METRIC

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SUPERSEDING
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MILITARY SPECIFICATION

BATTERIES, STORAGE: LEAD-ACID,
(LOW MAINTENANCE) (METRIC)

This specification is approved for use within the U.S. Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of waterproof, low maintenance, lead-acid battery furnished in charged and dry or charged and wet conditions (see 3.5 and 6.2):

Type Designation	Voltage	Rated reserve capacity (min)	Ampere-hours (20-hour rate)
6TL	12	200	120

Condition:		Military specification sheet part no.
A	Charged and dry	MS52149-1
B	Charged and wet	MS52149-2

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-Automotive Command, ATTN: AMSTA-GLC, Warren, MI 48397-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

AMSC N/A FSC 6140

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

Kit and the screws for installing the battery

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

O-S-801	- Sulfuric Acid, Electrolyte (for Storage Batteries).
PPP-B-140	- Battery, Storage, Industrial, Automotive and Navy Portable (Except Aircraft), Packaging of.

STANDARDS

FEDERAL

FED-STD-313	- Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government.
FED-STD-595	- Colors Used in Government Procurement.

MILITARY

MIL-STD-129	- Marking for Shipment and Storage.
MIL-STD-130	- Identification Marking of U.S. Military Property.
MS52149	- Battery, Storage, Lead-Acid (Low Maintenance), Type 6TL.

(Unless otherwise indicated, copies of federal and military specifications and standards are available from the Defense Printing Service Detachment Office, Standardization Documents Order Desk, Bldg. 4D, (Customer Service), 700 Robbins Ave., Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents. The following other Government document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DEPARTMENT OF TRANSPORTATION (DOT)

Federal Motor Carrier Safety Regulations (FMCSR) - 49 CFR

(Copies of FMCSR are available from the Department of Transportation, Washington, D.C. 20590.)

2.2 Non Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE J537	- Storage Batteries.
SAE J1495	- Test Procedure for Battery Flame Retardant Venting Systems.

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

(Non Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between requirements of this specification and the specification sheets, the latter shall govern.

3.2 Qualification. Batteries furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable Qualified Product List (QPL) at the time of award of contract (see 4.4 and 6.3).

3.3 Materials. Materials shall be as specified herein and in referenced specifications, standards and drawings. Material shall be free of defects adversely affecting performance or serviceability of the finished product (see 4.8.1).

3.3.1 Electrolyte. The electrolyte, used in filling batteries, shall conform to Class 3 of O-S-801 (see 4.8.1).

3.3.2 Active material. Active material reclaimed from plates of other batteries shall not be used (see 4.8.1).

3.3.3 Recycled, virgin and reclaimed materials. There are no requirements for the exclusive use of virgin materials. The use of recycled or reclaimed (recovered) materials is acceptable, provided that all other requirements of this specification are met (see 6.5.2).

3.4 Design and construction. Batteries shall be designed and constructed in accordance with MS52149. Battery shall be furnished as a complete, integral assembly, with no loose parts permitted, except for the vent filler plugs as specified in 3.4.6 (see 4.8.2).

3.4.1 Containers. Containers shall be molded to the dimensions specified in MS52149. The containers shall be free of leaks, blisters, cracks, or other defects that could adversely affect the performance of the battery. Container color shall be lusterless olive drab, conforming to color chip number 34088 of FED-STD-595. The container shall be made from non-absorbent, acid-resistant, thermoplastic material meeting the physical requirements specified in 3.4.1.1.1 through 3.4.1.1.4 (see 4.8.2).

3.4.1.1 Physical requirements.

3.4.1.1.1 Electrical breakdown. The battery container shall withstand an alternating current potential of 100 volts (V) root mean square (rms) per 2.54×10^{-2} millimeters (mm) of thickness without damage (see 4.8.4.1).

3.4.1.1.2 Acid absorption. The battery container material shall exhibit no cracks or blisters, no more than 1.5 percent increase in weight, and no more than 2 percent increase in any physical dimension in a 1.300 specific gravity electrolyte solution at 66 ± 3 degrees Celsius (°C) for a period of seven days (see 4.8.4.2).

3.4.1.1.3 Impact resistance. Twenty-four hours or more after manufacture, the sample battery case shall exhibit a minimum impact resistance after four hours pre-test conditioning at temperatures in Table I (see 4.8.4.3).

TABLE I. Impact resistance.

Pre-test conditioning temperature	Impact Resistance drop height of 1 kilogram (kg) weight
66°C	2100 mm
-18°C	1400 mm
-40°C	700 mm

3.4.1.1.4 Bulge resistance. Battery container shall exhibit no more than 6.4 mm bulge after exposure to 93 ± 3°C for one hour (see 4.8.4.4).

3.4.2 Battery cover. Battery cover shall meet the same physical and color requirements as the container material. Battery cover shall be of one piece design and shall be sealed to the container, thereby forming a case. Cover and base are to be parallel within 1.5 mm total. The seal shall maintain an acid tight joint between case and cover under all test conditions specified herein (see 4.8.6).

3.4.2.1 Filler plug openings. The battery cover shall contain a threaded vent filler plug opening for each cell (see 3.4.5). The vent filler plug openings shall be designed to permit easy determination of the electrolyte level. Electrolyte level instructions shall be plainly marked, either on the battery cover or on the vent filler plug (see 4.8.2).

3.4.3 Leakage. When tested per 4.8.3, no cell of the battery shall show a drop in pressure exceeding 0.69 kilopascals (kPa) (see 4.8.2).

3.4.4 Post seals. Post seals shall maintain an unbroken seal between post and cover and shall show no indication of leakage under any of the test conditions specified herein (see 4.8.2).

3.4.5 Cell seals. Cells shall be sealed by easily removable, air tight, and moisture proof seals, not an integral part of the battery cover, which shall retain their seal and hold firmly in place until intentionally removed. Dummy vent filler plugs may be used provided the proper plugs are packaged with the battery (see 4.8.2).

3.4.6 Vent filler plugs. Non-absorbent, acid resistant vent filler plugs (or vent caps) shall be provided for each cell. Design shall be as specified in MS52149-3. The vent filler plugs shall be of the submersible type and shall incorporate a vent with a check valve to permit the escape of gasses from the battery. Vent plugs shall not permit ignition of flammable gasses in the test battery when tested in accordance with 4.8.7.1. The check valves shall not leak more than two drops of water in 10 seconds when under a 1.22 meter (m) head of water and shall be designed to open before internal pressure reaches 3.45 kPa in excess of the external pressure. The plugs shall withstand temperatures from -54°C to 121°C without cracking, melting or other damage (see 4.8.7).

3.4.7 Handles. Handles shall be rope type plastic of the developed length specified in MS52149. Handles shall withstand the effects of electrolyte conforming to the Class 3 of O-S-801 (see 3.3.1). Each handle shall be attached to the battery case in such a manner as to withstand, without damage to the case, the handle, or the attachment, when tested in accordance with 4.8.8 at temperatures of 88° ± 1°C and -54° ± 1°C. If knots are used to secure rope handle, they shall be melted to prevent untying (see 4.8.2).

3.4.8 Grids and plates. Grids shall have no cracked, broken, or missing framing bars. After pasting of active material, plates shall evidence not more than three holes (missing pellets puncture holes) in the active material, and have no open windows. Plates shall be of the pasted type and

the grid lead alloy shall contain no antimony. Optional construction: Negative plate grids shall have non-antimony or low percent (not to exceed 1.0 percent) antimony and positive plate grids not to exceed 3.5 percent antimony (see 4.5).

3.4.9 Plate connections and intercell connectors. Plates of like polarity in each cell shall be integrally joined by intercell connectors. The intercell connectors shall be of the burned-on, cast-on, or welded type. Each connector shall be of such size and strength as to provide both electrical conduction and support for each group of like polarity plates. Plate-connecting intercell connectors of the up and over type shall not be used (see 4.5).

3.4.10 Separators. Separators shall be an envelope type, enclosing the positive plates and shall extend a minimum of 2.4 mm above plates after assembly (see 4.5).

3.4.11 Terminal posts. Terminal posts shall be of the design and location specified on the applicable specification sheet. The positive tapered terminal post shall be identified by a "+", a "POS", or a "P" and the negative terminal by a "-", a "NEG", or a "N" as shown on the applicable specification sheet. All metal parts of the terminal shall be lead or lead coated (see MS52149).

3.4.11.1 Terminal post torque resistance. Tapered terminal posts shall withstand, without damage to the battery, a torque of 28.25 Newton-meters (N.m) (see 4.8.9).

3.5 Battery condition. Batteries shall be furnished in a condition in accordance with MS52149 (see 6.2).

3.5.1 Charged and dry. Batteries furnished in the charged and dry condition shall contain dry plates and separators. The moisture content of the separators shall not exceed 3.0 percent. The moisture content of the plates shall not exceed 0.2 percent. No electrolyte shall be furnished (see 4.8.10).

3.5.1.1 Dry cell internal resistance. The terminal-to-terminal resistance of each cell, measured after assembly in the container with the top off, shall be no less than 50,000 ohms (see 4.5 and 4.8.11).

3.5.2 Charged and wet. Batteries furnished in the charged and wet conditions shall be filled to the proper level with electrolyte as specified in 3.3.1 and shall be fully charged when shipped. When fully charged, the specific gravity of the electrolyte shall be 1.280 $\pm$ .010, corrected to electrolyte temperature of 27°C and the open circuit, terminal-to-terminal voltage shall be not less than 2.10 V per cell corrected to 27°C (see 4.8.2).

3.6 Battery performance.

3.6.1 Cold activation of dry charge. Batteries furnished in the charged and dry condition shall exhibit a terminal voltage of 7.2 V or greater following the discharge rate and time specified in MS52149 after stabilizing the dry charged battery at -1° ± 1°C, and filling the battery with electrolyte also stabilized at the -1°C temperature (see 4.8.5).

3.6.2 Capacities.

3.6.2.1 Full charge capacity. Each battery shall yield a capacity of not less than that specified in MS52149 at a controlled temperature of 27° ± 3°C (see 4.8.12).

3.6.2.2 Reserve capacity. Fully charged batteries stabilized at 27° ± 3°C shall exhibit a minimum terminal voltage of 10.5 after a discharge rate of 25 amperes (A) for the time specified in MS52149 (see 4.8.13).

3.6.2.3 Low temperature capacity. Fully charged batteries (1.280 specific gravity, minimum) shall exhibit a minimum terminal voltage of 7.2 V after being discharged at the rate and time specified in MS52149 at temperatures of -18°C and -40°C (see 4.8.14).

3.6.3 Retention of charge. Following 30 days storage at 40°C, batteries shall successfully survive a discharge rate of 25 A for the time specified in MS52149 to a minimum terminal voltage of 10.5 V (see 4.8.15).

3.6.4 Electrolyte retention. Batteries shall evidence no leakage or spillage when tilted through an angle of 45 degrees from the normal plane of either major or minor axis (see 4.8.16).

3.6.5 Extreme temperature resistance. Batteries shall show no cracking of containers, covers, sealer, filler plugs, or other damage due to temperature change between 88°C and -54°C and no more than 0.69 kPa pressure drop in 30 seconds, with 3.45 kPa pressure applied to each cell individually after exposure to extreme test temperature (see 4.8.17).

3.6.6 Vibration resistance. Batteries shall maintain a steady voltage and current with no loosening of terminal posts in the cover; flooding of electrolyte at the top; intercell leakage; excessive sediment; broken connections, straps or plates; broken or defective separators; or other damage while being subjected to vibration through an amplitude of 1.1 to 1.3 mm (2.2 to 2.6 mm total vertical excursion) at a frequency of 2,000 to 2,100 cycles per minute. Vibration shall not decrease the reserve capacity of batteries below that specified in MS52149 (see 4.8.18).

3.6.7 Life-cycle capacity. Battery shall withstand 235 discharge/charge cycles. The life-cycles attained by each battery shall be taken as the total actual cycles completed on life cycle tests, plus each cycle attained on other tests (see 4.8.19).

3.6.8 Storage life. After 90 days of storage at standard test conditions, the battery shall exhibit a terminal voltage of 7.2 V or greater following the discharge rate and time specified in MS52149, for storage life after 90 days (see 4.8.20).

3.7 Identification marking. Marking data shall be applied to a permanent, electrolyte-resistant type label or nameplate, or may be molded on battery container. Labels and nameplates shall be securely and permanently attached to the side of the battery. A permanent label with removable tabs for identifying the "in-service" date (month and year) shall be provided on the battery top. It shall be optional to place the lot number on the battery top (see 4.8.2).

3.7.1 Identification data. Unless otherwise specified herein and in MS52149, identification marking shall be in accordance with MIL-STD-130 and shall include the following:

a. Battery identification (battery, storage, lead-acid, low maintenance).

b. Designation (Military and SAE, when applicable).

c. MS52149 part number.

d. Voltage: 12 volts.

e. Reserve capacity at 27°C: 200 minutes.

f. High discharge capacity and rate at -18°C and -40°C.

g. Contract or order number.

h. Date of manufacture (month and year) and lot number.

i. Manufacturer's CAGE code.

3.8 Instruction tags and labels. Instruction tags and labels which provide complete information for placing battery in service, operation, and charging shall be attached in a conspicuous place on each battery. The manufacturer's standard warning label regarding the hazards of acid and explosive gasses shall be permanently attached in a conspicuous place on each battery.

3.8.1 Instruction (charged and dry). Instructions for charged and dry batteries shall contain the following minimum information:

a. NOTE: This is a CHARGED and DRY storage battery. When placing in service, identify the "in-service" date by removing the proper tabs from the permanent label.

b. Remove and destroy sealing devices which seals cells during shipment and storage.

CAUTION: Do not remove sealing devices until ready to fill battery.

c. Fill each cell with electrolyte (sulfuric acid and water solution) of 1.280 ± .005 specific gravity at 27°C to designated level per instructions furnished by manufacturer. Temperature of the battery and the electrolyte must be above 15.5°C, but preferably not above 38°C.

d. Allow the battery to stand 30 minutes after filling, then check electrolyte specific gravity of each cell, correcting the reading to 27°C. Add electrolyte, if necessary, to bring to the designated level.

e. The battery shall be charged full at constant 15 volts before it is put into service using procedures specified in 4.3.3.2.

f. Charging current shall not exceed 6 amps. The temperature of the electrolyte during the charging period shall not be allowed to exceed 49°C.

g. Add electrolyte, as required, to bring to the proper level. Add only distilled water after initial charge to maintain proper level.

h. Keep the top and sides of the battery clean and dry. Make sure vent-filler plugs are clean. When cleaning is required, wash with water.

i. Battery should be charged every six months or when specific gravity of any cell falls below 1.250 and kept in cool, dry storage when not in use.

j. Electrolyte volume _____.

3.8.2 Instructions (charged and wet). Instructions for charged and wet batteries shall contain the following information:

a. NOTE: This is a CHARGED and WET storage battery. It was activated at time of manufacture and charged to full rated capacity.

b. Indicate the date of preparation for service by removing the proper tabs from the permanent label.

c. Check the electrolyte specific gravity and levels in all cells, and adjust to the proper levels by adding distilled water as required. Charge at a constant voltage of 15 volts until the specific gravity of the electrolyte remains constant for three consecutive readings taken at 30 minute intervals.

d. Check the electrolyte levels. Add distilled water, as required, to maintain proper level. Add the water only while the battery is being charged.

e. The battery is now ready for use.

f. Keep the top and sides of the battery clean and dry. Make sure the vent filler plugs are clean. When cleaning is required, wash with water.

g. Battery should be charged every six months or when specific gravity of any cell falls below 1.250 and kept in cool, dry storage when not in use.

3.9 Workmanship. Batteries shall be processed in such a manner as to be uniform in quality and free of defects that will affect their life, serviceability, or appearance. Containers, covers, and vent filler plugs shall be free of cracks, leaks, and broken parts. Lead burning shall be homogeneous and free from blow holes or imperfect bonds between parts which have been burned together. Marking shall be clear and distinct.

3.10 Material safety data sheet (MSDS). A MSDS shall be prepared in accordance with FED-STD-313 (see 4.8.22, 6.2 and 6.6).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance shall comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.4).
b. In process inspection (see 4.5).
c. Quality conformance inspection (QCI) (see 4.6).
    1. Examination (see 4.6.2).
    2. Tests (see 4.6.3).
d. Control tests (see 4.7).

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed under the following standard (room ambient) conditions:

Temperature: 20 to 35°C.
Relative humidity: (Uncontrolled room ambient).
Atmospheric pressure: (Site pressure).

4.3.1 Temperature of electrolyte. Unless otherwise specified herein, the temperature of the electrolyte at the beginning of the tests shall be within ± 1°C of the test temperature.

4.3.2 Instrument accuracy.

4.3.2.1 Hydrometer. The hydrometer shall provide a float accuracy of ± 3 points (.003) throughout the specific gravity scale and temperature range.

4.3.2.2 Electrical indicating instruments. All voltmeters and ammeters used in testing batteries shall be accurate within ± 0.5 percent of full scale value. The sensitivity of voltmeters shall be at least 20,000 ohms per volt. The voltmeter and ammeter ranges used shall be such that all readings are taken on the upper half of the scale.

4.3.2.3 Resistor tolerances. In all tests involving discharge through a resistance, such resistance shall be accurate within ± 0.5 percent.

4.3.3 Discharging and charging of test batteries.

4.3.3.1 Discharging. The fully charged battery shall be at a temperature of 27° ± 3°C and shall be discharged at the 20 hour rate (that current in amperes equal to 1/20th of the battery's rated ampere hour capacity), to a final average terminal voltage equivalent to 1.75 volts per cell, unless otherwise specified.

4.3.3.2 Charging. Batteries shall be charged using one of the following methods:

a. Batteries shall be charged at a constant voltage of 15.0 volts until specific gravity reading taken at 30 minute intervals remains constant. Charging current shall not exceed six amperes. The temperature of the electrolyte during the charging period shall not be allowed to exceed 49°C.

b. Batteries shall be charged as specified in SAE Standard J537.

c. Charging conditioning shall be conducted in a water bath at 27°C at a constant charging current of 6 amperes [1% of the rated cold cranking amperes (CCA)] for a calculated period (in hours) to return into the battery the equivalent of 130% of the ampere hours removed during the previous discharges.

4.3.3.3 Periodic charging. If the testing on any activated battery is temporarily stopped for a period of 48 hours, the battery shall be given a freshening charge at the specified rate until fully charged (see 4.3.3.2) before testing is resumed. A battery shall never be stored for more than 24 hours after a discharge without being recharged.

4.4 Qualification inspection. Sample batteries and parts shall be furnished for qualification inspection in accordance with table II. Qualification inspection shall be conducted at a place designated by, or approved by, the Government and shall consist of examination and tests specified in table III, and in the testing order specified in table IV (see 6.3).

TABLE II. Qualification samples.

Sample description	Quantity required
Batteries, complete	8 each
Container	3 each
Covers	3 each

TABLE III. Classification of inspection.

Title	Requirement	Inspection	In-process inspection	Qualification	QCI		Control test
					Exam	Test	
Materials and construction	3.3, 3.3.1, & 3.3.2	4.8.1		X			
Defects	3.4, 3.4.1, 3.4.2 thru 3.4.7, 3.4.11, 3.5.2, 3.7, 3.8.1 thru 3.9	4.8.2		X	X		
Physical characteristics							
Leakage	3.4.3	4.8.3		X		X	
Electrical breakdown	3.4.1.1.1	4.8.4.1		X	X		
Acid absorption	3.4.1.1.2	4.8.4.2		X	X		
Impact resistance	3.4.1.1.3	4.8.4.3		X	X		
Bulge resistance	3.4.1.1.4	4.8.4.4		X	X		
Covers	3.4.2	4.8.6		X	X		
Vent filler plugs	3.4.6	4.8.7		X	X		
Flame retardancy	3.4.6	4.8.7.1		X			
Handles	3.4.7	4.8.8		X	X	X	
Grids & plates	3.4.8	4.5	X	X			
Plate connections & intercell connectors	3.4.9	4.5	X	X			

TABLE III. Classification of inspection - Continued.

Title	Requirement	Inspection	In-process inspection	Qualification	QCI		Control test
					Exam	Test	
Separators	3.4.10	4.5	X	X			
Terminal post torque resistance	3.4.11.1	4.8.9		X		X	X
Charged and dry moisture content	3.5.1	4.8.10		X		X	
Dry cell internal resistance	3.5.1.1	4.5 & 4.8.11	X	X			
Performance							
Cold activation of dry charge	3.6.1	4.8.5		X		X	X
Full charge capacity	3.6.2.1	4.8.12		X		X	
Reserve capacity	3.6.2.2	4.8.13		X		X	X
Low temperature capacity	3.6.2.3	4.8.14		X		X	X
Retention of charge	3.6.3	4.8.15		X		X	
Electrolyte retention	3.6.4	4.8.16		X		X	
Extreme temperature resistance	3.6.5	4.8.17		X		X	X
Vibration resistance	3.6.6	4.8.18		X		X	X
Life cycle capacity	3.6.7	4.8.19		X		X	
Storage life	3.6.8	4.8.20		X		X	
Packaging	5.1.1	4.8.21		X	X		

TABLE IV. Order of QPL inspection.

Description	Sample 1/ Number	Requirement	Test
Electrical breakdown	CT1	3.4.1.1.1	4.8.4.1
Acid absorption	CT1/CV1	3.4.1.1.2	4.8.4.2
Impact resistance	CT2	3.4.1.1.3	4.8.4.3
Bulge resistance	CT3	3.4.1.1.4	4.8.4.4
Cold activation dry charged batteries	B2-6	3.6.1	4.8.5
Covers	CV2	3.4.2	4.8.6
Vent filler plugs	V1-6	3.4.6	4.8.7

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TABLE IV. Order of QPL inspection. - Continued.

Description	Sample 1/ Number	Requirement	Test
Vent plug flame retardancy	B6	3.4.6	4.8.7.1
Handles	B1	3.4.7	4.8.8
Terminal post torque resistance	B7	3.4.11.1	4.8.9
Moisture content dry charged batteries	B7	3.5.1	4.8.10
Dry cell internal resistance	B7	3.5.1.1	4.8.11
Full charge capacity	B4/5	3.6.2.1	4.8.12
Reserve capacity	B2-6	3.6.2.2	4.8.13
Low temperature capacity	B2-6	3.6.2.3	4.8.14
Retention of charge	B6	3.6.3	4.8.15
Electrolyte retention	B2/3	3.6.4	4.8.16
Extreme temperature	B2/3	3.6.5	4.8.17
Vibration	B2/3	3.6.6	4.8.18
Life cycle capacity	B4/5	3.6.7	4.8.19
Storage life	B8	3.6.8	4.8.20

1/ B = Battery sample
CT = Container sample
CV = Cover sample
V = Vent plug sample set (six) taken from battery B6.

4.4.1 Failure. Failure of a qualification sample to conform to any of the requirements specified, or any deficiency of a workmanship or material nature found as a result of the test, shall be cause for rejection. Further testing shall not be conducted until evidence has been provided by the contractor that corrective action has been taken to eliminate the deficiency.

4.5 In-process inspection. Before and during assembly, as applicable, grids and plates, plate connections and internal connector, separators and protectors, and completed assembly shall be examined and measured to determine conformance to 3.4.8, 3.4.9, 3.4.10, and 3.5.1.1.

4.6 QCI. QCI shall include the examination of 4.6.2 and the tests of 4.6.3. Noncompliance with any of the specified requirements in sections 3 and 5 shall be cause for rejection of the sample and the inspection lot.

4.6.1 Sampling plan. Unless otherwise specified (see 6.2), the sampling plan specified herein shall be used. See 6.5.1 for definitions of sampling inspection terms.

4.6.1.1 Lot formation. An inspection lot shall consist of a quantity of batteries of any one part number, from an identifiable production period, from one manufacturer, submitted at one time for acceptance.

4.6.1.2 Sample. The samples for QCI examinations and tests shall be selected at the rate of four fully completed batteries per each production lot. When production lots exceed 5,000 per week, four additional test samples shall be selected and tested.

4.6.2 Examination. The sample selected in accordance with 4.6.1.2 shall be examined and defects classified as specified in table V (see 4.8.2). The acceptance number in all cases is zero.

TABLE V. Classification of defects.

Category	Defect	Method of inspection
Critical	None	
Major		
101	Maximum dimensional limitations exceeded (see 3.4, 3.4.1, and 3.4.2).	Scale
102	Location and polarity of terminal posts not as specified (see 3.4.11).	Visual
103	Loose terminal posts (see 3.4.11.1).	Manual
104	Terminal markings not as specified (see 3.4.11).	Visual
105	Dimensions of terminal posts not as specified (see 3.4.11).	Scale
106	Low electrolyte level (charged and wet batteries only) (see 3.5.2).	Visual
107	Specific gravity of electrolyte out of limits (charged and wet batteries only) (see 3.5.2).	Hydrometer
108	Open circuit, terminal-to-terminal voltage, less than 2.10 volts per cell (charged and wet batteries only) (see 3.5.2).	Voltmeter
109	Vent holes not properly sealed (charged and dry batteries only) (see 3.4.5).	Visual
110	Vent filler plugs and filler caps not as specified (see 3.4.6).	Visual and 4.8.7.1
111	Post seals not as specified (see 3.4.4)	Visual
112	Leaks or cracks in container (see 3.4.3).	4.8.3
113	Cover not proper sealed to container (see 3.4.2).	Visual
114	Vent openings in cover not as specified (see 3.4.2.1).	Visual/ Scale
115	Missing or improper instructions (see 3.8.1 and 3.8.2).	Visual

TABLE V. Classification of defects. (Continued)

Category	Defect	Method of inspection
Minor		
201	Improper marking (see 3.7).	Visual
202	Handles not as specified (see 3.4.7).	Visual
203	Workmanship defects (see 3.9).	Visual

4.6.3 Test. The sample selected in accordance with 4.6.1.2 shall be subjected to the tests specified in table III. The acceptance number in all cases is zero.

4.6.4 QCI failure. Any item that fails to conform to any specified requirement shall be rejected; any failure (one or more) of the selected sample in either the Major/Minor categories or test for the appropriate inspection lot size shall constitute a failure of the entire lot. The rejected item(s) may be repaired or corrected and resubmitted for inspection. If the contractor utilizes sampling inspection as an element of his inspection system, rejected inspection lots may be resubmitted for acceptance if the contractor performs 100 percent inspection on the lot for those characteristics which were defective and resulted in rejection of the lot and removes all defective units or obtains procuring activity approval to resample the lot due to the insignificance of the defects. Resubmitted lots shall be kept separate from new lots and shall be clearly identified as resubmitted lots.

4.7 Control tests. Control tests shall be done by using one of the following procedures:

a. Samples shall be selected at the rate of four fully completed batteries per each production lot. One battery shall be tested as shown in table VI for each group. Samples shall be examined for the defects specified in table V. When production lots exceed 5,000 per week, four additional test samples shall be selected and tested.

TABLE VI. Control tests (a).

SAMPLE	DESCRIPTION	REQUIREMENT	TEST
I.	Group A tests		
	a. Reserve capacity	3.6.2.2	4.8.13
	b. Low temperature capacity	3.6.2.3	4.8.14
II.	Group B tests		
	a. Cold activation	3.6.1	4.8.5
	b. Reserve capacity	3.6.2.2	4.8.13
	c. Low temperature capacity	3.6.2.3	4.8.14
III.	Group C tests		
	Extreme temperature resistance	3.6.5	4.8.17

TABLE VI. Control tests (a). (Continued)

SAMPLE	DESCRIPTION	REQUIREMENT	TEST
IV.	Group D tests		
	a. Terminal post torque resistance	3.4.11.1	4.8.9
	b. Reserve capacity	3.6.2.2	4.8.13
	c. Vibration	3.6.6	4.8.18

b. Samples shall be selected from completed batteries each production day as detailed in table VII. Samples shall have been examined as specified in table V and determined to be acceptable.

TABLE VII. Control tests (b).

Day	Weekly Production Test Group	Batteries
First	B, C	2
Second	B, D	2
Third	A	1
Fourth	A	1
Fifth	A	1
Sixth	A	1
Seventh	A	1

Once tests successfully completed cover each group (A, B, C, D) of table VII production lots from those days may be released prior to completion of testing on all Group A batteries provided all other examinations/tests are acceptable. Alternately, if a manufacturer meets the requirements of the In Plant Quality Evaluation (IQUE) program, then lots shall be identified and shipped on a regular basis without waiting for examination and test results. Examination and testing for each lot shall be completed no later than 21 days from the final day of manufacture of the lot. In either case, the contractor shall be responsible for return/retesting of shipped lots which contain samples that subsequently fail examination and/or testing. Failure of any sample during examination or testing may be cause for the government to refuse to accept subsequent lots until it has been proven to the government's satisfaction that appropriate corrective actions have been implemented.

4.7.1 Control test failures. Failure of a sample to pass any of the tests specified in table VI or VII requires special sampling inspection per the following:

a. Samples which failed the initial test, shall be selected at the rate of two batteries per day.

b. Retest samples shall be subjected to only the tests required to mode of failure.

at 55 degrees ± 2 degrees.

c. Any samples which fail the resampling test, may be further divided into operator or shift, sub-lots, and retested.

d. Two retest failures of a sub-lot may be cause for rejection by the government.

4.8 Methods of inspection.

4.8.1 Materials and construction. Conformance to 3.3, 3.3.1 and 3.3.2 shall be determined by inspection of contractor records providing proof or certification that design, construction, processing, and materials conform to requirements. Applicable records shall include drawings, specifications, design data, receiving inspection records, processing and quality control standards, vendor catalogs and certifications, industry standards, test reports, and rating data.

4.8.2 Defects. Conformance to 3.4, 3.4.1, 3.4.2 thru 3.4.7, 3.4.11, 3.5.2, 3.7, and 3.8.1 thru 3.9, shall be determined by examination for the defects listed in table V. Examination shall be visual or by measurement with standard inspection equipment.

4.8.3 Leakage test. To determine conformance to 3.4.3, each cell of samples to be tested shall be subjected to 3.45 kPa using dry air or nitrogen gas for a period of 30 seconds. A drop in pressure of 0.69 kPa in any cell shall be considered a failure of the sample battery. Optional methods of leakage testing may be used if approved by the procuring activity.

4.8.4 Container tests.

4.8.4.1 Electrical breakdown test. To determine conformance to 3.4.1.1.1, the battery container shall be filled with lead or aluminum shot or fitted with a close fitting mandrel or other electrode to within 12.5 mm of the top of the lowest point on the sides, ends, or partitions of the containers. An alternating current potential of 100 V rms per 2.54×10^{-2} mm of thickness shall be applied for 15 seconds after full calculated voltage has been reached. Voltage shall be supplied by a transformer of not less than 1/2 kilovoltampere capacity, using the electrodes in a manner that will subject each outer wall and inner partition of the container to the electrode potential. Containers shall subsequently be examined for leaks, imperfections, or other evidence of perforation or burn-through.

4.8.4.2 Acid absorption test. To determine conformance to 3.4.1.1.2, two specimens, each 76 by 76 mm, shall be cut from the partitions of the container. After being measured with calipers and weighed in the dry condition at 27° ± 6°C, each specimen shall be immersed in a covered vessel containing 150 cubic centimeters (cc) of sulfuric acid solution of 1.300 specific gravity at 27°C. The vessel shall be held for seven days in an oven at 66°C ± 3°C. At the end of the heating period, the specimens shall be inspected for evidence of cracks or blisters and then measured and weighed. The percentage increase in dimensions and weight shall be calculated.

damage and leakage of electrolyte and then shall be

4.8.4.3 Impact resistance test. To determine conformance to 3.4.1.1.3, an undamaged specimen container shall be permitted to rest not less than 24 hours after manufacture. Before testing, the sample shall be conditioned for four hours at each test temperature. The test shall be conducted in a 66°C ± 2.0°C, -18°C and -40°C atmosphere. Impact resistance shall be determined by a 1 kg solid steel ball, used as a free falling weight. When testing, the height of drop necessary to crack the container on the inside opposite the point of impact is the impact value for that section. The impact resistance shall be found by dropping the weight at the height necessary to produce the minimum impact resistance requirement for the test temperature (see table I). The weight shall hit the container only once for each drop. During the test, the container shall be positioned on a flat steel plate, about 25 mm longer and wider than the container. The container shall be positioned in such a manner that the ball will strike 1/3 down from the top of the container on the centerline of the sides of each cell and on the center of each cell cover area (where thickness is uniform). Testing of post cells is not required.

4.8.4.4 Bulge resistance. To determine conformance to 3.4.1.1.4, the bulge resistance in the container shall be measured and determined as follows:

a. Place an empty container, to be tested, in an appropriate rigid metal tray.

b. Fill the container to within 25 mm of the top with commercial grade polyethylene glycol at a temperature of 93°C ± 3°C.

c. Place the tray, containing the container, to be tested, in an oven and maintain the polyethylene glycol at 93°C ± 3°C.

d. When the liquid in the end cell adjacent to the end wall, to be measured, reaches a temperature of 93°C ± 3°C, start a one hour soak time.

e. At the end of the soak period, remove the tray containing the container being tested, from the oven and within five minutes, measure the end wall bulge, using the spider arrangement. The polyethylene glycol is to remain in the test container until the completion of the measurements.

f. The bulge shall be determined by comparing the center of the end wall with the plane of the four corners exposed. The center of the end wall is defined as a point half way between the horizontal parting line at the bottom and the bottom of the top band.

g. Bulge is to be reported as the difference as determined in subparagraph f.

4.8.5 Cold activation. To determine conformance to 3.6.1, this test shall apply to batteries furnished in charged and dry condition and without supplementary charge. The battery and electrolyte, 1.280 ± .005 specific gravity at 27°C shall be placed in a cold chamber at -1° ± 1°C for at least 18 hours prior to test and held until both battery and acid are at -1° ± 1°C. The electrolyte shall conform to 3.3.1. Remove from cold chamber and immediately fill the battery with the cold electrolyte. Allow battery to stand 30 minutes after filling last cell. Record gravity and temperature of the electrolyte. Discharge the battery at 450 amperes. Note and record the terminal voltage at 60 seconds.

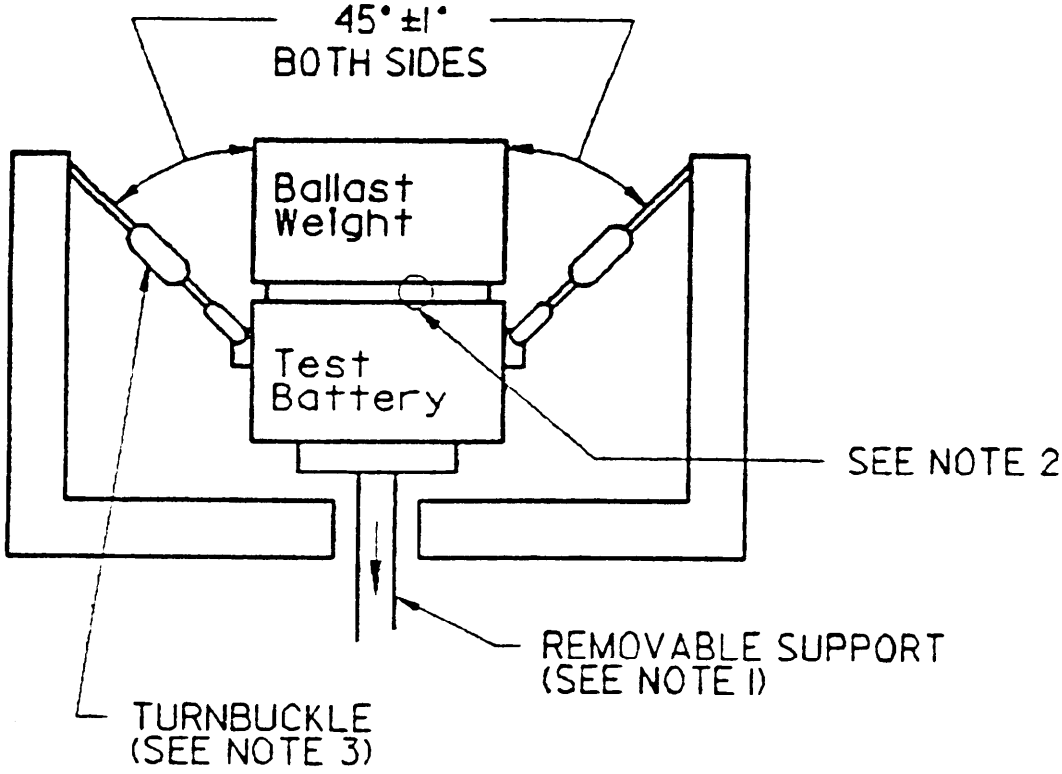
4.8.6 Battery cover physical characteristics. To determine conformance to 3.4.2, battery covers shall be tested as specified in 4.8.4.1, 4.8.4.2, and 4.8.4.3 with appropriate modifications in samples and procedures. Results shall be evaluated as specified in referenced paragraphs.

4.8.7 Vent filler plug thermal and pressure resistance test. To determine conformance to 3.4.6, each vent filler plug from the battery under test (see footnote, table IV) shall be placed in an ambient air temperature of -54° ± 1°C for two hours. At the end of the cooling period, the plugs shall be removed and immediately placed in an oven at an ambient air temperature of 121° ± 3°C for 90 minutes. The plugs shall then be removed and inspected for evidence of damage of such as cracking or melting. After a cooling period of one hour, each vent filler plug shall be inserted in a fixture arranged so that water pressure can be applied on the upper side of the plug, and air pressure on the lower side. Using this fixture, the upper side of each plug shall be subjected to a water pressure which exceeds the air pressure on the lower side by 12.07 kPa (water head of 1.22 meters if air pressure is atmospheric). The number of drops of water that leaks through each vent filler plug and the time required therefore (not to be less than one minute) shall be recorded. The water pressure shall then be released and the air pressure on the lower side increased to 3.45 kPa above the pressure existing on the upper side. Plug shall open under specified pressure.

4.8.7.1 Vent plug flame retardancy test. To determine conformance to 3.4.6, battery and vent plugs shall be tested for flame retardancy per SAE J1495.

4.8.8 Handle test. To determine conformance to 3.4.7, the handle and bond areas shall be saturated with electrolyte conforming to 3.3.1 and air dried twice daily for two days. The handles and bond areas shall again be saturated. The battery shall then be placed in an ambient air temperature of 88° ± 1°C for 60 minutes, allowed to cool to room temperature, and again heated at 88° ± 1°C for 60 minutes. The battery shall then be removed from the oven and immediately placed in a test fixture similar to figure 1. The battery shall be initially set on the removable support, and the angles and initial tautness of the handles shall be set with the support in place. The ballast weight, equal to the dry weight of the test battery, shall be placed on top of the test battery (a second similar battery may be used).

The support shall then be slowly removed and the battery and weight be allowed to hang freely by the handles for 60 seconds. The battery shall then be removed and the handles and bond shall be examined for conformance to 3.4.7. After the test, the battery shall be placed in an ambient air temperature of -54° ± 1°C for 24 hours. The battery shall be removed from the cold box and immediately subjected to the handle test previously specified.



NOTES:
1. Support shall allow gradual and even removal so as to minimize shock and insure even loading of both handles.
2. A lightweight (less than 1 kg) shim may be used between battery and weight to prevent damage to caps, posts or cover.
3. Turnbuckles shall be used to establish 45° angle of handles with test weight applied after removal of support. Turnbuckles shall include a device to support rope handles over a length of 114 mm during test.

FIGURE 1. Handle test.

4.8.9 Terminal post torque resistance test. To determine conformance to 3.4.11.1, an increasing torque up to 28.25 N.m shall be applied in a direction perpendicular to the axis of the terminal posts and parallel to the top of the battery by a torque-indicating device, through a fitted battery terminal or other clamping device. Observation shall be made for evidence of distortion of the strap and connected plates, or of the seal between the posts and the cell cover.

4.8.10 Charged and dry moisture. To determine conformance to 3.5.1, the plates and separators shall be weighed. They shall be dried in an oven at atmospheric pressure and a temperature of 74° to 77°C for 2 hours, or to a constant weight. The plates and separators shall be reweighed and the percentage of moisture computed.

4.8.11 Individual cell dry internal resistance test. To determine conformance to 3.5.1.1, the cell terminal-to-terminal resistance shall be measured with an ohmmeter, bridge, or other test instrument.

4.8.12 Full charge capacity test at 27°C. To determine conformance to 3.6.2.1, the battery full charge capacity rating (ampere-hours) shall be determined as follows:

a. Charge battery before each discharge in accordance with 4.3.3.2.

b. The temperature of the battery at the beginning of each discharge shall be 27° ± 3°C, and the temperature shall be maintained within this range by means of a water bath, or controlled air temperature condition, during discharge.

c. Discharge battery in accordance with 4.3.3.1, record the discharge time, and calculate the ampere-hour capacity.

d. Repeat steps a, b, and c.

e. Repeat steps a, b, and c.

f. The ampere-hour capacity obtained from each battery subjected to steps c, d, and e shall represent the full charge capacity. Exception: If the ampere-hour capacity is met in step c or d, extra steps are not required.

4.8.13 Reserve capacity test. To determine conformance to 3.6.2.2, reserve capacity tests shall be conducted as follows:

a. Charge battery before each discharge in accordance with 4.3.3.2.

b. The temperature of the battery at the beginning of each discharge shall be 27° ± 3°C, and the temperature shall be maintained within this range by means of a water bath, or controlled air temperature condition, during discharge.

c. Discharge battery at 25 ± 0.25 amperes to a terminal voltage of 10.5 volts. Record the time of discharge in minutes.

d. Repeat steps a, b, and c.

e. Repeat steps a, b, and c.

f. The longest time of discharge obtained from each battery subjected to steps c, d, and e shall represent the reserve capacity of the battery. Exception: If the reserve capacity requirement is met in step c or d, remaining steps through step e are not required.

The following correction factor shall be used to compensate for electrolyte temperature variation from the stabilized 27 ± 3°C.

Mc = Mr (1 - 0.009 (Tc - 27))
Mc = Corrected minutes
Mr = Minutes run
Tc = Temperature at one end of discharge
0.009 = Temperature correction factor

1/ Results not valid if electrolyte temperature is above 32°C or below 21°C at completion of test.

4.8.14 Low temperature capacity test. To determine conformance to 3.6.2.3, the test for high discharge rate at -18°C and -40°C shall be performed as follows:

a. Charge battery in accordance with 4.3.3.2.

b. Place battery in cold chamber having a temperature of minus 40 ± 3°C.

c. When the electrolyte has stabilized for one hour at minus 40 ± 3°C and immediately upon removal from the cold chamber, the battery shall be discharged at the rate and time specified in MS52149.

d. At this time the voltage shall be measured to determine conformance to 3.6.2.3.

e. If a battery fails the test, it shall be retested. The retested battery shall be charged in accordance with 4.3.3.2 with electrolyte stabilized at 27° ± 3°C, and then retested as specified in a through d. Failure of a battery to pass this second cycle shall be considered as failure to meet the specified requirements.

f. Test as per 4.8.13.

g. Repeat steps a through e, except temperature shall be -18° ± 1°C and discharge rate shall be at the rate and time specified in MS52149.

4.8.15 Retention of charge test. To determine conformance to 3.6.3, the retention of charge test shall be performed as follows:

a. Charge battery as specified in 4.3.3.2. Store battery for 30 days at a temperature maintained at 40° ± 3°C.

b. Discharge battery as specified in 4.8.13c.

c. Record time of discharge in minutes.

4.8.16 Electrolyte retention test. To determine conformance to 3.6.4, batteries shall be tilted through 45 degrees from a plane normal to the bottom of the battery along the major axis, held thus, for 30 seconds, and then similarly tilted and held along the minor axis. Batteries shall be observed for evidence of leakage, or spillage of electrolyte.

4.8.17 Extreme temperature resistance test. To determine conformance to 3.6.5, batteries shall be subjected to two thermal shock cycles. An internal pressure of 3.45 kPa shall be applied to each cell individually in parallel with a manometer at 27° ± 3°C for 30 seconds before and after each complete cycle. Drop in pressure in the individual cells shall be regarded as an indication of leakage. The following procedure for one cycle shall be used:

a. Battery shall be placed in an ambient air temperature of -54° ± 1°C for 24 hours, or until electrolyte is stabilized.

b. The battery shall then be placed in an ambient air temperature of 88° ± 1°C for 24 hours.

c. The battery shall be allowed to cool gradually to 27° ± 6°C for 24 hours.

4.8.18 Vibration resistance test. To determine conformance to 3.6.6, the test specimen shall be stabilized, then subjected to 4.8.13 a, b, and c in an ambient air temperature of 27° ± 6°C prior to vibration. Apparatus shall include a hold down frame to bear on the top edges of the battery container, but not on the vent plugs or terminal posts. While in an ambient air temperature of 27° ± 6°C and mounted in the vibrating machine, the specimen shall be vibrated for two hours at a frequency of 2,000 to 2,100 cycles per minute through an amplitude of 1.14 to 1.27 mm (total vertical excursion 2.28 to 2.54 mm). During this test the battery shall be discharged at the 20 hours rate. The test shall be repeated for one hour, except that the battery shall be chilled to, and the electrolyte stabilized at a temperature of minus 40° ± 2°C for one hour immediately before beginning vibration. During the test, the battery shall be observed for maintenance of steady voltage and current, and thereafter examined for evidence of loosening of terminal posts in the covers and flooding of electrolyte at the top. The battery shall be removed from the vibrating machine, allowed to warm to 27° ± 6°C until the electrolyte is stabilized, then subjected to 4.8.13 a, b, and c.

4.8.19 Life-cycle capacity tests. To determine conformance to 3.6.7, life tests shall consist of a series of discharge and charge in accordance with the applicable test specified in 4.8.19.1. Immediately prior to the beginning of the test, the battery shall be fully charged as specified in 4.3.3.2. Tests shall be performed with the battery in a water bath with the temperature maintained at 38° ± 3°C. Water shall be added as required to each cell to replace evaporation (except during the capacity discharge test cycle for ampere-hour capacity). When the ampere-hour capacity equals or drops below 40 percent of the rated ampere-hour capacity during the capacity discharge test cycle, the battery shall be fully charged as specified in 4.3.3.2 and tested as specified in 4.8.12. If the capacity is above 40 percent of normal full charged value, the life test shall be continued. If the capacity equals or falls below 40 percent, the life cycle test shall be terminated. The life cycle attained by a battery shall be taken as the total of the actual cycles completed on the life test, plus each cycle received on other tests.

4.8.19.1 Life-capacity discharge cycles. To determine conformance to 3.6.7, the test shall consist of a total of 235 discharge/charge cycles including normal and weekly cycles and cycles attained on other tests:

a. Normal cycles. The normal cycles shall consist of a series of six hour cycles (four cycles per day or approximately 24 per week). Each cycle shall consist of discharge for one hour at 40 amperes and charge for five hours at 10 amperes.

b. Weekly capacity discharge cycles. Ampere hour capacity shall be determined at the completion of each series of 24 normal cycles. The battery shall be discharged at the ampere rate for normal cycles, until a final average terminal voltage of 1.75 volts per cell has been reached. The ampere hour capacity shall be calculated as the product of the current rate in amperes and the time of discharge in hours. Following this discharge, the battery shall be fully charged per paragraph 4.3.3.2 or SAE J537 and the normal cycle procedure shall be continued. The battery shall be placed on a discharge cycle which, with the charge cycle, shall constitute a full normal cycle.

4.8.20 Storage life test. To determine conformance to 3.6.8, specimens shall be stored under standard test conditions (see 4.3) for 90 days. After storage, the battery shall be tested per 4.8.5.

4.8.21 Inspection of packaging. Packaging inspection shall be accomplished in accordance with the quality assurance provisions of PPP-B-140, or the applicable packaging data sheet as selected from paragraph 5.1.1 (see 6.2).

4.8.22 Inspection of Material Safety Data Sheet (MSDS). To determine conformance to 3.10, MSDS shall be inspected.

5. PACKAGING

5.1 Dry and wet charged batteries.

5.1.1 Preservation, packaging, and packing. Charged wet and dry batteries shall be cleaned, dried, preserved, packaged, and packed to the desired level of protection in accordance with PPP-B-140 or the applicable packaging sheet as specified (see 6.2).

5.1.2 Marking. Marking shall be in accordance with MIL-STD-129, including lot numbers, except for any special marking requirements (see 6.2).

5.1.3 Transportation (charged and wet batteries). Charged and wet batteries shall be packaged and transported in conformance to DOT Regulation 49 CFR.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Batteries covered by this specification are intended primarily for starting, lighting, and ignition service in military vehicles, including tactical and administrative vehicles, internal combustion engine driven industrial trucks and tractors, construction equipment and generator sets. The batteries will also be used for radio operation and as a source of electrical energy for operating vehicular accessories, such as sighting devices and control mechanisms.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number and date of this specification.
b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual document referenced (see 2.1.1 and 2.2).
c. Type designation, battery condition, and part number (see 1.1 and 3.5).
d. Identify activities requiring copies of completed MSDS and specify when the MSDS will be inspected (see 3.10 and 6.6).
e. Any special marking requirements (see 5.1.2).
f. Level of preservation, packaging, and packing in accordance with PPP-B-140 or the applicable packaging data sheet (see 5.1.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable QPL, whether or not such products have actually been so listed by that date. The attention of contractors is called to this requirement. Manufacturers are urged to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be

awarded contracts or orders for the items covered by this specification. The activity responsible for the QPL is the Commanding General, U.S. Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000. Information pertaining to qualification of products may be obtained from that activity.

6.4 Subject term (key word) listing.

Batteries
Storage Batteries
Lead-Acid Batteries

6.5 Definitions.

6.5.1 Definitions of terms used in sampling inspection.

a. Classification of defects. A classification of defects is the enumeration of possible defects of the unit of product classified according to their seriousness. A defect is any nonconformance of the unit of product with specified requirements. Defects will normally be grouped into one or more of the following classes: critical, major and minor defects. Also, defects may be grouped into other classes, or into subclasses within these classes.

b. Critical defects. A critical defect is a defect that judgement and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product; or a defect that judgement and experience indicate is likely to prevent performance of the tactical function of a major end item such as a ship, aircraft, tank, missile, or space vehicle.

c. Critical defective. A critical defective is a unit of product which contains one or more critical defects and may also contain major and/or minor defects.

d. Defective. A defective is a unit of product which contains one or more defects.

e. Formation of lots or batches. The product shall be assembled into identifiable lots, sublots, batches, or in such other manner as may be prescribed (see 1). Each lot or batch shall, as far as is practicable, consist of units of product of a single type, grade, class, size, and composition, manufactured under essentially the same conditions, and at essentially the same time.

f. Lot or batch. The term lot or batch shall mean "inspection lot" or "inspection batch", i.e., a collection of units or product from which a sample is to be drawn and inspected and may differ from a collection of units designated as a lot or batch for other purposes (e.g., production, shipment, etc.).

g. Lot or batch size. The lot or batch size is the number of units of product in a lot or batch.

h. Major defect. A major defect is a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

i. Major defective. A major defective is a unit of product which contains one or more major defects, and may also contain minor defects but contains no critical defect.

j. Minor defect. A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

k. Minor defective. A minor defective is a unit of product which contains one or more minor defects but contains no critical or major defect.

l. Presentation of lots or batches. The formation of the lots or batches, lot or batch size, and the manner in which each lot or batch is to be presented and identified by the supplier shall be designated or approved by the responsible authority. As necessary, the supplier shall provide adequate and suitable storage space for each lot or batch, equipment needed for proper identification and presentation, and personnel for all handling of product required for drawing of samples.

m. Representative sampling. When appropriate, the number of units in the sample shall be selected in proportion to the size of sublots or subbatches, or parts of the lot or batch, identified by some rational criterion. When representative sampling is used, the units from each part of the lot or batch shall be selected at random.

n. Sample. A sample consists of one or more units of product drawn from a lot or batch, the units of the sample being selected at random without regard to their quality. The number of units or product in the sample is the sample size.

o. Sampling plan. A sampling plan indicates the number of units of product from each lot or batch which are to be inspected (sample size or series of sample sizes) and the criteria for determining the acceptability of the lot or batch (acceptance and rejection numbers).

p. Time of sampling. Samples may be drawn after all the units comprising the lot or batch have been assembled, or samples may be drawn during assembly of the lot or batch.

6.5.2 Recovered materials. "Recovered materials" means materials that have been collected or recovered from solid waste (see 6.5.3).

6.5.3 Solid waste. "Solid waste" means (a) any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility; and (b) other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities. It does not include solid or dissolved material in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Clean Water Act (33 U.S.C. 1342 et seq.), or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) (Source: Federal Acquisition Regulations, section 23.402).

6.6 MSDS. The contracting officer should identify those activities requiring copies of the completed MSDS prepared in accordance with FED-STD-313. Additional pertinent Government mailing addresses for submission of data are listed in appendix B of FED-STD-313 (see 3.10 and 6.2).

6.7 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

6.8 AMC policy on AQLs/LTPDs. This specification is certified to be in compliance with current Army Materiel Command (AMC) policy for the elimination of AQLs/LTPDs (Acceptable Quality Levels/Lot Tolerance Percent Defectives) from military specifications.

Custodian:
Army - AT

Preparing activity:
Army - AT

(Project 6140-A759)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-B-62346D(AT)	8 September 1994

3. DOCUMENT TITLE: Batteries, Storage: Lead-Acid, (Low Maintenance) (Metric)

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

PREPARING ACTIVITY		
a. NAME	b. TELEPHONE (Include Area Code) (1) Commercial: (810) 574-5508	(2) AUTOVON: 786-5508
c. ADDRESS (Include Zip Code) COMMANDER U.S. ARMY TANK - AUTOMOTIVE COMMAND ATTN: AMSTA-GLC WARREN, MICHIGAN 48397-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	

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