

## **SECTION C**

This document covers thermostabilized elbow macaroni in tomato sauce packaged in a flexible pouch for use by the Department of Defense as a component of operational rations.

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

#### **PCR-E-019, ELBOW MACARONI IN TOMATO SAUCE, PACKAGED IN A FLEXIBLE POUCH, 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 noncomparable to the product standard, the contractor shall submit a replacement FA or PDM for approval. In any event, all product produced must meet all requirements of this document including product standard comparability.

B. Commercial sterility. The packaged product shall be processed until commercially sterile.

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

D. Appearance.

(1) General. The finished product shall be a uniform mixture of elbow macaroni in tomato sauce. The finished product shall be free from foreign materials.

(2) Macaroni. The elbow shaped macaroni shall be an enriched whole grain pasta product. The cooked elbow shaped macaroni shall be not less than 3/4 inch and not greater than 1-1/2 inches in length. The cooked elbow shaped macaroni shall be intact and have a medium tan color.

(3) Sauce. The sauce shall be a medium reddish-orange color and shall contain visible flecks of herbs and spices. The sauce may contain pieces of diced tomato.

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E. Odor and flavor. The packaged food shall have an odor and flavor of cooked whole grain pasta in a mild garlic and onion seasoned tomato sauce. The packaged food shall be free from foreign odors and flavors.

F. Texture.

(1) Macaroni. The cooked elbow shaped macaroni shall be slightly soft to slightly firm and shall not be pasty.

(2) Sauce. The sauce shall be slightly thin to moderately thick and free flowing.

G. Net weight. The average net weight shall be not less than 8.0 ounces (227 grams). The net weight of an individual pouch shall be not less than 7.5 ounces (213 grams).

H. Drained weight. The average drained weight of the elbow macaroni shall be not less than 4.0 ounces (113 grams). The drained weight of the elbow macaroni in an individual pouch shall be not less than 3.5 ounces (99 grams).

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

J. Analytical requirements.

(1) Fat. The fat content shall be not greater than 2.5 percent.

(2) Salt. The salt content shall be not greater than 1.0 percent.

K. Vegetarian requirement. This product shall contain no ingredients, major or trace, and/or processing aids derived from the flesh, skin, blood, entrails, or bones of animals. This includes, but is not limited to oils, fats, fatty acids and their esters, flavorings, gelling agents, coagulants, binders, emulsifiers, fatty alcohol, aldehydes, and ketones, lactones, glycerol, amino acids, hydrolyzed proteins, enzymes, and enzyme modified products. Furthermore, these products shall contain no ethyl alcohol, or ingredients derived from or containing methyl alcohol. Milk and eggs, and ingredients derived from them such as yogurt, or cheese (produced without animal based rennet or pepsin), are allowed.

**SECTION D**

**D-1 PACKAGING**

Product shall be filled into pouches and processed in accordance with MIL-PRF-44073, Packaging of Food in Flexible Pouches, Type I, Style 1.

**D-2 LABELING**

A. Pouches. Each pouch shall be correctly and legibly labeled. Printing ink shall be permanent black ink or any other contrasting color, which is free of carcinogenic elements. Prior to thermal processing of the pouches, the product name, lot number, filling equipment number and time stamp shall be applied. All other marking may be applied before or after thermal processing.

(1) Product name (not less than 1/8 inch high). Commonly used abbreviations may be used.

(2) Pouch code includes: 1/

- Lot number
- Filling equipment identification number
- Company code
- Retort identification number and Retort cook number (Optional)
- Time stamp (hour and minute of filling/sealing operation)

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, 14 February 2016 would be coded as 6045). The Julian code shall represent the day the product was packaged into the pouch and processed. Following the four digit Julian code, the other required code information shall be printed in the sequence as listed above.

B. Paperboard sleeves.

(1) The sleeves shall be clearly printed on one of the panels with permanent black ink as follows: 1/

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Product name (7/32 to 9/32 inch block letters)  
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

1/ With contracting officer approval, this information may be printed on the pouch in lieu of the paperboard sleeve.

(2) The product shall be formulated and labeled in accordance with all FDA labeling regulations and policies. The sleeves (or pouches, as applicable) shall be labeled with the following product name.

ELBOW MACARONI IN TOMATO SAUCE

**D-3 PACKING**

A. Packing. Not more than 40 pounds of product shall be packed in a fiberboard shipping box constructed in accordance with style RSC of ASTM D5118/D5118M, Standard Practice for Fabrication of Fiberboard Shipping Boxes. The fiberboard shall conform to type CF, class D, variety SW, burst grade 200 or ECT grade 32 of ASTM D4727/D4727M, Standard Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes. Each box shall be closed in accordance with ASTM D1974/D1974M, Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes.

**D-5 MARKING**

A. Shipping containers. Shipping containers shall be marked in accordance with DLA Troop Support 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.

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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 appearance, odor, flavor, and texture. Any failure to conform to the performance requirements or any appearance or palatability failure shall be cause for rejection of the lot.

(2) Periodic review evaluation. 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  
RDNS-SEC-F  
15 Kansas Street  
Natick, MA 01760-5056

One lot shall be randomly selected during each calendar month of production or as otherwise specified in the contract. Three (3) sample units shall be randomly selected from that one production lot. The three (3) sample units shall be shipped to Natick within five (5) working days from the end of the production month from which they are randomly selected and upon completion of all USDA inspection requirements. The sample units will be evaluated for overall quality against the current first article or product demonstration model.

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(3) Conformance inspection. Conformance inspection shall include the examinations/tests and methods of inspection cited in this section and in section 4 of MIL-PRF-44073.

**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 pouches. The sample unit shall be the contents of one pouch. The inspection level shall be S-3 and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 1.5 for major defects and 4.0 for minor defects. Defects and defect classifications are listed in table I. For drained weight inspection, a separate set of pouches shall be selected from the lot using the same sampling criteria as above. The pouches shall be immersed in not less than 140°F and not greater than 190°F water for 10 minutes prior to conducting the product examination and the drained weight inspection.

TABLE I. Product defects 1/ 2/ 3/ 4/ 5/

Category		Defect
<u>Major</u>	<u>Minor</u>	
		<u>Appearance</u>
101		Product not a uniform mixture of elbow macaroni in tomato sauce.
	201	Cooked elbow shaped macaroni not intact.
	202	Cooked elbow shaped macaroni does not have a medium tan color.
	203	Sauce not a medium reddish-orange color or not with visible flecks of herbs and spices.
		<u>Odor and flavor</u>
102		Product does not have an odor or flavor of cooked whole grain pasta in a mild garlic and onion seasoned tomato sauce.

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TABLE I. Product defects 1/ 2/ 3/ 4/ 5/ - Continued

<u>Category</u>	<u>Defect</u>
<u>Major</u>	<u>Minor</u>
	<u>Texture</u>
	204 Cooked elbow shaped macaroni not slightly soft to slightly firm or is pasty.
	205 Sauce not slightly thin to moderately thick or not free flowing.
	<u>Net weight</u>
	206 Net weight of an individual pouch less than 7.5 ounces (213 grams). <u>6/</u>
	<u>Drained weight</u>
	207 Drained weight of elbow macaroni in an individual pouch less than 3.5 ounces (99 grams). <u>7/</u>

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/ Product shall be verified as meeting the vegetarian requirement by CoC.

4/ Verification of the elbow shaped macaroni as enriched whole grain product that includes 51 percent of whole grain, as whole durum wheat flour, by total weight of ingredients shall be verified by the producer's CoC.

5/ Length of the cooked whole grain elbow shaped macaroni product shall be verified by CoC.

6/ Sample average net weight less than 8.0 ounces (227 grams) shall be cause for rejection of the lot.

7/ Sample average drained weight less than 4.0 ounces (113 grams) shall be cause for rejection of the lot.

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B. Methods of inspection.

(1) Commercial sterility. Commercial sterility shall be verified in accordance with FDA regulations.

(2) 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 quality scale to be considered acceptable.

(3) Net weight. The net weight of the filled and sealed pouches shall be determined by weighing each sample on a suitable scale tared with a representative empty pouch. Results shall be reported to the nearest 0.1 ounce or to the nearest 1 gram.

(4) Drained weight. ~~Weigh a U.S. Standard 1/4 inch sieve to obtain the sieve tare weight. The pouch contents shall be poured into a flat bottom container. A minimum of three times the volume of the pouch of not less than 140°F water and not greater than 190°F shall be added to the container so as to cover the contents. The contents and water shall be gently agitated so as to remove the sauce without breaking the elbow shaped macaroni. The contents shall then be poured into a U.S. Standard 1/4 inch sieve in a manner that will distribute the product over the sieve without breaking the elbow shaped macaroni. The sieve area shall be such that the distributed product does not completely cover all the openings of the sieve. The sieve shall be tilted at such an angle to assure complete drainage of liquid from the product. Drain product for two minutes before determining the drained weight by subtracting the sieve tare weight from the gross weight. The drained weight shall be reported to the nearest 0.1 ounce or to the nearest 1 gram.~~ Use a U.S. Standard 1/4 inch sieve for the drained weight examination. Heat all the pouches at the same time for 10 minutes in hot water. 1/ Pour the contents of the pouch into a flat-bottom container and repeatedly add hot water until all of the product has been removed from the pouch. 1/ Additional hot water may be added to the flat-bottom container so as to cover all of the contents. 1/ The mixture shall be gently agitated so as to liquefy rendered fat without breaking the product. 2/ The mixture shall not sit for greater than two minutes. The contents shall then be poured into the sieve in a manner that will distribute the product over the sieve without breaking up the product. The sieve area shall be such that the distributed product does not completely cover all the openings of the sieve. The sieve shall be tilted at an angle from 30 to 45 degrees to ensure complete drainage of liquid from the product. Drain product for two minutes. Place the sieve and its contents onto the scale and tare the scale to zero. Remove the elbow macaroni from the sieve by turning the sieve upside down and dumping the product. Place the sieve back on the scale and record the weight as a positive number. This value is the drained weight of the elbow macaroni. When



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necessary, rinse the screen before performing the next drained weight exam. The drained weight shall be reported to the nearest 0.1 ounce or to the nearest 1 gram. 3/

1/ Water temperature shall be not less than 140°F and not greater than 165°F.

2/ Additional hot water may be required for completely removing sauce and liquefying rendered fat.

3/ The initial unit of measurement shall be maintained throughout the exam (example: if ounce is used, the unit of measurement shall remain as ounces throughout the exam).

(5) Analytical. The sample to be analyzed shall be a composite of eight filled and sealed pouches which have been selected at random from the 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	991.36 or 2008.06
Salt	935.47

Test results shall be reported to the nearest 0.1 percent. Government verification will be conducted through actual testing by a Government laboratory. Any result not conforming to the analytical requirements shall be cause for rejection of the lot.

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

A. Packaging.

(1) Pouch material testing. The pouch material shall be examined for the characteristics listed in table I of MIL-PRF-44073 for Type I. The lot size, sample unit, and inspection level criteria for each of the test characteristics are listed below. Any test failure shall be classified as a major defect and shall be cause for rejection of the lot.

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Characteristic	Lot size expressed in	Sample unit	Inspection level
Oxygen transmission rate	yards	1/2 yard	S-1
Water vapor transmission rate	yards	1/2 yard	S-1
Camouflage	yards	1/2 yard	S-1
Thermal processing	pouches	1 pouch	S-2
Low temperature	pouches	1 pouch	S-2
High temperature	pouches	1 pouch	S-2
Directional tear	pouches	1 pouch	S-3

(2) Filled and sealed pouch testing. The filled and sealed thermoprocessed or hot-fill processed pouches shall be examined for the characteristics listed in table I of MIL-PRF-44073 for Type I. The lot size, sample unit, and inspection level criteria for each of the test characteristics are listed below. Any test failure shall be classified as a major defect and shall be cause for rejection of the lot.

Characteristic	Lot size expressed in	Sample unit	Inspection level
Residual gas volume	pouches	1 pouch	S-2
Internal pressure	pouches	1 pouch	S-2 <u>1/</u>

1/ When a three-seal tester is used, a separate set of samples is required for testing of the closure seal.

(3) Pouch examination. The pouches shall be examined for the defects listed in table II of MIL-PRF-44073 for Type I. The lot size shall be expressed in pouches. The sample unit shall be one thermal processed pouch. 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. Two hundred sample units shall be examined for critical defects. The finding of any critical defect shall be cause for rejection of the lot.

(4) Sleeve examination. The sleeves shall be examined for the defects listed in table III of MIL-PRF-44073 for Type I. The lot size shall be expressed in units of sleeves. The sample unit shall be one sleeve. The inspection level shall be S-3 and the AQL, expressed in terms of defects per hundred units, shall be 0.65 for major defects and 2.5 for minor defects.

**B. Packing.**

(1) Shipping container and marking examination. The filled and sealed shipping containers shall be examined for the defects listed in table II. 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.

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TABLE II. 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	More than 40 pounds of product.

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.

**SECTION J REFERENCE DOCUMENTS**

Unless otherwise specified, the applicable version of these documents is that which is active on the date of the solicitation or contract.

DLA Troop Support Form

Form 3556	Marking Instructions for Boxes, Sacks, and Unit Loads of Perishable and Semiperishable Subsistence
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MILITARY SPECIFICATION

MIL-PRF-44073	Packaging of Food in Flexible Pouches
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NON-GOVERNMENTAL STANDARDS

AMERICAN SOCIETY FOR QUALITY (ASQ) [www.asq.org](http://www.asq.org)

ANSI/ASQ Z1.4	Sampling Procedures and Tables for Inspection by Attributes
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ASTM INTERNATIONAL [www.astm.org](http://www.astm.org)

D1974/D1974M	Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes
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D4727/D4727M	Standard Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes
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D5118/D5118M	Standard Practice for Fabrication of Fiberboard Shipping Boxes
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AOAC INTERNATIONAL [www.aoac.org](http://www.aoac.org)

Official Methods of Analysis (OMA) of AOAC International