

INCH-POUND

MIL-C-44235B
31 March 1994
SUPERSEDING
MIL-C-44235A
8 January 1988

MILITARY SPECIFICATION

CAKES, CANNED, THERMOHYDROSTABILIZED, TRAY PACK

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

1. SCOPE

1.1 Scope. This specification covers cakes, thermohydrostabilized (oven baked process for low water activity batters) for use by the Department of Defense as a component of operational rations.

1.2 Classification. The product shall be of the following types, as specified (see 6.1):

- Type 1 - Yellow cake with chocolate crumb topping
- Type 2 - Chocolate cake with vanilla crumb topping
- Type 3 - Marble cake with toffee crumb topping
- Type 4 - Devil's fudge cake with coconut topping
- Type 5 - Spice cake with vanilla crumb topping
- Type 6 - Coffee cake with cinnamon crumb topping

2. APPLICABLE DOCUMENTS

2.1 Government documents.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development and Engineering Center, Natick, MA 01760-5018 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8920

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2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.1).

SPECIFICATIONS

FEDERAL

PPP-B-636 - Boxes, Shipping, Fiberboard

MILITARY

MIL-L-1497 - Labeling of Metal Cans for Subsistence Items
 MIL-L-35078 - Loads, Unit: Preparation of Semiperishable
 Subsistence Items; Clothing, Personal Equipment
 and Equipage; General Specification For
 MIL-C-44340 - Can, Tray Pack

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by
 Attributes
 MIL-STD-129 - Marking for Shipment and Storage

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

National Primary Drinking Water Regulations

(Copies are available from the Office of Drinking Water, Environmental Protection Agency, WH550D, 401 M Street, S.W., Washington, DC 20460.)

U.S. DEPARTMENT OF AGRICULTURE (USDA)

Regulations Governing the Inspection of Eggs and Egg Products
(7 CFR Part 59)

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(Copies are available from the Poultry Division, Agricultural Marketing Services, U.S. Department of Agriculture, Room 3944, South Building, P.O. Box 96456, Washington, DC 20090-6456.)

U.S. Standards for Condition of Food Containers

(Copies are available from the Chairperson, Condition of Container Committee, Agricultural Marketing Service, U.S. Department of Agriculture, Room 2506, South Building, P.O. Box 96456, Washington, DC 20090-6456.)

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS)
FOOD AND DRUG ADMINISTRATION (FDA)

Federal Food, Drug, and Cosmetic Act and regulations promulgated thereunder (21 CFR Parts 1-199)

(Copies are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of documents cited in the solicitation (see 6.1).

AMERICAN ASSOCIATION OF CEREAL CHEMISTS (AACC)

Approved Methods of the American Association of Cereal Chemists

(Application for copies should be addressed to the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 3330 - Peel Adhesion of Pressure-sensitive Tape

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

AOAC INTERNATIONAL

Official Methods of Analysis of the AOAC

(Application for copies should be addressed to the AOAC International, 2200 Wilson Boulevard, Suite 400, Arlington, VA 22201-3301.)

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NATIONAL ACADEMY OF SCIENCES

Food Chemicals Codex

(Application for copies should be addressed to the National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418.)

(Non-Government standards and other publications are normally available from the organizations that prepare or 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 document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First Article. When specified (see 6.1), a sample shall be subjected to first article inspection (see 6.2) in accordance with 4.4.

3.2 Ingredients. All ingredients shall be clean, sound, wholesome, and free from foreign material, evidence of rodent or insect infestation, extraneous material, off-odors, off-flavors, and off-colors.

3.2.1 Allspice, ground. Ground allspice shall be derived from dried, nearly ripe fruit of Pimenta officinalis Lindl and shall possess a fragrant, clove-like aroma, strongly aromatic, pungent, clove-like flavor and a dark reddish-brown color. Allspice shall contain not less than 3.0 mL of volatile oil per 100 grams of ground allspice with 80 percent eugenol as a principal constituent. A minimum of 95 percent, by weight, shall pass through a U.S. Standard No. 25 sieve.

3.2.2 Baking powder. Baking powder shall be double acting. The baking powder shall be prepared from highly purified food grade materials. The baking powder shall be a white, free-flowing mixture of sodium bicarbonate, corn starch and one or more of the acid-reacting substances (monocalcium phosphate, sodium acid pyrophosphate or sodium aluminum phosphate). The baking powder shall have an available carbon dioxide level of not less than 13 percent, by weight.

3.2.3 Bicarbonate of soda. Bicarbonate of soda shall comply with the Food Chemicals Codex.

3.2.4 Cinnamon, ground. Ground cinnamon shall be the dried bark of Cinnamomum buranii Blume commonly known as "Korintji Cinnamon." The cinnamon shall contain not less than 1.5 mL of volatile oil per 100 grams of ground cinnamon and be of such size that not less than 95 percent shall pass through a U.S. Standard No. 60 sieve.

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3.2.5 Cocoa. Cocoa shall be medium fat (10 to 12 percent cocoa fat), non-Dutched type cocoa. It shall conform to the standard of identity for Cocoa (21 CFR 163.113).

3.2.6 Coconut flakes. Coconut flakes shall be presweetened and shall have an aroma, color, and flavor of natural coconut. The coconut flakes shall be certified salmonella free.

3.2.7 Egg products.

3.2.7.1 Whole eggs, frozen. Whole eggs shall be frozen and shall have been processed and labeled in accordance with the Regulations Governing the Inspection of Eggs and Egg Products (7 CFR 59). The whole eggs shall be egg whites and egg yolks in their natural proportions as broken directly from the shell eggs, as evidenced by a USDA Egg Products Inspection certificate. The frozen whole eggs shall be USDA certified salmonella free and shall conform to the requirements for Frozen eggs (21 CFR 160.110). The USDA certificate shall also state the date of pasteurization. The USDA certificate shall accompany egg products shipped between plants. Frozen whole eggs shall be held at 10°F or lower and shall be used within 120 days from the date of pasteurization. The whole eggs shall be free from off-odors or foreign odors such as sour or fruity, and shall be free from foreign colors and materials.

3.2.7.2 Whole eggs, dried. The dried whole eggs shall be processed and labeled in accordance with the Regulations Governing the Inspection of Eggs and Egg Products (7 CFR 59). The dried whole eggs shall be USDA certified salmonella free and shall conform to the FDA definition and standard of identity for Dried eggs (21 CFR 160.105). The dried whole eggs shall not have been held in storage for more than ninety days prior to use in product formulation. The USDA certificate shall accompany egg products shipped between plants.

3.2.8 Flour.

3.2.8.1 Flour, cake. Cake flour shall be hard or soft wheat of the type known as high ratio cake flour, bleached, enriched or unenriched. If unenriched flour is used, equivalent enrichment shall be finely incorporated and dispersed by the manufacturer at the time of production of the finished product.

3.2.8.2 Flour, wheat. Wheat flour shall be free flowing, enriched, general purpose white (bleached).

3.2.9 Flavoring.

3.2.9.1 Flavoring, almond/vanilla, powder. The almond/vanilla flavor powder shall be a 16 to 1 concentrate natural and artificial flavoring with a typical almond and vanilla flavor and aroma (see 6.4.4).

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3.2.9.2 Flavoring, cream, artificial. Artificial cream flavoring shall be a liquid or a powder with typical flavor and aroma.

3.2.9.3 Flavoring, vanilla, liquid. Vanilla flavoring shall be natural or artificial, double strength, liquid flavoring with a typical vanilla flavor and aroma.

3.2.9.4 Flavoring, vanilla, powder. The vanilla flavor powder shall have the aroma, color and flavor of vanilla.

3.2.10 Ginger, ground. Ground ginger shall be derived from the root or rhizome of Zingiber officinale Roscoe and shall possess an aromatic odor and taste with a tan to pale brown color. The ginger shall contain not less than 1.5 mL of volatile oil per 100 grams and be of such size that not less than 95 percent shall pass through a U.S. Standard No. 30 sieve.

3.2.11 Glycerol. Glycerol shall be food grade, clear, colorless, and odorless and shall comply with the Food Chemicals Codex.

3.2.12 Guar gum. Guar gum shall comply with the Food Chemicals Codex.

3.2.13 Maltodextrin. Maltodextrin shall be a white, free flowing powder with a dextrose equivalent of ten. It shall have a maximum moisture of 6 percent, a pH of 4.0 to 4.7 and have 35 to 40 percent solids.

3.2.14 Margarine. Margarine shall be of vegetable origin only and shall conform to the the standard of identity for Margarine (21 CFR 166.110) and shall possess a fine and pleasing flavor. The body shall be smooth, firm and homogeneous. The margarine shall possess a uniform medium yellow color and shall be salted.

3.2.15 Potassium sorbate. Potassium sorbate shall be of food grade and comply with the Food Chemicals Codex.

3.2.16 Salt. Salt shall be non-iodized, white, refined sodium chloride with or without anticaking agents and shall comply with purity standards for sodium chloride of the Food Chemicals Codex.

3.2.17 Shortening.

3.2.17.1 Shortening, high ratio. High ratio shortening shall be a highly stable emulsified, white, plastic shortening made from hydrogenated soybean or cottonseed oil or a blend of these oils. The high ratio shortening shall have a maximum lovibond color of 2.0 Red; a Wiley Melting point range of 111^o to 119^oF; maximum free fatty acids of 0.1 percent and an alpha monoglyceride content of 3.0 to 3.6 percent. It shall have a stability of not less than 100 hours (A.O.M.) (see 6.4.1).

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3.2.17.2 Shortening, vegetable (cottonseed, palm, peanut, and/or soybean). The shortening shall be refined, hydrogenated, deodorized cottonseed, palm, peanut, or soybean oil or a combination thereof. The shortening may contain antifoaming agents and antioxidants (active ingredients BHA, BHT, TBHQ, or propyl gallate) in amounts permitted by the FDA. The shortening shall possess a uniform plastic texture and shall have a stability of not less than 100 hours (A.O.M.).

3.2.18 Silica. Silica shall be synthetic, amorphous, silicon dioxide and shall comply with the Food Chemicals Codex (see 6.4.5).

3.2.19 Starch, instant, granular. The granular, instant starch shall be white to off-white and odorless. The granular, instant starch shall have a moisture content of not more than 8.0 percent and the pH shall be in the range of 5.0 to 7.0. A five percent starch solution hydrated in cold or ambient temperature water shall be a smooth, non-grainy paste that develops to a full, spoonable consistency in five minutes. The prepared starch shall display good clarity and a thick, smooth, glossy consistency with good, cold storage stability. It shall be bland with no cereal or starch taste (see 6.4.2).

3.2.20 Sugar.

3.2.20.1 Sugar, light brown. Light brown sugar shall be partially refined cane or beet sugar. The sugar shall be light brown in color and shall possess a sweet, molasses-like flavor.

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

3.2.21 Toffee nuggets. Toffee nuggets shall be produced from sugar, hydrogenated soybean oil, sodium caseinate (milk protein), soy protein, artificial flavor, cellulose gum, artificial color, and FD&C yellow #5, and shall have a typical, sweet toffee flavor and aroma (see 6.4.3).

3.2.22 Water. Water used for formulation, icemaking, and washing shall conform to the National Primary Drinking Water Regulations.

3.2.23 Xanthan gum. Xanthan gum shall comply with the Food Chemicals Codex.

3.2.24 Preblended spice mixture. Preblended spices may be used. The spices in the mixture shall comply with the requirements of this specification. The containers used for the spice blend shall be labeled with each ingredient and the percentage of each ingredient in the blend. The ingredients shall be in the same proportions as specified in the ingredient formula.

3.3 Preparation and processing. The cakes shall be formulated and prepared as follows:

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3.3.1 Cake batter.3.3.1.1 Batter formulation (parts by weight).

<u>Ingredients</u>	<u>Type 1</u>	<u>Type 2</u>	<u>Type 3</u>	<u>1/</u> <u>Choc</u> <u>Yel</u>	<u>Type 4</u>	<u>Type 5</u>	<u>Type 6</u>
Sugar, white, granulated	30.24	26.70	26.5	31.00	26.62	29.53	30.24
Flour, cake	22.42	17.75	17.70	22.48	15.84	22.29	22.42
Water	14.80	11.86	11.90	14.82	18.55	14.71	14.80
Eggs, whole, frozen <u>2/</u>	13.91	19.78	19.78	13.98	15.32	13.83	13.91
Shortening, high ratio	12.54	14.52	14.52	12.54	11.09	12.47	12.54
Glycerol	3.14	2.36	2.36	3.14	3.23	3.12	3.14
Starch, instant granular	1.00	-	-	-	1.00	1.00	1.00
Salt	0.85	0.80	0.80	0.84	0.73	0.85	0.85
Baking powder	0.68	0.41	0.42	0.68	0.38	0.68	0.68
Potassium sorbate	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Guar gum	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Xanthan gum	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Flavoring, vanilla liquid	0.10	0.10	0.10	-	0.09	0.10	0.10
Flavoring, cream, artificial	0.02	-	-	0.02	-	0.02	0.02
Cocoa	-	3.80	3.80	-	5.00	-	-
Maltodextrin	-	1.48	1.48	-	1.48	-	-
Bicarbonate of soda	-	0.14	0.14	-	0.09	-	-
Flavoring, almond/ vanilla powder	-	-	0.20	0.20	-	-	-
Cinnamon	-	-	-	-	0.28	0.26	-
Allspice	-	-	-	-	-	0.28	-
Ginger	-	-	-	-	-	0.05	-
Sugar, light brown	-	-	-	-	-	0.51	-

1/ When preparing marble cake, make up chocolate and yellow cake batters separately.

2/ a. Frozen whole eggs shall be thawed and held at a temperature of 40°F or lower. In no case shall the defrosting period exceed five days. The thawed whole eggs shall be held for not more than 24 hours prior to use in the formula.

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b. Dried, whole eggs may be substituted for whole eggs (liquid basis) by following the manufacturer's recommended rehydration and mixing procedures and shall have no less than the equivalent amount of whole egg solids as the liquid basis.

Note: If the cake rises excessively, the amount of leavening may be reduced to adjust cake volume.

3.3.1.2 Cake batter preparation.

a. The cake batter shall be prepared according to good commercial practice to meet the specific gravity requirements indicated in footnote 1/ and the end item requirements.

1/ Specific gravity in grams per cubic centimeter of batter.

<u>Cake Batter</u>	<u>Specific Gravity</u>
Yellow cake	0.83 - 0.87
Chocolate cake	0.87 - 0.92
Marble cake	0.87 - 0.92
Devil's fudge cake	0.87 - 0.92
Spice cake	0.77 - 0.80
Coffee cake	0.83 - 0.87

3.3.2 Crumb topping.

3.3.2.1 Crumb topping formulation for cake types (parts by weight).

	<u>Type 1</u>	<u>Type 2</u>	<u>Type 3</u>	<u>Type 4</u>	<u>Type 5</u>	<u>Type 6</u>
Flour, wheat	46.94	47.84	36.84	25.24	47.84	46.14
Sugar, white, granulated	24.28	24.88	23.88	22.48	24.88	24.88
Margarine	12.44	12.44	11.44	12.44	12.44	12.44
Shortening, vegetable	10.94	12.44	10.44	12.44	12.44	12.44
Cocoa	3.00	-	-	-	-	0.80
Silica	2.00	2.00	2.00	2.00	2.00	2.00
Flavoring, vanilla powder	0.40	0.40	0.40	0.40	0.40	0.40
Toffee nuggets	-	-	15.00	-	-	-
Coconut flakes	-	-	-	25.00	-	-
Cinnamon	-	-	-	-	-	0.90

3.3.2.2 Crumb topping preparation.

a. Blend all dry ingredients on low speed until uniformly distributed.

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b. Add chilled (40°F) shortening and margarine and blend with dry ingredients until discrete particles are obtained.

c. Crumb topping may be prepared and stored at 40°F for up to thirty days provided it is protected against oxidative and other deteriorative effects.

Note: When preparing toffee crumb topping, add toffee nuggets at the end of the mixing procedure to avoid breaking the nuggets.

3.4 Tray pack filling, processing, and sealing.

3.4.1 Tray can filling.

3.4.1.1 Cake batter.

a. Forty-three ounces of batter, \pm 1 ounce, shall be filled immediately into each tray pack can. The batter surface shall be leveled.

b. For marble cakes, deposit twenty-six ounces of yellow cake batter (Type 3) into the tray can. Level the batter in the can. Pour seventeen ounces of chocolate cake batter (Type 3) and swirl sufficiently to obtain a marbled effect. The batter surface shall be leveled.

3.4.1.2 Crumb topping. Spread seven ounces of crumb topping evenly over surface of cake batter. Excess topping in the center of batter may cause cake to collapse.

3.4.2 Baking. The tray can rims shall be wiped clean of product prior to placing the lids on the can. The lids shall be clinched on one area of each side to allow for the escape of moisture and gases evolved during processing. The clinched filled cans shall be baked until adequately processed to meet all finished product requirements.

3.4.3 Tray can sealing. When the cakes leave the oven, they shall be sealed in accordance with the can manufacturer's guidelines/requirements and 21 CFR 113, Subpart D (see 4.5.5) and with either of the following methods:

a. When the product temperature is above 155°F, the tray can shall be hermetically sealed with an override pressure of 5 p.s.i. to 10 p.s.i. of clean, filtered, USP nitrogen or carbon dioxide to produce a stable vacuum upon cooling, which can be determined by the visible concavity of the can lid.

b. After cooling in air in a high efficiency particulate air filter chamber or clean room to a temperature of 155°F or below, the tray can shall be hermetically sealed to produce a stable vacuum upon cooling, which can be determined by the visible concavity of the can lid.

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For both of the above methods, at no time during the sealing operation shall the temperature of the cakes be less than 140°F.

3.5 Finished product requirements. The finished product shall comply with the following requirements:

- a. There shall be no foreign material such as, but not limited to, dirt, insect parts, hair, wood, glass, or metal.
- b. There shall be no foreign odor or flavor such as, but not limited to, burnt, scorched, stale, sour, rancid, or moldy.
- c. There shall be no color foreign to the product.
- d. The sample average net weight shall be not less than 48 ounces.
- e. No individual can shall contain less than 47 ounces of product.
- f. The cake crumb and crust shall have a color and texture typical of a fully baked cake.
- g. When bisected vertically with a sharp knife, the cake shall not crumble, shall not have compression streaks, shall not have gummy centers or soggy areas; shall have reasonably close, even grain structures and no raw portions; and shall not be scorched, dry and/or crisp.
- h. The crumb toppings shall be uniformly distributed over the top of the cake.
- i. The cake shall have the flavor typical of the labeled identification.
- j. The marble cake shall have distinct swirls of chocolate and yellow cake.
- k. Filled and sealed cans shall show evidence of proper vacuum as determined by concavity of the can lid (see 4.5.6).
- l. No individual tray pack cake shall have a water activity (A_w) value exceeding 0.890 (see 4.5.3.3).

3.5.1 Palatability. The finished product shall be equal to or better than the approved preproduction sample (see 6.1) in palatability and overall appearance.

3.6 Plant qualifications. The product shall be prepared, processed, and packaged in establishments meeting the requirements of Title 21, Code of Federal Regulations, Part 110, "Current Good Manufacturing Practice in Manufacturing, Packing, or Holding of Human Food," and the plant sanitation requirements of the appropriate Government inspection agency.

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3.7 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.

4. QUALITY ASSURANCE PROVISIONS

4.1 Contractor's responsibility. Inspection and acceptance by the USDA shall not relieve the contractor of obligation and responsibility to deliver a product complying with all requirements of this specification. The contractor shall ensure product compliance prior to submitting the product to the USDA for any inspection.

4.2 Inspection and certification. Product acceptability shall be determined by the USDA. The USDA will determine the degree of inspection and supervision necessary to ensure compliance with the requirements of this specification.

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

- a. First article inspection (see 4.4)
- b. Quality conformance inspection (see 4.5)

4.4 First article inspection. When a first article is required (see 6.1), it shall be inspected in accordance with the quality assurance provisions of this specification and evaluated for overall appearance and palatability. Any failure to conform to the quality assurance provisions of this specification or any appearance or palatability failure shall be cause for rejection of the first article.

4.5 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.5.1 Component and material examination. In accordance with 4.1, components and materials shall be examined in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.5.1.1 Ingredient and component examination. Conformance of ingredients and components to identity, condition, and other requirements specified in 3.2 shall be certified by the ingredient supplier or ingredient manufacturer, and compliance shall be verified by examination of pertinent labels, markings, U.S. Grade certificates, certificates of analyses, or other such valid documents acceptable to the inspection agency. If necessary, each ingredient shall be examined organoleptically or inspected according to generally recognized test methods, such as the standard methods described in the Official Methods of Analysis of the AOAC International, and in the

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approved methods of the American Association of Cereal Chemists, to determine conformance to the requirements. Any nonconformance to an identity, condition, or other requirement shall be cause for rejection of the ingredient or component lot or of any involved product.

4.5.2 In-process examination. In-process examination shall be performed to determine conformance to the preparation, processing, can interior coating, filling, sealing, and packaging requirements. Any nonconformance revealed by actual examination or by review of records of time, temperature, and formulation, or of other valid documents shall be cause for rejection of the involved product.

4.5.2.1 Sealing temperature examination. Temperature readings shall be made of at least six cans per lot (two from the beginning, the middle, and the end of the sealing operation). The finding of any can, the temperature of which is less than 140^oF at time of final seal shall be cause for rejection of all cans sealed after the last acceptable temperature was determined. In the event that acceptable product cannot be identified from nonconforming product, the entire lot shall be rejected (see 3.4.3).

4.5.2.2 In-process examination of cake specific gravity. After establishing and standardizing mixing condition that result in the required specific gravity, cake batter shall be examined once per batch as follow for conformance to the specific gravity requirement in 3.3.1.2:

A bakers' batter specific gravity determination cup or reasonable substitute shall be standardized as follows: Obtain tare weight of the cup. Fill cup with water. Level top of water with a straight edged spatula. Subtract the tare weight of the cup from the total weight of the cup and water to obtain the net weight (in grams) of water. This is a very close approximation of the volume of water in cubic centimeters. This procedure needs to be done only once if the same cup is always used for specific gravity determination.

The dry cup used for specific gravity determination shall be uniformly filled with batter so as to prevent entrapment of air. The top of the batter shall then be leveled with the lip of the cup using a spatula or other appropriate straight edge. The net weight of the batter shall be obtained by subtracting the total weight from the tare weight of the cup. The batter specific gravity = batter fill weight/net weight of an equal volume of water.

Failure to comply with specific gravity requirements shall be cause for rejection of the involved product.

4.5.3 Tray pack inspection. The USDA reserves the right to separate the inspection lot into smaller inspection lots.

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4.5.3.1 Net weight examination. Randomly select 30 filled and sealed tray pack cans from the inspection lot and weigh separately. Subtract the average tare weight (determined by randomly selecting and weighing 30 of the empty tray pack cans and lids used in preparing the product and dividing the total weight by 30) from the weight of each tray pack in the sample. The results shall be reported to the nearest 1 ounce. If the average net weight is less than 48 ounces or if the net weight of any individual can is less than 47 ounces, the lot shall be rejected.

4.5.3.2 Double sampling plan for product examination. The finished product shall be examined for the defects listed in table I utilizing the double sampling plans indicated in MIL-STD-105. The lot size shall be expressed in tray pack cans. The sample unit shall be one filled and sealed tray pack can. The inspection level shall be S-3 and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 4.0 for major defects and 6.5 for minor defects.

TABLE I. Product defects 1/ 2/

Category		Defect
<u>Major</u>	<u>Minor</u>	
101		The cake crumb and crust do not have a color and texture typical of a fully baked product
102		When bisected vertically with a sharp knife, the cake crumbles, has compression streaks, gummy center, or soggy areas; does not have a reasonable close, even grain structure; has raw portions; is scorched, dry and/or crisp
103		Cake flavor not typical as identified on cake label
	201	Crumb topping is not distributed evenly
	202	Marble cake does not have distinct swirls of chocolate and yellow cake

1/ The presence of foreign material (for example, glass, dirt, insect parts, hair, wood, metal) foreign odor or flavor (for example, burnt, scorched, stale, sour, rancid, moldy) or foreign color shall be cause for rejection of the lot.

2/ Product not equal to or better than the approved preproduction sample in palatability and overall appearance shall be cause for rejection of the lot (see 3.6.1).

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4.5.3.3 Water activity testing. Eight tray cans shall be randomly selected from each production lot and individually tested for water activity (Aw). Aw shall be determined in an Agricultural Marketing Service (AMS) laboratory in accordance with the Official Methods of Analysis of the AOAC, method 978.18. Recommendations in sections C, D, E, and F of method 978.18 should be followed for the preparation of reference salt slushes, calibration of instrument and determination of water activity in order to assure accurate water activity measurements. The sample unit shall be a specimen from the center of the cake. The sample shall be sliced in thirds horizontally and the material from the center of the middle slice shall be placed for measurement of water activity. Water activity testing shall be done at $77^{\circ}\text{F} \pm 1^{\circ}\text{F}$ (25°C). The results of each Aw determination shall be reported to the third decimal place. Water activity shall be determined not less than 4 days but not more than 14 days after baking to allow moisture equilibration in the product. Any result not conforming to the Aw requirement in 3.5 shall be considered a major defect and shall be cause for rejection of the lot.

4.5.4 Can condition examination. Examination of filled and sealed tray pack cans shall be in accordance with the U.S. Standards for Condition of Food Containers, except that the inspection for labeling shall be in accordance with 4.5.4.1. In addition, scratches, scuffs, or abrasions that occur on the outside coating as a result of the filling, sealing, and processing of the tray pack cans shall not be scored as a defect.

4.5.4.1 Can label examination. Labels shall be examined for defects in accordance with MIL-L-1497 (see 5.4) except, for self-adhering labels, the following additional defects shall apply:

Major: Label torn or scratched so as to obliterate any of the markings

Minor: Air bubbles under label

Label not properly adhered to can, for example, label raised or peeled back from edges or corners.

4.5.4.2 Label adhesive examination. When self-adhering labels are used, the adhesive shall be tested in accordance with ASTM D 3330.

4.5.5 Can closure examination. Can closures shall be examined visually and by teardowns in accordance with the can manufacturer's guidelines/requirements and 21 CFR 113, Subpart D, or 9 CFR 318, Subpart G, as applicable. Any nonconformance based on observation of can seam teardowns or on record of can seam teardowns shall be classified as a major defect and shall be cause for rejection of any involved product.

4.5.6 Vacuum examination. Cans shall be allowed to cool to $75^{\circ} \pm 5^{\circ}\text{F}$, held for at least 24 hours after sealing, and then examined for vacuum retention. To examine, lay a straight edge in the center of the lid along the length of the tray pack. Both ends of the straight edge shall touch the

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lid at the inside edge of the double seam. There shall be a visible gap between the straight edge and the lid for the entire distance of the label panel. Using a shorter straight edge, the same procedure shall be used across the width, in the center of the tray pack can. When examining a ribbed lid, lay the straight edge only between the two center ribs along the length of the can. The inspection lot shall include only tray packs produced in a single shift on a single sealing machine. The sample size shall be 50 cans. Any nonconformance shall be classified as a major defect and shall be cause for rejection of the lot.

4.5.7 Shipping container examination. Shipping containers shall be examined for defects in assembly, closure, and reinforcement (when applicable) in accordance with PPP-B-636. In addition, the following defects shall be classified as follows:

- Major: National stock number, item description, contract number, or date of pack markings missing, incorrect, or illegible.
- Reinforced with other than nonmetallic strapping or tape.
- Dimensions of pads not as specified.
- Interior packing with fiberboard liner or pads not as specified.
- Minor: Other required markings missing, incorrect, or illegible.
- Arrangement or number of cans not as specified.

4.5.8 Unit load inspection. Inspection of unit loads shall be in accordance with the quality assurance provisions of MIL-L-35078.

5. PACKAGING

5.1 Preservation. The product shall be preserved in accordance with level A.

5.1.1 Level A. Fifty ounces of product shall be filled into a tray pack can conforming to MIL-C-44340 and processed and sealed as specified in 3.4.

5.2 Packing. The product shall be packed in accordance with level A, B, or C as specified (see 6.1).

5.2.1 Level A packing. Four cans of product, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard box, constructed and closed in accordance with style RSC-L or HSC-L with a HSC full depth cover, grade V2s of PPP-B-636. The cans shall be packed flat, four in depth within the box, with the first two cans placed with the lids together and the next two cans with the lids together. The inside of each box shall be provided with a box liner and five fiberboard pads fabricated of grade V3c fiberboard. The height of the box liner shall be equal to the full inside depth of the box (+0 inch, -1/8 inch). Flute direction of the box liner shall be vertical. The pads shall be placed between the cans and on the top and bottom of the

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stacked cans. The pad dimensions shall be not less than 1/8 inch of the full length and width dimensions of the box. Each box shall be reinforced with nonmetallic strapping or pressure-sensitive adhesive filament-reinforced tape in accordance with the appendix of PPP-B-636. Shipping containers shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified (see 6.1), except that the unit load shall consist of 48 boxes with 12 boxes per course and four courses per load with all courses having the same pattern. Boxes may be stacked by interlocking and reversing each tier, or by columnar stacking with paperboard or fiberboard sheets placed between each tier. When unit loads are strapped, strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

5.2.2 Level B packing. Four cans of product, preserved as specified in 5.1, shall be packed as specified in 5.2.1, except the box shall be constructed of grade V3c, V3s, or V4s fiberboard.

5.2.3 Level C packing. Four cans of product, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard box, constructed and closed in accordance with style RSC-L, class domestic, grade 275 of PPP-B-636. The cans shall be packed flat, four in depth within the box, with the first two cans placed with the lids together and the next two cans with the lids together. The inside of each box shall be provided with a box liner and five fiberboard pads. The height of the box liner shall be equal to the full inside depth of the box (+0 inch, -1/8 inch). Flute direction of the box liner shall be vertical. The pads shall be placed between the cans and on the top and bottom of the stacked cans. The pad dimensions shall be not less than 1/8 inch of the full length and width dimensions of the box and shall be fabricated of class domestic, grade 175 fiberboard.

5.3 Unit loading. When specified (see 6.1), the product, packed as specified in 5.2.2 or 5.2.3, shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified except that the unit load shall consist of 48 boxes with 12 boxes per course and four courses per load with all courses having the same pattern. Boxes may be stacked by interlocking and reversing each tier, or by columnar stacking with paperboard or fiberboard sheets placed between each tier. When unit loads are strapped, strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

5.4 Labeling. Each tray pack can shall be labeled in accordance with MIL-L-1497 and with the following:

- Official establishment number (for example, EST 38) or a three letter code identifying the establishment
- Lot number 1/
- Production shift number 1/

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- 1/ The lot number shall be expressed as a four digit Julian code. The first digit shall indicate the year of production and the next three digits shall indicate the day of the year (Example, March 19, 1994 would be coded as 4079). The Julian code shall represent the day the product was packaged and processed. Sub-lotting (when used) shall be represented by an alpha character immediately following the four digit Julian code. Following the four digit Julian code and the alpha character (when used), the other required code information shall be printed in the sequence as listed above.

In addition, the name of the product shall be marked, stamping is permitted, on one 1001 by 200 end of the can. The labeling shall be legible when examined as specified in 4.5.4. Paper labels are not permitted. In addition, cans shall show the following statement:

YIELD: Serves 18 portions cut three rows by six rows.

As an alternate labeling method, a preprinted self-adhering 0.002 inch thick clear polyester label printed with indelible black ink may be used. Self-adhering labels shall be applied after baking. Pressure-sensitive adhesive shall require no preparation prior to application. Labels shall tack quickly and adhere without curling or breaking. The adhesive shall have a minimum adhesion of 60 ounces per inch width when examined as specified in 4.5.4.2. When self-adhering labels are used, the tray pack can shall be marked with the Julian code and a product code prior to baking. If only one cake flavor is produced per day, marking the tray can with the Julian code and a product code is not required. The contractor is responsible for maintaining product identity and date the product was baked.

5.5 Marking

5.5.1 Shipping containers. In addition to any special marking required by the contract or purchase order, shipping containers shall be marked in accordance with MIL-STD-129.

5.5.2 Unit loads. Unit loads shall be marked in accordance with MIL-L-35078. In addition, the following precautionary markings in capital letters larger than other markings shall be included:

CAUTION: DO NOT STACK PALLETS IN TRANSIT OR MORE THAN TWO HIGH IN STORAGE,
UNLESS PALLET RACKS ARE USED.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory).

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6.1 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. When a first article is required (see 3.1, 4.4, and 6.2).
- d. Provisions for approved preproduction samples (see 3.5.1 and 6.2).
- e. Level of packing required (see 5.2).
- f. Type and class of unit load when unit loading is required (see 5.2.1 and 5.3).

6.2 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of Federal Acquisition Regulation (FAR) 52.209-4. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.3 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 procuring activity should select the appropriate level of pack in accordance with the criteria established in AR 700-15/NAVSUPINST 4030.28/AFR 71-6/MCO 4030.33A/DLAR 4145.7.

6.4 Ingredient information.

6.4.1 Shortening, high ratio. It has been found that high ratio shortening Cake Mix 96, manufactured by Vandenberg Inc., and Cake and Icing Shortening, manufactured by Riceland Corp., meet the requirements of 3.2.17.1 and perform satisfactorily in this product.

6.4.2 Starch, instant, granular. It has been found that MIRA-SPERSE, manufactured by A.E. Staley Co., meets the requirements of 3.2.19 and performs satisfactorily in this product.

6.4.3 Toffee nuggets. It has been found that Toffee Nuggets manufactured by Anacon Foods Company, Roseville, MN, meets the requirements of 3.2.21 and performs satisfactorily in this product.

6.4.4 Flavoring, almond/vanilla powder. It has been found that natural and artificial Almond and Vanilla, 16 to 1, manufactured by International Bakers Services Inc., South Bend, IN, meets the requirements of 3.2.9.1 and performs satisfactorily in this product.

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6.4.5 Silica, synthetic, amorphous. It has been found that amorphous synthetic silica (Sipernat 50 or 50S) produced by Degussa Corp., Ridgefield Park, NJ, and Syloid 244 produced by Davison Chemical, Baltimore, MD, meet the requirements of 3.2.18 and perform satisfactorily in this product.

6.5 Subject term (key word) listing.

Canned food
Combat field feeding
Food processing
Operational rations
Shelf stable

Custodians:

Army - GL
Navy - SA
Air Force - 35

Preparing activity:

Army - GL
(Project 8920-0549)

Review activities:

Army - MD, QM
Navy - MC
DLA - SS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-C-44235B	2. DOCUMENT DATE (YYMMDD) 1994 March 31
3. DOCUMENT TITLE CAKES, CANNED, THERMOHYDROSTABILIZED, TRAY PACK		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME U.S. Army Natick RD&E Center	b. TELEPHONE (Include Area Code) (1) Commercial 508-651-4501	(2) AUTOVON/DSN 256-4501
c. ADDRESS (Include Zip Code) Commander, U.S. Army Natick RD&E Center ATTN: SATNC-WRE Natick, MA 01760-5018	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	