

DEPARTMENT OF DEFENSE
OFFICE OF CIVIL DEFENSE
Standard Item Specification

Revised April 1, 1962
(Supersedes FCDA specification
dated March 15, 1957)

ITEM: No. CD V-787

NOMENCLATURE: 10-DAY COMPARISON STANDARD
FOR FOOD AND WATER

UNIT: Each

1. SCOPE

This is a specification for a food and water comparison standard to be used by radiological civil defense personnel in determining the amount of radioactive material which may be present in water and solid or liquid food samples.

2. GENERAL PERFORMANCE REQUIREMENTS

2.1 When used with a standard OCD type CD V-700 geiger instrument the comparison standard gives instrument readings comparable to that of a fission product mixture less than 10 days old, with activity levels of approximately 9×10^{-2} microcuries per cubic centimeter.

2.2 The comparison standard is designed for use under conditions of extreme emergency and therefore shall incorporate maximum strength characteristics commensurate with the following detailed requirements.

3. CONTAINER MATERIAL AND CONSTRUCTION

3.1 Material. The container and lid shall be made from 80 pound .009 inch thick, 1.25 coke tin plate.

3.2 Size. The container shall be a standard 4 ounce circular seamless ointment tin approximately 1-1/16 inch high when assembled. The bottom portion shall be approximately 3 inches inside diameter and 59/64 inch high. (Ellisco Inc., Philadelphia, Pennsylvania, Type No. 12 or equal.)

3.3 Form Factor. The form factor shall be as shown in Attachment A. The bottom portion of the container shall have a continuous bead type lid stop 5/8 inch from the bottom. The container and lid shall be formed without evidence of wrinkles, cracks or flaws.

3.4 Closure. A slip cover lid shall be slightly larger than the upper section of the lower portion of the container to provide an airtight box fit. The lid shall be close fitting but easy to rotate and remove by hand.

3.5 Corners. The bottom portion of the container shall have an outwardly curled upper edge, (Ellisco "San-i-safe" or equal), and shall have an outside bottom radius of 3/32 inch. The lid shall have an outside cover radius of 3/64 inch.

4. FORMULATION AND MANUFACTURE

4.1 Radioactive Material. The radioactive component of the formulation shall be finely powdered uranyl acetate, $UO_2(C_2H_3O_2)_2 \cdot 2H_2O$, of 99.0% purity. 100% shall pass through 60 mesh sieves and 85% shall pass through 100 mesh sieves (J.T. Baker Chemical Co., Phillipsburg, New Jersey or other).

4.2 Epoxy Resin. The resin component of the formulation shall consist of Araldite 502 (Ciba Products Co., Fair Lawn, New Jersey or other), Versamid 125 (General Mills, Kankakee, Illinois or other) and Toluene (purified) Toluol.

4.3 Preparation of Container. The inside of the lids of the containers shall be greaseless to assure maximum adhesion with the epoxy mixture.

4.4 Preparation of Mixture

4.4.1 The resin formulation with uranyl acetate shall be mixed in two separate parts as follows:

Part A - Araldite 502.....12.5 parts by weight
Uranyl Acetate.....18.8 parts by weight

Part B - Versamid 125.....18.8 parts by weight
Toluene..... 6.3 parts by weight

4.4.2 Part A shall be mixed thoroughly with Part B. 9.0 grams of the resulting mixture shall immediately be weighed into each lid, since the pot life at room temperature is approximately 10 minutes.

4.5 Curing

4.5.1 The lids shall be positioned on a level surface to allow the mixture to flow to a uniform layer along the entire area of the inside of the lid. The lids shall remain unmoved until the resin has become firm.

4.5.2 All lids shall be air cured at least five days before assembly and packaging.

4.6 Lacquer

4.6.1 The inside rim and the edge of the lid shall be covered with a very thin film of transparent lacquer applied after the uranium epoxy formulation has cured for at least 72 hours and after each unit has been weighed as required in S.4.2 and B3.1.

4.6.2 During this process a circular mask shall be used to assure that lacquer is not deposited on the epoxy resin.

4.7 Completed Comparison Standard

4.7.1 A fully cured, properly proportioned comparison standard will contain 3.0 grams of uranyl acetate and 5.0 grams of epoxy resin. (See 5.4)

$$(0.38 \text{ PC} / \mu\text{g}) \times \left(\frac{100000}{9} \right) \times (3 \mu) = 1.14 \text{ E}+3 \text{ PC} \approx 1 \text{ PC}$$

4.7.2 The epoxy formulation cures at room temperature in about 18 hours. However maximum physical properties are obtained after 5 to 7 days at room temperature.

5. CHARACTERISTICS

5.1 Thermal Shock

5.1.1 The comparison standard shall be capable of withstanding without damage, alternate immersion in hot water and cold water.

5.1.2 For tests the comparison standard which has been aged for at least 72 hours shall be immersed in water at 185 to 195°F for two minutes followed by immediate immersion in cold water at 32 to 37°F for two minutes. This cycle shall be repeated four times.

5.2 Bending

5.2.1 The uranium epoxy formulation shall not crack or separate from the planar portion of the container lid following two maximum flexures.

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5.2.2 For tests the comparison standard which has been aged for at least 72 hours shall be bent with the hands so the opposite edges of the lid touch with the resin on the inside. After the lid is pulled back toward its original shape a second similar bend shall be performed along a line 90° from the first bend line, and the lid reshaped to its original form.

5.3 Radiation Count Level

5.3.1 The radiation level of each production comparison standard shall be within 20% of the radiation level of a special reference standard to be furnished to the contractor. (Two reference standards will be furnished for cross comparison to assure reliability.)

5.3.2 The mean or average of the radiation levels of all units tested from one batch of comparison standards shall be within 10% of the radiation level of the special reference standard.

5.3.3 Radiation levels shall be determined using a CD V-700 geiger survey meter adjusted in accordance with instructions for the unit. The average of ten separate readings shall be determined for the reference standard by resting the geiger probe on the rim of the lid with the opened probe window facing the resin. The radiation levels for the production comparison standards shall be determined in a similar fashion and should be made at the same time to minimize the effects of drift and variation of sensitivity of the CD V-700.

5.4 Weight

5.4.1 Each comparison standard which has aged for at least 72 hours shall contain 8.0 grams of uranium epoxy mixture.

(33 URANYL ACETATE PLUS 59 EPOXY RESIN)

5.4.2 For tests the average weight for 100 unfilled lids shall be determined and added to 8 grams. Production units which have cured for at least 72 hours shall not vary more than 1/2 gram from this gross reference weight.

5.5 Conflicts

In the event there are conflicts between the mixing ratios given in 4.4 and the activity count levels of the production units as required in 5.3, the formulation shall be adjusted and the requirements of 5.3 shall govern.

6. EXTERIOR FINISH

6.1 Container Bottom. The bottom portion of the container shall be gold lacquered inside and outside with type 239-21 sanitary gold lacquer or equal.

6.2 Lid. The outside of the lid shall be prepared with a lithograph size coat followed by a standard baked lithograph white coat. Printing and marking shall be lithographed light blue and red. The lid shall be protected with varnish.

6.3 Samples. Samples of the colors and finishes to be used shall be submitted for approval to the contract officer.

7. IDENTIFICATION

7.1 Marking. Each comparison standard furnished in accordance with these specifications shall bear the following data on the panel of the top of the lid: "10-DAY COMPARISON STANDARD for Food and Water. OCD Item CD V-787, Mod. ___" (to be furnished). In addition the contractor's name, city and state shall be given. The character and size of type and spacing may vary to facilitate manufacture. A drawing or sample of the markings and layout shall be submitted to the contract officer for approval prior to production.

7.2 Emblem. Each comparison standard lid shall be printed with the red, white, and blue CD emblem. The emblem shall be approximately one inch in diameter and located as shown in Attachment A.

8. TESTS

8.1 Conformance. Conformance with these specifications shall be determined according to the practices of the National Bureau of Standards. Unless otherwise stated, tests shall be performed at normal room temperature and pressure. Unless otherwise indicated, tests may be performed in any sequence.

8.2 Damage Resulting from Tests. Comparison standards damaged incident to test to determine their conformance with the requirements of the specifications will not be accepted by the purchaser.

8.3 Preproduction Models.

8.3.1 The bidder shall furnish with his bid three comparison standards which will be tested for conformance with these specifications as required by the Invitation for Bids.

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8.3.2 One of the preproduction models of a successful bidder who is awarded a contract will become the property of CCD and will be retained as a reference. One of the preproduction models tested shall be retained by the government inspector during the production period and will be returned to the manufacturer. All other preproduction models will be returned on request.

8.4 Production Testing. The required test procedure and test schedule is contained in Attachment B.

8.5 Test Costs. The manufacturer shall be responsible for the cost of tests conducted in his own plant. The costs of the initial tests under 8.3 will not be borne by the bidder.

8.6 Changes. The manufacturer shall obtain from the contracting officer written authorization to introduce into the production units any change from the approved preproduction model.

9. PACKING AND MARKING

9.1 Each comparison standard shall be heat-sealed in a .003 inch thick polyethylene bag and boxed individually. (See 4.5.2) The individual container shall be constructed of paperboard conforming to Federal Specifications PPP-B-566.

9.2 Approximately 1,000 individually boxed comparison standards shall be over-packaged in a shipping container designed for that purpose. The shipping container will be for domestic use and shall be a standard commercial container of double-faced corrugated fiberboard, with a bursting strength of not less than 275 pounds conforming to Federal Specifications LII-B-631c.

9.3 Each comparison standard box and each shipping container shall be marked with the following information: "10-Day Comparison Standard for Food and Water, CCD Item No. CD V-787, Model No. _____" and the name of the contractor. In addition, each shipping container shall be marked with the contract number, the shipping weight, and the number of instruments in the container.

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ATTACHMENT-A
FORM FACTOR
FOR

CD V-787

10 - DAY COMPARISON STANDARD



NOTE:

■ RED
■ BLUE
Printing BLUE

