

## **SECTION C**

This document covers cornbread packaged in a polymeric tray for use by the Department of Defense as a component of operational rations.

### **C-1 ITEM DESCRIPTION**

**PCR-C-071, CORNBREAD, PACKAGED IN A POLYMERIC TRAY, SHELF STABLE**

### **C-2 PERFORMANCE REQUIREMENTS**

A. Product standard. A sample shall be subjected to first article (FA) or product demonstration model (PDM) inspection as applicable, in accordance with the tests and inspections of Section E of this Performance-based Contract Requirements (PCR) document. The approved sample shall serve as the product standard. Should the contractor at any time plan to, or actually produce the product using different raw material or process methodologies from the approved Product Standard, which result in a product non-comparable to the Product Standard, the contractor shall arrange for a new or alternate FA or PDM approval. In any event, all product produced must meet all requirements of this document including Product Standard comparability.

B. Shelf life. The packaged product shall meet the minimum shelf life requirement of 36 months at 80°F.

C. Appearance.

(1) General. The finished product shall be cornbread. The cornbread shall be fully baked. The cornbread shall show no evidence of compression streaks.

(2) Cornbread. The cornbread shall have a golden brown surface. The interior shall be golden yellow, irregular shaped crumb. The product shall be free from foreign materials and shall show no evidence of excessive baking (materially darkened or scorched). The cornbread height, measured at its highest point, shall be not less than 1-1/4 inch.

D. Odor and flavor. The packaged food shall be free from foreign odors and flavors. The cornbread shall have a sweet, mild corn odor and flavor.

E. Texture. The cornbread shall have a dense, tender, moist, fine grain texture with scattered air pockets.

F. Net weight. No individual polymeric tray shall have a net weight of less than 36 ounces (1020 grams).

G. Palatability and overall appearance. The finished product shall be equal to or better than the approved product standard in palatability and overall appearance.

H. Analytical requirements.

(1) Fat content. The fat content shall be not less than 12.0 percent.

(2) Water activity (Aw). The water activity of packaged product shall be not greater than 0.850 at 25°C.

I. Oxygen content. The oxygen content of the filled and sealed polymeric tray shall not exceed 0.3 percent after 72 hours.

### **C-3 MISCELLANEOUS INFORMATION**

THE FOLLOWING INGREDIENTS ARE FOR INFORMATION ONLY. THIS IS NOT A MANDATORY CONTRACT REQUIREMENT.

A. Ingredients. The ingredients for cornbread may be as follows: Enriched bleached wheat flour (bleached flour, malted barley flour, niacin, reduced iron, thiamine mononitrate, riboflavin, folic acid), water, sugar, egg, partially hydrogenated soybean and cottonseed oils, yellow cornmeal, glycerol, soybean oil, may contain 2 percent or less of: nonfat dry milk, salt, leavening (sodium acid pyrophosphate, sodium bicarbonate, monocalcium phosphate), modified corn starch, xanthan gum, guar gum, potassium sorbate (preservative), artificial color (yellow 5 lake), natural and artificial flavor.

## **SECTION D**

### **D-1 PACKAGING**

A. Preservation. Product as specified plus the appropriate number of oxygen scavengers and ovenable tray insert, if applicable, shall be filled and sealed into polymeric trays and the trays shall conform to the requirements of section 3 of MIL-PRF-32004, Packaging of Food in Polymeric Trays, Type II Oven-baked Products. Verification testing and inspection of trays and lids shall be in accordance with Section 4 of MIL-PRF-32004 and the Quality Assurance Provisions of Section E of this Performance-based Contract Requirements document. The requirement for protective sleeves shall not apply to Type II Oven-baked Products.

B. Polymeric tray closure. The filled and sealed tray shall be securely closed.

C. Oxygen scavenger. The oxygen scavenger shall be constructed of materials that are safe for direct or indirect food contact and shall be suitable for use with edible products. The oxygen scavenger shall be in compliance with all applicable FDA regulations.

D. Ovenable tray insert. The ovenable tray insert (if utilized) shall be constructed of materials that are safe for direct or indirect food contact and shall be suitable for use with edible products. The ovenable tray insert shall be in compliance with all applicable FDA and USDA regulations.

## **D-2 LABELING**

A. Polymeric tray body. The polymeric tray body shall be clearly printed or stamped in a manner that does not damage the tray, with permanent ink of any contrasting color, which is free of carcinogenic elements. One end of the polymeric tray (see figure 1 of MIL-PRF-32004) shall be marked with the product name and number of portions. If the tray body end markings are not readily legible in low light conditions, a small, easily legible label shall be applied, but not over any existing tray markings. All other markings may be applied along the tray body side. The product name, lot number and filling equipment number shall be applied at the time of tray sealing. 1/

Tray body markings shall include:

(1) Product name. Commonly used abbreviations may be used.

(2) Tray code includes: 2/  
Lot Number

1/ As an alternate method, tray body markings may be clearly printed or stamped onto the polymeric tray lid at the time of tray sealing, in a manner that does not damage the lid, with permanent ink of any contrasting color, which is free of carcinogenic elements, provided that the required markings are applied onto the tray body prior to packing for shipment to ration assembler.

2/ 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, 14 February 2007 would be coded as 7045). The Julian code shall represent the day the product was packaged into the tray and the tray sealed. Sublotting (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.

B. Polymeric tray lid. The lid shall be clearly printed or stamped in a manner that does not cause damage. Permanent ink of any contrasting color, which is free of carcinogenic elements, shall be used. As an alternate labeling method, a pre-printed self-adhering 0.002 inch thick clear polyester label printed with indelible contrasting color ink may be used.

Note: The font tested by Natick was Microsoft Helvetica. The font used shall be similarly clear/easy to read as Helvetica. The recommended font sizes are as follows: 22 for the product name, 14 for “yield” and “to heat in water.” If an additional note is required on the label, such as “fluff before serving,” it should also be in font size 14. All other information should be in font size 9.

(1) Lid labeling shall include:

- Product name and flavor
- Ingredients
- Net weight
- Name and address of packer
- “Nutrition Facts” label in accordance with the Nutrition Labeling and Education Act (NLEA) and all applicable FDA regulations.

(2) Lid labeling shall also show the following statements:

**YIELD:** Serves 18 portions, cut 3 rows by 6 rows.

**TO HEAT IN WATER:** Submerge unopened tray in water. Bring water to a boil. Simmer gently 10-15 minutes. Avoid overheating (tray shows evidence of bulging).

**WARNING:** Do not heat tray in oven.

**TO TRANSPORT AFTER HEATING:** Stack trays with lids oriented upright and fiberboard pads in between.

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

**TO OPEN:** Using a clean knife, cut the lidding around the inside perimeter of the tray seals.

**SUGGESTION:** Cut lid along 3 sides and fold over uncut portion. Fold back to keep unused portions protected.

### **D-3 PACKING**

A. Packing for shipment to ration assembler. Four filled, sealed and processed polymeric trays shall be packed in a snug fitting fiberboard box conforming to style RSC-L, type CF, grade 275 of ASTM D 5118/D 5118M Standard Practice for Fabrication of Fiberboard Shipping Boxes. The trays shall be stacked with lids oriented upright. Fiberboard pads shall be placed between the trays and on the top and bottom of the stacked trays. The pad dimensions shall be not less than 1/8 inch of the full length and width inside dimensions of the box and shall be fabricated of class domestic, grade 275 fiberboard. The box shall be closed in accordance with ASTM D 1974 Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes.

#### **D-4 UNITIZATION**

A. Unit loads. Unit loads shall be as specified in DSCP FORM 3507, Loads, Unit: Preparation of Semiperishable Subsistence Items.

#### **D-5 MARKING**

A. Shipping containers and unit loads. Marking of shipping containers and unit loads shall be as specified in DSCP FORM 3556, Marking Instructions for Boxes, Sacks, and Unit Loads of Perishable and Semiperishable Subsistence.

### **SECTION E INSPECTION AND ACCEPTANCE**

The following quality assurance criteria, utilizing ANSI/ASQ Z1.4, Sampling Procedures and Tables for Inspection by Attributes, are required. Unless otherwise specified, Single

Sampling Plans indicated in ANSI/ASQ Z1.4 will be utilized. When required, the manufacturer shall provide the Certificate(s) of Conformance to the appropriate inspection activity. Certificate(s) of Conformance not provided shall be cause for rejection of the lot.

A. Definitions.

(1) Critical defect. A critical defect is a defect that judgment and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending on the item; or a defect that judgment and experience indicate is likely to prevent the performance of the major end item, i.e., the consumption of the ration.

(2) Major defect. A major defect is a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

(3) Minor defect. A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

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

(1) Product standard inspection. The first article or product demonstration model shall be inspected in accordance with the provisions of this document and evaluated for overall appearance and palatability. Any failure to conform to the performance requirements or any appearance or palatability failure shall be cause for rejection of the lot. The approved first article or product demonstration model shall be used as the product standard for periodic review evaluations. All food components that are inspected by the USDA shall be subject to periodic review sampling and evaluation. The USDA shall select sample units during production of contracts and submit them to the following address for evaluation:

US Army Research, Development, and Engineering Command  
Natick Soldier Research, Development, and Engineering Center  
AMSRD-NSC-CF-F  
15 Kansas Street  
Natick, MA 01760-5018

One lot shall be randomly selected during each calendar month of production. Two (2) sample units of each item produced shall be randomly selected from that one production lot. The two (2) sample units shall be shipped to Natick within five working days from the end of the production month and upon completion of all USDA inspection requirements. The sample units will be evaluated for the characteristics of appearance, odor, flavor, texture, and overall quality.

(2) Conformance inspection. Conformance inspection shall include the examinations and the methods of inspection cited in this section.

**E-5 QUALITY ASSURANCE PROVISIONS (PRODUCT)**

A. Product examination. The finished product shall be examined for compliance with the performance requirements specified in Section C of this Performance-based Contract Requirements document utilizing the double sampling plans indicated in ANSI/ASQ Z1.4. The lot size shall be expressed in polymeric trays. The sample unit shall be the contents of one polymeric tray. 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. Defects and defect classifications are listed in table I below. The filled and sealed polymeric trays shall be brought to room temperature (65°F to 75°F).

TABLE I. Product defects 1/ 2/ 3/

Category		Defect
<u>Major</u>	<u>Minor</u>	
		<u>General</u>
101		Product not cornbread.
102		Product not fully baked.
103		Polymeric tray does not contain intact oxygen scavenger(s).
104		Product shows evidence of excessive baking (materially darkened or scorched).
	201	Evidence of delamination by ovenable tray insert (if utilized).
	202	Evidence of compression streaks.

TABLE I. Product defects 1/ 2/ 3/

Category		Defect
<u>Major</u>	<u>Minor</u>	
		<u>Appearance</u>

- 203 Surface not golden brown.
- 204 Interior not golden yellow or not irregular shaped crumb.
- 205 Product height not as specified. 4/

Odor and flavor

- 105 Product not sweet or not mild corn odor or flavor.

Texture

- 206 Texture not dense or not tender or not moist or not fine grain with scattered air pockets.

Net weight

- 207 Net weight of an individual polymeric tray less than 36 (1020 grams) ounces.
- 

1/ Presence of any foreign materials such as, but not limited to dirt, insect parts, hair, glass, wood, or metal, or any foreign odors or flavors such as, but not limited to burnt, scorched, rancid, sour, stale, musty or moldy shall be cause for rejection of the lot.

2/ Finished product not equal to or better than the approved product standard in palatability and overall appearance shall be cause for rejection of the lot.

3/ Bisect cornbread vertically in the center with a sharp knife to inspect for defects.

4/ Cornbread shall be measured at the highest point along the vertical cut.

B. Methods of inspection

(1) Shelf life. The contractor shall provide a Certificate of Conformance that the product has a 36 month shelf life when stored at 80°F. Government verification may include storage for 6 months at 100°F or 36 months at 80°F. Upon completion of either storage period, the product will be subjected to a sensory evaluation panel for appearance and



palatability and must receive an overall score of 5 or higher based on a 9 point hedonic scale to be considered acceptable.

(2) Net weight. The net weight of the filled and sealed polymeric tray shall be determined by weighing each sample unit on a suitable scale tared with a representative empty tray, ovenable tray insert (if utilized), appropriate number of oxygen scavengers, and lid. Results shall be reported to the nearest 1 ounce or to the nearest 1 gram.

(3) Analytical. The sample to be analyzed shall be a one pound composite of three filled and sealed polymeric trays which have been selected at random from one production lot. The composite sample shall be prepared and analyzed in accordance with the following methods of the Official Methods of Analysis (OMA) of AOAC International:

<u>Test</u>	<u>Method Number</u>
Fat	922.06, 985.15

Test results shall be reported to the nearest 0.1 percent. Verification will be conducted through actual testing by a Government laboratory. Any nonconforming result shall be cause for rejection of the lot.

(4) Water activity (Aw). Eight filled and sealed polymeric trays shall be selected at random from the lot regardless of lot size. Water activity (Aw) shall be determined not less than 4 days but not more than 14 days after baking to allow moisture equilibration in the product. The product shall be individually tested for water activity in accordance with the Official Methods of Analysis (OMA) of the AOAC method 978.18, using an electric hygrometer system self-temperature controlled at 25°C or an equivalent instrument. The sample unit shall be a specimen from the center of the product. The results of each Aw determination shall be reported to the nearest 0.001. Any nonconforming result shall be cause for rejection of the lot.

(5) Oxygen content testing. Eight filled and sealed polymeric trays shall be randomly selected from one production lot and individually tested for oxygen content. Testing shall be accomplished after the filled and sealed polymeric trays have been allowed to equilibrate at room temperature for not less than 72 hours from the time of sealing. Test results shall be reported to the nearest 0.01 percent. Verification will be conducted through actual testing by a Government laboratory. Any individual result not conforming to the oxygen content requirement shall be cause for rejection of the lot.

**E-6 QUALITY ASSURANCE PROVISIONS (PACKAGING AND PACKING MATERIALS, POLYMERIC TRAY)**

A. Packaging and labeling.

(1) Polymeric tray testing. For purposes of clarification, the polymeric tray without the lid will be referred to as the “tray” and the polymeric tray with the lid shall be referred to as the “container”. The container and container materials shall be examined for the characteristics listed in table I of MIL-PRF-32004, Packaging of Food in Polymeric Trays. The lot size, sample unit, and inspection level criteria are provided in table II below for each of the test characteristics. Any test failure shall be classified as a major defect and shall be cause for rejection of the lot. For rough handling survivability at frozen temperature, polymeric tray survival rate shall be at least 85 percent.

TABLE II. Polymeric tray quality assurance criteria  
Prior to processing

Characteristic	Lot size expressed in	Sample unit	Inspection level
Tray configurations and dimensions	Trays	1 tray	S-1
Oxygen gas transmission rate of tray	Trays	1 tray	S-1
Oxygen gas transmission rate of lid	Yards	1/2 yard	S-1
Water vapor transmission rate of tray	Trays	1 tray	S-1
Water vapor transmission rate of lid	Yards	1/2 yard	S-1
Camouflage	Containers	1 container	S-1

After processing

Characteristic	Lot size expressed in	Sample unit	Inspection level
Processing	Trays	1 tray	S-2
Rough handling survivability	Test containers	1 container	S-2
Headspace (vacuum) <u>1/</u>	Containers	1 container	S-1

Closure seal	Containers	1 container	S-1
Internal pressure	Containers	1 container	S-1
Lid opening	Containers	1 container	S-1

1/ Lack of visible gap between straight edge and lidding material along entire length of lidding and/or lack of tautness by the lidding shall not be scored as defects.

(2) Examination of container. The container shall be examined for the defects listed in table II of MIL-PRF-32004 and the labeling defects listed in table III below. The lot size shall be expressed in containers. The sample unit shall be one processed and labeled container. The inspection level shall be I and the AQL, expressed in terms of defects per hundred units, shall be 0.65 for major A defects, 2.5 for major B defects and 4.0 for minor defects. Fifty sample units shall be examined for critical defects. The finding of any critical defect shall be cause for rejection of the lot.

TABLE III. Container labeling defects

Category		Defect
<u>Major A</u>	<u>Minor</u>	
101		Polymeric tray lid or body labeling missing, incorrect or illegible.
	201	When a pre-printed self adhering label is used, the label not adhering to tray lid (for example, label raised or peeled back from edge to corner) or presence of any areas of gaps along the perimeter of the label where the label is not properly adhered.

(3) Label adhesive examination. When self-adhering labels are used, the adhesive shall be tested in accordance with ASTM D 3330/D 3330M Standard Test Method for Peel Adhesion of Pressure Sensitive Tape. In lieu of testing, a Certificate of Conformance (CoC) shall be provided.

B. Packing.

(1) Shipping container and marking examination. The filled and sealed shipping containers shall be examined for the defects listed in table IV below. The lot size shall be expressed in shipping containers. The sample unit shall be one shipping container fully packed. The inspection level shall be S-3 and the AQL, expressed in terms of defects per hundred units, shall be 4.0 for major defects and 10.0 for total defects.

TABLE IV. Shipping container and marking defects

Category		Defect
<u>Major</u>	<u>Minor</u>	
101		Marking missing or incorrect or illegible.
102		Inadequate workmanship. <u>1/</u>
	201	Arrangement or number of polymeric trays not as specified.

1/ Inadequate workmanship is defined as, but not limited to, incomplete closure of container flaps, loose strapping, inadequate stapling, improper taping, or bulged or distorted container.

C. Unitization.

(1) Unit load examination. The unit load shall be examined in accordance with the requirements of DSCP FORM 3507, Loads, Unit: Preparation of Semiperishable Subsistence Items. Any nonconformance shall be classified as a major defect.

**SECTION J REFERENCE DOCUMENTS**

DSCP FORMS

- DSCP FORM 3507 Loads, Unit: Preparation of Semiperishable Subsistence Items
- DSCP FORM 3556 Marking Instructions for Boxes, Sacks, and Unit Loads of Perishable and Semiperishable Subsistence

MILITARY SPECIFICATIONS

MIL-PRF-32004      Packaging of Food in Polymeric Trays

**GOVERNMENT PUBLICATIONS**

Federal Food, Drug, and Cosmetic Act and regulations promulgated thereunder  
(21 CFR Parts 1-199) and (9 CFR Parts 1-391)

**NON-GOVERNMENTAL STANDARDS**

**AMERICAN SOCIETY FOR QUALITY (ASQ)**

ANSI/ASQ Z1.4-2003      Sampling Procedures and Tables for Inspection by Attributes

**ASTM INTERNATIONAL**

D 1974-98 (2003)      Standard Practice for Methods of Closing, Sealing,  
and Reinforcing Fiberboard Boxes

D 3330/D 3330M-04      Standard Test Method for Peel Adhesion of Pressure-  
Sensitive Tape

D 5118/D 5118M-05ae1      Standard Practice for Fabrication of Fiberboard  
Shipping Boxes

**AOAC INTERNATIONAL**      Official Methods of Analysis (OMA) of the AOAC  
International