

METRIC
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O-B-41H  
16 November 2010  
 SUPERSEDING  
 O-B-41G  
 31 May 2005

## FEDERAL SPECIFICATION

### BATTERY WATER

The General Services Administration has authorized the use of this federal specification by all federal agencies.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers one type of battery water that is used in lead-acid storage batteries.

#### 2. APPLICABLE DOCUMENTS

2.1 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on the date of invitation for bids or request for proposal shall apply.

##### ASTM International

ASTM D511	- Standard Test Methods for Calcium and Magnesium In Water
ASTM D512	- Standard Test Methods for Chloride Ion In Water
ASTM D1068	- Standard Test Methods for Iron in Water
ASTM D1193	- Standard Specification for Reagent Water
ASTM D1426	- Standard Test Methods for Ammonia Nitrogen In Water
ASTM D1688	- Standard Test Methods for Copper in Water
ASTM D1886	- Standard Test Methods for Nickel in Water

<p>Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: <a href="mailto:STDZNMGT@dla.mil">STDZNMGT@dla.mil</a> or Defense Logistics Agency Aviation VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616. Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at <a href="https://assist.daps.dla.mil/">https://assist.daps.dla.mil/</a>.</p>
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## ASTM International - Continued

- ASTM D6317 - Standard Test Method for Low Level Determination of Total Carbon, Inorganic Carbon and Organic Carbon in Water by Ultraviolet, Persulfate Oxidation, and Membrane Conductivity Detection

(Private sector and civil agencies may purchase copies of these voluntary standards from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. Electronic copies may be obtained from <http://www.astm.org/>.)

## Waters Corporation

- Method B-1011 - The Determination of Nitrite and Nitrate in Water Using Single Column Ion Chromatography
- 980896 - Anion Analysis Using Hydroxide Eluent and Indirect Conductivity Detection and EPA Method B-1011 for Nitrite and Nitrate Using UV Detection

(Private sector and civil agencies may purchase copies of these voluntary standards from Waters Corporation, 34 Maple Street, Milford, MA 01757. Electronic copies may be obtained from <http://www.waters.com/>.)

## 3. REQUIREMENTS

3.1 Physical characteristics. The battery water shall be clear, colorless, odorless, and free from suspended matter and sediment when tested as specified in 4.3.1.1.

3.2 Impurities. The battery water shall conform to the maximum allowable impurity requirements shown in table I when tested in accordance with the applicable test paragraphs and test standards listed in table I.

TABLE I. Maximum allowable impurities.

Impurity	Maximum (mg/L) <sup>1</sup>	Test paragraph	Test standard
Total solids	100	4.3.1.2	ASTM D6317 <sup>2</sup>
Organic and volatile matter	50	4.3.1.2	ASTM D6317 <sup>2</sup>
Calcium and magnesium (total)	40	4.3.1.3	ASTM D511
Iron	0.5	4.3.1.4	ASTM D1068
Copper	2.5	4.3.1.5	ASTM D1688
Chloride	5	4.3.1.6	ASTM D512
Nickel	0.2	4.3.1.7	ASTM D1886
Ammonia (as NH <sub>4</sub> )	8	4.3.1.8	ASTM D1426

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TABLE I. Maximum allowable impurities - Continued.

Impurity	Maximum (mg/L) <sup>1</sup>	Test paragraph	Test standard
Nitrites (as NO <sub>2</sub> )	5	4.3.1.9	Waters Corp. document 980896 <sup>2</sup>
Nitrates (as NO <sub>3</sub> )	10	4.3.1.10	Waters Corp. document 980896 <sup>2</sup>

<sup>1</sup> When specific gravity is unity, the concentration of aqueous solute in milligrams per liter (mg/L) of solution will equal the parts per million (ppm). The concentration in micrograms per liter (µg/L) will equal the parts per billion (ppb). When specific gravity is not equal to unity, mg/L or µg/L divided by the specific gravity of the solution will equal ppm or ppb, respectively.

<sup>2</sup> Test measurements conducted in accordance with the indicated test standards are expressed in µg/L and should be converted to the mg/L equivalent using 1 mg/L = 1000 µg/L.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the acquisition order (see 6.2), the contractor is responsible for the performance of all inspection requirements (examinations and tests) specified herein. Except as otherwise specified in the acquisition order (see 6.2), 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items supplied to the Government 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 comply with all requirements of the contract. Sampling inspection, as part of the 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.

4.1.2 Contractor assurance of compliance. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements using, as a minimum, the conformance criteria specified herein.

4.1.3 Alternative inspection provisions. When specified in the acquisition order (see 6.2), alternative inspection provisions, methods, or equipment such as statistical process control, tool control, and other types of sampling procedures may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the inspection provisions specified herein. Prior to applying such alternative procedures, methods, or equipment, the contractor shall describe them in a written proposal submitted to the Government for evaluation and approval. The contractor shall demonstrate that the effectiveness of each proposed alternative is equal to or better than the quality assurance provisions specified herein. In cases of dispute as to whether the contractor's proposed alternative provides equal quality assurance, the provisions of this

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specification shall apply. All approved alternative inspection provisions shall be specifically incorporated into the contractor's quality program or detailed inspection system, as applicable.

#### 4.2 Quality conformance inspection.

4.2.1 Lot. A lot shall consist of the battery water produced by one manufacturer at one plant from the same materials and under essentially the same manufacturing conditions, provided the operation is continuous. In the event the process is a batch operation, each batch shall constitute a lot (see 6.3.1).

4.2.2 Sampling for battery water tests. Sampling shall be conducted in accordance with table II. A representative specimen of approximately 0.9 liter (L) shall be removed from each sample container and placed in a suitable clean, dry container labeled to identify the lot and container from which it was taken.

TABLE II. Sampling for battery water tests.

Number of containers in a batch or lot	Number of samples
1 to 2	Sample 100%
3 to 25	2
26 to 150	3
151 to 1,200	5
1,201 to 7,000	8
7,001 to 20,000	10
over 20,000	20

4.2.3 Inspection procedures for battery water tests. Each sample specimen taken in accordance with 4.2.2 shall be tested as specified in 4.3.1. Failure of any test by any inspection shall be cause for rejection of the lot represented.

#### 4.3 Test methods.

4.3.1 Battery water tests. Reagent-grade water meeting the requirements of ASTM D1193 and reagent-grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Unless otherwise specified (see 6.2), acid and base reagents shall be concentrated acids and bases. Tests shall be conducted as specified in 4.3.1.1 through 4.3.1.10.

4.3.1.1 Physical characteristics test. Pour approximately 50 milliliters (mL) of the well-mixed specimen into a clean, dry, 25 x 150 mm test tube. Immediately examine for odor and then allow to stand for not less than 10 minutes. Examine by transmittance light for clarity, color, suspended matter, and sediment.

4.3.1.2 Total solids and organic and volatile matter. Determine the total solids and organic and volatile matter content of the specimen in accordance with ASTM D6317.

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4.3.1.3 Calcium and magnesium (total). Determine the calcium and magnesium content of the specimen in accordance with method A (complexometric titration) of ASTM D511.

4.3.1.4 Iron. Determine the iron content of the specimen in accordance with method A (direct atomic absorption) of ASTM D1068.

4.3.1.5 Copper. Determine the copper content of the specimen in accordance with method A (direct atomic absorption) of ASTM D1688.

4.3.1.6 Chloride. Determine the chloride content of the specimen in accordance with method C (ion selective electrode) of ASTM D512.

4.3.1.7 Nickel. Determine the nickel content of the specimen in accordance with method A (direct atomic absorption) of ASTM D1886.

4.3.1.8 Ammonia (as NH<sub>4</sub>). Determine the ammonia content of the specimen in accordance with method B (ion selective electrode) of ASTM D1426.

4.3.1.9 Nitrites (as NO<sub>2</sub>). Determine the nitrites content of the specimen in accordance with EPA method B-1011 as described in Waters Corporation document 980896.

4.3.1.10 Nitrates (as NO<sub>3</sub>). Determine the nitrates content of the specimen in accordance with EPA method B-1011 as described in Waters Corporation document 980896.

NOTE: For a complete description of EPA method B-1011, refer to Waters Corporation Method B-1011.

## 5. PACKAGING

5.1 Packaging. The requirements for packaging shall be as specified in the acquisition order (see 6.2).

5.2 Unit quantity. The battery water shall be provided in either 1-gallon or 5-gallon containers, or in bulk quantity as specified in the acquisition order (see 6.2).

## 6. NOTES

INFORMATION FOR GUIDANCE ONLY. (This section contains information of a general or explanatory nature that is helpful, but is not mandatory.)

6.1 Intended use. The battery water is intended for use in lead-acid storage batteries only.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, revision, and date of this standard.
- b. Responsibility for inspection, if different (see 4.1).
- c. Inspection facility, if different (see 4.1).

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- d. Alternative inspection, if required (see 4.1.3).
- e. Acid and base reagents, if other than specified (see 4.3.1).
- f. Packaging requirements (see 5.1).
- g. Unit quantity required (see 5.2).

### 6.3 Definitions.

6.3.1 Batch. A batch is a specific quantity of material that has been manufactured by some unit chemical process or subjected to some physical mixing operation intended to make the final product substantially uniform.

6.3.2 Specific gravity. Specific gravity is the ratio of the density (mass of a unit volume) of a substance to the density of a given reference material. Specific gravity commonly refers to relative density with respect to water, which has a specific gravity of unity (1) at 20 °C.

### 6.4 Subject term (key word) listing.

Lead-acid  
Rechargeable  
Specific gravity  
Storage  
Wet cell

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

#### MILITARY INTERESTS:

Custodians:  
Army - EA  
Navy - YD  
Air Force - 68  
DLA - GS

Review Activity:  
Army - AT

#### CIVIL AGENCY COORDINATING ACTIVITY:

GSA - FAS

Preparing Activity:  
DLA - GS3

(Project 6810-2010-014)

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