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SUPERSEDING
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FEDERAL SPECIFICATION

CALCIUM HYPOCHLORITE, TECHNICAL

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

1. SCOPE

1.1 This specification covers calcium hypochlorite in granular form for bleaching, disinfecting, and decontaminating purposes.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue 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:

NN-P-71	-	Pallet, Materials-handling, Wood (General Construction Requirements).
QQ-S-781	-	Strapping, Steel, Flat and Seals.
NNN-P-1475	-	Paper, Filter, Analytical.
PPP-B-601	-	Boxes, Wood, Cleated-Plywood.
PPP-B-621	-	Boxes, Wood, Nailed and Lock-Corner.
PPP-B 636	-	Box, Fiberboard.
PPP-C-186	-	Containers, Packaging and Packing for Drugs, Chemicals, and Pharmaceuticals.
PPP-D-729	-	Drum, Metal, 55-Gallon (for Shipment of Noncorrosive Material).

Federal Specifications:

PPP-F-320	-	Fiberboard; Corrugated and Solid, Sheet Stock (Containers Grade), and Cut Shapes.
PPP-P-704	-	Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons).
PPP-T-66	-	Tape, Pressure-Sensitive Adhesive, Vinyl Plastic Film.

Federal Standards:

Fed. Std. No. 123	-	Marking for Domestic Shipments (Civil Agencies.)
Fed. Test Method Std. No. 536	-	Soap and Soap-Products (Including Synthetic Detergents); Sampling and Testing.

(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, D.C., 20402.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D.C., Atlanta, Chicago, Kansas City, Mo., Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, Wash.

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

Military Specifications:

MIL-V-12276	-	Varnish Phenolic, Baking.

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" x 48" 4-Way (Partial) Pallet 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.)

Laws and Regulations:

7-CFR 362	-	Federal Insecticide, Fungicide, and Rodenticide Act.
21-CFR 191	-	Hazardous Substances: Definitions and Procedural and Interpretative Regulations.
49-CFR 171-179	-	Department of Transportation Rules and Regulations for the Transportation of Explosives and Other Dangerous Articles.

(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 document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

D1193-72	-	Reagent Water.
D1238-70	-	Flow Rates of Thermoplastics by Extrusion Plastometer, Measuring.
D1505-68	-	Density of Plastics by the Density - Gradient Technique, Test for.

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

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Chemical and physical properties. Calcium hypochlorite shall conform to the requirements of table I when tested as specified therein.

Table I. Chemical and physical properties

Property	Requirement	Test paragraph
Available chlorine, percent, minimum	65.0	4.3.1
Loss of available chlorine on heating, percent, maximum	10.0	4.3.2
Moisture, percent, maximum	10.0	4.3.3
Total mixed oxides of heavy metal plus aluminum oxide, percent, maximum	0.50	4.3.4
Iron, percent, maximum	0.25	4.3.5
Particle size:		4.3.6
No. 14 sieve, percent passing, minimum	75.0	
No. 100 sieve, percent passing, maximum	10.0	
Bulk density, g per ml, minimum	0.8	4.3.7

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 requirement 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 supplies and services conform to specified requirements.

4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the calcium hypochlorite 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).

4.2.2 Sampling.

4.2.2.1 For examination of preparation for delivery. Sampling shall be conducted in accordance with MIL-STD-105.

4.2.2.2 For test. Sampling shall be conducted in accordance with table II. A representative 1-pound specimen shall be removed from each container in the sample and placed in a suitable, clean, dry container labeled to identify the lot and container from which the specimen was taken (see 6.4).

Table II. Sampling for test

Number of containers in lot or batch	Number of sample containers *
2 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

* For 6-ounce containers, two additional containers, taken randomly the lot, shall be added to each sample to make up the 1-pound specimen amount.

4.2.3 Inspection procedure.

4.2.3.1 For examination of preparation for delivery. The sample unit shall be one filled and closed unit, intermediate, or shipping container, as applicable, ready for shipment except that contents per container, (a) below, shall be inspected prior to closing and sealing the respective container. Sample containers and the preparation for delivery thereof shall be examined for the following defects using an AQL of 1.0.

(a) Contents per container not as specified
(b) Container not as specified
(c) Container closure not as specified
(d) Container damaged or leaking
(e) Marking incorrect, missing, or illegible

4.2.3.2 For test. Each sample specimen taken in 4.2.2.2 shall be tested as specified in 4.3.1 through 4.3.7. Failure of any test by any specimen shall be cause for rejection of the lot represented. (For samples of 6-ounce containers, first determine particle size (4.3.6) by using approximately equal portions of each of the 3 containers in the sample; then composite the remaining portions of the 3 containers, intimately mix, and determine the remaining tests on the composite for each sample.)

4.3 Tests. Water in accordance with ASTM D1193 and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.3.1 Available chlorine.

4.3.1.1 Reagents.

(a) Sodium arsenite solution (0.1N). Dissolve exactly 4.948 grams (g) of arsenous oxide in 150 milliliters (ml) of warm water containing approximately 3 g of sodium hydroxide. Cool, neutralize the excess alkali with dilute sulfuric acid (1 to 3), using phenolphthalein as the indicator, until the solution is just decolorized. Add 300 ml of water containing about 25 g of sodium bicarbonate. If a pink color develops, add a few drops of the dilute sulfuric acid to decolorize the solution. Transfer quantitatively to a 1-liter volumetric flask, dilute to volume, and mix.

(b) Starch solution. Mix approximately 2 g of soluble starch with sufficient cold water to form a thin slurry. Add the slurry to approximately 1 liter of boiling water, add 1 g of salicylic acid, and boil until the solution is clear. Cool and store in a glass stoppered bottle.

(c) Standard 0.1N iodine solution. Mix 12.70 +/- 0.05 g of iodine with twice its weight of potassium iodide. Dissolve in a small quantity of water, filter into a 1-liter volumetric flask, dilute to the mark, and mix well. Pipet 50 ml of the sodium arsenite solution ((a), above) into an Erlenmeyer flask, dilute with 100 ml water, and add approximately 5 g of sodium bicarbonate. Add 5 ml of starch solution ((b), above) and titrate with iodine solution from a buret until a permanent blue color is obtained (Note 1: iodine solution should be added cautiously and dropwise near the endpoint). Calculate normality of the iodine solution as follows:

$$\text{Normality of iodine solution} = \frac{5.0000}{V}$$

where: V = Milliliters of iodine solution used.

4.3.1.2 Procedure. Weigh, to the nearest 0.001 g, 5.0 g of material and quantitatively transfer to a porcelain mortar. Add 30 to 40 ml of water and grind and mix until a smooth paste is obtained. Add more water, stir well with the paste, allow the insolubles to settle for a few seconds, and decant the supernatant liquid into a 1-liter volumetric

flask. Add more water to the insolubles in the mortar; grind, mix, and decant as before. Repeat the operation until all of the material has been transferred to the volumetric flask. Rinse the mortar and pestle and add the rinsings to the volumetric flask. Dilute to the mark the water. Mix thoroughly and, without allowing the material to settle, pipet a 50-ml aliquot into a 250-ml Erlenmeyer flask containing 50 ml of water. From a buret or pipet, add 50 ml of 0.1N sodium arsenite solution (4.3.1.1(a)). Add an excess of sodium bicarbonate (5 to 10 g) and 5 ml of starch solution (4.3.1.1(b)). Titrate the excess sodium arsenite solution with standard 0.1N iodine solution (4.3.1.1(c)) from a buret until a permanent blue color is obtained (Note 1, above, is applicable). Calculate percent available chlorine as follows:

$$\text{Percent available chloride} = \frac{3.546\ (AC - BD)}{W}$$

where: A = Milliliters of sodium arsenite solution used,
B = Milliliters of iodine solution used,
C = Normality of sodium arsenite solution,
D = Normality of iodine solution, and
W = Weight, in grams, of specimen in aliquot.

4.3.2 Loss of available chlorine on heating. Place 15.00 g of material in a 3-inch diameter evaporating dish. Place the dish on a steam bath at 100 deg. +/- 2 deg. C for 2 hours. Cover with a watch glass and allow to cool to room temperature. Transfer the material to a porcelain mortar and proceed from this point with the determination of available chlorine as described in 4.3.1.2, except that instead of a 50-ml aliquot, use a 20-ml aliquot. Calculate the percent available chlorine of the heated material. Calculate the percent loss of available chlorine as follows:

$$\text{Percent loss of available chlorine} = \frac{100(A - B)}{A}$$

where: A = Percent available chlorine (4.3.1) and
B = Percent available chlorine after heating.

4.3.3 Moisture.

4.3.3.1 Apparatus. A round-bottom flask of 500 ml capacity shall be fitted with a reflux column with a connected tube at the top of the reflux column. Ground-glass joints without a lubricant shall be used. The reflux column shall be approximately 1 inch in diameter and from 12 to 16 inches in length. The reflux column shall contain projections to prevent drops from falling from the top of the column into the flask.

Insulation shall be provided, if necessary, so that all water is driven over in about 20 minutes. The connecting tube shall be drawn down and 12 inches of 5 millimeter (mm) glass tubing fused on. The tube shall be bent at an angle of about 20 deg. from the horizontal with 2 inches at the outlet and bent directly downward with a ground-glass connection fitted to a water-cooled condenser with straight inner tube about 12 inches long. The outlet of the condenser, during the determination, shall be 1/2 inch above the surface of the liquid and inserted for at least 1 inch into the receiver. The receiver shall be a 100 ml Goetz centrifuge tube with a 1 ml graduated stem at the bottom in 0.05 ml divisions, or a 100 ml oil tube with a 3 ml graduated stem in 0.1 ml divisions, depending upon the amount of moisture in the sample.

4.3.3.2 Procedure. Add 50 g of material to 100 ml of orthodichlorobenzene contained in a 500 ml flask. Shake contents and connect flask to reflux column. Place 75 ml of petroleum ether in the receiver and add 1 or 2 drops of wetting agent solution in petroleum ether, then heat the flask. The orthodichlorobenzene will drive the water up the column and into the condenser. After the orthodichlorobenzene condensation has reached the receiver, allow 25 ml of the liquid to accumulate in the receiver, which will remove most of the water from the condenser coil. If high precision is desired, or if there is any noticeable amount of water in the condenser coil, disconnect the connecting tube from the top of the condenser and wash out the condenser with a little of the above petroleum ether containing a drop of wetting agent. Regulate the size of the sample and type of receiver so that the water obtained will come within the calibrated stem readings. Calculate percent moisture as follows:

$$\text{Percent moisture} = \frac{100\ V}{W}$$

where: V = Milliliters of water collected and
W = Weight, in grams, of sample.

4.3.4 Total mixed oxides of heavy metals plus aluminum oxide. Weigh, to the nearest 0.01 g, 10.0 g of material into a porcelain casserole. Add 50 ml of water and stir the mixture. Using a watch glass to prevent splattering, cautiously add, in small increments, 60 ml of 10-percent hydrogen peroxide. Allow the reaction to subside and slowly add hydrochloric acid until the solution is distinctly acid (approximately 30 ml will be required). After the reaction subsides, rinse the watch glass into the casserole. Evaporate the solution to near dryness on a steam bath and dry in an oven at 120 deg. C for 1 hour. Remove the casserole from the oven and cool. Using a watch glass to prevent splattering, carefully cover the residue with 30 ml of hydrochloric

acid, dilute withhot water to approximately 150 ml, and digest on a steam bath for 10 minutes. Rinse the watch glass into the casserole. Filter the contents of the casserole through a filter paper conforming to type II, class 6 of NNN-P-1475. Wash thoroughly the contents of the filter paper with a hot solution of dilute (1 to 99) hydrochlorice acid. Complete the washing with hot water. Discard the filter paper and residue. Add 10 ml of dilute nitric acid (1 to 4) to the filtrate in a beaker and boil for a few minutes. Nearly neutralize with ammonium hydroxide; then, using methyl red as the indicator, complete the neutralization with ammonium hydroxide and add 1 drop in excess. Boil for 1 to 2 minutes and filter through a 9-centimeter filter paper conforming to type II, class 5 of NNN-P-1475. Wash the filter paper and its contents 6 times with hot 2-percent ammonium chloride solution to which ha been added sufficient ammonium hydroxide to make it just alkaline to methyl red. Retain the filtrate. Place the filter paper and its contents in the original beaker and macerate in 10 ml of hydrochloric acid. Dilute with hot water to 150 ml, add 3 drops of methyl red indicator, neutralize with ammonium hydroxide and add 1 or 2 drops in excess. Boil for 1 or 2 minutes and filter through a 11-centimeter filter paper conforming to type II, class 5 of NNN-P-1475. Wash the filter paper and its content 10 time with the hot 2-percent ammonium chloride solution (as specified above). Combine the filtrate with that retained above. Retain the precipitate. Adjust the combined filtrate to about 200 ml and transfer to a 300-ml Erlenmeyer flask. Add 2 ml of ammonium hydroxide, heat to boiling, remove heat source, and pass hydrogen sulfide through the solution for 15 minutes. Cover the flask and allow it to stand for 1 hour. If a precipitate forms, filter, wash the collected precipitate with the 2-percent ammonium chloride solution (as specified above), and combine this precipitate with the precipitate retained above. Ignite the combined precipitate in a crucible at 1000 deg. C to constant weight, cool, and record weight as iron oxide, aluminum oxide, and the oxide of the heavy metals. (Retain the ignited precipitate for the determination of iron.) Calculate the percent mixed oxides of heavy metals plus aluminum oxide as follows:

$$\text{Percent mixed oxides plus aluminum oxide} = \frac{100\ A}{W}$$

where: A = Weight, in grams, of the ignited precipitate and
W = Weight, in grams, of sample.

4.3.5 Iron.

4.3.5.1 Reagents.

(a) Stannous chloride. Dissolve 5 g of the crystallized salt in 10 ml of hot hydrochloric acid and dilute to 100 ml with water. Keep the solution in a closed dropping bottle containing metallic tin.

(b) Phosphoric acid mixture. Add slowly, while stirring, 150 ml of orthophophoric acid and 150 ml of sulfuric acid to 500 ml of water, and dilute to 1 liter with water and mix.

(c) Indicator. Make up a 0.3 percent aqueous solution of either the barium or sodium salt of diphenylamine sulfonate.

(d) Standard potassium dichromate. Dissolve 2.452 g of potassium dichromate in water and dilute to 1 liter. Standardize against standard sample No.27b (Sibley Iron Ore) issued by the National Bureau of Standards.

(e) Mercuric chloride. Prepare a saturated solution of mercuric chloride using distilled water.

4.3.5.2 Procedure. Add 2 g of fused potassium bisulfate to the retained ignited precipitate from 4.3.4. Slowly heat over a low flame and gradually increase the heat until the melt is cherry red and the oxides have dissolved. Allow the melt to cool and transfer it to a 250 ml beaker. Wash the crucible with hot water, receiving the water in the same beaker. Dilute to 50 ml, add 10 ml hydrochloric acid, and heat to boiling. Next add a solution stannous chloride, drop by drop, while stirring, until the solution is decolorized and then add 1 drop more. Cool in an ice water bath, wash down the inside of the beaker with water, and add rapidly 10 ml of a cool, saturated solution of mercuric chloride. Stir the solution vigorously for 1 minute, add 15 ml of the phosphoric acid mixture and 3 drop of the indicator. Dilute to 150 ml with cold water and titrate with standard potassium dichromate solution. Take as the end point the stage at which a drop causes an intense deep-blue coloration that remain unchanged on the further addition of dichromate. Calculate percentage of iron (Fe) based on original sample.

$$\text{Percentage of iron} = \frac{A \times N \times 5.584}{W}$$

where: A = Milliliters of potassium dichromate,
N = Normality of potassium dichromate, and
W = Weight, in grams, of sample (see 4.3.4).

4.3.6 Particle size. Determine particle size in accordance with Method 2101 of Fed. Test Method Std. No.536.

4.3.7 Bulk density. Weigh approximately 40.0 g of sample, previously passed through a No. 14 sieve, into a 100-ml graduated cylinder from which the lip has been removed. Stopper the graduate and pass a closely fitting glass sleeve, about 3 inches long, over it. Clamp the sleeve to a ringstand.

Place a large rubber stopper under the cylinder and adjust the sleeve so that the graduate will be 10 centimeters above the rubber stopper when the base of the graduate touches the lower edge of the sleeve. Raise the graduate until it touches the sleeve, then release. Continue raising and dropping the graduate until 100 cycles are completed. Read the volume of the sample and calculate the bulk density in grams per milliliter.

4.4 Certification. The supplier shall certify that the polyethylene material (5.1.1.1, 5.1.1.2, or 5.1.1.3, as applicable) conforms to the melt index and density requirements when tested in accordance with the specified ASTM method.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2 and 6.5).

5.1.1 Level A.

5.1.1.1 Six-ounce quantity. Six (+/-0.06, -/+0.00) ounces (oz) of calcium hypochlorite shall be packaged in a nominal 8-fluid oz polyethylene bottle conforming to group A, class 2, style 2, grade 2 of PPP-C-186. The material for the bottle shall be a homopolymer of polyethylene having a maximum melt index of 0.90 and a minimum density of 0.955 g per cubic centimeter when tested in accordance with ASTM D1238 and ASTM D1505, respectively. Virgin material shall be required and no regrind material shall be permitted. The bottle weight without the screw cap shall be a minimum of 25 g. The bottle shall have a minimum opening of 23/32 - inch diameter. Closure shall be closure A of PPP-C-186. The screw cap shall be sealed with a band of vinyl-plastic pressure sensitive tape conforming to type I, class optional of PPP-T-66 and of sufficient width to extend well down on the neck of the bottle and slightly over the top edge of the cap.

(a) Intermediate packaging. Forty-eight 6-oz quantities shall be packaged upright in a close-fitting box conforming to style RSC, grade W5c or W6c of PPP-B-636. The bottles shall be arranged in 2 layers, each layer in a 4 by 6 pattern. The layers shall be separated by a fiberboard pad. Each bottle shall be separated from adjacent bottles by interlocking fiberboard partitions which shall form snug-fitting, full-bottle height cells. Pads and partitions shall be of fiberboard conforming to grade W5c or W6c of PPP-F-320. The box shall be closed and water-proofed by taping in accordance with the requirements for water-proofing of slotted style box in the appendix to PPP-B-636.

5.1.1.2 Three and three-quarter-pound quantity. Three and three-quarter pounds (+/-0.6, -/+0.0 oz) of calcium hypochlorite shall be packaged in a

nominal 75 fluid oz polyethylene, screw cap bottle having a volume outage of 5 to 15 percent of the total volume of the filled bottle. The material for the bottle shall be the same as specified for the bottle for the 6-oz quantity. The bottle weight, without screw cap shall be a minimum of 90 g. The neck of the bottle shall accommodate a minimum nominal 53-mm diameter screw cap closure and shall be furnished with a minimum of 1 turn of a modified buttress-type thread. The screw cap shall be designed to fit the above described neck of the bottle and shall have a minimum of 2 turn of a modified buttress-type thread. The screw cap shall be capable of being tightened on the neck of the bottle to a minimum of 60 pound-inches without stripping the threads or disengaging or damaging the screw cap. The screw cap shall be tightened to the neck of the filled bottle to a torque of 30 to 40 pound-inches. The screw cap shall be secured to the neck of the bottle by applying a strip of tape to the side of the bottle from a point 1/3 the distance from the top of the bottle, extending over the cap and down the opposite side 1/3 the distance from the top of the bottle. The tape shall be minimum 1/2-inch wide conforming to type I of PPP-T-66.

(a) Intermediate packaging. Twelve bottles of 3 3/4-pound calcium hypochlorite shall be intermediately packaged upright in a 4 by 3 pattern in a close-fitting fiberboard box conforming to grade V3c of PPP-B-636. Each bottle shall be placed in a close-fitting cell formed by half-slotted interlocking fiberboard partitions of the same height as the bottle. Top and bottom fiberboard pads and box liner shall be inserted in each box. Sufficient padding and lining shall be inserted in the box to prevent movement of the bottles. The fiberboard for the partitions, liner, and pads shall conform to minimum grade W6c of PPP-F-320. At the option of the supplier, 12 bottles of 3 3/4-pounds of calcium hypochlorite shall be intermediately packaged in a box conforming to type CF, class domestic, grade 200 of PPP-B-636 having liners, partitions, and pads of equal material. The box shall be closed and then overpacked in a box conforming to grade V3c of PPP-B-636; closure shall be as specified in the appendix to PPP-B-636.

5.1.1.3 Five-pound quantity. Five pounds (+/-0.8, -/+0.0 oz) of calcium hypochlorite shall be packaged in a polyethylene bottle as specified in 5.1.1.2 except for size and weight of the container. The size shall be nominal 100 fluid oz. The weight of the empty bottle without the screw cap shall be minimum 160 g.

(a) Intermediate packaging. Five-pound quantities of calcium hypochlorite shall be intermediately packaged as specified in 5.1.1.2(a) for 3 3/4-pound quantities, except that the number of bottles shall be 9 and the pattern shall be 3 by 3.

5.1.2 Level C.

5.1.2.1 Six-ounce quantity. Six (+/-0.06, -/+0.00) oz of calcium hypochlorite shall be packaged in a polyethylene bottle in a manner assuring protection of contents from the supply source to the first receiving activity and for limited tenure of storage.

(a) Intermediate packaging. Forty-eight 6-oz bottles of calcium hypochlorite shall be packaged upright in a close-fitting box conforming to type CF, variety SW, grade 175 for a type 2 load of 40 pounds (maximum weight of box and contents) of PP-B-636. A tight pack shall be assured by the use, when required, of fiberboard pads formed from the same material as the box. The box shall be closed in accordance with the requirements for class domestic boxes in the appendix to PPP-B-636.

5.1.2.2 Five-pound quantity (for civil agency use only). Five pounds (+/-0.08, -/+0.0 oz) of calcium hypochlorite shall be packaged in a wide mouth, round, high density polyethylene container with a plastic screw cap closure in a manner assuring protection of contents from the supply source to the first receiving activity and for limited tenure of storage. An outer seal conforming to seal A of PPP-C-186 shall be used with the screw cap.

(a) Intermediate packaging. Nine 5-pound bottles of calcium hypochlorite shall be intermediately packaged upright in a 3 by 3 pattern in a close-fitting fiberboard box conforming to type CF, class domestic, grade 200 of PPP-B-636. Each bottle shall be placed in a close-fitting cell formed by half-slotted interlocking fiberboard partitions of the same height as the bottles. Top and bottom fiberboard pads and box liner shall be inserted in each box. Liners, pads, and partitions shall be of the same material as the box.

5.2 Packing. Packing shall be level A, B, or C as specified (see 6.2 and 6.5).

5.2.1 Level A.

5.2.1.1 Six-ounce, 3 3/4-pound, or 5-pound quantities. Four intermediate packages of 6-oz bottles or 2 intermediate packages of 3 3/4-lb bottles or 5-lb bottles of calcium hypochlorite of like description, packaged a specified in 5.1, shall be packed upright in a close-fitting box conforming to overseas type, style I of PPP-B-601. Motion of contents shall be prevented by inserting fiberboard pads, conforming to minimum of grade W6c of PPP-F-320, where needed. The box shall be closed and reinforced with galvanized strapping, as specified in PPP-B-601.

5.2.1.2 Thirty-five-pound quantity. Thirty-five pounds (+/-5.0, -/+0.0 oz) of calcium hypochlorite shall be packed in a pail conforming to type II, class 5 of PPP-P-704 of a capacity sufficient to contain the product (approximately 6 gallons). All interior surfaces of the pail shall be coated with a minimum 0.00075 inch thick baked-on epoxy phenolic resin conforming to type III, class optional of MIL-V-11276.

5.2.1.3 One-hundred-pound quantity. One hundred pounds (+/-16.0, -/+0.0 oz) of calcium hypochlorite shall be packed in a minimum 24 gauge steel drum conforming to Department of Transportation (DOT) 17H or 37A and having a nominal capacity of 15 gallons. All interior surfaces of the drum shall be coated with a minimum 0.00075 inch thick baked-on epoxy-phenolic resin conforming to type III, class optional of MIL-V-12276. The exterior surfaces of the drum shall be coated as specified for drum exteriors in PPP-D-729.

5.2.2 Level B.

5.2.2.1 Six-ounce quantity. Four boxes of 6-oz bottles, packaged as specified in 5.1, shall be packed upright in a close-fitting nailed wood box or fiberboard box as specified (see 6.2). The nailed wood box shall conform to style 4, class 2, grade B for a type 2 load exceeding 50 pounds but not exceeding 100 pounds of PPP-B-621. The fiberboard shall conform to grade V2s for a type 2 load of 90 pounds maximum of PPP-B-636. A tight fit of contents within the box shall be assured by the insertion, where needed, of fiberboard pads formed from material conforming to grade V3c of PPP-F-320. Each box shall be closed and reinforced by steel strapping, as specified in the appendix of the applicable box specification.

5.2.2.2 Three and three-quarter-pound quantity. Twelve bottles of calcium hypochlorite, packaged as specified in 5.1, shall be packed upright in a 4 by 3 pattern in a close-fitting fiberboard box conforming to style RSC, grade V3c of PPP-B-636. Each bottle shall be placed in a close-fitting cell formed by half-slotted interlocking fiberboard partitions of the same height as the bottle. Top and bottom fiberboard pads and box liner shall be inserted in each box. Sufficient padding and lining shall be inserted in the box to prevent movement of the bottles. The fiberboard for partitions, liner, and pads shall conform to grad W5c or W6c of PPP-F-320. The box shall be closed and water-proofed by tape in accordance with the requirements for waterproofing of slotted style boxes in the appendix to PPP-B-636. At the option of the supplier, 12 bottles of 3 3/4-pounds of calcium hypochlorite, arranged as specified above, shall be packed in a partition fitted box conforming to type CF, class domestic, grade 200 of PPP-B-636 having liner, partitions and pads of equal material. The box shall be closed and then overpacked in a close-fitting box conforming to style TSC, grade

V3c for a type 1 load of not over 90 pounds of PPP-B-636. The box shall be closed and waterproofed by taping in accordance with the requirements for waterproofing slotted style boxes in the appendix to PPP-B-636. Each box shall be reinforced by steel strapping as specified in the appendix to the box specification.

5.2.2.3 Five-pound quantity. Five-pound quantities of calcium hypochlorite, packaged as specified in 5.1, shall be packed as specified in 5.2.2.2 for 3 3/4-pound quantities, except that the number of bottles shall be 9 and the pattern shall be 3 by 3.

5.2.3 Level C. Uniform quantities of calcium hypochlorite in pails or drums or uniform quantities of like packages of calcium hypochlorite in polyethylene bottles, packaged as specified in 5.1, shall be packed in a manner and in containers acceptable to the common carrier and which will assure safe delivery to destination in a satisfactory condition at the lowest applicable rate.

5.3 Palletization. Unless otherwise specified, shipping containers shall be palletized in accordance with the applicable requirements of MIL-STD-147, except that load tie-down strapping shall be restricted to coated steel conforming to class A of QQ-S-781. The pallet shall conform to type IV of NN-P-71.

5.4 Marking. In addition to any marking required herein or by the contract or order, marking on unit, intermediate, and shipping containers shall be in accordance with DOT regulations and Fed Std No. 123 for civil agency domestic shipment or MIL-STD-129 for civil agency foreign shipment and all military shipments. Shipping containers shall be marked in accordance with MIL-STD-129 for a type II shelf life item of 12 months and to show the "UP" end of the container.

5.4.1 Directions for use. Each container shall be marked "To be used and stored in accordance with detailed command instructions."

5.4.2 Precautionary labeling. Each unit, intermediate, or shipping container shall be labeled to comply with the requirements of the Federal Hazardous Substance Act and The Federal Insecticide, Fungicide, and Rodenticide Act. Precautionary labeling shall be essentially as follows:

DANGER: MAY BE FATAL IF SWALLOWED
MAY CAUSE BURNS
STRONG OXIDANT

Use extreme caution when opening - contents may spray!
Avoid contact with skin or eyes.
Avoid contamination with acids and oxidizable materials such as fuels, oils, paint products, disinfectants, activated carbon, and ammonia. Such contamination can cause fire or release of hazardous gases and heat.
Keep container closed and stored in a cool dry place.
Mix only in accordance with directions for use.

POISON

First aid

In case of contact with skin or eyes: Immediately flush continously with water; for eyes get medical attention.
If swallowed: Immediately give milk, egg white, starch paste, or milk of magnesia by mouth. Call a physician.
Note to physician: Do not give acidic antidotes.

5.4.2.1 Shipping container. Each shipping container shall have the yellow label for oxidizing materials affixed to it in accordance with DOT regulations.

5.4.2.2 Unit container. The closure of each unit container shall be conspicuously marked with: "WARNING! READ LABEL."

6. NOTES

6.1 Intended use. Calcium hypochlorite covered by this specification is intended for disinfecting drinking water, for bleaching, as a general disinfectant, and for chemical-biological decontamination.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Level of packaging and packing required.
(c) Size of unit quantity required.
(d) Whether wood or fiberboard boxes are required (5.2.2.1).
(e) Whether marking is for military or civilian agencies.

6.3 Batch. A batch is defined as that quantity of material which has been subjected to some unit chemical or physical mixing process intended to make the final product substantially uniform.

6.4 Precaution. It is important that sampling be done as rapidly and thoroughly as possible because of the chemical changes which the

material undergoes upon exposure to the air. When opening containers of bleaching materials, personnel must be protected against the caustic effect of bleach in the eyes or on the skin, as well as the effect of chlorine gas on the lungs.

6.5 Specified packaging and packing. Table III summarizes data pertaining to packaging and packing covered in this specification.

Table III. Packaging and packing data

Unit container Type of unit container	6-oz Polyethylene bottle	3 3/4-lb Polyethylene bottle	5-lb Polyethylene bottle	35-lb Steel pail	100-lb Steel drum
PACKAGING					
Level A					
Unit pkg.	5.1.1.1	5.1.1.2	5.1.1.3	----	----
Intermediate pkg.	5.1.1.1(a)	5.1.1.2(a)	5.1.1.3(a)		
Bottles per intermed. pkg.	48	12	9	----	----
Level C		(NONE)			
Unit pkg.	5.1.2.1	----	5.1.2.2	----	----
Intermediate pkg.	5.1.2.1(a)	----	5.1.2.2(a)	----	----
Bottles per intermed. pkg.	48	----	9	----	----
PACKING					
Level A	5.2.1.1	5.2.1.1	5.2.1.1	5.2.1.2	5.2.1.3
Bottles per pack	192	24	18	----	----
Approx. outside dimensions (in.)	29x21x25	24x17x26	38x19x16	12 dia. x 14 ht.	15 dia. x 25 ht.
Level B	5.2.2.1	5.2.2.2	5.2.2.3	----	----
Bottles per pack	192	12	9	----	----
Approx. outside dimensions (in.)	26x20x24	21x16x13	17x17x15	----	----
Level C	5.2.3	5.2.3	5.2.3	5.2.3	5.2.3

[1] Level C packaging of 3 3/4-lb. bottle is not permitted.
[2] Level A or C packaging of like unit containers may be packed level A, B, or C, as desired.

MILITARY INTEREST:

Custodians

Army - EA
Navy - SH
Air Force - 68

Review activities:

Army - GL, MD, ME
Navy - MS, SH, YD
Air Force - 68
DSA - GS

User activities:

Army - CE, SM
Navy - MC

Civil Agency Coordinating Activities:

GSA - FSS
HEW - FDA
VA - DMS
DCGOVT - DCG
INT.
JUSTICE

Preparing activity:

Army - EA

Project No. 6810-0295

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 40 cents each.

O-C-114B
AMENDMENT-2
March 9, 1977
SUPERSEDING
Amendment-1
July 25, 1975

FEDERAL SPECIFICATION

CALCIUM HYPOCHLORITE, TECHNICAL

This amendment, which form a part of Federal Specification O-C-114B, dated July 23, 1974, was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

PAGE 3

Paragraph 2.2, under American Society for Testing and Materials (ASTM) Standards, add the following:

D 2022-64 - Sampling and Chemical Analysis of Chlorine-Containing Bleaches

PAGE 6

Delete paragraphs 4.3.1, 4.3.1.1, 4.3.1.2, and substitute the following:

4.3.1 Available chlorine. Available chlorine shall be determined in accordance with ASTM D 2022, method for calcium hypochlorite, except that sampling shall be as specified in 4.2.2.2, and calculation shall be as follows:

$$\text{Percent available chlorine} = \frac{3.546\ A\ B}{W}$$

where: A = Normality of sodium thiosulfate solution.
B = Milliliters of sodium thiosulfate solution used, and
W = Weight, in grams, of specimen in aliquot.

PAGE 16

Paragraph 5.4.2.1, delete and substitute the following:

5.4.2.1 Shipping container. The yellow label, conforming to DOT regulations shall be placed on shipping containers only as required by DOT regulations. Each pail or drum shall be marked "DO NOT SHIP BY AIR IF DATE OF PACK IS OVER ONE YEAR OLD." A four-inch square label having a minimum of 1/4-inch wide red border shall be used. The characters shall be in red and shall be parallel to the horizontal borders.

MILITARY INTEREST:
Custodians:

Army - EA
Navy - SH
Air Force - 68

CIVIL AGENCY COORDINATING ACTIVITIES:
GSA - FSS
HEW - FDA
INT - MIN
JUS - FPI
VA - DMS

Review activities:
Army - EA, GL, GS, MD, ME
Navy - SH, YD
Air Force - 68
DSA-GS

User activities:
Army - CE, SM
Navy - MC

Preparing activity:
GSA-FSS

FSC 6810