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8 January 1988
SUPERSEDING
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MILITARY SPECIFICATION

CAKES, CANNED, THERMOHYDROSTABILIZED, TRAY PACK

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

1. SCOPE

* 1.1 Scope. This document 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 classes, as specified (see 6.1).

Class 1 - Poundcake
Class 2 - Marble cake
Class 3 - Spice cake
Class 4 - Chocolate brownie cake
Class 5 - Blueberry flavored cake
Class 6 - Apple coffee cake

* 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Documents. The following documents form a part of this document 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.

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 01760-5014 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 8920

SPECIFICATIONS

FEDERAL

TT-C-495	-	Coatings, Exterior, for Tinned Food Cans
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

STANDARDS

MILITARY

MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	-	Marking for Shipment and Storage
MIL-STD-900	-	Bacterial Standards for Starches, Flours, Cereals, Alimentary Pastes, Dry Milks and Sugars Used in the Preparation of Thermostabilized Foods for the Armed Forces

2.1.2 Other Government documents. The following other Government documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

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

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.)

U.S. DEPARTMENT OF AGRICULTURE (USDA)

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

U.S. Standards for Grades of Nonfat Dry Milk (Spray Process)

(Application for copies should be addressed to the Dairy Division, Room 2750-S, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, DC 20250.)

U.S. Standards for Grades of Canned Applesauce

U.S. Standards for Grades of Dehydrated Apples

U.S. Standards for Grades of Fruit Jelly

(Application for copies should be addressed to the Chief, Processed Products Branch, Fruit & Vegetable Division, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, DC 20250.)

U.S. Standards for Condition of Food Containers

(Application for copies should be addressed to the Director, Market Research and Development Division, Agricultural Marketing Service, U.S. Department of Agriculture, South Building, 14th and Independence Avenue, S.W., Washington, DC 20250.)

U.S. Standards for Grades of Shelled Walnuts

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

ENVIRONMENTAL PROTECTION AGENCY (EPA)

National Primary Drinking Water Regulations

(Application for copies should be addressed to the Office of Drinking Water, Environmental Protection Agency, WH550D, 401 M Street, S.W., Washington, DC 20460.)

(Copies of documents 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 document 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 issues of the nongovernment documents which are current on the date of the solicitation.

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.)

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, 1111 North 19th Street, Suite 210, Arlington, VA 22209.)

NATIONAL ACADEMY OF SCIENCES

Food Chemicals Codex

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

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

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 shall take precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4, 6.1, and 6.3).

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 Sugar. Sugar shall be white, refined, granulated, cane or beet sugar, or a combination thereof. Sugar shall meet the bacterial requirements of MIL-STD-900.

3.2.2 Flour. 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. The flour shall comply with the standards of MIL-STD-900.

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

3.2.4 Egg products.

* 3.2.4.1 Whole eggs, liquid or frozen. Whole eggs may be liquid or frozen and shall be processed and labeled in accordance with the Regulations Governing the Inspection of Eggs and Egg Products (7 CFR Part 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. For liquid whole eggs, the certificate shall state the date and time of pasteurization. Liquid whole eggs shall be held at a temperature of 40°F or lower and shall be held for not more than 72 hours from the time of pasteurization until the start of formulation of the product in which they are used. Frozen whole eggs shall be held at 10°F or lower and used within 120 days from the date of production. The whole eggs shall be free from off-odors, off-flavors, or foreign odors and flavors such as metallic, musty, sour, or fruity, and shall be free from foreign colors and materials.

* 3.2.4.2 Whole eggs, dried. Dried whole eggs or free-flowing dried whole eggs may be used. The anticaking ingredient in the free-flowing dried whole eggs may be either silicon dioxide or sodium silicoaluminate. The amount of silicon dioxide shall be not more than 1 percent by weight of the dried whole eggs and the amount of sodium silicoaluminate shall be less than 2 percent by weight of the dried whole eggs. The dried whole eggs and free-flowing dried whole eggs shall contain not less than 95 percent by weight total egg solids, and shall be processed and labeled in accordance with the Regulations Governing the Inspection of Eggs and Egg Products (7 CFR Part 59), as evidenced by the USDA egg products inspection shield on the label. Dried whole eggs and free-flowing dried whole eggs shall be smooth and free from lumps that do not fall apart under light pressure; free from foreign materials; and free of scorched, burnt, sulfurous, or other pronounced off-odors, off-flavors, and foreign colors.

* 3.2.4.3 Egg yolks, liquid or frozen. Liquid or frozen egg yolks or frozen sugared egg yolks (approximately 10 percent sugar added) may be used. The egg yolks and sugared egg yolks shall be processed and labeled in accordance with the Regulations Governing the Inspection of Eggs and Egg Products (7 CFR Part 59), as evidenced by the USDA egg products inspection shield on the label. For

liquid egg yolks, a USDA Egg Products Inspection Certificate shall state the date and time of pasteurization. Liquid egg yolks shall be held at a temperature of 40°F or lower and shall be held for not more than 60 hours from the time of pasteurization until the start of formulation of the product in which they are used. Frozen egg yolks and sugared egg yolks shall be held at 10°F or lower and used within 120 days from the date of production. Once thawed, egg yolks shall be held at 40°F for a period not to exceed 24 hours prior to the start of formulation of the product in which they are used. The egg yolks and sugared egg yolks shall be free from off-odors, off-flavors, or foreign odors and flavors such as metallic, musty, sour, or fruity, and shall be free from foreign colors and materials.

* 3.2.4.4 Egg whites, dried. The dried egg whites shall be spray dried egg whites and the type used for white cakes. The dried egg whites may contain a whipping aid (not more than 0.1 percent sodium lauryl sulfate) to improve whipping properties. The dried egg whites shall have been processed and labeled in accordance with the Regulations Governing the Inspection of Eggs and Egg Products (7 CFR Part 59), as evidenced by the USDA egg products inspection shield on the label.

3.2.5 Nonfat dry milk. Nonfat dry milk shall be of extra grade as defined in the U.S. Standards for Grades of Nonfat Dry Milk (Spray Process). It shall be of the high heat type.

3.2.6 Walnuts, shelled. Walnuts shall be shelled English walnut pieces of the medium piece size classification, shall be classified as light color, and shall be U.S. No. 1 of the U.S. Standards for Grades of Shelled Walnuts. A minimum of 82 percent, by weight, of the pieces shall pass through a 3/8 inch diameter round hole screen and not more than 1 percent, by weight, shall pass through a 1/4 inch diameter round hole screen. The shelled walnuts shall be coated with an approved food grade antioxidant and shall be of the latest season's crop.

3.2.7 Cocoa. Cocoa shall be medium fat (10 to 21 percent cocoa fat), sweet, non-Dutched type cocoa. It shall conform to the Definition and Standards for cocoa products under the Federal Food, Drug, and Cosmetic Act and regulations promulgated thereunder.

3.2.8 Apple jelly. Apply jelly shall be U.S. Grade A of the U.S. Standards for Grades of Fruit Jelly.

3.2.9 Water. Water used for formulation, ice making, and washing shall conform to the National Primary Drinking Water Regulations.

3.2.10 Fruit nuggets or bits. Blueberry or apple nuggets or bits shall be not more than a 1/4 inch dice containing sucrose, cottonseed or soybean oil, fruit fiber and/or wheatgerm, artificial blueberry or apple flavor, as applicable, and lake colors. The nuggets or bits shall not exceed 5 percent

in moisture. Optional ingredients may include starch, sodium caseinate, soy protein, other caloric sweetening agents and other appropriate stable flavorings and colors.

3.2.11 Applesauce, canned, sweetened. Canned applesauce shall be sweetened, natural color and flavor type, and regular (comminuted) style. The canned applesauce shall be U.S. Grade A of the U.S. Standards for Grades of Canned Applesauce and shall be of the latest season's pack.

3.2.12 Starch, waxy maize, modified, pregelatinized, instant (see 6.4). The starch shall be pure, off-white, odorless slightly coarse ground powder (greater than 97 percent through U.S. Standard #100 sieve). It shall be modified, pregelatinized, cross-linked, and stabilized. A 5 percent starch solution when fully hydrated with high shear and at a temperature greater than 72°F shall be highly viscous (peak greater than 1400 B.U.). The starch shall have a maximum moisture content of 9.0 percent and pH of 4.0 to 6.5. It shall display high clarity, sheen, and cold storage stability. The starch shall be bland with no objectionable off-notes and shall comply with MIL-STD-900.

3.2.13 Mono-diglycerides. Mono-diglycerides shall be a combination of mono-glycerides and diglycerides with manufacturers' analyses indicating the alpha monoglyceride content to be between 40 and 55 percent.

3.2.14 Corn syrup solids. Corn syrup solids shall be powdered, free-flowing with a Dextrose Equivalent of 24.

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

3.2.16 Blueberry flavor. Blueberry flavor shall be a water soluble artificial blueberry flavor prepared in conformance with the Federal Food, Drug, and Cosmetic Act.

3.2.17 Vanilla flavoring. Vanilla flavoring shall be pure vanilla extract.

3.2.18 Orange oil, 2-fold. Orange oil shall be cold pressed from Valencia oranges. Twice the amount of single strength oil may be used in place of double strength oil.

3.2.19 Lemon oil, 2-fold. Cold pressed natural lemon oil shall be used. Twice the amount of single strength oil may be used in place of double strength oil.

3.2.20 Bicarbonate of soda. Bicarbonate of soda shall comply with Food Chemicals Codex.

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

3.2.22 Sodium aluminum phosphate, acidic. Sodium aluminum phosphate shall comply with Food Chemicals Codex.

3.2.23 Sodium stearoyl-2-lactylate. Sodium stearoyl-2-lactylate shall be powdered and free flowing and comply with the requirements of the Food Chemicals Codex.

3.2.24 Gum arabic powder. Gum arabic powder shall be free-flowing and shall comply with the requirements of the Food Chemicals Codex.

3.2.25 Lecithin. Lecithin shall comply with the Food Chemicals Codex.

3.2.26 Nutmeg, ground. The ground nutmeg shall be derived from dried seeds of Myristica fragrans Houtt. The nutmeg shall have a dull brown color. It shall contain not less than 7.5 mL of volatile oil per 100 grams of ground nutmeg and be of such size that not less than 95 percent shall pass through a Standard No. 20 sieve.

3.2.27 Cinnamon, ground. Ground cinnamon shall be the dried bark of Cinnamonum burmani Blume commonly known as "Kerintz 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 Standard No. 30 sieve.

3.2.28 Mace, ground. Ground mace shall be derived from the dried arillus of Myristica fragrans Houtt. It shall be yellow-tan to reddish-tan in color and shall have a fragrant, nutmeg-like, aromatic odor. The mace shall contain not less than 12.0 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. 20 sieve.

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

3.2.30 Preblended spice and seasoning mixture. Preblended spices and seasonings may be used. The spices and seasonings in the mixture shall comply with the requirements of this document. The containers used for the spice and seasoning 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.

3.2.31 Color, yellow No. 5. Yellow No. 5 color shall be FDA approved.

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

3.2.33 Apples, dehydrated, diced (see 6.5). Dehydrated apples shall meet U.S. Grade A requirements of the U.S. Standards for Grades of Dehydrated Apples except for uniformity of size. Dehydrated apples shall be approximately 3/8 inch dice and shall be of the latest season's pack.

* 3.3 Batter formulation (parts by weight). The batter formulation shall be as specified in table I.

TABLE I. Batter formulation

	Class 1	Class 2		Class 3	Class 4	Class 5	Class 6
		Marble					
	Poundcake	Choc	White	Spice	Chocolate brownie	Blueberry flavored	Apple coffee 1/
Sugar	24.3 2/	28.2	29.0	24.62	26.5	30.0	27.4
Flour	24.4	25.0	29.0	24.6	20.5	25.0	26.8
Shortening	24.4	6.2	6.2	5.3	7.2	5.35	5.8
Whole eggs 3/	12.3	6.2	--	--	--	--	--
Egg yolks 3/	12.3 2/	--	--	--	--	--	--
Dried whole eggs	--	--	--	3.1	2.8	--	--
Whole eggs, liquid, frozen or dried 3/	--	--	--	--	--	--	10.8 5/
Nonfat dry milk	--	2.0	1.45	1.2	1.2	1.2	1.4
Walnuts	--	--	--	--	6.3	--	--
Cocoa	--	9.4	--	--	6.0	--	--
Apple jelly	--	--	--	--	--	--	6.4
Water	--	18.8	28.8	--	22.0	24.3	17.4 5/
Fruit nuggets or bits	--	--	--	--	--	9.0	--
Applesauce	--	--	--	36.0	--	--	--
Starch, modified	--	--	--	--	2.0	--	--
Mono-diglycerides	1.0	1.0	1.0	0.55	0.5	0.55	0.6

TABLE I. Batter formulation - Continued

	Class 1	Class 2		Class 3	Class 4	Class 5	Class 6
	Poundcake	Marble Choc	Marble White	Spice	Chocolate brownie	Blueberry flavored	Apple coffee 1/
Corn syrup solids	--	--	--	--	1.6	--	--
Salt	0.5	0.3	0.5	0.55	0.4	0.5	0.6
Blueberry flavor	--	--	--	--	--	0.5	--
Vanilla flavoring	0.2	0.5	0.3	0.55	0.1	--	--
Orange oil, 2-fold	0.1	--	--	--	--	--	--
Lemon oil, 2-fold	0.1	--	--	--	--	--	--
Bicarbonate of soda	--	0.5	0.5	0.55	0.3	0.4	0.4
Glycerol	--	1.5	1.5	1.5	1.6	1.5	1.5
Dried egg whites	--	--	1.0	--	--	1.0	--
Sodium aluminum phosphate	--	--	0.35	0.35	0.3	0.3	0.4
Sodium stearoyl-2-lactylate	0.3	0.3	0.3	0.25	0.3	0.3	0.3
Gum arabic powder	--	--	--	--	0.2	--	--
Lecithin	--	--	--	--	0.1	--	--
Nutmeg	--	--	--	0.16	--	--	--
Cinnamon	--	--	--	0.54	--	--	--
Mace	--	--	--	--	--	--	0.1
Ginger	--	--	--	0.08	--	--	--
Yellow No. 5, FD&C	--	--	--	--	--	--	4/
Potassium sorbate	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Apple mix for apple coffee cake (see 3.5)

	Parts by weight
Apples - Nuggets, bits, or dehydrated dices	57.50
Sugar	30.0
Water	11.10
Cinnamon	1.30
Nutmeg	0.10

a. Dehydrated apple dices shall be moistened with the specified apple mix water (allowed to set until water is absorbed) and coated with the preblended sugar and spices. Fruit nuggets or bits shall not directly contact water. Fruit nuggets can be incorporated after sugar, spice, and water are blended into completed batter.

b. In high humidity environment, the water may be proportionately reduced to ensure the required finished product water activity.

2/ a. When frozen egg yolks containing sugar are used, the sugar contained therein shall be included in calculating the parts by weight of sugar.

b. When frozen egg yolks containing sugar are used, the yolk content alone shall be considered in computing the parts by weight of egg yolks; added sugar shall not be included in this computation.

3/ Frozen whole eggs, egg yolks, and sugared egg yolks shall be thawed and held at a temperature of 40°F or lower and shall be held for not more than 24 hours prior to use in the formula.

4/ 16.75 grams FD&C yellow No. 5 per 1000 pounds dry ingredients.

5/ If dried whole eggs are used, the percentages to be used are as follows:

Ingredients	Parts by weight
Dried whole eggs	3.40
Water	24.80

3.4 Cake batter preparation.

a. Cream sugar, shortening, and emulsifiers until light and fluffy. 1/

b. Blend all dry ingredients together until uniformly distributed prior to adding to other ingredients.

1/ A 3- or 4-speed cake-type mixer should be used to prevent excessive mixing times, to evenly distribute the ingredients, and to fully hydrate the flour. Mixing temperature should be in the range of 60° to 70°F to prevent premature leavening reactions.

c. Separately combine eggs (if fresh or frozen) with all other liquid ingredients and blend until uniformly distributed.

d. Alternately add portions of dry mixture and liquid mixtures until all of dry mixture and liquid mixture have been added.

e. Mix at a moderate speed until smooth and uniform batter is formed.

f. Add fruits and walnuts, if used, and blend.

g. When preparing marble cake, make up chocolate and white cake batters separately.

NOTE: The contractor is not required to follow the exact batter preparation procedures shown above, provided the cake conforms to all finished A_w (water activity) values and finished product requirements.

* 3.5 Tray pack filling, processing, and sealing. Batters in the applicable amount shown below shall be filled immediately into each tray pack can (see 5.1.1). The batter surface shall be leveled and covered with clean commercial parchment paper (minimum basis weight of 27 pounds per ream). The tray rims shall be wiped clean of batter, prior to placing the lids on.

Class	Average fill weight (ounces) 1/
1 - Poundcake	52
2 - Marble cake 2/	48
3 - Spice cake	50
4 - Chocolate brownie cake	52
5 - Blueberry flavored cake	50
6 - Apple coffee cake	53 3/

1/ A plus or minus 1 ounce tolerance will be allowed for individual cans provided the average fill weight is not less than specified.

2/ Deposit 24 ounces of white batter into the can, add 24 ounces of chocolate batter, and swirl to obtain marble effect.

3/ 53 ounces consists of 48 ounces of batter and 5 ounces of apple mix for apple coffee cake (see 3.3 footnote 1)

The lids of the trays shall be clinched on loosely, to allow for the escape of moisture and gases evolved during processing. The loosely clinched filled cans shall be placed continuously in the oven and baked under the following conditions, or until adequately processed to meet all finished product requirements. The cakes shall be handled gently during baking and cooling to prevent surface depressions caused by jarring or dropping the trays. When the canned cakes leave the oven, they 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 presence of a visible concavity of the can lid. The internal temperature of the cakes shall be no less than 180°F at the time of sealing.

or

The canned cakes shall be hermetically sealed after cooling in air in a high efficiency particulate air filter chamber or clean room to a temperature not less than 175°F to produce a stable vacuum upon cooling, which can be determined by the presence of a visible concavity of the can lid.

Class	Baking temperature	Recommended baking time
1 - Poundcake	275°F	2 hours
2 - Marble cake	275°F	1 hour 10 min
3 - Spice cake	275°F	1 hour 20 min
4 - Chocolate brownie cake	275°F	1 hour 30 min
5 - Blueberry flavored cake	275°F	1 hour 20 min
6 - Apple coffee cake	275°F	1 hour 20 min

3.6 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 average and individual net weights shall be not less than the following:

Class	Cake	Net weight average (oz)	Net weight individual (oz)
1	Poundcake	52	51
2	Marble cake	48	47
3	Spice cake	50	49
4	Chocolate brownie	52	51
5	Blueberry flavored cake	50	49
6	Apple coffee cake	53	52

e. The cakes and their crusts shall have a uniform color and texture.

f. The cakes shall not be raw, gummy and/or collapsed, indicating underbaked conditions.

g. When bisected vertically with a sharp knife, the cakes 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, stringy or ungelatinized portions; and shall not be scorched, dry and/or crisp, indicating overbaked conditions.

h. The cakes shall have uniformly distributed fruit pieces, nuggets/bits, or nuts, as applicable.

i. The cakes shall have a flavor typical of the labeled identification.

j. The marble cakes shall have distinct yet integrated swirls of chocolate and white cake.

k. Brown depressions on cake surface due to the improper mixture of the egg ingredients in the poundcake shall be prevented.

l. The cakes shall be prevented from adhering to the lid by covering the cakes with large enough food grade parchment paper.

m. Filled and sealed cans shall show evidence of proper vacuum as determined by concavity of the can lid (see 4.5.6).

n. The filled and sealed thermohydrostabilized tray pack cans shall show no evidence of can swelling when tested for sterility as specified in 4.5.3.4.

3.6.1 Water activity. No individual tray pack cake shall have a water activity value exceeding 0.890. The mean water activity (x) shall not exceed 0.890 and unbiased standard deviations(s) for the calculated mean shall not exceed the value specified below. 1/ Nonconformance with individual, mean (x) or standard deviation(s) requirements shall be cause for rejection of the lot.

Calculated mean (x)	Maximum unbiased standard deviation	Calculated mean (x)	Maximum unbiased standard deviation
0.890	0.0028	0.825	0.0120
0.885	0.0035	0.820	0.0127
0.880	0.0042	0.815	0.0135
0.875	0.0049	0.810	0.0142
0.870	0.0056	0.805	0.0149
0.865	0.0063	0.800	0.0156
0.860	0.0071	0.795	0.0163
0.855	0.0078	0.790	0.0170
0.850	0.0085	0.785	0.0177
0.845	0.0092	0.780	0.0184
0.840	0.0099	0.775	0.0191
0.835	0.0106	0.770	0.0198
0.830	0.0113	0.765	0.0206

1/ For calculated means lying between tabular values, use the higher tabular value.

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

3.7 Plant qualification. 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, Processing, Packaging or Holding of Human Foods," and the plant sanitation requirements of the appropriate Government inspection agency.

3.8 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 the requirements of this document. The contractor shall assure 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 necessary to assure compliance with the requirements of this document.

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 document and evaluated for overall appearance and palatability. Any failure to conform to the quality assurance provisions of this document 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 inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document 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, or compliance 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 Association of Official Analytical Chemists and in the Approved Methods of the American Association of Cereal Chemists, to determine conformance to the requirements. Any nonconformance to any 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 packing 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 inspection. Temperature readings shall be made of at least six tray packs per lot (two from the beginning, middle, and end of the lot). The finding of any tray pack, the temperature of which is less than the specified temperature at time of final seal shall be cause for rejection of the lot (see 3.5).

4.5.3 Tray pack inspection. The inspection lot shall include only tray packs produced in one workshift. The USDA reserves the right to separate the inspection lot into smaller inspection lots.

4.5.3.1 Net weight inspection. Randomly select 30 filled and sealed tray pack cans of each class of product 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 any result is less than the applicable weight indicated below, the lot shall be rejected.

Cake classes	Average weight (oz)	Individual weight (oz)
Classes 1 and 4	52	51
Class 2	48	47
Classes 3 and 5	50	49
Class 6	53	52

4.5.3.2 Product inspection. The sample size shall be as indicated by the double sampling plan specified in table II. The tray pack cans shall be selected at random from the lot. The tray packs shall be opened and inspected for the defects listed in table III. The tray pack cans shall be opened not less than 24 hours after sealing.

TABLE II. Double sampling plan for product inspection 1/

Lot size (cans)	Sample size (No. of cans)	Cumulative sample	Acceptance number	Rejection number
0 to 3,200	8	-	0	2
	8	16	1	2
3,201 to 35,000	13	-	0	3
	13	26	3	4

1/ a. If no defects are found in the first sample, the lot shall be accepted.

b. If the number of defects found in the first sample equals or exceeds the rejection number, the lot shall be rejected.

c. If the number of defects found in the first sample exceeds the acceptance number but is less than the rejection number, the second sample shall be inspected. Defects found in the first and second samples shall be combined and if the number of defects in the cumulative sample equals or exceeds the rejection number, the lot shall be rejected.

TABLE III. Product defects 1/ 2/

Category		Defect
Major	Minor	
101		The cake and crust do not have a uniform color and texture
102		The cake is raw, gummy and/or collapsed indicating underbaked conditions
103		When bisected vertically with a sharp knife, the cake crumbles; has compression streaks, gummy center, or soggy areas; does not have a reasonably close, even grain structure; has raw, stringy, or ungelatinized portions; is scorched, dry and/or crisp indicating overbaked conditions
104		Not a uniform distribution of fruit pieces, nuggets/ bits, or walnuts, as applicable
105		Cake flavor not type as identified on label
106		Marble cake does not have distinct yet integrated swirls of chocolate and white cake
107		Egg ingredients not properly mixed in poundcake to prevent brown depressions on cake surface
	201	Cake not covered with food grade parchment large enough to prevent cake adhesion to the lid

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

2/ Product not equal to or better than the approved preproduction sample (see 6.1) in palatability or overall appearance shall be cause for rejection of the lot. (This comparison shall be performed only when deemed necessary by an Agricultural Marketing Service (AMS) agent.)

4.5.3.3 Water activity testing. Eight tray pack cans shall be randomly selected from each production lot and individually tested for water activity. The water activity shall be determined in an AMS laboratory in accordance with the Official Methods of Analysis of the Association of Official Analytical Chemists; Chapter: Vegetables Products, Processed; Method: Water Activity Official First Action, using an electric hygrometer system or an equivalent instrument. The sample unit shall be a specimen from the center bottom layer of the cake. The results of each A_w (water activity) determination shall be reported to the third decimal place. The calculated mean of the eight samples shall be the value used to enter the table in 3.6.1. The lot shall be rejected if the individual or mean of the water activity values exceeds 0.890 or if the unbiased standard deviation exceeds the applicable value in 3.6.1 for the calculated mean.

* 4.5.3.4 Commercial sterility testing. The sample size shall be one filled, baked, and sealed tray pack can selected from each batch in the lot. The sample cans shall be tested for commercial sterility by incubating the cans at 80°F ± 5°F for 10 days. Any evidence of can swelling shall be considered a critical defect and cause 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 inspection for labeling shall be in accordance with MIL-L-1497 (see 5.4).

* 4.5.5 Can closure examination. Can closures shall be examined visually and by teardowns in accordance with the can manufacturer's requirement amd CFR 21, Part 113, subpart D. Any nonconformance based on observation of can seam teardowns or of record of can seam teardowns shall be cause for rejection of any involved product.

* 4.5.6 Vacuum examination. Cans shall be allowed to cool to 75° ± 5°F, held for at least 24 hours after sealing, and then examined for vacuum retention. To examine, lay a straightedge in the center of the lid along the length of the tray pack. Both ends of the straightedge shall touch the lid at the inside edge of the double seam. There shall be a visible gap between the straightedge and the lid for the entire distance of the label panel. Using a shorter straightedge, the same procedure shall be used across the width, in the center of the tray pack can. When examining a ribbed lid, only lay the straightedge 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 nonconforming tray pack can 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 or C as specified (see 6.1).

5.1.1 Level A. A size 1001 by 1206 by 200 tray pack can shall be filled with batter, thermohydrostabilized, and sealed as specified in 3.5. The base plate of the can shall be electrolytic chromium-coated steel and shall be of a sufficient temper to protect the product during shipment and storage. The base plate weight of the body and end of each can shall be 90 pounds per base box. The entire inside area of the can shall be coated. Scratches or fractures shall not penetrate through the interior can coating. The interior can coating shall not peel or blister when in contact with the product. The interior can coating shall neither affect nor be affected by the packaged product. A certificate of conformance shall be furnished to certify compliance with the interior can coating requirements. The can shall be coated overall on the outside with a coating conforming to type I of TT-C-495.

5.1.1.1 When specified (see 6.1), the base plate of the can shall be electrolytic chromium-coated steel and shall be of sufficient temper to protect the product during shipment and storage. The base plate weight of the body and end of each can shall be 98 pounds per base box. The body design shall be reinforced on the bottom with six longitudinal beads or ribs 0.050 inch ± 0.010 inch deep. The beads shall be 9 inches by 3/4 inch in length and width and shall be equidistant in the center panel of the bottom. The end design shall be reinforced with eight longitudinal beads 0.018 inch ± 0.004 inch deep. The beads shall be 11 inches by 3/4 inch in length and width and shall be equidistant in the center panel of the end. The center four beads on the end design shall be interrupted to provide a 5-inches by 5-inches flat center panel for labeling. The apex of all these beads shall be outward. The interior and exterior can coating requirements shall be as specified in 5.1.1.

5.1.2 Level C. The product shall be preserved as specified in 5.1.1, except that cans with commercial exterior coating will be acceptable.

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). 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. 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 so as to create columnar stacking. 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 also 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). 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 the same material as the box.

5.3 Unit loading. When specified (see 6.1), the product, packed as specified in 5.2.2 and 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 course per load with all courses having the same pattern so as to create columnar stacking. When unit loads are strapped, the strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

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

- Official establishment number (e.g., est 38) or a three letter code identifying the establishment

- Lot number 1/

- Production shift number 1/

1/ The lot number shall be expressed as 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, 1987 would be coded as 7078.) 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 side of the can. The labeling shall be legible when examined as specified in 4.5.4 after preparation of product in accordance with heating instructions. Paper labels are not permitted. Cans shall show the following statements:

* TO HEAT

a. To heat: Submerge unopened can in boiling water. Simmer gently 10-20 minutes (longer if product is cold). Avoid overheating (can shows evidence of bulging).

CAUTION: Use care when opening as pressure may have been generated within the can.

b. To heat in oven: Either punch several holes in lid of can or open can in usual manner leaving the loose lid in place. Place in a 350° oven for approximately 15 minutes.

WARNING: Do not place unopened can in oven. This may cause the can to burst.

YIELD

* For Army Field Feeding use, serves 18 portions cut 3 rows by 6 rows. For other uses, serves 20 portions cut 4 rows by 5 rows.

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 when tray pack cans are fabricated from 90 pounds per base box, the following precautionary marking in capital letters, larger than other markings, shall be included:

CAUTION: DO NOT STACK PALLETS IN TRANSIT
OR MORE THAN TWO HIGH IN STORAGE

6. NOTES

6.1 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this document.
b. Class of product required (see 1.2).
c. When a first article is required (see 3.1, 4.4 and 6.3).
d. Provisions for approved preproduction samples (see 3.6.2 and 6.3).
e. Level of preservation and packing required (see 5.1 and 5.2).
f. When tray pack cans are to be fabricated from 98 pounds per base box (see 5.1.1.1).
g. Type and class of unit load when unit loading is required (see 5.2.1 and 5.3).

6.2 Appropriate level of pack. Based on the conditions known or expected to be encountered during shipment, handling, and storge of the specific item being procured, the procuring activity should select the appropriate level of pack in accordane with the criteria established in AR 700-15/NAVSUPINST 4030.28/AFR 71-6/MCO 4030.33A/DLAR 4145.7.

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. 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 include specific instructions in all acquisition instruments regarding arrangements for selection, inspection, and approval of the first article.

6.4 Starch waxy maize, modified, pregelatinized, instant. "Pure-Flo F" starch from National Starch and Chemical Corporation or its equivalent may be used to provide a satisfactory end item.

6.5 Apples, dehydrated, diced. "King Blossom Apple Dices" from Valley Evaporating Company or its equivalent may be used to provide a satisfactory end item.

* 6.6 Subject term (key word) listing.

Cakes
Canned
Tray pack

6.7 Changes from previous issue. The margins of this document are marked with an asterisk (*) to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only, and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content, as written, irrespective of the marginal notations and relationship to the last previous issue.

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DP - SS

Preparing activity:

Army - GL

Project No. 8920-0502

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-44235A	Cakes, Canned, Thermohydrostabilized, Tray Pack

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR ☐ USER ☐ MANUFACTURER ☐ OTHER *(Specify)*: _____
b. ADDRESS *(Street, City, State, ZIP Code)*	

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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NATICK OP, 1 Apr 84

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