

O-S-602E
February 24, 1977

SUPERSEDING
O-S-602D
December 10, 1969

FEDERAL SPECIFICATION

SODIUM HYPOCHLORITE SOLUTION

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 two grades of sodium hypochlorite solution (see 6.1).

1.2 Classification. Sodium hypochlorite (NaOCl) solution shall be of the following grades, as specified (see 6.2):

Grade A - 5.25 percent NaOCl by weight.

Grade B - 12.5 percent NaOCl by weight.

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

PPP-B-585 - Boxes, Wood, Wirebound.

PPP-B-601 - Boxes, Wood, Cleated-Plywood.

PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.

PPP-B-636 - Boxes, Shipping, Fiberboard.

PPP-C-1337 - Containers, Composite; (Steel Drum with Polyethylene Insert).

PPP-F-320 - Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

Federal Standards:

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

Fed. Std. No. 313 - Material Safety Data Sheets, Preparation and the Submission Of.

(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 sub- scription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 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 Services Administration Regional Offices, in Boston, New York, Washington, D.C., Atlanta,

Chicago, Kansas City, MO, Fort Worth, Denver, San Fransisco, 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.)

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Military Specifications:

- MIL-B-26701 - Bottles, Screw Cap and Carboys, Polyethylene Plastics.
- MIL-P-15011 - Pallet, Material Handling, Wood, Post Construction, 40-Way Entry.
- MIL-V-21628 - Vermiculite, Expanded (General Purpose).

Military Standards:

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-147 - Palletized and Containerized Unit Loads, 40-inch by 48-inch Pallets, Skids, Runners, or Pallet-Type Base.

(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.)

Federal Regulations:

- 40 CFR 162 - Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act.
- 40 CFR Subchapter C - Hazardous Material Regulations.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 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 date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

- D 2022 - Standard Methods of Sampling and Chemical Analysis of Chlorine-Containing Bleaches
- D 2111 - Standard Methods of Test for Specific Gravity of Halogenated Organic Solvents and their Admixtures.
- E 70 - Standard Method of Test for pH of Aqueous Solutions with the Glass Electrode.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, N.W., Washington, D.C. 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification

Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

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3. REQUIREMENTS

3.1 EPA registration and labeling. Sodium hypochlorite solution shall be registered with the Environmental Protection Agency (EPA) and labeled in accordance with the applicable sections of 40 CFR 162.

3.2 Material. Sodium hypochlorite solution shall be a liquid.

3.3 Chemical and physical properties. Sodium hypochlorite shall conform to the requirements of table I when tested as specified in 4.2.4.

TABLE I. Chemical and physical requirements of sodium hypochlorite solution

Requirement	Grade A		Grade B	
	Min.	Max.	Min.	Max.
Specific gravity 25/25 deg. C	1.075	1.110	1.196	1.243
pH	10.5	12.5	-	-
Free alkali, as NaOH, weight %	-	-	0.5	1.0
Available chlorine, as NaOCl, weight %	5.25	7.19	12.5	15.6

3.4 Workmanship. Sodium hypochlorite shall be visibly clear and free from foreign matter.

3.5 Safety data. Safety data shall be submitted in accordance with Fed. Std. No. 313.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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 assure that supplies and services conform to prescribed requirements.

4.2 Quality conformance inspection.

4.2.1 Examination of preparation for delivery.

4.2.1.1 Lot. For this examination, a lot shall be sodium hypochlorite solution, fully packed, marked, and offered for examination at one time. Lot size shall be expressed in number of filled shipping containers.

4.2.1.2 Sampling plan. Sample unit for this examination shall be one filled shipping container. Sampling shall be conducted in accordance with MIL-STD-105. Sample size, acceptance, and rejection numbers shall be determined by special inspection level S-2 and acceptable quality level (AQL) 4.0 percent defective, respectively. Defects shall be scored in accordance with table II.

TABLE II. Examination of preparation for delivery

Examine	Defect
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Marking

Omitted; incorrect; illegible; improper size,

	location, sequence, or method of application.
Container	Not as specified.
Contents	Not as specified.
Material	Component missing or damaged.
Workmanship	Bulging or distortion of Container.

4.2.2 Examination of closure, waterproofing, and banding of shipping containers. When shipping containers are required to comply with PP-B-585, PPP-B-601, PPP-B-621, or PPP-B-636, examination for defects in closure, waterproofing, and banding shall be in accordance with the appendix to the applicable box specification.

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4.2.3 Examination of material and workmanship.

4.2.3.1 Lot. For this examination, a lot shall be sodium hypochlorite solution produced by one manufacturer,, at one plant, from the same raw materials, by the same manufacturing process, and offered for examination at one time. Lot size shall be expressed in number of filled unit packages.

4.2.3.2 Sampling plan. Sample size for this examination shall be one unit package. Defects shall be determined in accordance with table IV. Lot shall be rejected if sample contains one defect.

TABLE IV. Examination of material and workmanship

Examine	Defect
Material	Not a liquid.
Workmanship	Foreign matter visibly present.

4.2.4 Testing. Because of the unstable nature of sodium hypochlorite solution, special attention shall be paid to collection and preservation of the sample. Exposure to heat and sunlight accelerates decomposition and shall be avoided. Samples shall be stored in a cool, dark place until analysis, which shall be performed as soon as possible after sampling.

4.2.4.1 Lot. For testing, a lot shall be as specified in 4.2.3.1.

4.2.4.2 Sampling plan. Sampling shall be as specified in 4.2.3.2, except that defects shall be determined in accordance with the test methods in 4.3. Lot shall be rejected if sample contains one defect.

4.3 Test methods.

4.3.1 Specific gravity. Specific gravity shall be determined in accordance with ASTM D 2111, Method B, Specific Gravity by means of a Hydrometer.

4.3.2 pH (grade A). pH of grade A sodium hypochlorite solution shall be determined in accordance with ASTM E 70.

4.3.3 Free alkali (grade B). Free alkali of grade B sodium hypochlorite solution shall be determined in accordance with ASTM D 2022, free alkali as sodium hydroxide (NaOH). Calculation shall be for free alkali as NaOH, weight percent.

4.3.4 Available chlorine.

4.3.4.1 Test dilution. For grade A, a 50.00 ml aliquote shall be accurately diluted to 1 liter. For grade B, a 25.00 ml aliquote shall be accurately diluted to 1 liter.

4.3.4.2 Procedure. A 25.00 ml aliquote of the test dilution shall be used for testing. Available chlorine shall be determined in accordance with ASTM D 2022, except that calculations shall be as follows:

(a) Grade A

$$\text{NaOCl, weight percent} = 2.98 \text{ NV}$$

Sp. gr.

(b) Grade B

$$\text{NaOCl, weight percent} = \frac{5.96 \text{ NV}}{\text{Sp. gr.}}$$

N = normality of sodium thisulfate standard solution.

V = volume of standard, ml.

Sp. gr. = Specific gravity of sodium hypochlorite solution, determined in
in 4.3.1, prior to dilution.

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5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or commercial as specified (see 6.2). In addition, sodium hypochlorite solution shall be packaged, marked, and labeled in accordance with 49 CFT Subchapter C for hypochlorite solutions, as applicable.

5.1.1 Level A.

5.1.1.1 One-quart quantity. One quart +/- 1/4 fluid ounce of sodium hypochlorite solution shall be packaged in a bottle conforming to MIL-B-26701, 1-quart capacity. The closure shall be vented and capable of preventing leakage of the solution. The bottle shall be packaged in a box measuring 4-in. square and 9-1/4-in. deep, conforming to PPP-B-636, type CF, class weather-resistant, variety SW, grade W5c. The void in the box shall be filled with vermiculite conforming to MIL-V-21628, size 1 or 2. The box shall be closed by taping as specified in the appendix to PPP-B-636.

(a) Intermediate packaging. Eight 1-quart bottles, packaged as specified in 5.1.1.1, shall be arranged upright in two rows of four bottles each in a box conforming to PPP-B-636, type CF, class weater-resistant, variety SW, grade W5c. Fiberboard pads conforming to PPP-F-320, type CF, class weather-resistant, variety SW, grade W5c, shall be used where needed to assure a tight fit. The box shall be closed by taping as specified in the appendix to PPP-B-636.

5.1.1.2 Pme-gallon quantity. One gallon + 1 fluid ounce of sodium hypochlorite solution shall be packaged as specified in 5.1.1.1, except that the bottles shall be 1-gallon capacity and the box shall measure 6-1/2-in. square and 12-5/8-in. deep.

5.2 Packing. Packing shall be level A or commercial, as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 One-quart quantity. One-quart quantity shall be packed in a 16-or 18-quart pack, as specified (see 6.2).

(a) Sixteen-quart pack. Two intermediate packages, prepared as specified in 5.1.1.1(a), shall be packed upright in any of the following containers at the option of the supplier:

PPP-B0585, class 3, style 2, load type 2.

PPP-B-601, overseas type, style I or J, grade A.

PPP-B-621, class 2, style 4-1/2, grade A, load type 2.

Fiberboard pads conforming to PPP-F-320, type CF, class weather-resistant, grade W5c, shall be inserted where needed to assure a tight pack. Each box shall be closed and reinforced with galvanized strapping as specified in the appendix to the applicable box specification.

(b) Eighteen-quart pack. Eighteen bottles, packaged as specified in 5.1.1.1, shall be packed in a box conforming to PPP-B-636, type CF, class weather-resistant vareity SW, grade W5c. The box shall be fitted with dividers or partitions to provide a cell for each container. The dividers or partitions shall be of the same material as the box and the same height as the box. The box shall be approximately 3/8-in. higher than the container and shall be closed in accordance with the appendix to the box specification.

5.2.1.2 One-gallon quantity. Six containers, packaged as specified in 5.1.1.2, shall be packed upright in two rows of three bottles each in a close-fitting wood box as specified for the 1-quart quantity in 5.2.1.1.

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5.2.1.3 Five-gallon quantity. Five gallons + 4 ounces of sodium hypochlorite solution shall be packed in a metal container with polyethylene insert conforming to PPP-C-1337, type II, class 1. The spout shall be either a flexible or pull-out type and shall have a vented closure. A vented plastic dustcap which shall not be affected by the contents of the pail shall be secured to each closure.

5.2.1.4 Fifty-five gallon quantity. Fifty-five gallons + 1 quart of sodium hypochlorite solution shall be packed in a nominal 55-gallon steel drum conforming to PPP-C-1337, type II, class 4. The drum closure shall be vented in accordance with 49 CFR Subchapter C, for hypochlorite solutions.

5.2.2 Commercial. Sodium hypochlorite solution shall be packed in containers to insure safe delivery at destination to provide for safe redistribution by the initial receiving activity, and shall be acceptable by common carrier under National Motor Freight Classification Rules or Uniform Freight Classification Rules and 49 CFR Sub-chapter C.

5.3 Markings. Containers and unit loads (when applicable) shall be marked in accordance with Fed. Std. No. 123 or MIL-STD-129, as specified (see 6.2). In addition, intermediate packages and shipping containers shall bear the following marking with characters not less than 3/8 inch in height.

STORE IN A COOL PLACE AND NOT IN DIRECT SUNLIGHT

5.4 Palletization. When specified (see 6.2), shipping containers shall be palletized in accordance with the applicable requirements of MIL-STD-147 except that strapping shall be restricted to galvanized steel of 1.25-in, minimum width and 0.035-in. minimum thickness. The load tie-down straps parallel to the 48-inch pallet dimension shall be modified to serve as load utilizing straps, containing the load but not the pallet. One load tie-down strap shall be added to, and approximately centered between, those straps which are normally required to be parallel to the 40-inch pallet width. One horizontal strap of 0.75-in. minimum width and 0.023-in. minimum thickness shall be required for each tier of containers. The pallet shall conform to style 1, type optional, class 1, preserved of MIL-P-15011. All wood storage aids, if used, shall be preserved as specified for the pallet.

5.5 Unitization. (Applicable to full rail car and truck load shipments only.) The sodium hypochlorite solution shall be unitized for shipment in accordance with normal commercial practice. The unitized load shall not exceed 2,500 pounds in weight, 63 inches in height, 56 inches in length and 45 inches in width.

6. NOTES

6.1 Intended use. Sodium hypochlorite solution is intended for use as a bleach and disinfectant. Both grades will decompose rapidly when exposed to heat and light. They should be stored in a cool, dark place and used as soon as possible. The user may find it necessary to reorder frequently in order to assure a continuous supply of fresh solution. Sodium hypochlorite solution should never be mixed with ammonia or toilet bowl cleaners.

6.1.1 Grade A. Grade A sodium hypochlorite solution is intended for use as a household-type bleach and disinfectant.

6.1.2 Grade B. Grade B sodium hypochlorite solution is intended for use in swimming pool chlorination and in sanitizing food processing and dairy equipment. Its use should be in accordance with manufacturer's directions.

6.2 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Grade required (see 1.2 and 6.1).
- (c) Packaging and packing required (see 5.1 and 5.2).
- (d) Quantity required (see 5.1 and 5.2).
- (e) Marking document applicable (see 5.3).

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6.3 Classification changes. This specification supersedes Federal Specification)-S-602D, dated December 10, 1969. Percents NaOC1 have been changed as illustrated in table V below.

TABLE V. Classification changes in O-S-602E

Grade	O-S-602D	O-S-602E
A	5	5.25
B	10	12.5

Custodians:

Army - EA
Air Force - 68

activities:

Army - EA, GL, MD, SM
Air Force - 68
DSA-GS

User activities:

Army - EL, MI
Navy - AS, MC, SH

Military coordinating activity:

Army - EA

Preparing activity:

GSA

Civil agency coordinating

DOT-ACO
GSA-FSS
HEW-NIH
USDA-ARS
VA-DMS

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