCE OF SUPPLY: IMPULSE CORP.  
8254 RONSON ROAD  
SAN DIEGO, CA 92111
  - FINISH: NONE. COLOR: BLACK.
  - MARK WITH FULL P/N PER MIL-STD-130 (CAGE, DWG NUMBER, DASH NO & REV LETTER; SERIAL NUMBER REQD).
  - ITEM SHALL COMPLY WITH REQUIREMENTS OF MIL-M-19595 NONCONTACT COMPONENT. 100% INSPECTION REQUIRED.  
CAUTION: CONTAMINATION OF ITEMS DURING FABRICATION AND PACKAGING BY CONTACT WITH MAGNETIC MATERIALS SUCH AS MAGNETS, IRON, METAL FILINGS OR ANY OBJECT THAT CAN GENERATE A MAGNETIC. FIELD MAY CAUSE THE ITEM/PRODUCT TO BE REJECTED.
  - CONFIGURATION OF EXAMPLE SHOWN:  
WEIGHT: 7.50 lbs. MAX.  
VOLUME: 221.80 CU. IN. ±.25 IN. CU.  
DENSITY: .034 LBS/CU. IN.  
BATTERY: EXTREME PLUS VRLA SEALED LEAD ACID  
5 AMP HOUR BATTERY  
P/N XP-12-5.  
SOURCE OF SUPPLY: BATTERIES PLUS.
  - VENT PORT. REMOVE WHEN CHARGING.
  - MAXIMUM BATTERY HEIGHT. HEIGHT TO BE DETERMINED BY VENDOR TO ACHIEVE NEUTRAL BUOYANCY.
  - REQUIRED INTERFACE FEATURE.
  - DRAWING TO BE USED IN CONJUNCTION WITH SPECIFICATION, LOW M<sub>μ</sub> BATTERY DWG. NO. 7458756.



SPECIFICATION CONTROL DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES REMOVE ALL BURRS AND SHARP EDGES ALL DIMENSIONS INCLUDE CHEMICALLY APPLIED FINISHES ALL MACH SURFACES APPROX. 125 CONCENTRICITY ON MACH DIA. .004 TIR TOLERANCES: FRACTIONS DECIMALS ANGLES ± 1/64 .00 ±.01 85° .006 ±.005		APPLIED RESEARCH LABORATORIES <b>ARL</b> The University of Texas at Austin		DEPARTMENT OF THE NAVY PROGRAM EXECUTIVE OFFICE, MINE WARFARE ARLINGTON, VA 22242	
PROJECT: N00039-96-D-0051-5-80		DRAWN: DLC		DATE: 01/09/18	
DO NOT SCALE DRAWING		ENGR/DSSN		DATE	
MATERIAL: 2		CHECKED		DATE	
FINISH: 3		APPROVED		DATE	
APPROVED FOR ARL-01		APPROVED FOR ARL-01		DATE	
APPROVED FOR RFP (M/W)		APPROVED FOR RFP (M/W)		DATE	
SIZE: D	CAGE CODE: 53711	DWG NO.: 7458755	REV: 0	SCALE: 1/1	SHEET 1 OF 1

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PART DASH NO.	QTY REQD PER ASSY	FINAL	NEXT ASSY	USED ON
				APPLICATION

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