

**FINAL REPORT
JANUARY 2002**

REPORT NO. 02-06



**5-GALLON DS2 CONTAINER,
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TEST**

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Prepared For:

U.S. Army Soldier and Biological
Chemical Command
ATTN: AMSSB-RSO-DDN
Rock Island Arsenal
Rock Island, IL 61299-7390



**VALIDATION ENGINEERING DIVISION
MCALESTER, OKLAHOMA 74501-9053**

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U.S. ARMY DEFENSE AMMUNITION CENTER

VALIDATION ENGINEERING DIVISION
MCALESTER, OK 74501-9053

REPORT NO. 02-06

**5-GALLON DS2 CONTAINER,
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TEST**

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**5-GALLON DS2 CONTAINER,
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TEST REPORT NO. 02-05**

JANUARY 2002

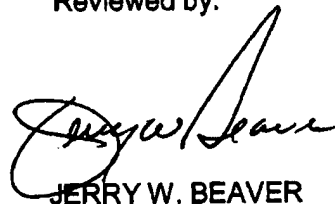
ABSTRACT

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SOSAC-DEV) was tasked by the U.S. Army Soldier and Biological Chemical Command (SBCCOM) to conduct a UN POP Test for certification of the 5-gallon DS2 container. Six containers were used in the tests. No significant flaws were found. As a result of the performance of the containers during testing, the 5-gallon DS2 container is recommended for USA-wide use.

Prepared by:


JEFFERY L. DUGAN
Validation Engineer

Reviewed by:


JERRY W. BEAVER
Chief, Validation Engineering Division

PART 1 – INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SOSAC-DEV), was tasked by the U.S. Army Soldier and Biological Chemical Command (SBCCOM) to conduct a UN POP Test for certification of the 5-gallon DS2 container.

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Operations Support Command (OSC), Rock Island, IL. Effective 9 July 1993, the three-letter designator "DEV" was assigned for use when conducting UN POP tests. Effective 9 August 1994 this designation was included in the Joint Regulation AR 700-143, Performance Oriented Packaging of Hazardous Materials. Reference is made to the following:

IOC-R, 10-23, Mission and Major Functions of USADAC,
7 January 1998.

C. OBJECTIVE. To determine if this item meets UN POP requirements.

D. CONCLUSION. As tested, the 5-gallon DS2 container, NSN 6850-00-753-4870, meets all UN POP requirements with no problems encountered during testing.

PART 2 – ATTENDEES

DATE PERFORMED: 8-26 NOVEMBER 2001

ATTENDEE

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Rock Island Arsenal
Rock Island, IL 61299-7390

PART 3 -TEST PROCEDURES

The test procedures outlined herein were extracted and summarized from 49 CFR, Subpart M, Section 178.600. All tests will be conducted to Packing Group II requirements.

A. DROP TEST. Each package will be dropped onto a non-yielding surface from the height and orientations listed below. The drop height is measured as the vertical distance from the target to the lowest point on the package. The drop height for Packing Group I is 1.8 meters (5.9 feet), for Packing Group II it is 1.2 meters (3.9 feet), and Packing Group III is 0.8 meters (2.6 feet). Materials which have a specific gravity (SG) exceeding 1.2, the drop height must be calculated as follows: for Packaging Group I the SG X 4.9 feet; for Packaging Group II the SG X 3.3 feet; and, for Packaging Group III the SG X 2.2 feet.

Packaging	No. of Tests	Drop Orientation of Samples
Steel drums, Aluminum drums, Metal Drums (other than steel or aluminum), Steel jerricans, Plywood drums, Wooden barrels, Fiber drums, Plastic drums and jerricans, Composite packagings which are in the shape of a drum	Six ... (three for each drop)	First drop (using three samples): The package must strike the target diagonally on the chime or, if the packaging has no chime, on the circumferential seam or an edge. Second drop (using the other three samples): The package must strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body.
Boxes of natural wood, Plywood boxes, Reconstituted wood boxes, Fiberboard boxes, Plastic boxes, Steel or aluminum boxes, Composite packagings which are in the shape of a box.	Five... (one for each drop)	First drop: Flat on the bottom (using the first sample). Second drop: Flat on the top (using the second sample). Third drop: Flat on the long side (using the third sample). Fourth drop: Flat on the short side (using the fourth sample). Fifth drop: On a corner (using the fifth sample).
Bags --- single-ply with a side seam	Three... (three drops per bag).	First drop: Flat on a wide face (using all three samples). Second drop: Flat on a narrow face (using all three samples). Third drop: On an end of the bag (using all three samples).
Bags --- single-ply without a side seam, or multi-ply	Three... (three drops per bag).	First drop: Flat on a wide face (using all three samples). Second drop: On an end of the bag (using all three samples).

B. LEAKPROOFNESS TEST. Three samples of each different packaging must be tested and pass the leakproofness test. The packaging must be restrained under water while the internal air pressure is applied. An internal air pressure must be applied to the packaging as indicated for the following groups;

- (1) Packaging Group I: Not less than 30 kPa (4 psi)
- (2) Packaging Group II: Not less than 20 kPa (3 psi)
- (3) Packaging Group III: Not less than 20 kPa (3 psi)

The test must be conducted for a minimum time of 5 minutes.

C. HYDROSTATIC PRESSURE TEST. Three test samples are required for each different packaging. For packagings constructed of stainless steel, monel, or nickel, only one sample is required for periodic retesting of packagings. Metal packagings and composite packagings other than plastic, including their closures, must be subjected to the test for 5 minutes. Plastic packagings and composite packagings, including their closures, must be subjected to the test pressure for 30 minutes. The test pressure must be applied continuously and evenly, and it must be kept constant throughout the test period. The hydraulic pressure applied, taken at the top of the receptacle, and determined by any one of the following methods must be:

- (1) Not less than the total gauge pressure measured in the packaging at 55 degrees C (131 degrees F), multiplied by a safety factor of 1.5. This total gauge pressure must be determined on the basis of a maximum degree of filling with a filling temperature of 15 degree C (59 degree F);
- (2) Not less than 1.75 times the vapor pressure at 55 degrees C (122 degrees F) of the material to be transported minus 100 kPa (15 psi), but with a minimum test pressure of 100 kPa (15 psi); or
- (3) Not less than 1.5 times the vapor pressure at 55 degrees C (131 degrees F) of the material to be transported minus 100 kPa (15 psi), but with a minimum test pressure of 100 kPa (15 psi).

Packagings intended to contain hazardous materials of Packing Group I must be tested to a minimum test pressure of 250 kPa (36 psi).

D. STACKING TEST. Three test samples must be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages that might be stacked on it during transport. The minimum height of the stack, including the test sample, must be 3.0 meters (10 feet). The duration of the test must be 24 hours, except that plastic drums, jerricans, and composite packaging 6HH, intended for liquids, shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 degrees Celsius (104 degrees Fahrenheit). Alternative test methods that yield equivalent results may be used if approved by the Associate Administrator for Hazardous Materials Safety.

E. VIBRATION TEST. Three sample packagings, selected at random, must be filled and closed as for shipment. The three samples must be placed on a vibrating platform that has a vertical or rotary double-amplitude (peak-to-peak displacement) of one inch. The packages should be constrained horizontally to prevent them from falling off the platform, but must be left free to move vertically, bounce and rotate. The test must be performed for one hour at a frequency that causes the package to be raised from the vibrating platform to such a degree that a piece of material approximately 1.6mm (0.063 inch) thickness (such as steel strapping or paperboard) can be passed between the bottom of any package and the platform.

F. PASS/FAIL CRITERIA. A package passes the above tests if there is no rupture or leakage from any of the samples. No test sample should show any deformation that could adversely affect transportation safety or any distortion liable to reduce packaging strength.

PART 4 – TEST RESULTS

UN POP tests were conducted for certification of the 5-gallon DS2 container, NSN 6850-00-753-4870. Applicable tests that were conducted were as follows:

A. DROP TEST. Drop tests were conducted on 26 November 2001 from 3.9 feet. The impact surface was a steel sheet covering a concrete surface that provided an unyielding surface. The drops conducted were oriented to hit on the chime and on the top seam. Post drop inspections showed no significant damage. Photo 1 shows the setup used for the drop tests.



Photo 1. Drop Test Setup for UN POP Testing

B. LEAKPROOFNESS TEST. The leakproofness tests were conducted on 26 November 2001. The three test samples were pressurized to 5 psi and submerged using weights in a tank of water. The test samples were watched for 30 minutes without any detection of any leaks.

C. HYDROSTATIC TEST. The hydrostatic tests were performed on 26 November 2001 on three test samples. The samples were pressurized to 15 psi with water for 30 minutes. All test samples passed, with no leaks detected. See Photo 2 for the setup for the hydrostatic tests.

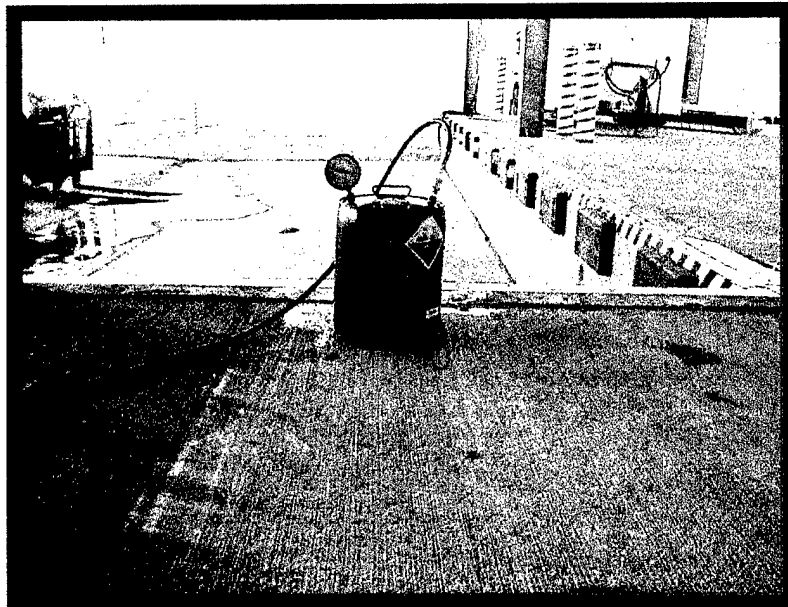


Photo 2. Hydrostatic Test Setup for UN POP Testing

D. STACKING TEST. The stacking test was conducted 8-14 November 2001 for 24-hour periods on various test samples. The compression weight was 550 pounds. Test sample 1 was tested 8 - 9 November 2001; test sample 2 was tested 13 - 14 November 2001; and, test sample 3 was tested 14 - 15 November 2001. This weight equates to a minimum stack height of 10 feet as required by UN POP test procedures. End of test inspection indicated no damage. See Photo 3 for stacking test setup.

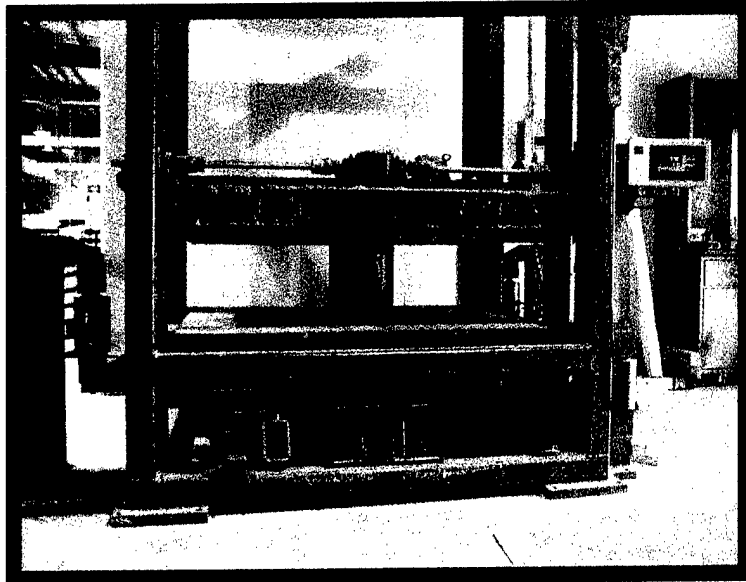


Photo 3. Stacking Test Setup for UN POP Testing

E. VIBRATION TEST - The vibration test was conducted on 26 November 2001 on three test samples. The test ran for 1 hour on each specimen at 225 cycles-per-minute. Following the completion of the test, inspections revealed no damage to the containers. Photo 4 depicts the setup for the vibration tests.

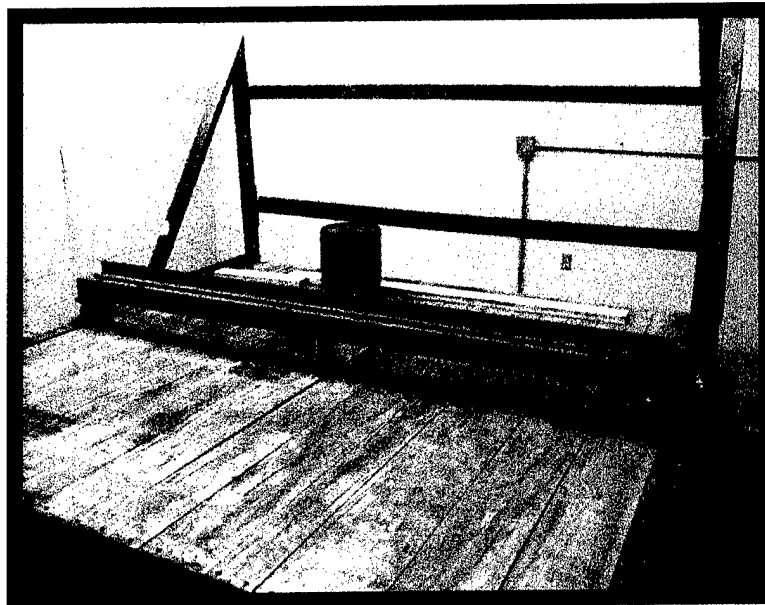


Photo 4. Vibration Test Setup for UN POP Testing

UN POP TESTS (STANDARD FORM)

**5-GALLON DS2 CONTAINER,
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TEST**

U.S. Army Defense Ammunition Center
ATTN: SOSAC-DEV, 1 C Tree Road
McAlester, OK 74501-9053

918-420-8908

Jerry W. Beaver

Test Report Number: 02-06	Service Code: DEV
Product NSN: 6850-01-136-8888	Nomenclature: Decontaminating Agent, DS2
Shipping Name: Caustic Alkali Liquids, n.o.s. (Diethylenetriamine, Ethylene Glycol Monomethyl Ether, Sodium Hydroxide)	UN ID Number: 1719
Hazard Class: 8	Packaging Group: II
Physical State: Liquid	NALC/DODAC: N/A
CAA Number: N/A	EX Number: N/A
CFR 49 Packaging Method: 202	
Net Explosive Weight: N/A	

**DESCRIPTION OF PACKAGINGS TO BE TESTED
EXTERIOR CONTAINER**

Exterior Container: 5-gallon DS2 container

CFR 49 Reference Number: 173.7A

UN Code: 3A1

NSN Exterior Container: 6850-00-753-4870

Specifications: 3A1

Net Quantity Weight: 45.5 lbs. (24.5 kg)

Tested Gross Weight: 46.5 lbs. (25.4 kg)

Dimensions Interior: Height: 13.5 in Diameter: 11.5 in

Manufacturer: All Bann

Year Container Manufactured: 1985

Drawing Number(s): N/A

Cushioning: None

Closure: None

INTERMEDIATE CONTAINER

Intermediate Container Description: None

Specification Number: N/A

Container NSN: N/A

Intermediate Container Cushioning: N/A

Intermediate Container Closure Method: N/A

Intermediate Container Dimensions: N/A

Number Of Intermediate Containers: N/A

UNIT CONTAINER

Unit Container Description: N/A

Unit Container Specification: N/A

Unit Container NSN: N/A

Unit Container Cushioning: N/A

Unit Container Closure Method: N/A

Unit Container Dimensions: N/A

Number of Unit Containers: N/A

SPECIAL NOTES

All exterior, intermediate, and unit containers must be inspected prior to use.

Inspect for physical damage, structural integrity and leakproofness of the containers.

SUPPLEMENTAL INFORMATION

Permitted Transportation Modes:

Military, DOD, or commercial truck, rail, and ship.

Military cargo aircraft.

Specific Gravity: .98

Hydrostatic Test Pressure Applied: 15 psi

Leakproofness Test Applied: 5 psi

TEST PROCEDURES

Test Conducted	Test Method	Test Results
(1) Pre-Conditioning (fiberboard)	Part 178.602	N/A
(2) Drop Test	Part 178.603(e)(1)(ii)	Pass
(3) Leakproofness Test	Part 178.604	Pass
(4) Hydrostatic Pressure Test	Part 178.605	Pass
(5) Stacking Test (550 lbs.)	Part 178.606(c)(1)	Pass
(6) Vibration Test	Part 178.608(b)(3)	Pass

UN POP Marking

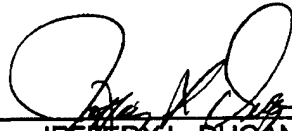
U1A1/Y/100/85

n USA/DOD/DEV

CERTIFICATION

Unless expressly stated to the contrary, we certify that all of the above applicable tests have been performed in strict conformance to CFR 49, Subpart M, Parts 178.600 – 178.608. Based on the successful test results shown above, this container is deemed suitable for transport of the hazardous material described herein, provided that maximum tested weights and quantities are not exceeded and the packaging is assembled as tested. The use of other packaging methods or components may make this test invalid.

PREPARED BY:


JEFFERY L. DUGAN
Test Engineer

DATE: 13 Dec 2001

SUBMITTED BY:


JERRY W. BEAVER
Chief, Validation Engineering Division

DATE: 13 Dec 2001

APPROVED BY:


WILLIAM R. FRERICHS
Associate Director for Engineering

DATE: 13 Dec 2001

PART 5 – SPECIAL PACKAGING INSTRUCTIONS

INCH-POUND

**MIL-P-51529(EA)
AMENDMENT 4**

28 September 1990

**SUPERSEDING
AMENDMENT 3
18 June 1990**

MILITARY SPECIFICATION

**PACKAGING OF DECONTAMINATING AGENT, DS2 IN 1-1/3 QUART CAN AND
5-GALLON PAIL**

*This amendment forms a part of MIL-P-51529(EA), dated
11 December 1986, and is approved for use by the U.S. Army
Chemical Research, Development and Engineering Center, De-
partment of the Army and is available for use by all Departments
and Agencies of the Department of Defense.*

PAGE 1

2.1.1:

Under "SPECIFICATIONS", "FEDERAL": Add "PPP-B-601 - Boxes, Wood,
Cleated Plywood" and "PPP-B-636 - Boxes, Shipping, Fiberboard".

Under "SPECIFICATIONS", "MILITARY": Add "MIL-B-117 - Bags, Sleeves and
Tubing - Interior Packaging" and "MIL-B-2427 - Box, Ammunition Packing: Wood,
Nailed".

PAGE 4

3.3.1.2: Delete "The cans shall then be given a pretreatment coating (finish 5.1.1 of
MIL-STD-171) conforming to TT-C-490, type I." and substitute "The cans shall then be

AMSC N/A

FSC PACK

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MIL-P-51529(EA)
AMENDMENT 4

given a pretreatment coating (finish 5.2 of MIL-STD-171) conforming to TT-C-490, type III (WASH PRIMER)."

PAGE 6

3.3.2.2: Insert before the last sentence of the paragraph:

"The cleaning, priming and topcoat procedure shall include the spout, including the threaded area, and the soldered insert area with the cap removed. The painted spout area shall be thoroughly dry before the cap is screwed on. The epoxy primer shall be applied to the chimes in sufficient quantity so that the epoxy coat flows into the crevices. The outside of the cap shall be cleaned in a way that the tin plate or cap liner is not damaged and then be painted in accordance with 20.24 of MIL-STD-171."

PAGE 7

3.10.2: Delete the paragraph in its entirety and substitute the following:

"3.10.2 Five gallon pail. The epoxy primer coating shall have a thickness of 1.0 - 1.5 mils and the topcoat shall have a thickness in the range of 1.8 - 2.4 mils when tested as specified in 4.4.4.7 at two points, 180 degrees from each other."

3.11: Delete the paragraph and subparagraphs in their entirety and substitute the following:

"3.11 Packing.

3.11.1 Level A.

3.11.1.1 One and one-third quart quantity. Twelve 1-1/3 quart cans of DS2 unit packed as specified in 3.3.1.1 shall be packed with closures in an uppermost position in a fiberboard box conforming to PPP-B-636 V3c PSC and closed in accordance with method IV. The inside dimensions of the box shall be 17-7/8 by 13-3/8 by 6-7/8 inches for length, width and height, respectively. Cans shall be arranged in a 3 by 4 can pattern. Each can shall be placed in a cell formed by fiberboard half-slotted separators. The shorter separator shall be 12-3/4 by 6-1/2 inches and the longer separators shall be 17 by 6-1/2 inches. The box shall be closed in accordance with method IV of PPP-B-636 and the corners blunted. The fiberboard box shall be placed in a bag conforming to class B, type I, style 1 of MIL-B-117. Excess air shall be evacuated and the bag closed by heat sealing in accordance with MIL-P-116. The bag shall then be placed in a wirebound wood box conforming to class 3, with veneer faceboards, style optional, for a type 3 load not to

MIL-P-51529(EA)
AMENDMENT 4

exceed 85 pounds of PPP-B-585. The wood parts of the box shall be preserved as specified in MIL-B-2427, grade A. The inside dimensions of the box shall be 18-1/2 by 14-1/4 by 7-1/2 inches in length, width, and height respectively. The box shall be furnished with a liner around the inner facing of the box and pads for the top and bottom inner faces. The liner shall be 66 by 7-1/4 inches and shall be scored to fit against the side and end of the box. The pads shall be 18-1/4 by 14 inches. The separators, liner, and pads shall be formed from impregnated fiberboard conforming to, as a minimum, class 1, type SW, CFI grade 125 of PPP-B-1163. The flutes in the fiberboard for the liner and separators shall be parallel to the height of the box. Additional pads shall be added to obtain a tight pack and prevent motion. The box shall be closed in accordance with the requirements for closure in PPP-B-585. There shall be no evidence of leakage of the 1-1/3 quart cans after vibration when the filled and closed shipping box is tested as specified in 4.4.4.4.

3.11.1.2 Small quantities. Quantities of one to five 1-1/3 quart cans shall be packed in a fiberboard box conforming to PPP-B-636. The packed fiberboard box shall be placed in a wood box conforming (style RSC, grade V5c, class WR) to PPP-B-621, PPP-B-601 or PPP-B-585.

3.11.1.3 Five-gallon quantity. The 5-gallon quantity unit packed as specified in 3.3.2.1 shall require no further protection for shipment other than unitization.

3.11.2 Level B.

3.11.2.1 One-and-one-third-quart quantity. From one to twelve 1-1/3 quart cans of DS2, unit packed as specified in 3.3.1.1, shall be packed as specified in 3.11.1.1 for level A except the box shall conform to (style RSC, grade V5c, class WR) of PPP-B-636. The box size and number of fiberboard cells shall be as required for the number of cans being packed."

PAGE 12

4.4.4.5:

lines 6 and 7: Delete "This significant area shall be from top to bottom of containers including top and bottom chime seams and body seams." and substitute "This significant area shall be from top to bottom of containers including top and bottom chime seams, the crevices between the chimes and the pail wall, and body seams. Other significant areas include the spout area without the cap and handle weld area."

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AMENDMENT 4

After the last sentence, add the following sentence:

"Each significant area shall be inspected and the results individually recorded for review by the government."

PAGE 13

6.2: Add the following new subparagraph:

"(c) Level of packing required."

Custodian:

Army - EA

Preparing activity:

Army - EA

Project No. PACK-A368

H-15-29

MIL-P-51529(EA)
11 December 1986

MILITARY SPECIFICATION

PACKAGING OF DECONTAMINATING AGENT, DS2 IN 1-1/3 QUART CAN AND 5-GALLON PAIL

This specification is approved for use within Chemical Research, Development and Engineering Center, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the packaging of a solution type decontaminating agent hereinafter referred to as DS2.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

O-T-634	- Trichloroethylene, Technical
QQ-8-571	- Solder, Tin Alloy: Tin-Lead Alloy; and Lead Alloy
TT-C-490	- Cleaning Methods for Ferrous Surfaces and Pretreatment for Organic Coatings
PPF-B-585	- Boxes, Wood, Wirebound
PPF-B-621	- Boxes, Wood, Nailed and Lock-Corner
PPF-B-1163	- Box, Corrugated Fiberboard, High Compression Strength, Weather-Resistant, Wax-Resin Impregnated
PPF-C-2020	- Chemicals, Liquid, Dry, and Paste: Packaging Of
PPF-P-704	- Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons)

: Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army Chemical Research, Development and Engineering Center ATTN: SMOCR-SPT-S, Aberdeen Proving Ground, MD 21010-5423 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

THIS DOCUMENT CONTAINS 14 PAGES.

FSC PACK

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MIL-P-51529(EA)

MILITARY

- MIL-P-116 - Preservation-Packaging, Methods Of
- MIL-S-6872 - Soldering Process, General Specification For
- MIL-W-12332 - Welding, Resistance, Spot, Seam, and Projection; For
Fabricating Assemblies of Low-Carbon Steel
- MIL-C-22750 - Coating, Epoxy-Polyamide
- MIL-D-50030 - Decontaminating Agent, DS2
- MIL-T-81533 - Trichloroethane, 1,1,1, (Methyl Chloroform) Inhibited,
Vapor Degreasing

STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by
Attributes
- MIL-STD-171 - Finishing of Metal and Wood Surfaces
- MIL-STD-810C - Environmental Test Methods

2.1.2 Drawings, technical data package lists and publications. The following drawings, technical data package lists, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DRAWINGS AND TECHNICAL DATA PACKAGE LISTS (TDPL)

U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND

CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

- 5-51-379 - Palletization for Decontaminating Agent, DS2
(Level A or B Packs)
- 5-51-380 - Marking, Decontaminating Agent, DS2
- 5-51-383 - Palletization 5-Gal Pails, Decontaminating
Agent, DS2
- 5-51-385 - Marking, Decontaminating Agent, DS2, 5 Gallon
Pail
- 5-51-386 - Can and Closure
- 5-51-387 - Decontaminating Agent, DS2
- TDPL 5-51-387-10,20 - Decontaminating Agent, DS2

U.S. ARMY MATERIEL COMMAND

- 19-48-4116/162A-20PA1002 - Unitization Procedures For Boxed Ammunition
and 19-48-4116-20PA1002 and Components on 4-Way Entry Pallets.
Agent, Decontaminating DS2, Packed in
5-Gal Pail, Unitized 24 Pails per 35" x
45-1/2" Pallet; Pail Size 11-3/8" Dia x
13-1/2" H.

MIL-P-51529(EA)

PUBLICATIONS

**U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER**

PURCHASE DESCRIPTIONS

EA-N-1334 - Nitrogen, Technical (High Purity)

(Copies of specifications, standards, drawings, technical data package lists, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the non-government documents which is current on the date of the solicitation.

ASTM STANDARDS

**B 117 - Salt Spray (Fog) Testing
D 1654 - Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments**

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Materials and components.

3.1.1 Materials. All materials cited on TDPL 5-51-387-10 and TDPL 5-51-387-20 or on the subsidiary drawings shall conform to the specifications listed thereon or to the specific characteristics set forth on the drawings.

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3.1.2 Components. All components of the 1-1/3-quart can and the 5-gallon pail shall conform to the specifications and drawings listed on TDPL 5-51-387-10 and TDPL 5-51-387-20, respectively and subsidiary drawings.

3.2 Manufacture. The 1-1/3-quart can and the 5-gallon pail shall be manufactured in accordance with the requirements of Drawing 5-51-387 and the subsidiary drawings thereto.

3.3 Unit packing, level A. DS2 shall be unit packed level A in a 1-1/3-quart or 5-gallon quantity as specified (see 6.2).

3.3.1 One-and-one-third-quart can quantity.

3.3.1.1 Can fill and evaluation. A quantity of 1-1/3 quarts (+1/2 or -0 fluid ounces) of DS2 conforming to MIL-D-50030 shall be unit packed in a can conforming to Drawing 5-51-386. The empty, unpainted can shall meet the leakage requirement specified in 3.4. The empty can interior and exterior shall have no oil, grease, dirt, scale, rust, or any foreign matter and shall be dry at the time of filling. If not clean and dry, the can shall be cleaned in accordance with method C1 of MIL-P-116 and dried in accordance with MIL-P-116, method optional. The can shall then be purged of air by inserting a nozzle to near the bottom of the inside of the can and injecting dry nitrogen gas conforming to EA-N-1334 at a rate of 0.04 to 0.06 cubic feet per second for no less than 2-1/2 seconds. The can shall then be filled with the above specified quantity of DS2 and the closure cap shall be immediately soldered in place to form a vapor and liquid leak-proof seal. Soldering practice shall be in accordance with MIL-S-6872 using solder conforming to type Sn40WACp1, Sn60WACp1 or Sn63WACp1 of QQ-S-571. The solder shall completely wet the contiguous areas of cap-can top junction and shall form a smooth, well-defined, concave, meniscus-like fillet throughout the circumferential area around the cap.

3.3.1.2 Can finish preparation. The filled can shall be thoroughly cleaned in hot water neutral pH detergent solution of soldering flux and any DS2 that may have been spilled on the container surface during the filling operation. The can shall be rinsed in clean water and dried in accordance with MIL-P-116, method optional. The filled, unpainted can shall meet the leakage requirement specified in 3.6. Upon completion of the leakage tests, the cans shall be prepared for the finishing operation. The cans shall be cleaned by vapor degreasing (finish 4.10 of MIL-STD-171) using a solvent conforming to O-T-634, type II, or MIL-T-81533. The cans shall then be given a pretreatment coating (finish 5.1.1 of MIL-STD-171) conforming to TT-C-490, type 1. The filled, cleaned, pretreated, primed (without top coat or paint) and unmarked container shall meet the salt spray corrosion resistance requirement specified in 3.8. The entire outer surface of the container shall then be painted in accordance with finish 20.24 of MIL-STD-171, Color Green 383. The paint finishing shall meet the requirements specified in 3.9 and 3.10.1. Touch-up of paint is not permitted.

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3.3.2 Five-gallon pail quantity.

3.3.2.1 Pail fill and evaluation. Five-gallons of DS2 conforming to MIL-D-50030 shall be packed in accordance with type II, class 2 of PPP-C-2020. Unit containers shall conform to type I, class 4 of PPP-P-704 except that the top and bottom chime seams, the seam at the nozzle-to-head sheet interface, and the body seams shall contain no organic seaming compound but shall be completely and continuously welded closed to form a vapor and liquid leak-proof seal. The pail shall be painted as specified in 3.3.2.2. As an alternative to the double lock seam for top and bottom chimes, a simple lock seam shall be permitted to facilitate welding. Each pail shall be provided with a clinched-in and seam welded nozzle with an inner seal plate. Each nozzle shall be screw-type without push-pull spout. The inner seal plate shall be inserted in accordance with manufacturer's instructions and shall then be soldered in place in accordance with MIL-S-6872 using solder conforming to type Sn40WAGP1 of QQ-S-571. The solder shall completely wet the contiguous areas of the screw-cap inner seal junction, and shall form a smooth, well-defined, concave, meniscus-like fillet throughout the circumferential area of the inner seal nozzle interface. The nozzle shall be crimped and resistance seam welded in place to form a leak-proof seal. All welding shall meet the requirements of MIL-W-12332. The empty, unpainted pail shall meet the leakage requirement of 3.4 and the welding characteristics of 3.5. No interior coating shall be applied to surfaces which come in contact with DS2 or welded or soldered areas. Immediately prior to filling with DS2, air shall be purged from the pail by dry nitrogen as specified for the 1-1/3-quart quantity in 3.3.1.1 except that the nitrogen shall be injected at a rate of 0.08 to 0.10 cubic feet per second for no less than 9 seconds. The pail shall then be filled with the specified quantity of DS2 and immediately closed. The screw-cap shall be furnished with a liner of paper-board faced with phenol-formaldehyde baked-on resin film. The screw-cap shall be tightened to a torque within a range as specified by the pail manufacturer.

3.3.2.2 Pail finish preparation. After the filling and sealing of the pail, the fill hole area shall be cleaned thoroughly of all excess solder and flux as well as any DS2 that may have adhered to the container as part of the fill operation specified in 3.3.2.1. The filled, closed and unpainted pail shall meet the leakage requirement (3.6) and the vibration requirement (3.7). The entire outer surface of the pail shall then be cleaned in accordance with method 4.2 of MIL-STD-171. If soak cleaning is chosen by the manufacturer, the temperature of the bath shall not exceed 160°F and a source of agitation to the bath shall be added. The surface shall then be rinsed prior to the priming and finishing operation. Poor rinsing can cause poor results in subsequent coating operations. The pails shall then be given a pretreatment coating (finish 5.1.1 of MIL-STD-171) conforming to TT-C-490, type 1. The pail shall meet the requirements specified in 3.8 and 3.9. The container shall be examined just prior to priming and painting to assure that the previously cleaned and pretreated surface is dry and does not contain any oil, grease, scale, rust, or foreign matter of any kind. The entire outer surface of the container shall then be painted in accordance with finish 20.24 of MIL-STD-171, Color Green

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3.83. The primer coating and top coat shall have a thickness as specified in 3.10.2. Poor adhesion of paint shall be construed as evidence of improper cleaning. Paint touch-up is not permitted.

3.4 Leakage of unpainted, empty container. The unpainted, empty container (can or pail) shall not leak when tested as specified in 4.4.4.1.

3.5 Welding characteristics of empty 5-gallon pail. The base metal outside the weld area shall fail and there shall be no evidence of plastic sealant or gasket in the weld when the empty 5-gallon pail is tested as specified in 4.4.4.2. The minimum button diameter, as measured in two perpendicular directions at the faying surface, shall be as specified in table I.

TABLE I. Weld button requirements

Thickness of thinner part	Minimum button diameter
0.010	0.10
0.020	0.13
0.031	0.16
0.040	0.19
0.050	0.22
0.062	0.25
0.078	0.29
0.094	0.31
0.109	0.32
0.125	0.33

*For intermediate thicknesses, direct interpolation may be used.

3.6 Leakage of unpainted, filled container. The unpainted, filled container (can or pail) shall not leak when tested as specified in 4.4.4.3.

3.7 Vibration. After being subjected to vibration as specified in 4.4.4.4, the 5-gallon pail or box of twelve 1-1/3-quart cans shall show no evidence of leakage when tested as specified in 4.4.4.3.

3.8 Salt spray corrosion resistance. The filled, cleaned, pretreated, primed (without top coat) and unmarked container (can or pail) shall have a mean creepage from scribe of no more than 1.0 mm and shall show no evidence of rust or blisters on other concerned areas when tested as specified in 4.4.4.5.

3.9 Adhesion. The coating shall exhibit no removal from the container (can or pail) and the film shall show no blistering or other defects when tested as specified in 4.4.4.6.

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3.10 Paint thickness.

3.10.1 One-and-one-third-quart can. The paint thickness shall be as specified on Drawing 5-51-386 when tested as specified in 4.4.4.7.

3.10.2 Five-gallon pail. The primer coating shall have a thickness in the range of 0.8 - 1.4 mils and the top coat shall have a thickness in the range of 1.8 - 2.4 mils when tested as specified in 4.4.4.7.

3.11 Packing, level A.

3.11.1 One-and-one-third-quart quantity. Twelve 1-1/3-quart cans of D82 unit packed as specified in 3.3.1.1 shall be packed with closures in an uppermost position in a wirebound wood box conforming to class 3, with veneer faceboards, style optional, for a type 3 load not exceeding 85 pounds of PPP-B-585. The wood parts of the box shall be preserved as specified for the grade A box in PPP-B-621. The inside dimensions of the box shall be 17-7/8 by 13-3/8 by 6-7/8 inches for length, width, and height, respectively. Cans shall be arranged in a three by four can pattern. Each can shall be placed in a cell formed by fiberboard half-slotted separators. The shorter separators shall be 12-3/4 by 6-1/2 inches and the longer separators shall be 17 by 6-1/2 inches. The box shall be furnished with a liner around the inner facing of the box and pads for the top and bottom inner faces. The liner shall be 62 by 6-3/4 inches and shall be scored to fit against the sides and ends of the box. The pads shall be 17-3/8 by 13 inches. The separators, liner, and pads shall be formed from impregnated fiberboard conforming to, as a minimum, class I, type SWCFT, grade 125 of PPP-B-1163. The flutes in the fiberboard for the liner and separators shall be parallel to the height of the box. Motion of contents shall be prevented by inserting additional pads. The box shall be closed in accordance with the requirements for closure in PPP-B-585. There shall be no evidence of leakage of the 1-1/3-quart cans after vibration when the filled and closed shipping box is tested as specified in 4.4.4.4.

3.11.2 Five-gallon quantity. The 5-gallon quantity unit packed as specified in 3.3.2.1 shall require no further protection for shipment other than unitization.

3.12 Unitisation. The 1-1/3-quart quantity packs shall be palletized as shown on Drawing 5-51-379. The 5-gallon quantity pails shall be palletized as shown on Drawings 19-48-4116-20PA1002 and 19-48-4116/162A-20PA1002.

3.13 Marking. The 1-1/3-quart can of D82 shall be marked as shown on Drawing 5-51-386. The pack of 1-1/3-quart cans shall be marked as shown on Drawing 5-51-380. The pallet load of packs of 1-1/3-quart cans shall be marked as shown on Drawing 5-51-379. The 5-gallon pail of D82 shall be marked as shown on Drawing 5-51-385. The pallet load of 5-gallon pails shall be marked as shown on Drawing 5-51-383.