W-B-134C
February 16, 1973
SUPERSEDING
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Fed. Spec. W-B-134A
April 16, 1962

FEDERAL SPECIFICATION

BATTERY, STORAGE, (LEAD-ACID, INDUSTRIAL FLOATING SERVICES)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers industrial storage batteries of the lead-acid type for stationary floating service.

1.2 Classification. Individual storage batteries, as covered by this specification, shall be of the voltage, ampere-hour capacity, and within the dimensional limitations, as specified in the invitation for bids. They shall be of the following types, classes, and styles, as specified (see 6.1).

Type I - Flat Pasted Positive Plate Design.

Class 1 - Lead-Antimony Grid Alloy.

Style A - For full float service - moderator discharge low deterioration rate, for communications, control office use, explosion protected.

Style B - For full float service - high discharge low deterioration rate. For control, switchgear and auxiliary power use, explosion protested.

Type II - Plante' Positive Plate Design.

Style A - For full float service - moderate discharge low deterioration rate, for communications, control office use explosion protected.

Style B - For full float or trickle service - high discharge low deterioration rate. For control, switchgear and auxiliary power use, explosion protected.

Type III - Multitublar Positive Plate Design.

Style A - For full float service - moderate discharge low deterioration rate. For communication, control office use, explosion protected.

Style B - For full float service - high discharge low deterioration rate. Per control switchgear and auxiliary power use, explosion protected.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specifications:

Q-S-801 - Sulfuric Acid, Electrolyte (For Storage Batteries)
PPP-B-140 - Batteries, Storage, Industrial: Preparation for Shipment and Storage of.

Federal Standards:

Fed. Std. No. 123 - Marking for Domestic Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Service Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Forth Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and standards from established distribution points in their agencies.)

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 General. Unless otherwise specified (see 6.1), battery components shall be of a material and construction described in this specification, and shall be equal or superior to those used in the manufacturer's commercial product.

3.1.1 Materials. All materials used in the construction of batteries purchased under this specification shall be equal or superior to the manufacturer's best commercial established standards. The positive active material shall be essentially lead dioxide and the negative active material shall be sponge lead. The electrolyte shall be an aqueous solution of sulfuric acid. The battery shall be new that is, not previously used. Specifically, it shall contain no plates, rubber, plastic, or glass, or other components previously used in other batteries and shall be free from reclaimed active material. The use of reclaimed lead, properly refined, is permissible.

3.2 Plates. Unless otherwise specified, all cells shall consist of one or more positive plates and one more negative plate than positive plate (see 6.1). The end plates shall be negative ones whose outer surfaces are open to view to facilitate inspection.

3.2.1 Positive plates. The positive plates shall be of the pasted plate design, Plante' design or multitublar plate design of the type class, and style specified (see 6.1).

3.2.1.1 Pasted positive plates. Pasted positive plates shall consist of lead-alloy grids of such design as to insure uniform current distributions throughout the mass of active material. The design of the grids and composition of active material shall be such as to insure that the active material is held securely is place and in complete electrical contact with the grids.

3.2.1.2 Plante' positive plates. Plante' positive plates shall consist of lead that has been processed to increase the surface area and electro-chemically formed to convert the outer surfaces to lead peroxide active material.

3.2.1.3 Multitubular positive plates. Multitubular positive plates shall consist of multiple insulated containers filled with active material and having a centrally placed core rod conductor. The containers shall run vertically, permitting free passage of electrolyte from one face of the plate to the other. Each container shall be slotted or perforated, or reinforced porous tubing which will permit the diffusion of the acid electrolyte into the container.

3.2.2 Negative plates. The negative plates shall be of the size, number, and thickness that conform to the manufacturer's commercial standards for the various sizes and types of batteries and shall approximate the size of the positive plates, except for thickness.

3.3 Grids.

3.3.1 Lead-calcium grid alloy. Lead-calcium grids for positive plates and component parts shall not contain more than 0.085 percent calcium by weight; for negative grids and component negative parts, the calcium context shall not exceed 0.10 percent by weight. The maximum allowable impurities shall not exceed the following percentages by weight:

Antimony	Trace	
Arsenic	Trace	
Bismuth	0.01	Percentage
Copper	.002	
Iron	.002	
Platinum	.00001	
Silver	.002	

3.3.2 Lead-antimony grid alloy. Lead-antimony grids for positive plates and component parts shall not contain more than 8.0 percent antimony by weight. The maximum allowable impurities shall not exceed the following concentrations by weight:

	Percent
Bismuth	0.05
Copper	.05
Iron	.005
Platinum	.00001
Zinc	.002

3.4 Positive and negative groups. Plates of like polarity in each cell shall be burned integrally to the respective straps to form a parallel group; the straps shall be of such design, size, and strength as to be adequate electrical conductors and mechanical supports for the respective plate groups.

3.5 Elements. Elements shall be assembled by intermeshing the positive and negative groups, and insulated from each other by separators.

3.6 Separation and retention (insulation). Plate separation and provisions for retention of active materials in positive plates shall equal or exceed the following:

(a) For Type I (Flat pasted plate design) a combination of two or three elements (1) separator (3.6.1), and/or fibrous glass mat (3.6.2).

(b) For Type II (Plante') a single porous rubber separator.

(c) For Type III (Multi-tubular) a single porous rubber separator in addition to the reinforced porous tubing material.

3.6.1 Separators. Separators shall be of microporous rubber or of any synthetic material (plastic, etc.) with a proven float service life sufficient to meet the life requirements of this specification.

3.6.2 Retainers. Except as otherwise provided retainers shall be rubber, plastic, or fibrous-glass mat flat sheets.

3.6.2.1 Rubber or plastic retainers. The rubber or plastic flat sheet retainers shall be perforated or slotted in such a manner so as to effectively retard shedding of active material from the plates. They shall have a minimum porosity of 25 percent. In assaying porosity, only the area of the retainer corresponding to the active material shall be considered.

3.6.2.2 Fibrous-glass mat retainers. Fibrous-glass mat retainers may be used in lieu of, or in conjunction with rubber or plastic retainers. The fibrous-glass shall be composed of filament 0.40 to 0.70 mil. diameter and completely over the surface of both faces of each positive plate and may extend beyond the edges. The mat fibers shall be intermingled and weigh not less than 1.5 mg. per mil thickness. The mat shall be uniform in density over its area.

3.7 Electrolyte. Electrolyte furnished in or with the cells shall be a solution of sulfuric acid in water, and shall conform to the requirements of O-S-801.

3.8 Specific gravity. Unless otherwise specified, cells supplied under this specification shall be furnished with fully charged electrolyte with a specific gravity of 1.215 +/- 0.005 at an electrolyte temperature of 77 deg. F.

3.9 Posts and intercell connectors. Posts and intercell connectors shall be adequate to carry, without excessive heating or voltage drop, the current incident to the service application. Intercell connectors shall be burned or bolted to the cell terminals, and shall not obstruct the filling vents. Copper inserts, when used, shall be completely embedded in posts or intercell connectors to prevent contact with electrolyte. Copper strips, when used for intercell connectors, shall be protested with a uniform and homogeneous lead or lead-alloy coating not less than 0.002 inch thick. This coating shall be suitably bonded to the copper strips to prevent peeling and shall be free from blisters and pinhole. When lead-coated copper connectors are used in conjunction with cast-alloy and pieces the lead coating on the connectors shall become an integral part of the cast-alloy pieces. Each terminal post shall have two nonintersecting connection bolt holes at right angles to each other, except cells rated 150 ampere-hours or less which may have one bolt hole per terminal.

3.10 Terminal markings (polarity). Polarity of positive-cell terminal shall be plainly and durably marked "POS", "p", red plastic post nut, or "+". Negative terminal shall be marked "NEG", "N", black plastic post nut, or "-".

3.11 Intercell connectors and jumpers. Intercell connectors and jumpers shall be well protected against corrosion and of a type flexibility, and current-carrying capacity suitable for the service intended.

3.12 Cell containers. Unless otherwise specified (see 6.1), cell containers shall be of transparent or translucent plastic material.

3.12.1 Sediment space. Containers shall have sediment space sufficient to accommodate all the active material which will settle therein during the life of the cell so that during this period there will be no contact between the deposited sediment and the plates.

3.12.2 Space above plates. Containers shall have space above plate tops to provide for an electrolyte normal level of a height sufficient that the cells need not be watered more frequently than is customary for the service application intended.

3.12.3 Acid absorption. Acid absorption of the container material shall not exceed 1 percent by weight.

3.13 Cell covers. Cell covers shall be of plastic material commercially approved for the application and shall have sufficient strength to prevent cracking or warping during the life of the battery. Cover material shall conform to acid-absorption requirements specified in 3.12.3.

3.13.1 Filling vent. The vent cap shall be of the screw, bayonet type, or other types suitable for intended application. Suitable baffling shall be provided in the cell, vent, or cap to avoid spraying and to minimize creepage of electrolyte while at the same time permitting gas escape. Unless otherwise specified (see 6.1), each cell, including its vent cap, shall be of such design as to preclude the ignition of gases within the cell from a spark or flare outside the cell.

3.13.2 Seal. The joint between the cover and container, and all covering openings other than the vents, shall be gastight and effectively sealed against creepage of electrolyte. The sealing compound used to seal the cover-container joints of containers shall be an acid-resisting material entirely suitable for the purpose. It shall be capable of maintaining an unbroken seal between the cover and the container throughout a temperature range of 0 deg. to 140 deg. F. Sealing compound recovered from batteries previously in use shall not be used.

3.14 Assembly. Cells shall be furnished as individual cells, or complete batteries, as specified by the purchaser.

3.14.1 Battery assembly. Unless otherwise specified, battery assembly shall be of standard groups, dimensions, and connections, and shall include suitable terminal connection.

3.15 Weights. Average weights of cells and battery assemblies shall approximate the manufacturer’s published catalog values.

3.16 Charged-and-wet. The battery charge shall be maintained during the forming and handling prior to shipment in such a manner as to prevent formation of hard white sulphate which cannot be converted by charging within thirty days after shipment.

3.16.2 Charged-and-dry. Batteries intended for storage in the charged-and-dry condition within the time limit specified by the manufacturer shall contain dry-charged plates and dry separators. When necessary to prevent deterioration of

plates due to exposure to moist air, the vents shall be sealed and the batteries made ready for service by filling with electrolyte in accordance with instructions furnished by the manufacturer. When made wet and fully charged, they shall be required to deliver initially only 85 percent of their rated capacity when discharged at their normal rate at 77 deg. F. This specification shall not be construed to permit use of "dumped" charged-and-wet batteries.

3.17 Markings. Batteries or cells furnished as individual units shall be legibly and permanently marked with at least the following:

(a) Name or registered trademark of the manufacturer.

(b) Manufacturer's type designation including the number of plates.

(c) Ampere-hour capacity and hour-rating.

(d) Month and year of manufacture in arabic numerals (e.g., 5-69).

Markings may be embossed or indented on the cell cover, cell container (except the bottom), top of terminal posts, or connector or a marking plate may be permanently attached to the cell or rack.

3.18 Instructions. With each shipment of batteries, there shall be included for each type and size of cell in the shipment a set of complete instructions for the proper installations and maintenance of the battery including charge and discharge characteristics. The instructions shall be securely fastened in plain view of the top of the battery, properly protected from mechanical or chemical damage.

3.19 Performance.

3.19.1 Capacity ratings. Individual cells or storage batteries made from individual cells shall give initially not less than 85 percent of the ampere-hour capacity specified (see 1.2), when tested as described in 4.5.1. The battery shall be of such design that when operated on a full-float routine, compatible with economical use of the battery under service conditions, it will consistently attain its rated capacity within 2 years.

3.19.2 Ampere-hour efficiency. The battery shall have an ampere-hour efficiency such that the battery shall have a capacity equal to at least 85 percent of the rated 8-hour capacity when tested in accordance with 4.5.2.

3.19.3 Life. Batteries shall be a design proven to endure in full-float service. The design shall be such that when charged at a low rate or a high rate, or when operated on a full-float basis, distortion or excessive wear of the plates will not result. The cells shall be of a design for which data, from either field tests or proven accelerated life tests, can be made available by the manufacturer to show batteries of like design will have the following minimum useful life:

	Years
Calcium-Lead cells	20
Antimony-Lead cells	14
Plante' design	25
Multitubular design	20

3.19.4 Retention of charge. The specific gravity drop measured on any cell after being tested in accordance with 4.5.3 shall not exceed the following:

	Percent
Calcium-Lead cells	0.005
Antimonial-Lead cells	.015
Plante-Lead cells	.015

3.20 Workmanship. The workmanship in fabricating the parts, the assembly of the battery, and the lead burning shall be first class in every particular. Active plate material shall be free from breaks, projections, and loose parts. Grids shall be free of open sections, evidence of cold pouring, cracks, and blowholes. Breaks in those parts of the grids which are used to retain the active material are permissible only when the situation of the break does not impair the strength of the grid permit the active material to become loosened or separated from the plate. All sections of plates involving lead burning shall be homogeneous and free form blowholes or imperfect bonds between the portions jointed.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform an of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.1.1 Where it is impracticable to complete any test on batteries taken from current production prior to delivery to the Government, such as the "Life test" (4.5.4), the supplier shall make available his records of tests on preceding production as necessary to establish proof that batteries or like design, manufactured under substantially identical or essentially equivalent conditions, have met the requirements of this specification.

4.2 Lot. Submission of the product and the formation of lots shall be in accordance with MIL-STD-105.

4.2.1 Sampling for inspection (see 4.2.2). Sampling for inspection shall be in accordance with MIL-STD-105.

4.2.2 Visual, dimensional, and primary functional inspection. Each battery or cell selected in accordance with 4.2.1, shall be inspected for conformance to the following acceptable quality levels (A.Q.L.) on the basis of percent defective:

Classification	A.Q.L.
Major	1.0
Minor	2.5

4.2.3 Classification of defects. For inspection purposes, defects shall be classified as follows:

Major defects (1.0 A.Q.L)
Plates (see 3.2).
Positive and negative plates (see 3.2).
Grids (see 3.3).
Positive and negative groups (see 3.4).
Elements (see 3.5).
Separation and retention (see 3.6).
Separators (see 3.6.1).
Retainers (see 3.6.2).
Electrolyte (see 3.7).
Specific gravity (see 3.8).
Posts and intercell connectors (see 3.9).
Terminal markings, polarity (see 3.10).
Intercell connectors and jumpers, where applicable (see 3.11).

Cell containers (see 3.12).

Cell covers (see 3.13).

Assembly (see 3.14).

Weights (see 3.15).

Charge condition (see 3.16).

Marking (see 3.17).

Workmanship (see 3.20).

Minor defects (2.5 A.Q.L.)

Missing instructions (see 3.18).

Chipped vent plug thread (see 3.13.1)

4.3 Sampling for test. Sampling for testing shall be in accordance with table I below:

TABLE I. Testing

Group	Tests	Sampling	Acceptance Number
I	4.5.1, 4.5.2, and 4.5.3	One battery or cell as applicable per month or one for each 500 produced whichever occurs first, except that not more than 3 batteries need be tested in any single month.	All samples must pass
II	4.5.4	One battery per year.	All samples must pass

4.4 Conditioning of samples.

4.4.1 Initial conditioning. If the battery is supplied in a completely charged-and-wet condition, it shall be given no initial conditioning. If the battery is supplied in a charged-and-dry condition, it shall be initially conditioned in accordance with the manufacture's directions. During the period of charging the electrolyte temperature shall be maintained at 95 deg. +/- 20 deg. F.

4.5 Test procedures.

4.5.1 Capacity test. To determine conformance to 3.19.1, cells or batteries shall be discharged (after initial conditioning charge if required) at the 8-hour rate of 85 deg. F. to an end voltage of 1.75 per cell.

4.5.2 Efficiency test. A fully charged unused battery shall be discharged at its 8-hour rate to 1.75 volts per cell except that if the cell voltage at the end of 6.8 hours is still above 1.75 volts per cell, the discharge shall be stopped and the voltage recorded. The battery shall then be recharged within 7.5 hours, the ampere-hours being returned to the battery shall not exceed 111 percent of the ampere-hours capacity realized during the previous discharge. Allow the battery to stand on open circuit for 12-16 hours. The battery shall then be discharged at its 8-hour rate to 1.75 volts per cell (or to the same voltage measured above even if the time is less than 6.8 hours). The capacity of this last discharge shall be at least 85 percent of the rated 8-hour capacity.

4.5.3 Retention of charge test. The cell or battery shall be fully charged and then shall be allowed to stand on open circuit in an ambient temperature of 77 deg. F +/- 5 deg. F. for a period of 30 days. At the end of the 30-day period, the specific gravity of each cell shall be measured and compared with the requirements of 3.19.4.

4.5.4 Life test. Either normal or proven accelerated test programs approved by General Services Administration may be used to determine battery life. In either case, the cells or batteries shall be float charged within the temperature and terminal volt ranges specified by the manufacturer for his test program. All necessary data to substantiate conformance to 3.19.3 shall be collected and recorded throughout the test period.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing, and marking. The preservations, packing, and marking shall be in accordance with PPP-B-140, except Civil Agency marking shall be with 5.2.1. The preservation and packaging shall be level A or C and the packing shall be level A, B, or C (see 6.1).

5.2 Marking.

5.2.1 Civil agencies. In addition to markings required by the contract or order, the interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

6. NOTES

6.1 Ordering data. Purchasers should select the preferred options permitted herein (see 1.2, 3.1, and 3.15). Where all materials or construction described in section 3 are not suitable for the service for which the battery is intended, those materials, or constructions not acceptable, shall be listed in the invitation for bids (see 3.1). Procurement documents should also include the following:

6.1 Ordering data. Purchasers should select the preferred options permitted herein (see 1.2, 3.1, and 3.15). Where all materials or construction described in Section 3 are not suitable for the service for which the battery is intended, those materials, or constructions not acceptable, shall be listed in the invitation for bids (see 3.1). Procurement documents should also include the following:

(a) Title, number, and date of this specification (see heading).
(b) Type, style and class of battery required (see 1.2).
(c) Ampere-hour capacity and voltage or number of cells (see 1.2).
(d) Maximum dimensions of battery (see 1.2), and where applicable, a sketch showing space available and terminal arrangement.
(e) Specific gravity, if other than specified (see 3.8).
(f) Flame arresters, if other than specified (see 3.13.1).
(g) Assembly (see 3.14).
(h) Charge condition of battery (see 3.16).
(i) How suppliers' records of tests are to be made available to the Government (see 4.1).
(j) Level of preservation, packaging, level of packing required (see 5.1).

MILITARY CUSTODIANS:

Army - ME
Navy - YD
Air Force - 82

Review activities:

Navy - CG

User activities:

Navy - OS
Army - EL

Civil agency coordinating activity:

GSA - FSS

Military coordinating activity:

GSA-FSS

Military coordinating activity:

Navy - YD

Preparing activity:

GSA - FSS

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