

O-C-289G
December 27, 1985

SUPERSEDING

O-C-289F
September 19, 1975

FEDERAL SPECIFICATION

CHLORINATION KIT, WATER PURIFICATION,

(FOR TREATMENT OF DRINKING WATER)

This specification is approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE

1.1 Scope. This specification covers one type of small chemical kit for use in the disinfection of water in Lyster bags or other small containers (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government publications. 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

O-C-114	- Calcium Hypochlorite, Technical
PPP-B-636	- Boxes, Shipping, Fiberboard

Federal Standard

FED-STD-123 - Marking for Shipment (Civil Agencies)

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FSC 6850

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(Single copies of this specification, other Federal specifications, and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents, and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies.)

Military Specifications

MIL-C-37873 - Chlorine Test Tablet, DPD Method, 100's
MIL-P-43327 - Paper, Book, Water Resistant (Text)

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 Unit Loads

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

Federal Regulations

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR 162)

(The Code of Federal Regulations (CFR) and Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Reprints of certain regulations and application forms for registration of economic poisons may be obtained from the Registration Division, Environmental Protection Agency, Washington, DC 20460.)

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.

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Standard Methods for the Examination of Water and Wastewater (S.M.E.W.W.), 15th Edition

Standard Methods 408C, 408E, and 409A

(Application for copies should be addressed to the American Public Health Association, 1015 15th Street, N.W., Washington, DC 20005.)

American Society for Testing and Materials (ASTM)

D 3951 - Standard Practice for Commercial Packaging

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

(Industry 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 Description. The chlorination kit shall consist of components specified in table I.

TABLE I. Chlorination kit components

Component	Quantity
Tubes of calcium hypochlorite	100
Chlorine test tablets, DPD No. 1	150
Color comparator	1
Instruction sheet	1

3.2 Components.

3.2.1 Tubes of calcium hypochlorite. The tubes specified in 3.2.1.2 shall be filled with the calcium hypochlorite specified in 3.2.1.1 such that each tube contains 0.60 ± 0.05 grams of calcium hypochlorite when tested as specified in 4.2.1.1.

3.2.1.1 Calcium hypochlorite. The calcium hypochlorite shall conform to the requirements of O-C-114. The calcium hypochlorite shall be registered with the Environmental Protection Agency in accordance with the Federal Insecticide Fungicide and Rodenticide Act.

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3.2.1.2 Tubes. The tubes shall be made from clear glass tubing having an outside diameter of 8.55 to 8.95 mm and a wall thickness of 0.8 ± 0.05 mm. (Note: Using the above tubing, a theoretical minimum internal diameter of 6.85 mm and a maximum internal diameter of 7.45 mm with an average internal diameter of 7.15 mm is obtained.) The tubes shall be approximately 70 mm long and shall be hermetically sealed by fusion of the glass with no leaks when tested as specified in 4.2.1.1 (see 6.3). The tubes shall have near the center, a transverse file mark extending 360 degrees around the tube and of sufficient depth to permit the tube to be broken with a clear right-angle break without splintering or shattering. Each tube shall be marked with the following information:

Calcium hypochlorite

Contents of tube normally sufficient to provide
2 mg/L dosage for one sterilizing Lyster bag

30-35 gallons of water
(Date packaged)

The information shall be legibly printed on each tube with a black, non-smearing, waterproof ink. The information marking on the tubes shall withstand soaking in water when tested as specified in 4.2.1.1.

3.2.2 Chlorine test tablets, DPD No. 1. The chlorine test tablets, DPD No. 1, quick dissolving shall conform to the requirements of MIL-C-37873 except that each tablet shall be hermetically sealed in a foil-polymer laminate. (The sealed package may be in strips not exceeding 10 tablets per strip.)

3.2.3 Color comparator. The color comparator shall be formed of colorless plastic and shall hold a 10 mL water sample without leaking. It shall have six stepped sections or cells, each with a viewing window and marked in black: 1, 1.5, 2, 3, 5 and 10 mg/L respectively (see figure 1). Each cell window shall present a minimum viewing area of 100 mm^2 and shall be bordered in black. Alongside the cell windows shall be a similar row of color standard windows. The color of the standard shall match the color seen through each window when a water sample containing that amount of available chlorine is poured into the comparator and a DPD tablet added, when tested as specified in 4.2.1.1.

3.2.4 Instruction sheet. The instructions shall be legibly printed with black ink on white water resistant paper conforming to MIL-P-43327. The instructions shall be as follows:

FOR 1 to 2 mg/L

1. Clean the canvas (Lyster) bag before using and suspend it by supporting ropes as shown in Department of the Army Field Manual, FM 21-10. Fill the bag to the 36-gallon mark (which is 4 inches from the top of the bag). Use clear settled water if possible.

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2. Prepare the chlorinating solution by depositing the powder from one calcium hypochlorite tube supplied with the chlorination kit in a clean cup, pan, or pitcher containing about one-half cup of water. Stir with a clean implement until a cloudy mixture results; then add an additional cup of water and stir until liquid becomes homogeneous. The amount of water used to dissolve the powder should be approximately 1/2 to 1 pint for the contents of 1 tube. A tube may easily be opened by holding it firmly in both hands with the thumbs next to the file scratch and breaking it by applying pressure at both ends of the tube. The file scratch or etch mark on the tubes may be cut deeper with the use of the corner of a small file. Care should be exercised not to etch the glass too deeply as this may cause involuntary rupture of the glass with the resultant loss of some of the vial contents.

3. Add the chlorinating solution to the Lyster bag and mix well with the water to be treated with a clean stirring device.

4. Allow the water in the Lyster bag to remain chlorinated for 10 minutes before testing for proper chlorination.

5. Draw from each outlet or spigot and return to the bag, sufficient water to insure that the lines connecting the outlets or spigots to the container are completely filled with chlorinated water. At least a pint of water shall be drawn from each outlet.

6. Test the water for proper chlorination as follows:

- a. Let approximately 1 pint of water drain to waste from one spigot. Then draw water to fill the plastic comparator above the top of the uppermost black border.
- b. Tear open one tablet package and drop the tablet into the comparator.
- c. After 2 minutes, place thumb over opening and invert 3 times.
- d. If the color of the water in the left window marked 1 is the same or darker than the right window marked 1, chlorination is acceptable. Wait an additional 20 minutes before using. If the color of the water is lighter, repeat the chlorination and testing, starting with paragraph 2 of these instructions:

7. To obtain any desired concentration of up to 10 mg/L total available chlorine proceed as directed (paragraphs 1-5) using the amount of calcium hypochlorite recommended by the sanitary engineer or officer in charge (up to approximately 5 or 6 tubes of calcium hypochlorite), and retest (paragraph 6).

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3.3 Workmanship. The quality of the chlorination kit shall conform to the levels established in this specification. The occurrence of defects shall not exceed the number permitted under the acceptable quality levels (AQLs) specified in section 4 for all examinations and tests of materials, components, and end items, as applicable.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

4.2 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.2.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase documents.

4.2.1.1 Component testing. Fabricated components shall be tested for the characteristics shown in table II. All requirements shall be applicable to the sample unit. The lot size units and sample units shall be as follows:

<u>Fabricated component</u>	<u>Lot size expressed in units of</u>	<u>Sample unit</u>
Calcium hypochlorite tubes	Calcium hypochlorite tubes	6 filled tubes
Color comparator	Comparators	1 comparator

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The sample size for testing shall be as follows:

<u>Lot size</u>	<u>Sample size (sample units)</u>
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

Failure of any sample unit to meet the specified requirements shall be cause for rejection of the component lot.

TABLE II Component tests.

<u>Component</u>	<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method paragraph</u>
Filled and sealed tubes	Weight per tube	3.2.1	4.3.1
	Leakage	3.2.1.2	4.3.2
	Legibility of marking after water soaking	3.2.1.2	4.3.3
Color comparator	Performance	3.2.3	4.3.4

4.2.2 End item visual examination. The chlorination kits shall be examined for the defects listed below. The lot size shall be expressed in units of kits. The sample unit shall be one complete kit. The inspection level shall be I and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 4.0.

<u>Examine</u>	<u>Defect</u>
General	Any component omitted or not as specified. Any component damaged or defective.
Calcium hypochlorite tubes	Less than 100 tubes. Not clear glass. Dimensions not as specified. Empty or grossly overfilled tube File mark not as specified. Marking omitted; incorrect; illegible; or of improper size, location, sequence, or method of application.
DPD tablets	Box contains less than 150 tablets.

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<u>Examine</u>	<u>Defect</u>
Color comparator	Not made of colorless plastic. Dimensions not as specified. Marking missing, incorrect, or illegible.
Instruction sheet	Ink not black. Paper not white. Printed material omitted, incorrect, illegible, or not in proper sequence.

4.2.3 Packaging inspection. An inspection shall be made to determine that preservation, packing, and marking comply with the section 5 requirements. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully packaged. The lot size shall be the number of shipping containers in the inspection lot. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

<u>Examine</u>	<u>Defect</u>
Marking (exterior and interior)	Omitted; incorrect; illegible; of improper size, location, sequence or method of application.
Materials	Any component missing, damaged, or not as specified.
Workmanship	Inadequate application of components such as: incomplete closure of container flaps, improper taping, loose strapping, inadequate stapling. Bulged or distorted container.
Contents	Number of intermediate packs per shipping container is more or less than required. Weight of contents of each container exceeds requirements. Number of tubes of calcium hypochlorite per intermediate pack when procured separately is more or less than specified. Number of chlorination kits per intermediate pack is more or less than required. <u>1/</u>

NOTE: 1/ For this defect, one intermediate pack from each shipping container in the sample shall be examined.

4.2.4 Palletization inspection. An inspection shall be made to determine that the palletization complies with the section 5 requirements. Defects shall be scored in accordance with the list below. The sample unit shall be one palletized unit load fully packaged. The lot size shall be the number of palletized unit loads in the inspection lot. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 6.5.

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<u>Examine</u>	<u>Defect</u>
Finished dimensions	Length, width, or height exceeds specified maximum requirements.
Palletization	Pallet pattern not as specified. Interlocking of loads not as specified. Load not bonded with required straps as specified.
Weight	Exceeds maximum load limits.
Marking	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application.

4.3 Methods of inspection.

4.3.1 Weight per tube test. Break five filled tubes at the file mark and separately weigh the contents of each tube. The weight of the contents of each tube shall be reported to the nearest 0.01 g. One or more tubes failing to meet the specified weight of contents requirement shall be a test failure.

4.3.2 Leak test. Place a filled and sealed tube into a transparent vessel capable of withstanding 25 inches of vacuum. Cover the tube with not less than 1/2 inch of water at a temperature of not more than 80°F and also with a grating to prevent the tube from floating. Apply 20 ± 0.5 inches of vacuum to the vessel for 3 seconds. Escape of air bubbles indicates leakage through seals and shall be considered a test failure.

4.3.3 Legibility after water soaking test. The printed glass tube of calcium hypochlorite shall be immersed in water at 70° to 80°F for 1 hour. The printing shall then be examined for legibility. Any illegibility of the information marking shall be considered a test failure.

4.3.4 Color comparator performance test. Using the procedure of method 409A of S.M.E.W.W., 15th Edition, prepare an adequate quantity of standard chlorine solutions at the concentrations: 0.1, 1.5, and 10.0 ppm. Determine color activity of tablets with each solution using standard potassium permanganate solutions prepared and used as indicated in method 408E of S.M.E.W.W., 15th Edition, using DPD tablets in lieu of DPD indicator reagent. Prepare separate free available chlorine standard solutions of 1.0, 1.5, 2.0, 3.0, 5.0 and 10.0 mg/L concentration, verified by method 408C of S.M.E.W.W., 15th Edition. Using each solution in turn, fill the comparator and add a DPD tablet. Place thumb over opening and invert a few times until tablet is substantially dissolved. Any failure of the color in cell window corresponding to chlorine concentration used to correspond to standard or any failure to hold sample without leaking shall be considered a test failure.

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5. PACKAGING

5.1 Preservation. Preservation shall be level A or Commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Unit packing.

5.1.1.1.1 Calcium hypochlorite. Ten tubes of calcium hypochlorite (see 3.2.1) shall be unit packed in the apertures of a strip of jumbo single-faced corrugated board, corrugations and liner to be made with chipboard; each aperture to be such size as to fit a tube exactly. The chipboard strip shall be 1/4 inch wider than the length of the tube. Alternatively, ten tubes of calcium hypochlorite (see 3.2.1) shall be unit packed in a tray consisting of paperboard strip equal in width to the length of the tube plus 1/4 inch formed into undulations affixed to a paperboard backing strip by adhesive. The design shall be such that the undulations shall be equal in depth to the diameter of the tube plus approximately 1/32 inch and have sufficient tension to securely engage and maintain each tube in each undulation. Each backing strip shall be provided with continuous tabs along each longer dimension. Tabs shall be equal in height to the height of the undulations. Material used in fabrication of trays shall be white patent coated newsboard of excellent bending quality. Undulation strip shall caliper not less than 0.012 inch and with backing strip not less than 0.016 inch. The trays shall be approximately 6 inches in length, 3 inches in width, and 1/2 inch in depth. Approximate dimensions are furnished as a guide only.

5.1.1.1.2 Chlorine test tablets, DPD No. 1. One hundred and fifty tablets, sealed in foil polymer laminate (see 3.2.2) shall be unit packed in a snug-fitting box that will afford adequate protection against physical damage.

5.1.1.1.3 Color comparator. The color comparator shall be unit packed in a snug-fitting sleeve or box made of bending plain chipboard having a minimum thickness of 0.012 inches.

5.1.1.2 Intermediate pack.

5.1.1.2.1 Chlorination kits. One hundred tubes of calcium hypochlorite, 150 chlorine test tablets and one color comparator, unit packed as specified in 5.1.1.1 together with an instruction sheet (see 3.2.4) shall be packed in a intermediate snug-fitting fiberboard box conforming to style FTC, grade V3c or W5c, of PPP-B-636. Strips shall be nested together in sets of two with the corrugations facing each other. Trays shall be stacked upright. Each box shall be closed by sealing all seams with waterproof tape in accordance with the appendix of PPP-B-636.

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5.1.1.2.2 Calcium hypochlorite (when procured separately). When calcium hypochlorite is to be procured separately (see 6.2), one hundred tubes, unit packed as specified in 5.1.1.1.1, shall be packed in a intermediate fiberboard box as specified in 5.1.1.2.1.

5.1.2 Commercial. Each chlorination kit and separately procured tubes of calcium hypochlorite shall be preserved in accordance with ASTM D 3951.

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

5.2.1 Level A packing.

5.2.1.1 Chlorination kits. Twenty chlorination kits, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, V2s of PPP-B-636. Each shipping container shall be closed in accordance with method III, waterproofed in accordance with method V, and reinforced as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.2.3.

5.2.1.2 Calcium hypochlorite (when procured separately). When calcium hypochlorite is to be procured separately (see 6.2), tubes of the product, preserved as specified in 5.1, shall be packed as specified in 5.2.1.1. The weight of contents of each shipping container shall not exceed 65 pounds.

5.2.2 Level B packing.

5.2.2.1 Chlorination kits. Twenty chlorination kits, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, type CF (variety SW) or SF, class domestic, grade 275 of PPP-B-636. Each shipping container shall be closed in accordance with method II as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.2.3.

5.2.2.2 Calcium hypochlorite (when procured separately). When calcium hypochlorite is to be procured separately (see 6.2), tubes of the product, preserved as specified in 5.1, shall be packed as specified in 5.2.2.1. The weight of contents of each shipping container shall not exceed 65 pounds.

5.2.2.3 Weather-resistant fiberboard containers. When specified (see 6.2), the shipping container shall be a grade V3c, V3s, or V4s fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with Method III as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.2.3.

5.2.3 Commercial packing. Chlorination kits, and separately procured tubes of calcium hypochlorite, preserved as specified in 5.1, shall be packed in accordance with ASTM D 3951.

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5.3 Palletization. When specified (see 6.2), chlorination kits and separately procured tubes of calcium hypochlorite, packed as specified in 5.2, shall be palletized in accordance with load type I of MIL-STD-147. Pallet type shall be type I (4-way entry), type III, type IV, or type V in accordance with MIL-STD-147. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means K and L or film bonding means O or P. Pallet patterns shall be in accordance with the appendix of MIL-STD-147. Interlocking of loads shall be effected by reversing the pattern of each course. If the container is of a size which does not conform to any of the patterns specified in MIL-STD-147, the pallet used shall first be approved by the contracting officer.

5.4 Marking.

5.4.1 Unit packs and intermediate packs.

5.4.1.1 Unit packs for calcium hypochlorite tubes. Each unit packs specified in 5.1.1.1 shall have one end printed or a label affixed with the following information:

Stock No.
Item description.
Quantity.
Contract No.
Date manufactured.
Name and address of manufacturer.
EPA Reg. No. ---

In addition to the above, the information on the unit packs for the calcium hypochlorite tubes shall include the percent available chlorine in the material when placed in the tube and the date of shipment.

5.4.1.2 Intermediate packs of chlorination kits. Each fiberboard box containing a complete chlorination kit shall be marked or labeled with the name and quantity of the chemicals contained therein, kit stock number, contract number, and the name of the supplier. The box shall also be marked in minimum 1/4-inch high letters as follows:

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5.4.1.3 Intermediate packs of calcium hypochlorite (when procured separately). Each intermediate pack of separately procured tubes of calcium hypochlorite shall be marked as specified in 5.4.1.1.

5.4.2 Shipping containers.

5.4.2.1 Civil agencies. In addition to any special marking required by the contract or order, shipping containers shall be marked in accordance with FED-STD-123 or ASTM D 3951, as applicable.

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5.4.2.2 Military requirements. In addition to any special marking required by the contract or purchase order, shipping containers and palletized unit loads shall be marked in accordance with MIL-STD-129 or ASTM D 3951, as applicable.

6. NOTES

6.1 Intended use. This item is intended for use in the disinfection of water in Lyster bags and small containers by chlorine in order to render water safe for drinking purposes.

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. Selection of applicable levels of preservation and packing (see 5.1 and 5.2).
- c. When separate procurement of tubes of calcium hypochlorite is desired (see 5.1.1.2.2, 5.2.1.2, and 5.2.2.2).
- d. When weather-resistant grade fiberboard shipping containers are required for level B packing (see 5.2.2.3)
- e. When palletization is required (see 5.3).

6.3 Sealing of the calcium hypochlorite glass tube. Extreme caution should be exercised in preparing and sealing the calcium hypochlorite tubes, since decomposition is accelerated at temperatures in excess of 90°F.

MILITARY INTERESTS:

Custodians

Army - GL
Navy - MC
Air Force - 68

Review activities

Army - MD
Navy - MS
DLA - GS

User activity

Army - CR

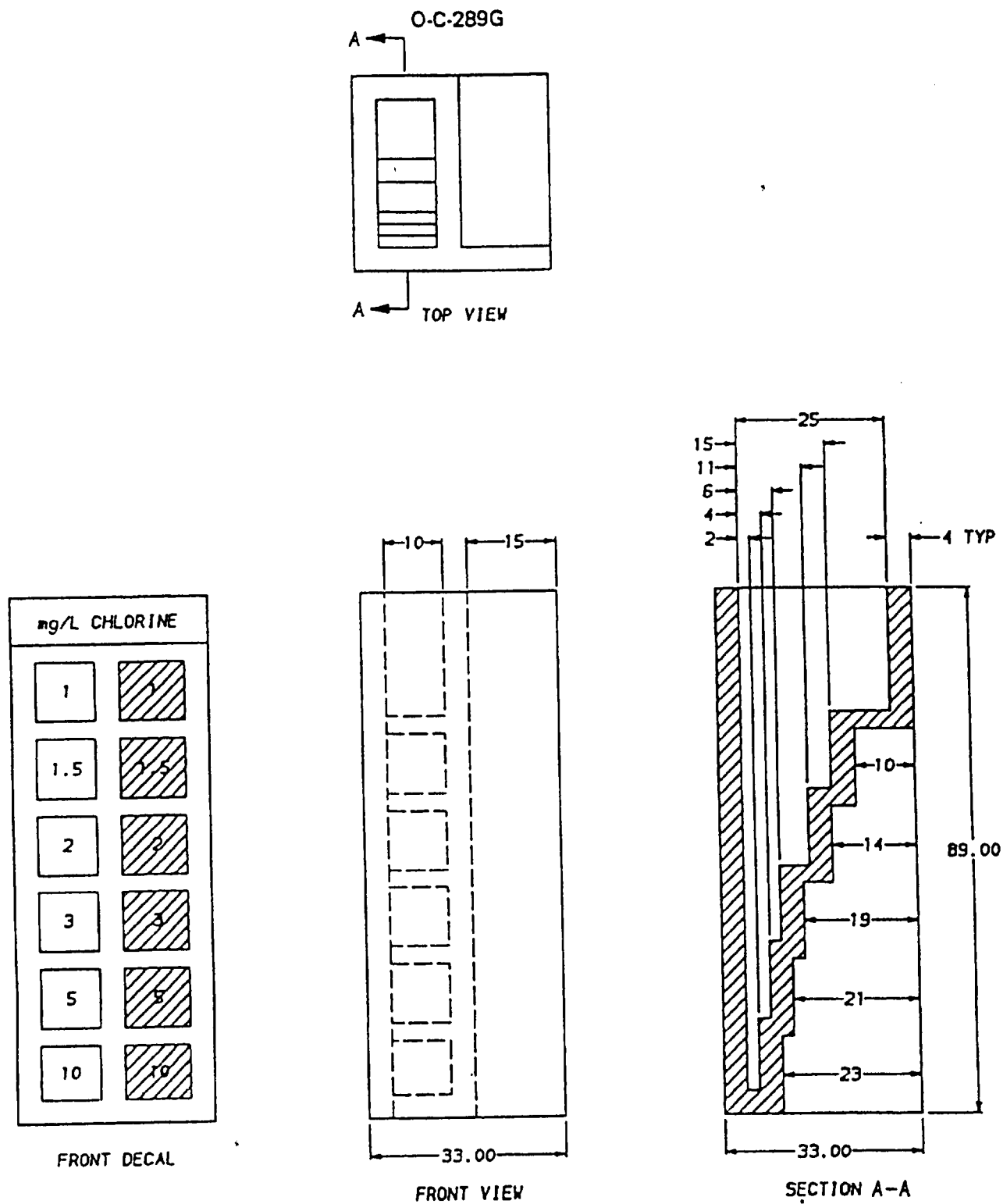
CIVIL AGENCY COORDINATION ACTIVITIES:

AGR-AMS
GSA-FSS
HEW-NIH

PREPARING ACTIVITY:

Army - GL

Project No. 6850-0760



NOTE, DIMENSIONS ARE IN MILLIMETERS.

FIGURE 1, COMPARATOR, COLOR, STEPPED WEDGE

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

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL (See Instructions - Reverse Side)	
1. DOCUMENT NUMBER O-C-289G	2. DOCUMENT TITLE Chlorination Kit, Water Purification, (For Treatment of Drinking Water)
3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____
b. ADDRESS (Street, City, State, ZIP Code)	
5. PROBLEM AREAS	
a. Paragraph Number and Wording:	
b. Recommended Wording:	
c. Reason/Rationale for Recommendation:	
6. REMARKS	
7a. NAME OF SUBMITTER (Last, First, MI) - Optional	8. WORK TELEPHONE NUMBER (Include Area Code) - Optional
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional	9. DATE OF SUBMISSION (YYMMDD)