

MIL-P-43950

30 June 1976

(see 6.5)

MILITARY SPECIFICATION

PIE FILLING, PREPARED, LEMON, CANNED

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers the requirements for ready-to-use lemon pie filling, for use by the Armed Forces as an item of general issue.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

- TT-C-495 - Coatings, Exterior, for Tinned Food Cans
- PPP-B-636 - Boxes, Shipping, Fiberboard
- PPP-C-29 - Canned Subsistence Items, Packaging and Packing Of
- PPP-C-96 - Cans, Metal, 28 Gage and Lighter

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- MIL-L-1497 - Labeling of Metal Cans for Subsistence Items
- MIL-L-35078 - Loads; Unit: Preparation of Nonperishable Subsistence

STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-668 - Sanitary Standards for Food Plants

FSC 8940

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

LAWS AND REGULATIONS

U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Federal Food, Drug, and Cosmetic Act and Regulations Promulgated Thereunder

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

U.S. DEPARTMENT OF AGRICULTURE

Regulations Governing the Grading and Inspection of Egg Products

(Application for copies should be addressed to the Information Division, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, DC 20250.)

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

ASSOCIATION OF OFFICIAL ANALYTICAL CHEMISTS

Official Methods of Analysis of the Association of Official Analytical Chemists

(Application for copies should be addressed to the Association of Official Analytical Chemists, P.O. Box 540, Benjamin Franklin Station, Washington, DC 20044.)

NATIONAL RESEARCH COUNCIL

Food Chemicals Codex (F.C.C.)

(Application for copies should be addressed to the Office of Director, National Academy of Sciences, National Research Council, 2101 Constitution Avenue, N.W., Washington, DC 20418.)

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AMERICAN OIL CHEMISTS SOCIETY

Official and Tentative Methods of the American Oil Chemists Society

(Application for copies should be addressed to the American Oil Chemists Society, 508 South Sixth Street, Champaign, IL 61820.)

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, N.W., Washington, DC 20036.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Bid sample approval. Duplicate, unless otherwise specified (see 6.1), individually canned samples, consisting of not less than 7 pounds, 8 ounces (3.4 kg) of pie filling in a No. 10 can, which the bidder proposes to furnish and which comply with the specification requirements, shall be submitted to the contracting officer prior to the bid opening and will be inspected to the extent necessary to properly evaluate the bid. One sample of each duplicate shall be evaluated by a technical group to determine compliance with 3.5.1 for the subjective characteristics (flavor, odor, color and texture). In addition, the technical group shall rate the sample as to overall quality, taking into consideration all the subjective characteristics. The remaining sample shall be used as a standard for the subjective characteristics in determining acceptance of intended delivery products. The approval of any bid sample for the aforementioned characteristics shall not constitute approval of the product as meeting the other requirements of this specification.

3.2 Materials. All materials shall be clean, sound, wholesome and free from objectionable odor and foreign matter.

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3.2.1 Starch. Starch shall be modified, stabilized, waxy maize food starch which is highly stable to overcooking and low pH condition.

3.2.2 Lemon puree. Lemon puree shall be prepared from lemon juice and lemon fruit cells and shall be free of fibrous fruit material, pieces of peel and seeds.

3.2.3 Sugar. Sugar (sucrose) shall be white, refined, granulated cane or beet sugar, or a combination thereof.

3.2.4 Salt. Salt shall be white, refined sodium chloride, with or without anticaking agents. Iodized salt shall not be used.

3.2.5 Coloring material. Coloring material shall be certified FD&C Yellow #5.

3.2.6 Acids. Acids used shall comply with the Food Chemicals Codex.

3.2.7 Egg yolk. Egg yolk shall be frozen egg yolk or dehydrated egg yolk powder. Egg yolk shall be prepared under the continuous inspection of the U.S. Department of Agriculture, and shall be identified by appropriate labeling or marking with USDA Inspection Shield. The egg yolk shall have been tested and certified Salmonella negative by U.S. Department of Agriculture.

3.2.8 Shortening, hydrogenated. Hydrogenated vegetable shortening shall be derived from cottonseed or peanut oil or combination thereof with the stability of not less than 60 hours AOM (active oxygen method). It may contain an antioxidant or combination of antioxidants as permitted by FDA.

3.2.9 Corn syrup. Corn syrup shall have the dextrose equivalent of 60 to 62.

3.2.10 Potassium sorbate. Potassium sorbate shall conform to the Food Chemicals Codex.

3.2.11 Lemon oil. Oil of lemon shall be cold-pressed lemon oil or a partially or deterpened oil therefrom, or a combination thereof, which is free of terpene-like odor. The lemon oil shall meet requirements as specified in the Food Chemicals Codex. The oil shall have been kept in darkness at a temperature not exceeding 70°F (21°C) and shall show no evidence of deterioration at time of use.

3.2.12 Lemon juice. Lemon juice shall be prepared from unfermented juice obtained from clean, sound, mature lemons of one or more of the high acid varieties.

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3.3. Formulation. The lemon pie filling shall be prepared according to the following formula:

<u>Component</u>	<u>Parts by weight</u>
A. Water	42.6
Salt	0.2
Shortening	0.5
Sugar <u>1/</u>	1.5
Yellow color #5 <u>2/</u>	as required
B. Sugar <u>1/</u>	7.5
Starch	6.4
Water	10.5
Potassium sorbate	as required
C. Sugar <u>1/</u>	16.5
Lemon puree <u>3/</u>	4.9
Egg yolk	<u>4/</u>
Water	7.0
Acid	<u>5/</u>

- 1/ Corn syrup for high fructose syrup may be substituted for not more than 20 percent of the sugar.
- 2/ FD&C Yellow #5 may be used at the level of 0.0026 percent to give a desirable color to the finished filling.
- 3/ Lemon puree may be replaced by lemon oil and lemon juice at the following levels: 0.05 percent lemon oil and 0.5-1.0 percent lemon juice.
- 4/ Two percent for frozen egg yolks and 1.0 percent for dried egg yolks.
- 5/ Acids may be a combination of citric and sodium citrate at the level of 0.075 and 0.025 percent, respectively. Other acids, such as adipic or malic may be used that will give equivalent flavor characteristic.

3.4 Processing. The lemon pie filling may be prepared according to currently available commercial methods. Alternatively, the lemon pie filling may be prepared according to sequence and temperatures as follows:

- A. Heat to 150°F (66°C) until shortening melts.
- B. Dissolve B and add to A and heat to 180°F (82°C).
- C. Add C to A and B and heat to 190°F (88°C).
- D. Can and seal immediately.

After canning, the canned product shall be cooled as rapidly as practical to a temperature that inhibits further product change.

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3.5 Finished product.

3.5.1 Physical requirements. The finished product shall have a good flavor, odor and color characteristic of lemon pie filling and shall contain no free liquid. The lemon filling shall not be watery nor weep. It shall have no ungelatinized pockets, and shall be uniformly distributed over the bottom crust. It shall contain no cracks or crevices, and shall be easily sliced into portions and transferred to serving dishes without breaking. The finished filling shall not be tough or rubbery.

3.5.2 Analytical requirements. The finished pie filling shall conform to the following analytical requirements when tested in accordance with 4.4.

pH	Not less than 2.9 nor more than 3.0
Soluble solids (Brix)	Not less than 35° Brix nor more than 38° Brix
Acid, as citric	Not less than 0.5 nor more than 0.6 percent

3.6 Federal Food, Drug, and Cosmetic Act. All deliveries shall conform in every respect to the provisions of the Federal Food, Drug, and Cosmetic Act and regulations promulgated thereunder.

3.7 Workmanship. The product shall be prepared, processed, and packaged under modern sanitary conditions and in accordance with good commercial practice. The product shall be processed in establishments meeting the requirements of MIL-STD-668.

4. QUALITY ASSURANCE PROVISIONS

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

4.2 Preacceptance inspection. The product shall be rejected if produced in plants not meeting the requirements of 3.7.

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4.3 Inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter.

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

4.3.1.1 Ingredients. Conformance of ingredients to identity requirements (kind, composition, quality standard, USDA inspection and certification, as applicable) shall be ascertained by examination of pertinent labels, marking, invoices or other valid documents. In addition, each ingredient shall be examined organoleptically as necessary to determine conformance to 3.2.

The sample unit for inspection shall be approximately 1/2 pound (0.22 kg) of ingredient derived from a primary container. In the event a lot consists of less than five containers, a sample unit shall be extracted from each container in the lot. Nonconformance to identity requirements or one or more sample units not conforming to condition requirements shall indicate an unacceptable ingredient, and use of such shall be cause for rejection of the involved finished product.

4.3.1.2 Testing of vegetable shortening and cans. Vegetable shortening and cans shall be tested in accordance with table I. Test requirements for the characteristics listed shall be average requirements. A test failure shall indicate an unacceptable component and use of such shall be cause for rejection of the involved quantity of end item.

TABLE I. Testing of vegetable shortening and cans

Component	Sample unit	Lot size expressed in	Inspection level	Characteristics	Results reported	Test ref and rqmt para
Vegetable shortening	One pound (0.45 kg) composite <u>1/</u>	Pounds (0.45 kg)	S-1	Stability	Pass or fail <u>2/</u>	3.2.8 4.4
Cans <u>3/</u>	One can w/lid	Cans	S-1	Tin plate	Nearest 0.01 lb/ base box	5.1.1 4.4

1/ The composite shall be derived from the number of primary containers indicated by the inspection level.

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2/ If failure, report to nearest hour.

3/ Tests for can coating (when required) and can label shall be performed on the same cans submitted for tin plate test, in accordance with the applicable subsidiary specifications.

4.3.2 Process examination. Examination shall be performed to determine conformance to formulation requirements and required processing requirements. Records of formulation shall be maintained. Nonconformance shall be cause for rejection of the involved finished product.

4.3.3 Examination of the end item. Examinations shall be in accordance with tables III through V and 4.3.3.1 through 4.3.3.3. Sampling plans for the aforementioned tables shall be in accordance with table II. The acceptable quality levels (AQLs) shall be expressed as percent defective for tables III and IV and defects per hundred units for table V.

TABLE II. Sampling plans

Table	Sample unit	Lot size expressed in	Inspection level	AQLs	
				Major	Minor
III	One filled can	Cans	S-3	-	2.5
IV	One filled and closed can	Cans	S-3	1.5	-
V	One filled can	Cans	S-2	1.5	-

TABLE III. Examination of net weights 1/

Category	Defect
<u>Minor</u>	
201	Less than 7 pounds 5-1/2 ounces (3.3 kg)

1/ Report results to nearest 1/2 ounce (gram). Lot shall be rejected if sample data indicates a lot average net weight of less than 7 pounds 8 ounces (3.4 kg).

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TABLE IV. Examination for vacuum (see 4.4)

<u>Category</u>	<u>Defect</u>
<u>Major</u>	
101	Less than 3 inches of vacuum (a pressure of not more than 90.8 kPa)

TABLE V. Examination of product characteristics 1/

<u>Category</u>	<u>Defect</u>
<u>Major</u>	<u>Finished product</u>
101	Color not typical of lemon pie filling
102	Free liquid
103	Off odor
	<u>Prepared product (filling)</u> <u>2/</u>
104	Watery
105	Ungelatinized pockets
106	Cracks or crevices
107	Not uniformly distributed over crust
108	Tough or rubbery
109	Sliced portion falls apart when transferred to a plate
110	Not easily sliced into portions

1/ Presence of foreign material (e.g., metal, glass, wood, paint, filth, insects, etc.) shall be cause for rejection of the lot.

2/ Bake one pie per sample unit in accordance with directions in 5.4.1.

4.3.3.1 Examination of cans. Examination of cans for external condition and interior enamel shall be in accordance with the quality assurance provisions of PPP-C-29. Examination of exterior can coating (when required) and can label shall be in accordance with the quality assurance provisions of TT-C-495 and MIL-L-1497 respectively.

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4.3.3.2 Examination of shipping containers. Examination of filled and closed shipping containers shall be in accordance with the quality assurance provisions in the appendix of PPP-B-636. In addition, the following defects shall be included in the examination: Major - Markings missing, incorrect or illegible. Minor - Arrangement of cans not as specified.

4.3.3.3 Examination of unit loads. Unit loads shall be examined in accordance with the quality assurance provisions of MIL-L-35078.

4.3.4 Sampling procedures and acceptance criteria for testing the finished product. The finished product shall be tested for total acidity, pH and soluble solids (Brix) in accordance with 4.4. The sample for testing shall be a one pound (0.45 kg) composite derived from the number of cans indicated by inspection level S-2. Lot size shall be expressed in cans. Each result shall be reported to the same unit or decimal place as specified for the pertinent requirement. A test failure shall be cause for rejection of the lot.

4.4 Examination and test methods. Examination and test procedures which differ from those specified herein, unless otherwise excepted, may be used by the contractor if they provide a quality assurance equivalent to that specified. If the contracting officer determines that such procedures and controls do not provide, as a minimum, such quality assurance, the contractor will use the procedures set forth herein. In case of dispute, as to examination or test results, the procedures specified herein will govern.

4.4.1 Examination procedures.

4.4.1.1 Can vacuum. After processing, sample cans shall be selected which are free from dents or other visible damage. The cans and contents shall be allowed to reach a temperature of $75^{\circ} \pm 5^{\circ}\text{F}$ ($24^{\circ}\text{C} \pm 3^{\circ}\text{C}$). The vacuum reading shall then be taken with a puncture type vacuum gauge, making the puncture as near as possible to the double seam to minimize error due to distortion of the end. For normal inspection purposes, a correlation of 1-inch (25 mm) of mercury shall be added to the gauge reading for each 1,000 feet (304.8 m) above sea level at which the determination is made. Should the results be questionable, the reading shall be corrected to a referenced temperature of 68°F (20°C) and a reference pressure of 29.9 inches (759 mm) of mercury. (Gauge and headspace volume correlation shall also be included). The following is an example of a normal inspection vacuum determination:

	<u>Inches</u>	<u>(Pressure)</u>
Vacuum reading	3	(90.8 kPa)
Altitude correlation (2000 ft) (610 m)	2	(94.2 kPa)
Corrected vacuum	5	(84.1 kPa)

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4.4.2 Test procedures.

4.4.2.1 Tin plate weights. Tin plate weights shall be determined by any method specified in PPP-C-96.

4.4.2.2 Titratable acidity. Titratable acidity shall be determined in accordance with AOAC, Chapter: Spices and Other Condiments; Section: Vinegars; Method: Total acids.

4.4.2.3 Soluble solids (Brix). Soluble solids shall be determined by means of a refractometer at 20°C, either directly with use of a sugar refractometer or correlated with refractive indices of sucrose solutions at 20°C, if readings are in terms of refractive index. It is suggested that if a clear reading is difficult to obtain, the materials be filtered through a milk pad. Slight pressure may be applied to force liquid through the filter.

4.4.2.4 Determination of pH. The pH shall be determined on the thoroughly mixed sample. Check and adjust meter to pH of 4.0 at 20°C with 0.05 M acid potassium phthalate. Rinse electrode free of sample phthalate solution with distilled water, then place electrodes in sample. Rinse electrodes free of sample and recheck instrument with phthalate solution.

4.4.2.5 Oil stability. Stability of the oil shall be determined in accordance with Method CD 12-57, Fat Stability, Active Oxygen Method of the Official and Tentative Methods of the American Oil Chemists Society, Section C, Commercial Fat and Oils.

5. PACKAGING

5.1 Preservation-packaging. The lemon pie filling shall be preserved-packaged in accordance with level A or C, as specified (see 6.1).

5.1.1 Level A. Seven pounds, 8 ounces (3.4 kg) (-2-1/2 ounce (-70 g) tolerance) of the lemon pie filling shall be filled into a size 603 by 700, round, metal can with soldered side seam and compound-lined, double seamed ends. The can shall be made throughout from not less than commercial 0.50/0.25 differential electrolytic tin K plate per base box and shall be coated overall on the inside with two coats of enamel suitable for the product with an inside side seam stripe. Alternatively, the can shall be made throughout from not less than commercial 1.25/0.25 electrolytic tin plate per base box and shall be coated overall on the inside with an enamel suitable for the product with an inside side seam stripe. Tin plate weight shall be determined in accordance with 4.4.2.1 and K plate shall meet the criteria cited in PPP-C-29. The can shall be coated overall on the outside with a coating conforming to type I of TT-C-495. The can shall be sealed under conditions which will result in a vacuum of not less than 3 inches (a pressure of not more than 90.8 kPa) when examined in accordance with 4.4.1.1.

5.1.2 Level C. Lemon pie filling shall be packaged in accordance with 5.1.1 except that cans with or without commercial exterior coatings are acceptable.

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5.2 Packing. Six cans of lemon pie filling, arranged 3 in length, 2 in width and 1 in depth, shall be packed on end in a snug-fitting shipping container in accordance with level A, B, or C, as specified (see 6.1).

5.2.1 Level A packing. The shipping container shall be a fiberboard box, constructed, closed, and reinforced in accordance with style RSC-SL, V2s, of PPP-B-636. When unit loading is specified, sleeve and reinforcement are not required.

5.2.2 Level B packing. The shipping container shall be a fiberboard box, constructed and closed in accordance with style RSC, V3c, V3s, or V4s, of PPP-B-636.

5.2.2.1 Nonmetallic reinforcement of shipping containers. When specified (see 6.1 and 6.3), the shipping container specified in 5.2.2 shall be reinforced with nonmetallic strapping or pressure-sensitive adhesive, filament-reinforced tape in accordance with the appendix of PPP-B-636.

5.2.3 Level C packing. The shipping container shall be a fiberboard box, constructed and closed in accordance with style RSC, type CF or SF, class domestic, method II closure, of PPP-B-636.

5.2.3.1 Alternate shipping containers. When specified (see 6.1 and 6.4) the shipping container shall be in accordance with Uniform Freight Classification or National Motor Freight Classification, as applicable.

5.3 Unit loads. When specified (see 6.1) the lemon pie filling, packed as specified in 5.2, shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of unit load specified.

5.4 Labeling and marking.

5.4.1 Cans. Cans shall be labeled in accordance with MIL-L-1497. Labeling shall include directions for use as follows:

DIRECTIONS FOR USE

For pie, pour 28 ounces (3-1/4 cups) filling into baked 9-inch pie shell. Top with whipped topping or meringue. Yield: 4 9-inch pies per 1 No. 10 can. For 100 servings, use 4-1/4 No. 10 cans.

If meringue is used, filling must be heated to 122°F (50°C) before addition of meringue. Spread about 2-1/2 cups whipped meringue on warm filling. Spread meringue to edge of the crust so the top of pie is completely covered. Bake in 350°F oven, 16-20 minutes, or until slightly browned.

NOTE: This product may also be used for filling cakes, cream puffs, sweet rolls, etc.

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5.4.2 Shipping containers. Shipping containers shall be marked in accordance with MIL-STD-129.

5.4.3 Unit loads. Unit loads shall be marked in accordance with MIL-L-35078.

6. NOTES

6.1 Ordering data. Procuring documents should specify the following:

- (a) Title, number and date of this specification.
- (b) When other than four bid samples are required (see 3.1).
- (c) Levels of preservation-packaging and packing required (see 5.1 and 5.2).
- (d) When packing specified in 5.2.2.1 or 5.2.3.1 is required.
- (e) Type and class of unit load when unit loading is specified (see 5.3).

6.2 Appropriate level of pack. Based on the conditions known or expected to be encountered during shipment, handling, and storage of the specific item being procured, the contracting officer should select the appropriate level of pack in accordance with the criteria established in AR 700-15. NAVSUPINST 4030.28, AFR 71-6, MCO 4030.14D or PSAR 4145.7, as applicable.

6.3 Intended use of nonmetallic reinforcement of shipping container. Packing specified in 5.2.2.1 is intended for transfer at sea operations or specific overseas operations.

6.4 Packing specified in 5.2.3.1 is intended for direct shipments from the supply source to the first receiving activity for immediate use within CONUS.

6.5 Supersession data. This document covers the requirements of LP/P DES 4-74, 30 January 1974.

Custodians:

Army - GL
Navy - SA
Air Force - 45

Preparing activity:

Army - GL
Project No. 8940-0333

Review activities:

Army - MD
Navy - MS, MC
DP - SS

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