MILITARY SPECIFICATION

BOTTLES, PLASTIC, MOLDED POLYETHYLENE

This specification is approved for use by all departments and agencies of the Department of Defense (DOD).

1. SCOPE

1.1 Scope. This specification covers blow molded high density polyethylene (HDPE) bottles for the packaging of lubricating oils.

1.2 Classification. HDPE bottles covered in this specification shall be of the following types, styles, and sizes as specified (see 6.2):

TYPES

Type I - Modified square.
Type II - Cylindrical.

Style a - Screwcap closure with integral liner.
Style b - Screwcap closure with separate liner.
Style c - Screwcap closure with nonback off feature.

Size 1 - 1-quart nominal capacity.

Size 2 - 1-liter nominal capacity.

Size 3 - 5-quart nominal capacity.

Size 4 - 5-liter nominal capacity.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Director, AMC Packaging, Storage, and Containerization Center, ATTN: SDSTO-TE-S, Tobyhanna, PA 18466-5097; 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 FSC 8125

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

A-A-883	- Tape, Pressure-Sensitive, Masking
L-P-378	- Plastic Sheet and Strip, Thin Gauge, Polyolefin
L-P-390	- Plastic Compounds, Molding and Extrusion, Polyethylene
PPP-B-636	- Box, Shipping, Fiberboard
PPP-F-320	- Fiberboard, Corrugated and Solid, Sheet Stocks (Container Grade), and Cut Shapes
PPP-T-76	- Tape, Pressure-Sensitive Adhesive, Packing/Paper
PPP-C-1797	- Cushion Material, Resilient, Low Density, Unicellular, Polypropylene

MILITARY

MIL-P-116	- Preservation, Methods of

STANDARDS

FEDERAL

FED-STD-101	- Test Procedures for Packaging Materials

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-290	- Packaging of Petroleum and Related Products

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

2.1.2 Other publications. The following documents form a part of this specification herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

US DEPARTMENT OF TRANSPORTATION

Code of Federal Regulations, Title 49, Part 1 to Part 199.

(Application for copies should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1238 - Measuring Flow Rates of Thermoplastics by Extrusion Plastometer

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.)

2.1.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Material. The bottles shall be made of blow molded grade HDPE, conforming to L-P-390 and as specified herein. The density of the material shall enable the filled bottles to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guarantee of the acceptance of the finished product. The selected grade of material will be tested in acordance with ASTM D 1238.

3.2 Color. The color of the bottles shall be determined by the pigmentation selected by the manufacturer when a color has not been specified by contract. Colors shall not be specified by contract unless the manufacturer's colors are shown to be non-contrasting with unit container marking requirements of MIL-STD-290 (see 4.3.1.1).

3.3 Construction. The bottle shall be blow molded in one piece. Dimensions of types I and II bottles shall be determined by the liquid quantity of the unit measure, and as specified in figures 1 and 2.

3.4 Shape. Bottles may be round or modified square about their vertical axis and shall be one piece seamless construction. Unless otherwise specified, handles formed as an integral part of the bottle shall be provided for sizes 3 and 4.

3.5 Pour spout. Unless otherwise specified, the thickness of the wall of the pour spout shall be sufficient to support the weight of the filled bottle while in the pour position. Dimensions of the pour spout shall be as specified in figures 1 and 2 (see 4.3.1.2). The spout location shall be configured anywhere within the parameter of the top.

3.6 Closure. Unless otherwise specified, caps for bottles furnished under this specification shall be made of polyethylene of the same type as the bottles. Caps made from material other than polyethylene shall have separate liners. When separate liners are required for either polyethylene or nonpolyethylene caps, they shall be made of a 50-50 mixture of polyethylene and polyisobutylene and shall have a thickness of 0.050 inch $\pm$ 0.005 inch (1.3 mm $\pm$ .013 mm).

3.7 Threads. Threads on the neck of the bottle and the cap shall be of the buttress type allowing at least one revolution before seating of the cap against the bottle. When the cap is completely screwed onto the bottle, the rim of the bottle shall seat firmly against the inner bearing surface of the cap or against the liner to ensure sealing (see 4.3.1.1).

3.8 Ullage. The ullage or outage of filled bottles shall be not less than 5 percent and a maximum of 10 percent when tested as specified in 4.4.1.

3.9 Durability. Filled bottle closures shall be tested in accordance with rough handling tests as specified in 4.4.2. The bottles shall show no cracks, breaks, or signs of leakage.

3.10 Uniformity. The bottles shall be uniform in color, texture, finish, and physical properties (see 4.3.1.1).

3.11 Compatibility. When specified in the contract or order, the supplier shall furnish evidence based on shelf-life studies of the degree of compatibility between the bottle and the contents. The supplier shall offer the container only for those contents known to be compatible with it. Evidence of compatibility shall be lack of chemical or physical degradation of the bottle or its contents under conditions of protected storage at an average temperature of 70° F. (21° C.) for a period of at least 1 year.

3.12 Workmanship. The bottles shall be smooth and the surface shall be free from ridges and pinch off flash, flow marks, or depressions on mold partition line crevices. They shall also be free from bubbles, cracks, pinholes, dirt, foreign matter, warpage, chipped edges, blisters, scratches, and other defects affecting their serviceability or appearance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use any 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 when such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

Quality conformance inspection (see 4.3).

4.3 Inspection of the end item.

4.3.1 Examination of the end item. Examination of the end item shall be made in accordance with the classification of defects, inspection levels, and acceptable quality levels (AQLs) following. The lot size, for the purpose of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of bottles, complete with cap, of the specified capacity for examination under 4.3.1.1 and 4.3.1.2.

4.3.1.1 Examination of the end item for defects in appearance, construction, and workmanship. The sample unit for this examination shall be one complete bottle with cap.

Table I. Classification of Defects

Examination	Defects (Major)
Appearance and construction	Not formed in one piece and not symmetrical in shape. Bottom of bottle does not rest upon a smooth flat surface. Surface of bottle not smooth; evidence of flow marks or ridges. Not clean, dry, or ready for use. Presence of bubbles, blisters, cracks, chipped edges, dirt, foreign matter, deep scratches, or abrasions. Neck opening not as specified. Pour lip and cap threads not buttress type. Threads not clean; threads distorted or contain sharp edges. Cap not material specified. Cap does not provide tight fitting closure. Cap liners not molded or securely attached within the cap; not tight fitting.
Markings	Identification markings omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements (see 6.2).

4.3 1.2 Examination of the end item for defects in dimensions. The sample unit for this examination shall be one bottle without cap.

Examination	Defects (Major)
Inside diameter	Pour lip not within tolerance as specified in figure 1 or figure 2 as applicable.
Length of pour spout	Not within tolerance specified in figure 1 or figure 2, as applicable.

4.3.1.3 Inspection levels and acceptable quality levels (AQLs) for examination. The inspection levels for determining the sample size and the AQLs expressed in defects per 100 units shall be as specified in table II.

Table II. For Examination

Examination	Inspection Level	AQLs
4.3.1.1	I	2.5
4.3.1.2	S-2	1.5

4.3.2 Testing of the end item. The end item shall be tested for the applicable characteristics as indicated in table III for each lot of material presented for examination. The sample unit for performance of all tests shall consist of three bottles of the specified capacity. Three sample units randomly selected shall be tested with no evidence of failure to meet the specified requirements.

4.4 Test methods.

4.4.1 Outage/Ullage. Bottles shall be tested in the following manner to determine compliance with 3.8.

4.4.1.1 Procedure. The bottle and cap shall be weighed empty. The bottle shall be filled with water equal in volume to the nominal capacity of the bottle and the bottle reweighed. The bottle shall then be completely filled to the top with water and the cap screwed on tight, assuring that no air bubbles are entrapped in the bottle. The bottle shall be wiped dry and reweighed again. The outage/ullage shall be calculated as follows:

$$\text{Percentage Outage} = \frac{W_3 - W_2}{W_3 - W_1} \times 100$$

Note. Weights are to the nearest gram.

W_1 = Weight of empty bottle.

W_2 = Weight of bottle filled to rated capacity with water.

W_3 = Weight of bottle completely filled with water (no air content).

4.4.2 Drop test. The bottles shall be filled to rated capacity with a solution of 30 weight percent calcium chloride in water and conditioned for 24 hours at -40° C. ± 1° C. (-40° F. ± 2° F.). After conditioning, each bottle shall be immediately dropped twice from a height of 4 feet (1.2 M), in a free fall,

Table III. Instruction for Testing

Characteristic	Requirement	Test Method	Requirement to		Description or Numerical Point of Failure as Applicable[1]	Results Reported to Nearest Percent or Grams[2]
			Sample Unit	Lot Average		
Outage/Ullage	3.8	4.4.1	X	1		Percent
Drop Test (bottles)	3.9	4.4.2	X	1	X	--------
Rate of extrusion	3.1	4.4.3	X	1	X	--------

[1]If failure is indicated, report either description or numerical point of failure, as applicable.

[2]Test reports shall include all values on which results are based.

onto a flat solid concrete surface, one to fall flat upon the side opposite the handle, if any, and one to fall bottom first. The bottles shall then be examined for defects to determine compliance with 3.9.

4.4.3 Rate of extrusion. Bottles shall be tested for rate of extrusion (grams/10 min.) in accordance with ASTM D 1238, procedure A, condition E specified therin.

4.4.4 Packaging inspection. The inspection of the packaging and interior package marking shall be in accordance with the group A and B quality conformance inspection requirements of MIL-P-116. The inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification and the marking requirements of MIL-STD-290.

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 Cleaning and drying. Items shall be cleaned and dried using any suitable process specified in MIL-P-116.

5.1.1.2 Preservatives. Preservatives shall not be used.

5.1.1.3 Unit packing. Unless otherwise specified by the contract or order, 12 1-quart or 1-liter capacity filled bottles shall be packaged, as specified in figure 3. Unless otherwise specified by contract or order, six 5-quart or 5-liter filled bottles shall be packaged, as specified in figure 4.

5.1.2 Commercial. The commercial preservation shall be as specified in ASTM D 3951.

5.2 Packing. Packing for filled bottles shall be level B or commercial, as specified.

5.2.1 Level B. Twelve 1-quart or 1-liter filled bottles shall be packaged, as specified in figure 3. Six 5-quart or 5-liter filled bottles shall be packaged, as specified in figure 4. Each shipping container shall be closed in accordance with method II, as specified in the ppendix of the container specification.

5.2.2 Commercial. Item shall be packed in accordance with ASTM D 3951.

5.3 Marking.

5.3.1 Level B. In addition to any special marking required by the contract or order, unit containers and shipping containers shall be marked in accordance with MIL-STD-290.

5.3.2 Commercial. Marking shall be in accordance with ASTM D 3951.

6. NOTES

6.1 Intended use. HDPE bottles covered by this specification are intended for use as unit containers for lubricating oils within the limitations prescribed by Department of Transportation (DOT) and Civil Aeronautics Board (CAB) regulations and military directives relating to shipment. Containers, which are not marked to indicate conformity to applicable DOT container specifications, shall be used only for items not regulated by DOT tariffs and for regulated items for which nonspecification polyethylene containers are permitted.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Type, class, and size of unit containers (see 1.2).

c. Levels of preservation and packing (see 5.1 and 5.2).

d. Marking requirements (see 5.3).

e. Evidence of degree of compatibility of bottle with contents (see 3.11).

Custodians
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Preparing Activity - SM

Project No. 8125-04-376

Review Activities
DLA - GS

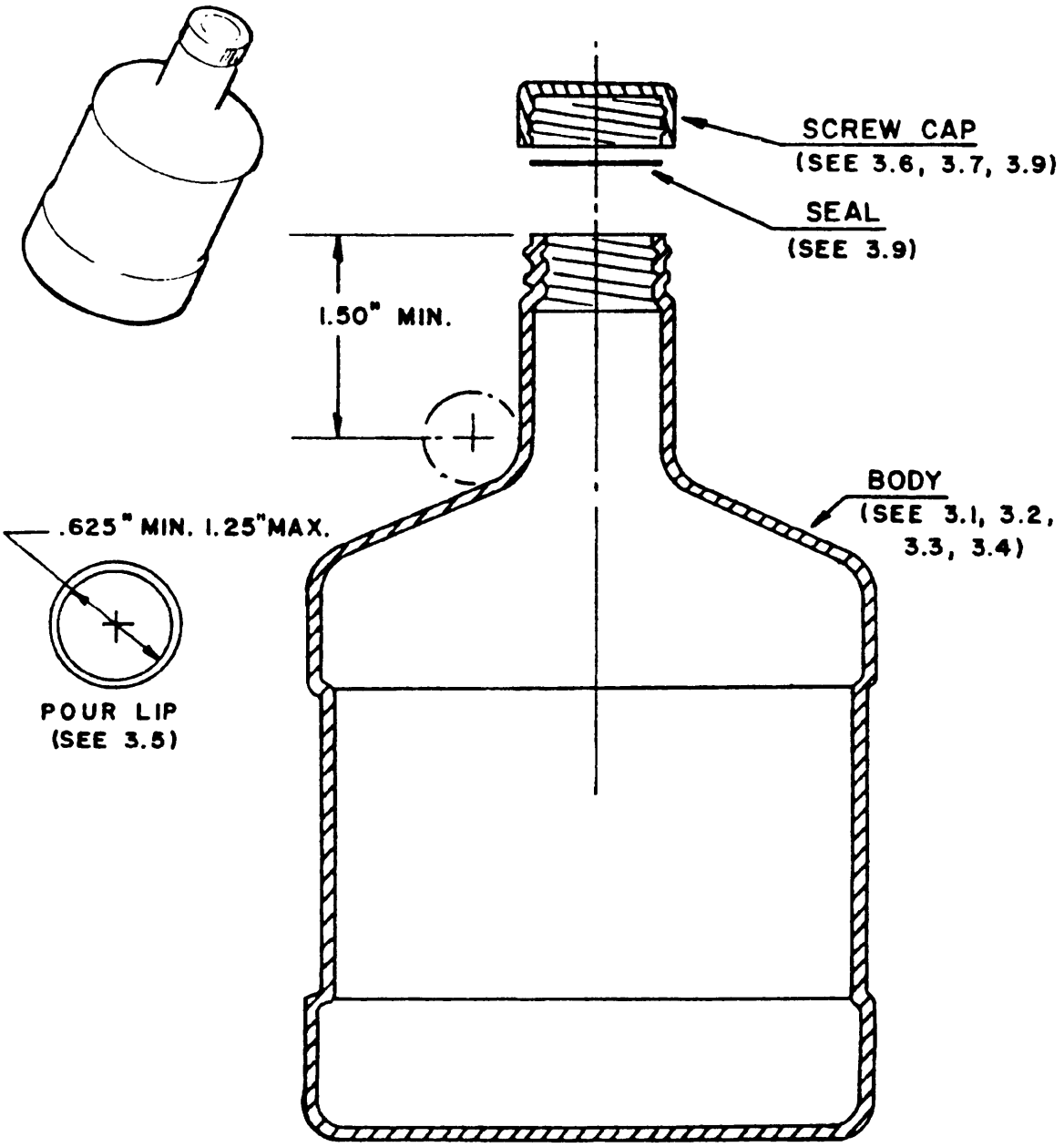

FIGURE 1. One quart/liter bottle

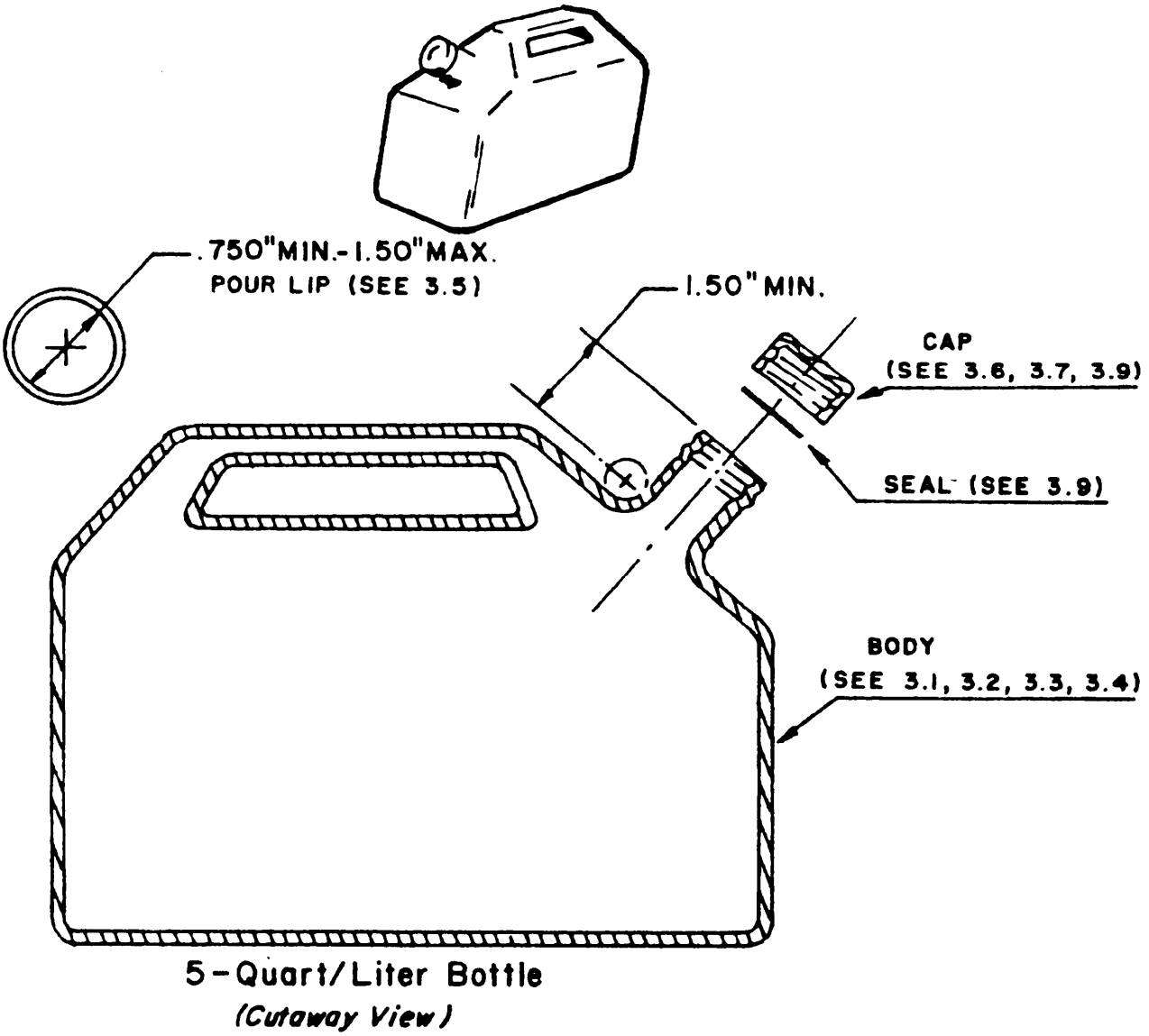

FIGURE 2. Five quart/liter bottle

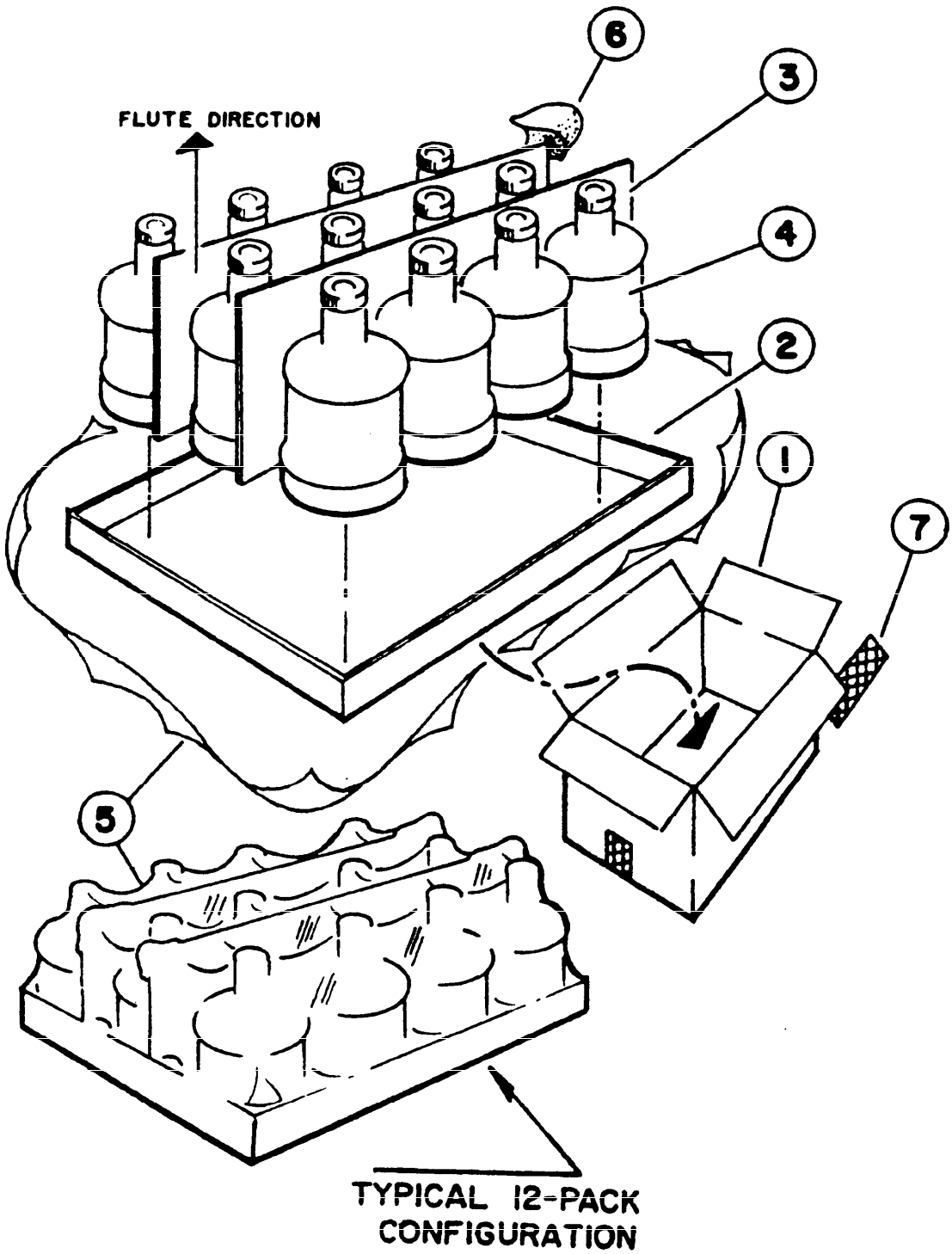

FIGURE 3. Packaging configuration

Bill Of Materails

FIND	QTY	NOMENCLATURE	SPECIFICATION	DESCRIPTION
1	1	Box	PPP-B-636	Type CF; Class WR; V3C
2	1	Tray	PPP-F-320	Type CF; Class Domestic; Container Grade
3	2	Divider	PPP-F-320	Type CF; Class Domestic; Container Grade
4	12	Bottle	MIL-B-61000	One-Quart/Liter, High Density Polyethylene
5	1	Wrap	L-P-378	Type IV; Class 4
6	AR	Cushioning	PPP-C-1797	Foam, ¼ Inch Thickness
7	AR	Tape	PPP-T-76	Adhesive, Pressure Sensitive, Packing/Paper

NOTES

1. Bottle configuration shown is representative. Individual industrial configurated designs may vary.

2. The -3 divider is shown inserted between the bottles lengthwise of the -2 tray for additional stacking strength and weight distribution. Placement of the divider may vary according to bottle design, lengthwise or widthwise. This is permitted as long as not less than two dividers are used.

3. The -6 cushioning shall be placed on all sharp corners of the fiberboard, as required, to prevent puncturing of the -5 wrap.

4. Though unit containers may be configured to minimize cube, filled bottles shall not be inverted.

5. The contract or order shall specify the intermediate container as either the -1 box, or the -5 wrap.

FIGURE 3. Packaging configuration - continued

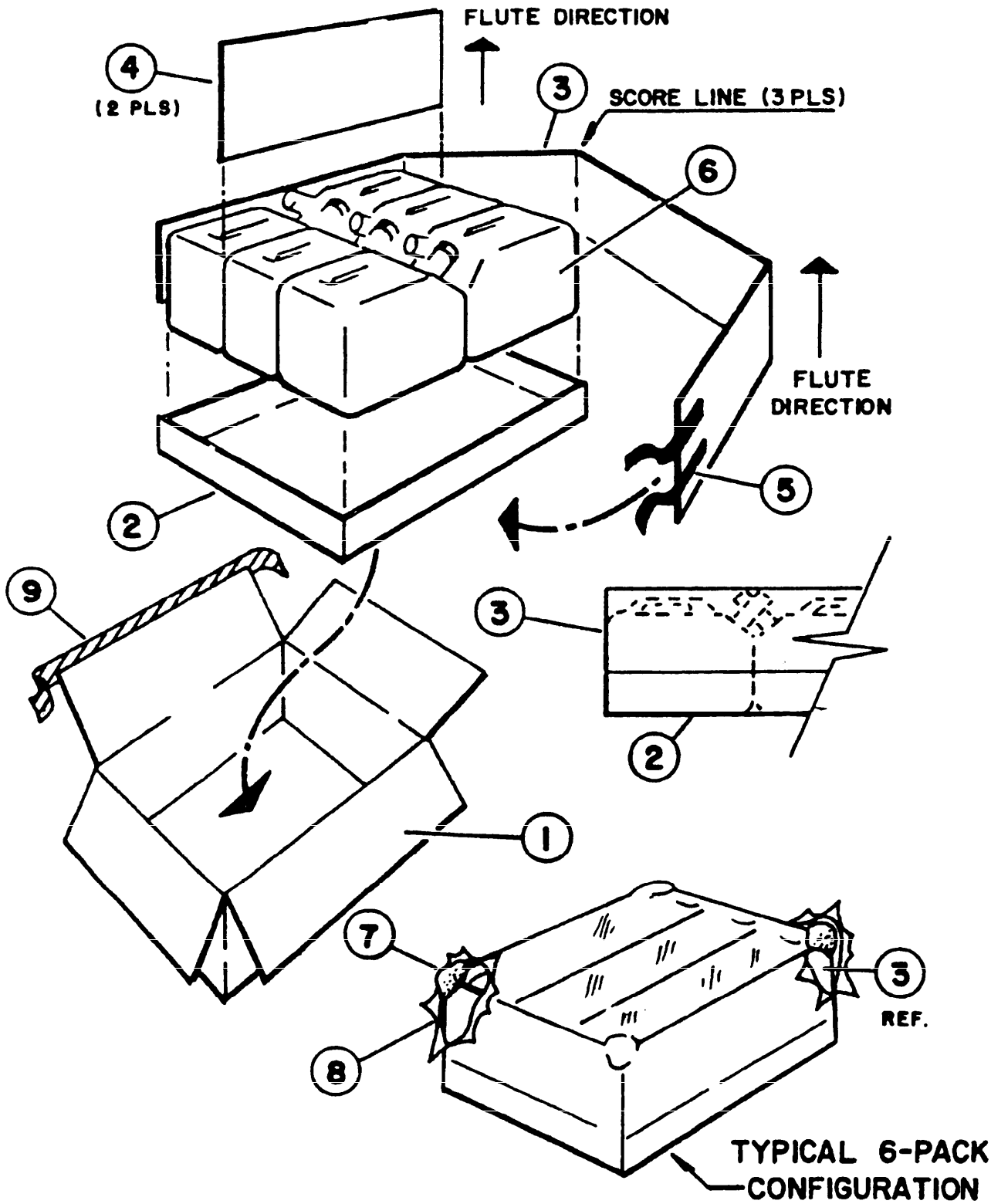

FIGURE 4. Packaging configuration

Bill Of Materials

FIND	QTY	NOMENCLATURE	SPECIFICATION	DESCRIPTION
1	1	Box	PPP-B-636	Type CF; Class WR; V3C
2	1	Tray	PPP-F-320	Type CF; Class Domestic; Container Grade
3	1	Liner	PPP-F-320	Type CF; Class Domestic; Container Grade
4	2	Divider	PPP-F-320	Type CF; Class Domestic; Container Grade
5	AR	Tape	A-A-883	Adhesive, Pressure Sensitive, Masking
6	6	Bottle	MIL-B-61000	Five Quart/Liter, High Density Polyethylene
7	AR	Cushioning	PPP-C-1797	Foam; ¼ Inch Thickness
8	1	Wrap	L-P-378	Type IV; Class 4
9	AR	Tape	PPP-T-76	Pressure Sensitive, Adhesive, Packing/Paper

NOTES

1. Bottle configuration shown is representative. Individual industrial configurated designs may vary.

2. The -3 divider is shown inserted between the bottles lengthwise of the -2 tray for additional stacking strength and weight distribution. Placement of the divider may vary according to bottle design, lengthwise or widthwise. This is permitted as long as not less than two dividers are used.

3. The -7 cushioning shall be placed on all sharp corners of the fiberboard, as required, to prevent puncturing of the -8 wrap.

4. Though unit containers may be configured to minimize cube, filled bottles shall not be inverted.

5. The contract or order shall specify the intermediate container as either the -1 box, or the -8 wrap.

FIGURE 4. Packaging configuration - continued

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

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	2. DOCUMENT TITLE
MIL-B-61000	BOTTLES, PLASTIC, MOLDED POLYETHYLENE

3a. NAME OF SUBMITTING ORGANIZATION

b. ADDRESS *(Street, City, State, ZIP Code)*

4. TYPE OF ORGANIZATION *(Mark one)*

- ☐ VENDOR
- ☐ USER
- ☐ MANUFACTURER
- ☐ OTHER *(Specify)*: _____

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	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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