FINAL REPORT
JANUARY 2002

REPORT NO. 02-05

WIREBOUND BOX WITH 1-1/3 QUART DS2 CANS,
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TEST

Distribution Unlimited

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

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VALIDATION ENGINEERING DIVISION
MCALESTER, OKLAHOMA 74501-9053

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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 Wirebound Box with 1-1/3 Quart DS2 Cans. Six boxes were used in the tests. No significant flaws were found. As a result of the performance of the boxes and cans during testing, the wirebound box with 1-1/3 quart DS2 cans is recommended for USA-wide use.

Prepared by: JEFFREY L. DUGAN
Validation Engineer

Reviewed by: JERRY W. BEAVER
Chief, Validation Engineering Division
U.S. ARMY DEFENSE AMMUNITION CENTER

VALIDATION ENGINEERING DIVISION
MCALESTER, OK 74501-9053

REPORT NO. 02-05

WIREBOUND BOX WITH 1-1/3 QUART DS2 CANS,
UNITED NATIONS (UN) PERFORMANCE ORIENTED
PACKAGING (POP) TEST

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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 wirebound box with 1-1/3 qt DS2 cans. The box was manufactured by the General Box Company from Meridian, KS. The can containers were manufactured by Poly Research Corp. from Holtsville, NY.

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 wirebound box with 1-1/3 quart DS2 cans manufactured by the General Box Company meets all UN POP requirements with no problems encountered during testing.
### PART 2 – ATTENDEES

**DATE PERFORMED:** 24-25 November 2001

<table>
<thead>
<tr>
<th>ATTENDEE</th>
<th>MAILING ADDRESS</th>
</tr>
</thead>
<tbody>
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<tr>
<td></td>
<td>Rock Island, IL 61299-7390</td>
</tr>
</tbody>
</table>
PART 3 - TEST PROCEDURES

The test procedures outlined herein were extracted and summarized from 49 CFR, Subpart M, Section 178.600. All tests were 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.

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

C. **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.

D. **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 for certification of the wirebound box with 1-1/3 quart DS2 cans (NSN 6850-00-753-4827) were conducted on the container. Applicable tests that were conducted were as follows:

A. DROP TEST. Drop tests were conducted on 25 October 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. **STACKING TEST.** The stacking test was conducted on 24-25 October 2001 for a duration of 24 hours. The compression weight was 1,070 pounds. 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 2 for the setup during the stacking test.

![Photo 2](image)

**Photo 2.** Stacking Test Setup for UN POP Testing

C. **VIBRATION TEST.** The vibration test was conducted on 25 October 2001 on three test samples placed once lateral and once longitudinal. The test ran for 1 hour for each specimen/orientation and each specimen ran at 237 cycles-per-minute lateral and 245 longitudinal. Following completion of the test, inspections revealed no damage to the containers. Photo 3 shows the setup for the vibration tests.
Photo 3. Vibration Test Setup for UN POP Testing
UN POP TESTS (STANDARD FORM)

WIREBOUND BOX WITH 1-1/3 QUART DS2 CANS, MANUFACTURED BY POLY RESEARCH CORP.
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: 02-05
Product NSN: 6850-01-136-8888
Shipping Name: Caustic Alkali Liquids, n.o.s.
(Diethylenetriamine, Ethylene Glycol
Monomethyl Ether, Sodium Hydroxide)

Hazard Class: 8
Physical State: Liquid
CAA Number: N/A
CFR 49 Packaging Method: 202
Net Explosive Weight: N/A

Service Code: DEV
Nomenclature: Decontaminating Agent, DS2
UN ID Number: 1719
Packaging Group: II
NALC/DODAC: N/A
EX Number: N/A
DESCRIPTION OF PACKAGINGS TO BE TESTED
EXTERIOR CONTAINER

Exterior Container: Wirebound Box

CFR 49 Reference Number: 173.7A

UN Code: 4C1

NSN Exterior Container: N/A

Specifications: 4C1, Fed. Spec. PPP-B-555

Net Quantity Weight: 45.5 lbs. (24.5 kg)

Tested Gross Weight: 46.5 lbs. (25.4 kg)

Dimensions Interior: 20"-long x 14"-wide x 7.5"-high

Manufacturer: General Box Co.

Year Container Manufactured: 1989

Drawing Number(s): N/A

Cushioning: Fiberboard

Closure: Wire

INTERMEDIATE CONTAINER

Intermediate Container Description: Metal Can

Specification Number: N/A

Container NSN: 6850-00-753-4827

Intermediate Container Cushioning: N/A

Intermediate Container Closure Method: N/A

Intermediate Container Dimensions: 4-1/2" diameter x 6-5/8" high

Number Of Intermediate Containers: 12
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: N/A
Leakproofness Test Pressure Applied: N/A
**TEST PROCEDURES**

<table>
<thead>
<tr>
<th>Test Conducted</th>
<th>Test Method</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Pre-Conditioning (fiberboard)</td>
<td>Part 178.602</td>
<td>N/A</td>
</tr>
<tr>
<td>(2) Drop Test</td>
<td>Part 178.603(e)(1)(ii)</td>
<td>Pass</td>
</tr>
<tr>
<td>(3) Leakproofness Test</td>
<td>Part 178.604</td>
<td>N/A</td>
</tr>
<tr>
<td>(4) Hydrostatic Pressure Test</td>
<td>Part 178.605</td>
<td>N/A</td>
</tr>
<tr>
<td>(5) Stacking Test (1070 lbs.)</td>
<td>Part 178.606(c)(1)</td>
<td>Pass</td>
</tr>
<tr>
<td>(6) Vibration Test</td>
<td>Part 178.608(b)(3)</td>
<td>Pass</td>
</tr>
</tbody>
</table>

**UN POP Marking**

u 4C1/Y25.4/89  

n USA/DOD/DEP

**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. FRERICHES  
Associate Director for Engineering  

DATE: 13 Dec 2001
PART 5 – SPECIAL PACKAGING INSTRUCTIONS
MIL-F-51529(EA)
AMENDMENT 4
28 September 1990
SUPERSEDED
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-F-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 L” and substitute “The cans shall then be

AMSC N/A

FSC PACK

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5-2
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 PFP-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 PFP-B-636 and
the corners blunted. The fiberboard box shall be placed in a bag conforming to class B,
type 1, 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
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 conformance (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 bail wall, and body seams. Other significant areas include the spout area without the cap and handle weld area.”
After the last sentence, add the following sentence:

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

6.2: Add the following new subparagraph:

"(c) Level of packing required."

Custodian: Army - EA
Preparation activity:
Army - EA
Project No. PACK-A368
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 (DODI 88) and supplement thereeto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

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

AMSE N/A

THIS DOCUMENT CONTAINS 14 PAGES.

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MILITARY

MIL-P-116 - Preservation-Packaging, Methods Of
MIL-S-8872 - Soldering Process, General Specification For
MIL-W-12332 - Welding, Resistance, Spot, Seam, and Projection; For
Fabricating Assemblies of Low-Carbon Steel
MIL-G-22750 - Coating, Epoxy-Polyamide
MIL-D-5000 - Decontaminating Agent, DS2
MIL-T-81333 - Trichloroethane, l,l,l,(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 follow-
ing 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
(Include 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 MATERIAL COMMAND

19-48-4116/162A-20PA1002 - Unitization Procedures For Boxed Ammunition
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.

2
PUBLICATIONS

U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND

CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

PURCHASE DESCRIPTIONS

RA-M-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.)

(Monogovernment 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 NS 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 TDL 5-51-387-10 and TDL 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 TDEK 5-51-387-10 and TDEL 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 CI 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 Sn60W4Sn or Sn60W4Pb 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, menstruous-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-R-534, 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 I. 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 363. The paint finishing shall meet the requirements specified in 3.9 and 3.10.1. Touch-up of paint is not permitted.
3.3.2 Five-gallon pail quantity.

3.3.2.1 Pail fill and evaluation. Five-gallons of D82 conforming to MIL-D-50030 shall be packed in accordance with type II, class 2 of PFP-C-2020. Unit containers shall conform to type I, class 4 of PFP-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 sealant 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-5872 using solder conforming to type Sn60Cu40P1 of QQ-S-571. The solder shall completely wet the continuous 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 D82 or welded or soldered areas. Immediately prior to filling with D82, 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 0.06 to 0.10 cubic feet per second for no less than 9 seconds. The pail shall then be filled with the specified quantity of D82 and immediately closed. The screw-cap shall be furnished with a liner of paperboard 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 D82 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 3.6 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.
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**

<table>
<thead>
<tr>
<th>Thickness of thinner part</th>
<th>Minimum button diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.010</td>
<td>0.10</td>
</tr>
<tr>
<td>0.020</td>
<td>0.13</td>
</tr>
<tr>
<td>0.031</td>
<td>0.16</td>
</tr>
<tr>
<td>0.040</td>
<td>0.19</td>
</tr>
<tr>
<td>0.050</td>
<td>0.22</td>
</tr>
<tr>
<td>0.062</td>
<td>0.25</td>
</tr>
<tr>
<td>0.078</td>
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<tr>
<td>0.094</td>
<td>0.31</td>
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<tr>
<td>0.109</td>
<td>0.32</td>
</tr>
<tr>
<td>0.125</td>
<td>0.33</td>
</tr>
</tbody>
</table>

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 creaseage 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.
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 0.5 - 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 DB2 unit packed as specified in 3.3.1.3 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 FFP-B-585. The wood parts of the box shall be preserved as specified for the grade A box in FFP-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 SWCP, grade 125 of FFP-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 FFP-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 Unitization. The 1-1/3-quart quantity packs shall be palletized as shown on Drawing 5-51-379. The 5-gallon quantity pallets shall be palletized as shown on Drawings 19-48-8116-20PA1002 and 19-48-8116/162A-20PA1002.

3.13 Marking. The 1-1/3-quart can of DB2 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 5-51-386. 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 DB2 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.