

INCH-POUND

MIL-DTL-32235/1
12 February 2007

DETAIL SPECIFICATION SHEET

HEATER MODULE,
TYPE I: MAGNESIUM AND IRON HEATER, ASSEMBLY REQUIRED

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

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-DTL-32235.

REQUIREMENTS

I. Heater module.

The Type I heater module shall consist of a heater module box containing four sub-units, an activator mechanism/pull-tab, and a barrier pouch containing four heaters. The sub-units shall consist of the heating tray, the activation fluid unit, and the polymeric food tray. The four sub-units shall be stacked and the activation mechanism/pull-tab connected to the four activation fluid units. The sub-unit assemblies shall be placed into the heater module box.

A. Heater.

The magnesium alloy powder shall be evenly distributed and completely sealed within the scrim matrix of the heater. The super-corroding alloy shall be Mg - 5 atomic % Fe produced from magnesium metal powder and food grade electrolytic iron powder by solid state blending in a vibratory ball mill. The heater elements shall consist of the super-corroding Mg-Fe alloy powder and the electrolyte together with flow and wetting agents. The magnesium and iron function as anode and cathode, respectively. The electrolyte is activated by the addition of fluid that initiates a rapid corrosion of the magnesium particles within the matrix. The products of the chemical reaction are heat, magnesium hydroxide, and gaseous hydrogen.

Each heater shall contain a minimum of 85 grams of reactive magnesium. The non-woven porous polymeric scrim shall be sealed and sized as shown on Figure 1 to accommodate proper fit and function of the heater module.

AMSC N/A

FSC 8970

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Each heater (heater elements in a matrix) shall be correctly and legibly labeled. The label shall contain the following information:

- (1) Date 1/
- (2) Contractor's name and address
- (3) "Do Not Eat" pictogram. The pictogram shall be printed in three colors; a black figure of a person on a white background with a red circle and a bar (prohibition sign). The minimum outside diameter of the pictogram circle shall be 7/8 inch. (See Figure 1)

1/ Each heater shall have the date of pack noted by using a four digit code beginning with the final digit of the current year followed by the three digit Julian day code. For example, 14 February 2007 would be coded as 7045. The Julian day code shall represent the day the heater was manufactured.

Four heaters shall be packaged in a barrier pouch conforming to MIL-PRF-44073. The barrier pouch shall have maximum outer dimensions of 11 inches by 15 inches.

Each pouch shall be correctly and legibly labeled. The label shall contain the following information:

- (1) Name
- (2) Contents
- (3) Active ingredients with proper chemical names
- (4) Date 1/
- (5) Contractor's name and address and emergency phone number

1/ Each pouch shall have the date of pack noted by using a four digit code beginning with the final digit of the current year followed by the three digit Julian day code. For example, 14 February 2007 would be coded as 7045. The Julian day code shall represent the day the heaters were packaged.

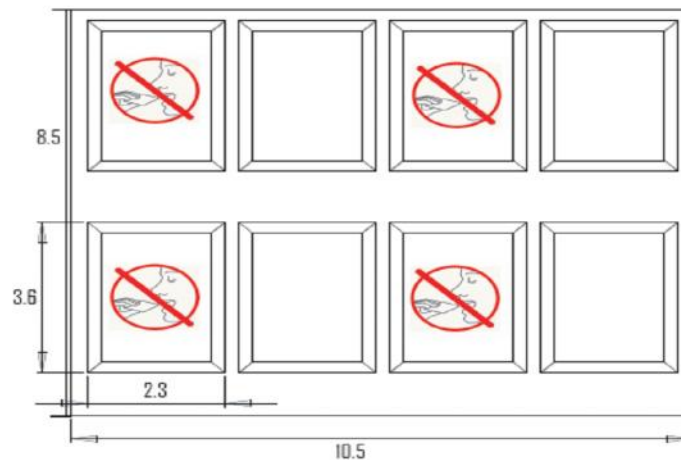


FIGURE 1. Heater

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The following instructions shall be affixed to the heater barrier pouch:

UGR-E Type I Heater Assembly Instructions

The water-activated heaters have been hermetically sealed in a tri-laminate package for shipping. A heater must be inserted into each white thermoformed heating tray prior to activation.


Refer to enclosed UGR-E Operational Instruction Card for directions on use.

CAUTION

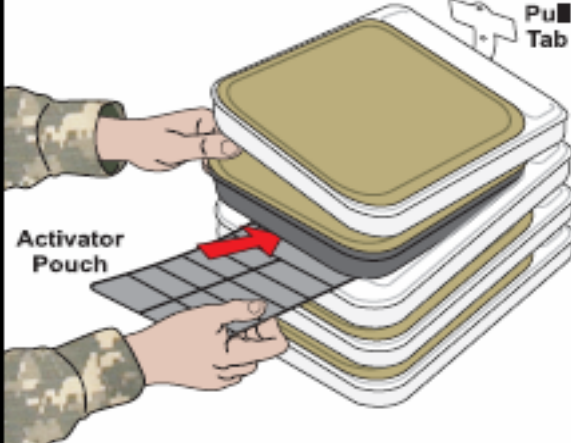
Use Only in A Well Ventilated Environment, as Magnesium-Based Heaters Produce Hydrogen (0.3 Cubic Meters or 12 Cubic Feet) - Per UGR-E Heaters Will Generate Steam that could Burn Skin - Use Caution when Handling.

Spent heaters are nontoxic and nonhazardous. All waste materials may be disposed of as general municipal waste.

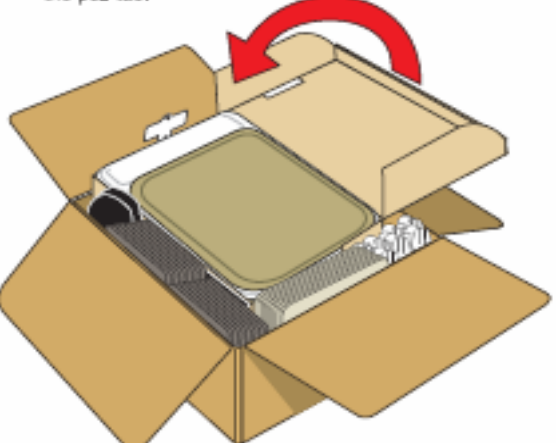
1 Tear tri-laminate heater bag(s) open at notch and remove heaters.




2 While keeping the trays stacked together in the carton, carefully insert a heater under each food tray by raising each food tray just enough to slide a heater under each of the food trays. **USE CAUTION: Do Not pull the pull tab.**



3 Close the Heating Cover Module and allow plastic pull-tab to pass through the cut-out without pulling or disturbing the pull-tab.



4 Refer to Operating Instruction Sheet attached to Heater Module Cover for use.



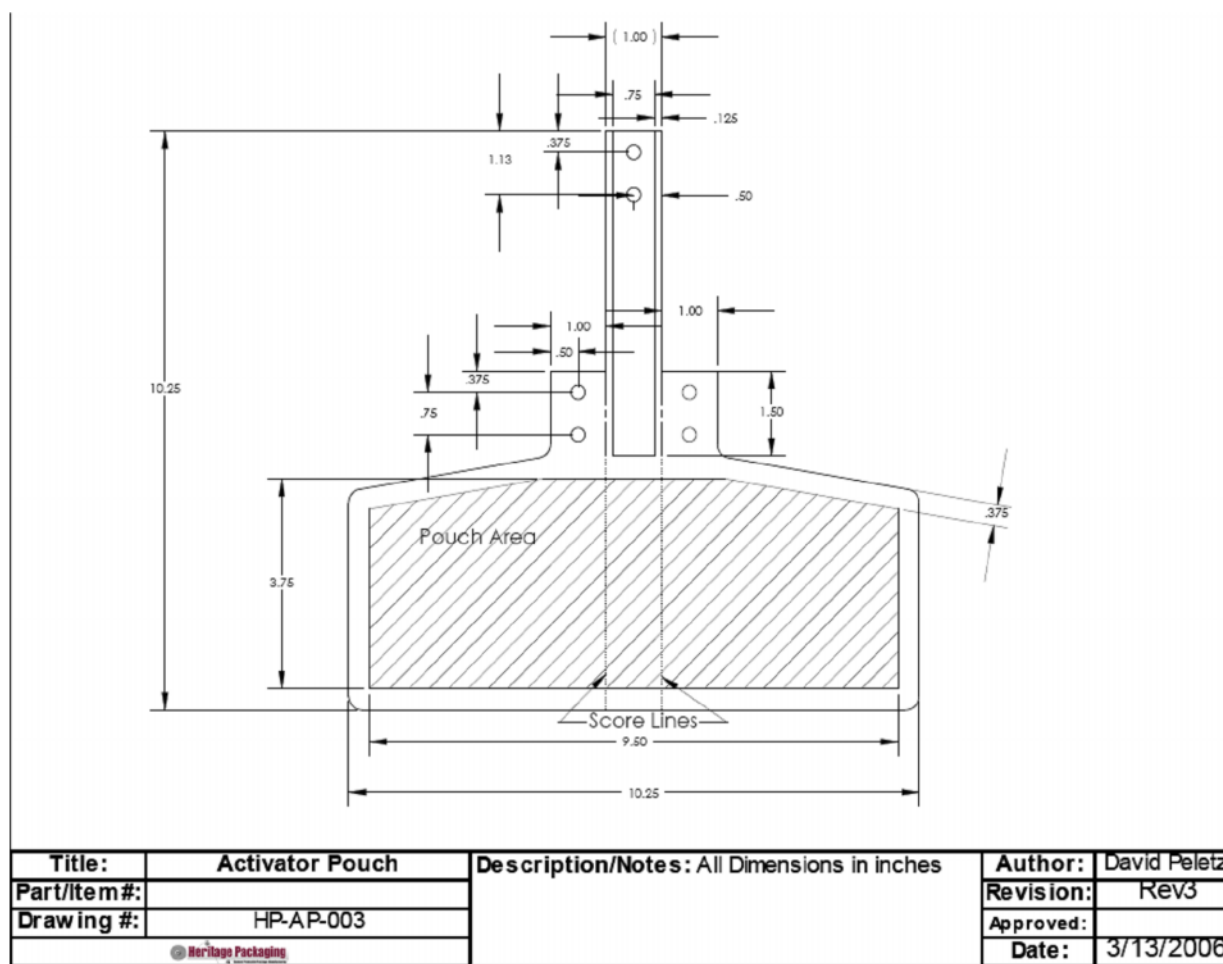
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FIGURE 2. Heater assembly instructions

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B. Activation fluid unit.

The pouch for containing the activation fluid unit shall be made of material equivalent to Class 1 of MIL-PRF-131. The pouch shall be manufactured following the dimensions and design shown in Figure 3. Tolerances for the pouch dimensions shall be $\pm 1/8$ inches. Sufficient length for the center tab and careful assembly is critical to ensuring that the pouch is not inadvertently torn open during assembly and subsequent transport and storage. The solid lines shown at 1 inch off center at the base of the tab are cut lines. The 1 inch center tab section of the pouch shall be constructed with additional material for reinforcement. The center section of the pouch shall be scored (laser or mechanical) to provide easy tear properties without degrading the strength and barrier properties of the pouch. The pouch shall be filled with 1.5% saline (water and sodium chloride) solution. The minimum volume of saline solution in the pouch shall be 330 ml.

FIGURE 3. Activation fluid unit

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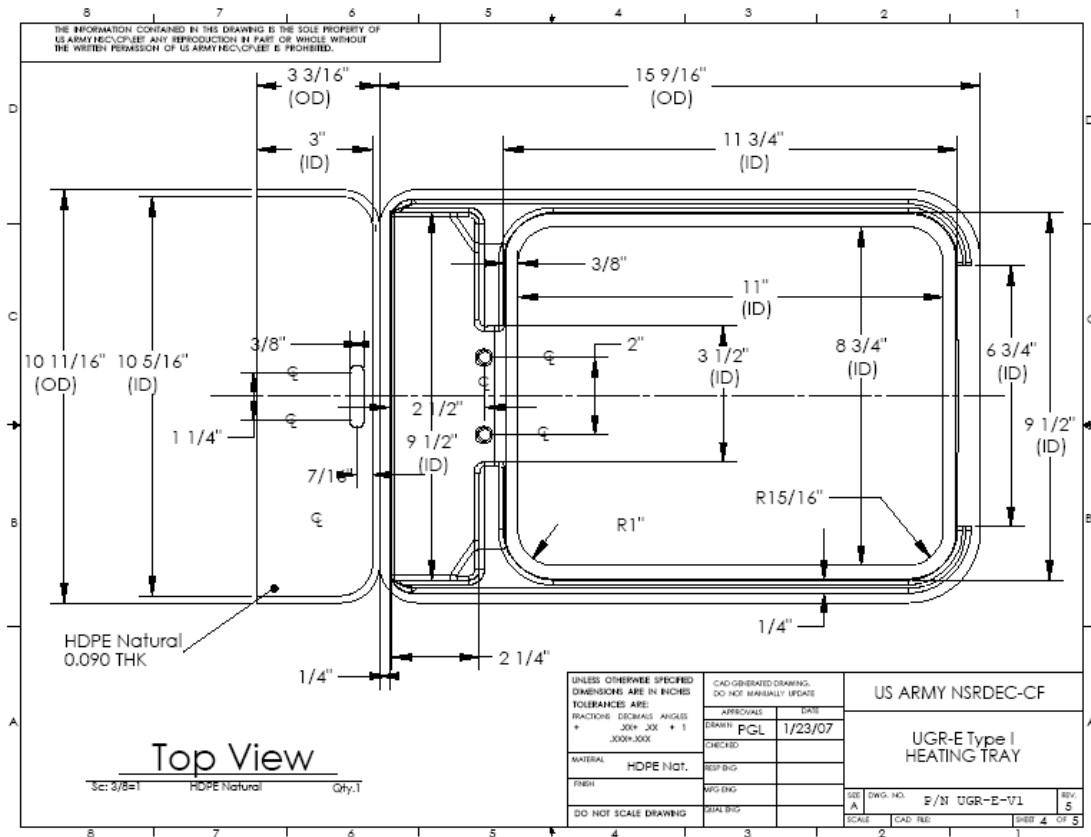
C. Heating tray.

The heating tray shall be molded from 0.090-inch high density polyethylene. The heating tray consists of two compartments. The smaller compartment serves as a retaining reservoir for the activator fluid unit and includes two buttons to which the two short tabs of the activation fluid unit pouch are secured for activation.

A fold-over flap shall be included on the heating tray to retain and protect the activator fluid unit. A slot shall be cut into the cover to allow the center tab of the activation fluid unit pouch to slide through, which later is attached to the pull tab.

The larger compartment shall be configured to hold the heater, polymeric food tray, and accommodate the activation fluid. The compartment shall be configured with a raised and rounded edge that supports the polymeric food tray securely above the heater.

Dimensions of the heating tray shall be as specified in Figures 4, 5, 6 and 7. The tolerance for the angle measurements shall be +/- 1 degree. The tolerance for the linear measurements shall be +/- 1/8 of an inch.

FIGURE 3. Heating tray, top view

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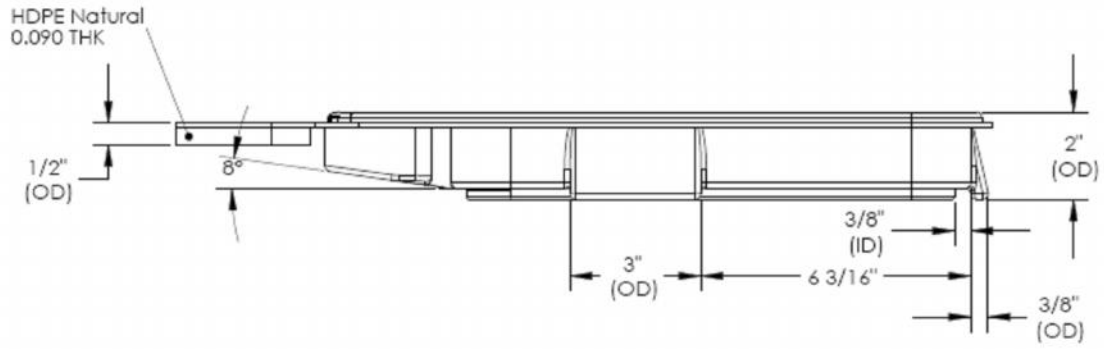


FIGURE 4. Heating tray, side view

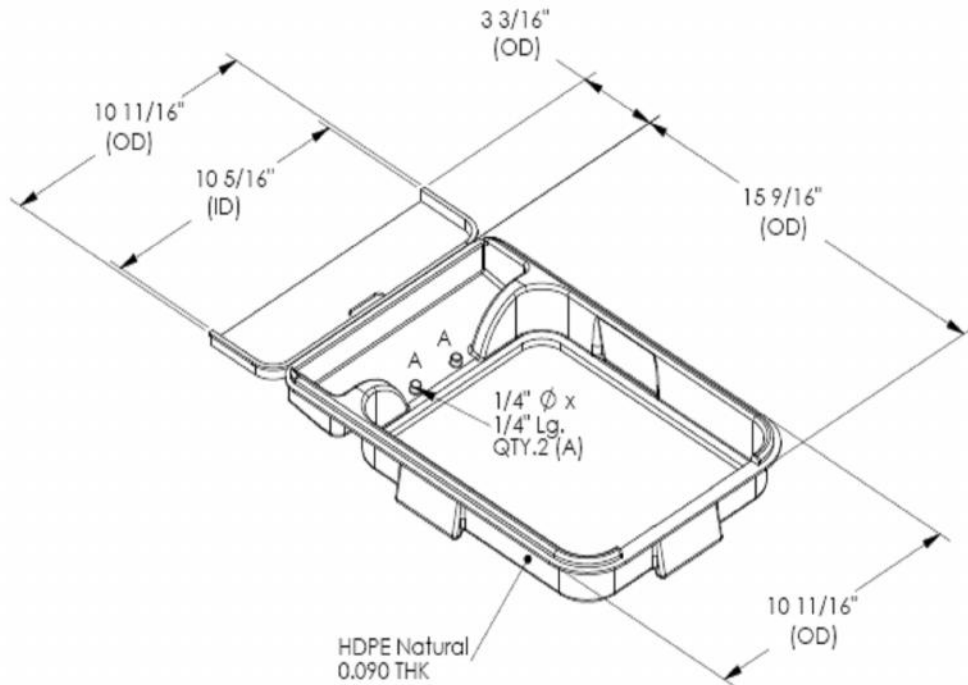
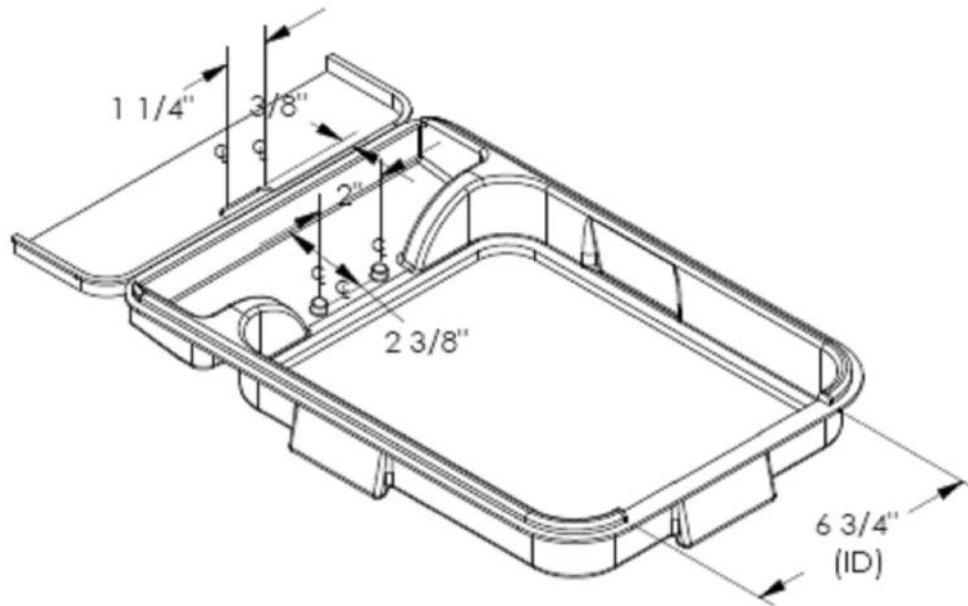


FIGURE 5. Heating tray, end view

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FIGURE 6. Heating tray, interior viewD. Pull tab.

The pull tab shall be constructed of a blend of low to medium density polyethylene, or equivalent material, to provide high strength characteristics under a wide range of environmental conditions. The material shall withstand temperatures ranging from -20°F to 160°F without fracture or failure. Dimensions of the pull tab shall be as specified in Figures 7 and 8.

The pull tab shall be configured with four loading stations to support the four-tray one-step activation intended for the heater module. Each station includes a larger center tooth through which the activator tabs are assembled and two smaller teeth that retain the assembled activator tab. The center tab of the activation fluid unit shall be inserted through the back opening of the tooth and each of the two holes on the extending end of the activator tab are pressed onto this tooth until the edge of the tab is secured under both retaining teeth.

Upon completion of the heater module assembly, the four center tabs of the activation fluid units securely connect to the pull tab. At the time of use, the operator of the heater module pulls the pull tab to tear the activation fluid unit pouches, releasing the saline solution and activating the heaters.

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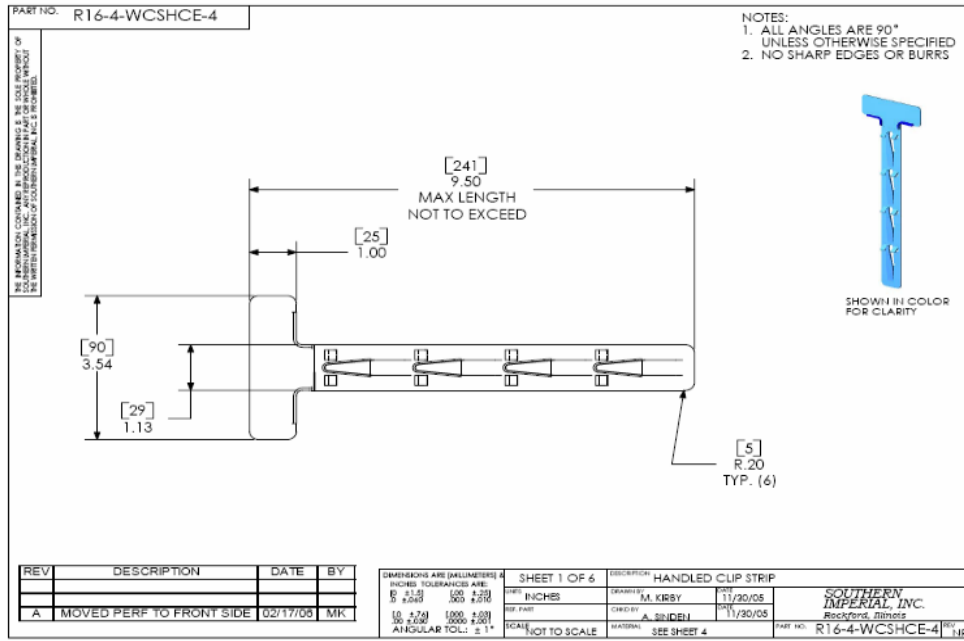


FIGURE 7. Pull tab, design

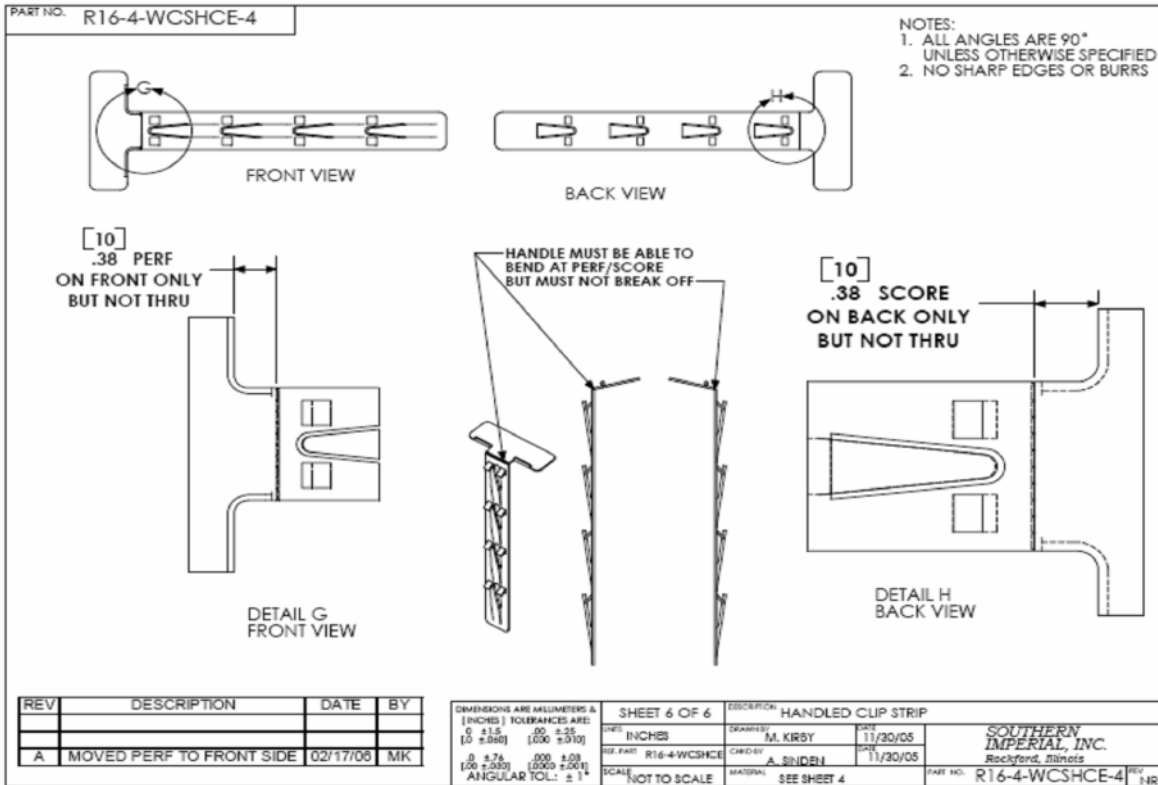


FIGURE 8. Pull tab, details

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E. Assembly of heater module.

The Type I heater module shall consist of a box containing four sub-units, an activator mechanism/pull-tab, and a barrier pouch containing four heaters. The sub-units shall consist of the heating tray, the activation fluid unit, and the polymeric food tray. The four sub-units shall be stacked and the activation mechanism (pull-tab) connected to the four activation fluid units. The sub-units shall be placed into the heater module box.

A corrugated fiberboard pad measuring approximately 10-1/2 by 15 inches shall be placed on the top tray sub-unit.

The barrier pouch containing the four heaters shall then be placed on the fiberboard pad inside the heater module box.

The heater module box shall be closed.

Design and dimensions of the heater module box shall be as specified in Figure 9.

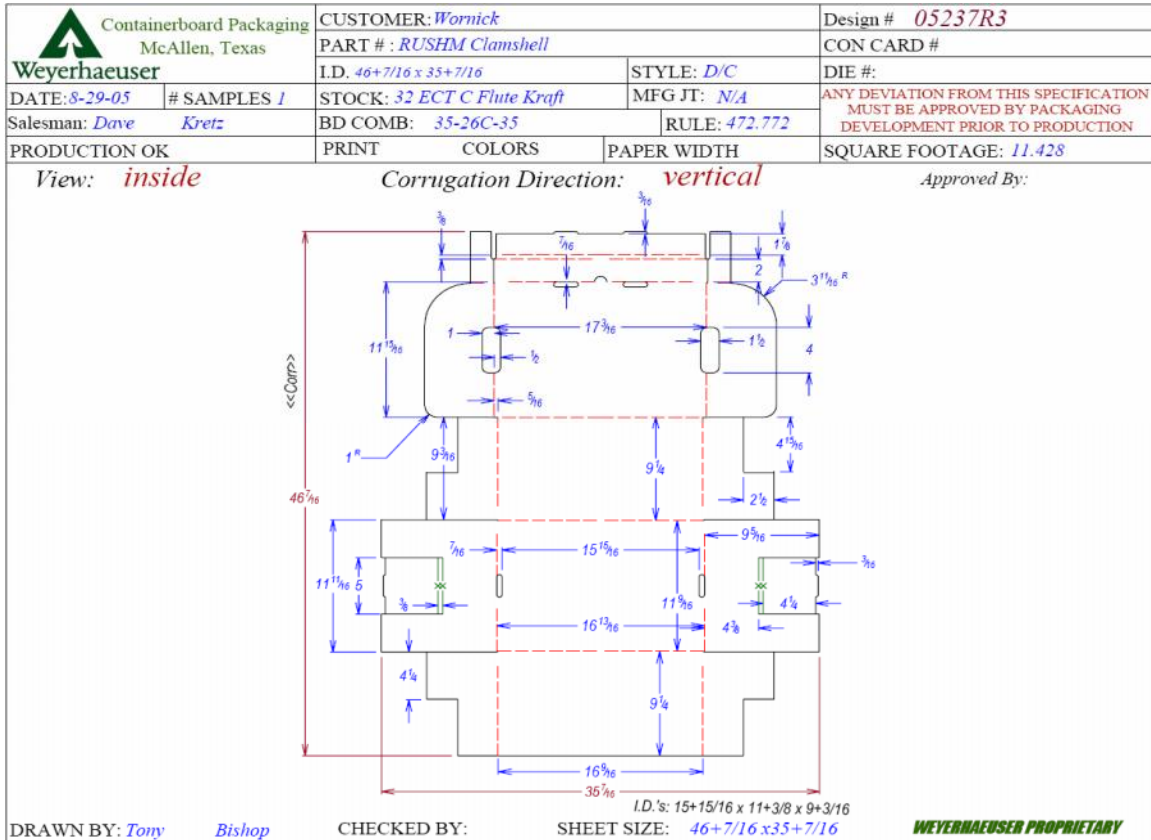


FIGURE 9. Heater module box

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The following instruction sheet shall be affixed on the top center of the heater module box:

ACTIVATOR TAB

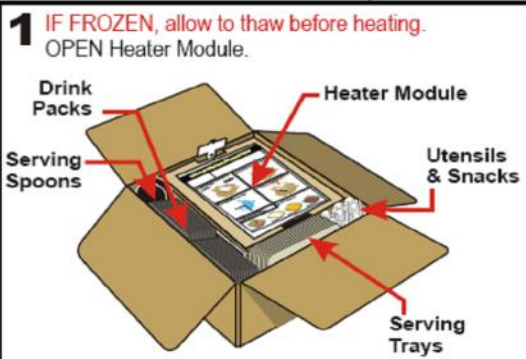
UGR-E TYPE I Operating Instructions

This food container consists of a self-heating meal unit, additional menu components, and serving accessories to provide one complete meal for 18 Soldiers. The UGR-E has built-in, safe, water-activated chemical heaters that provide a hot meal in 45 minutes.

WARNING

- Vapors released by activated heater contain hydrogen, a flammable gas. Do not place an open flame within 10 feet of the unit while heating.
- Do not use inside a vehicle or shelter, as vapors released by activated heater can displace oxygen.
- Hot water leakage can burn and cause injury.
- Discard heating tray after use. Do not drink any water remaining in the heating tray or use it in food items.

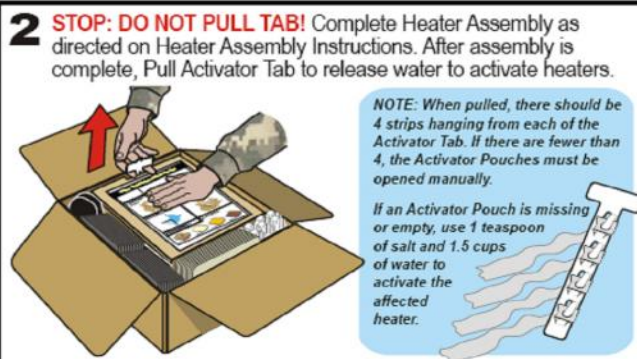
1 IF FROZEN, allow to thaw before heating. OPEN Heater Module.



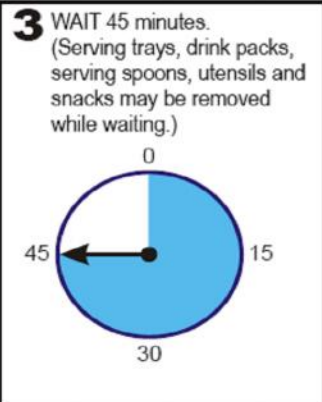
2 STOP: DO NOT PULL TAB! Complete Heater Assembly as directed on Heater Assembly Instructions. After assembly is complete, Pull Activator Tab to release water to activate heaters.

NOTE: When pulled, there should be 4 strips hanging from each of the Activator Tab. If there are fewer than 4, the Activator Pouches must be opened manually.

If an Activator Pouch is missing or empty, use 1 teaspoon of salt and 1.5 cups of water to activate the affected heater.



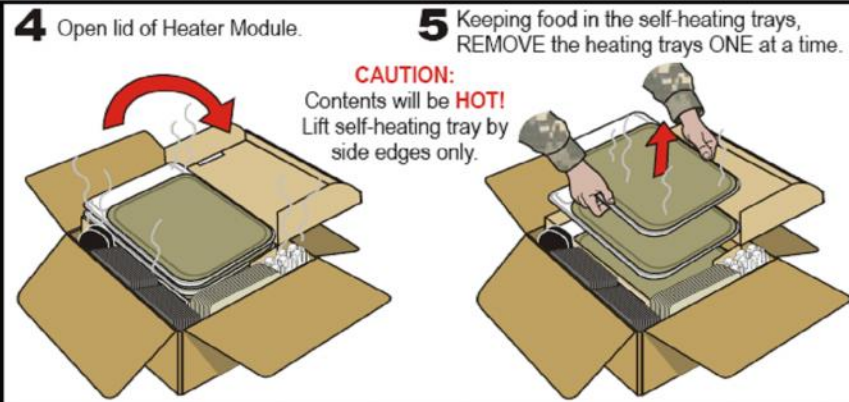
3 WAIT 45 minutes. (Serving trays, drink packs, serving spoons, utensils and snacks may be removed while waiting.)



4 Open lid of Heater Module.


5 Keeping food in the self-heating trays, REMOVE the heating trays ONE at a time.

CAUTION: Contents will be HOT! Lift self-heating tray by side edges only.



6 Remove food lids by cutting U-shape about one inch from outside edge, and serve. Once opened, do not keep tray items as leftovers.

FOOD SAFETY NOTICE: Use new safety knife provided to prevent food contamination. Food service gloves and antibacterial wipes are also included.



KEEP COVER CLOSED WHEN HEATING

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FIGURE 10. Operating instructions

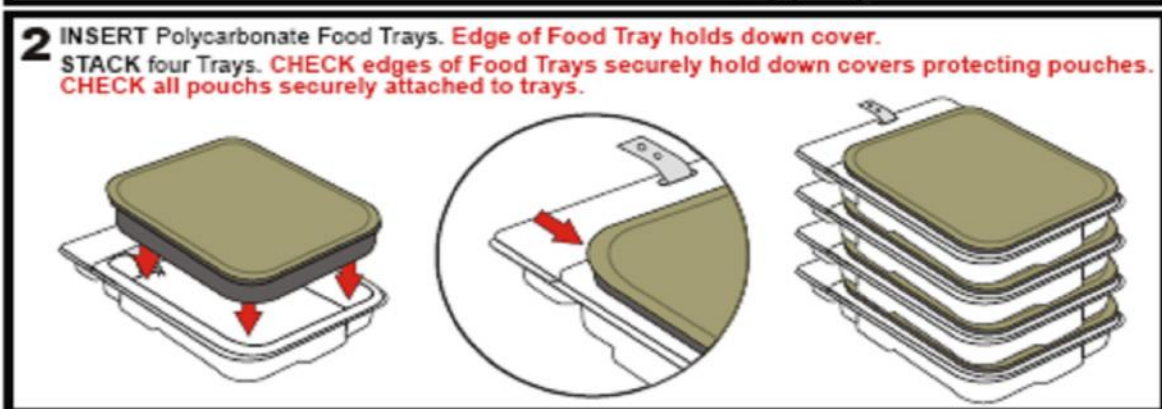
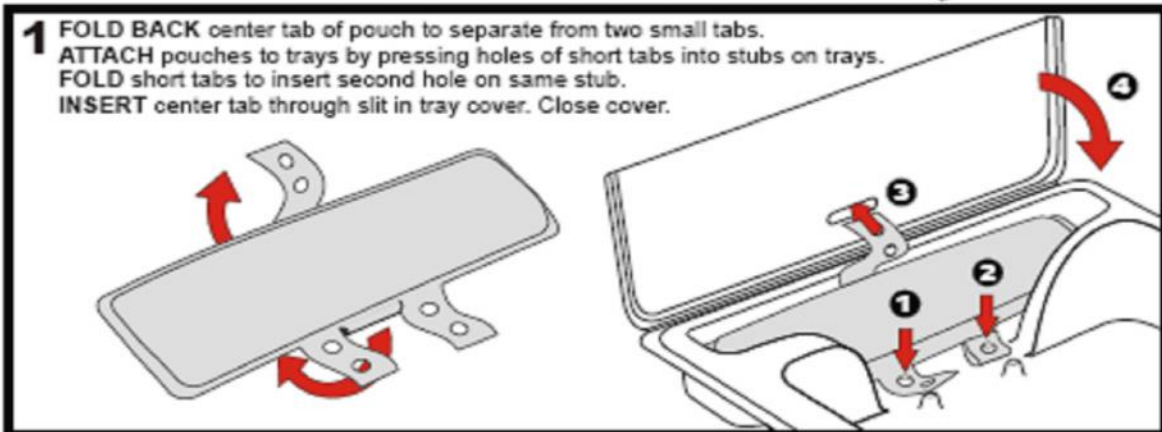
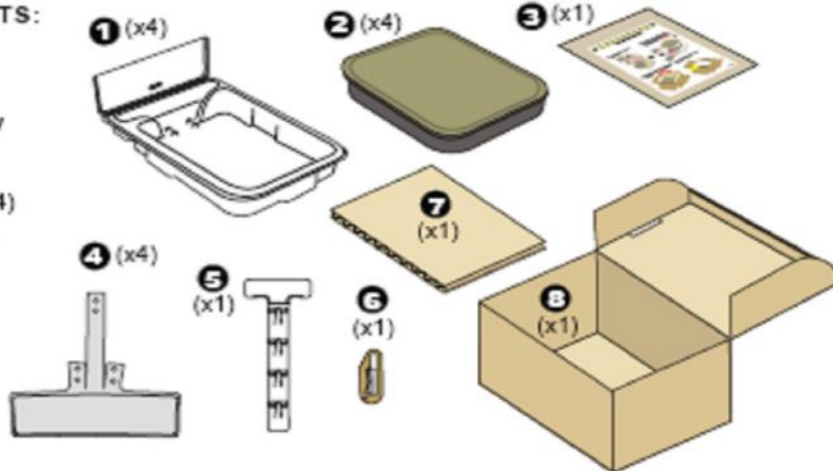
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The following guidance is provided to the assembler of the heater module:

Assembly Instructions for Heater Module Production

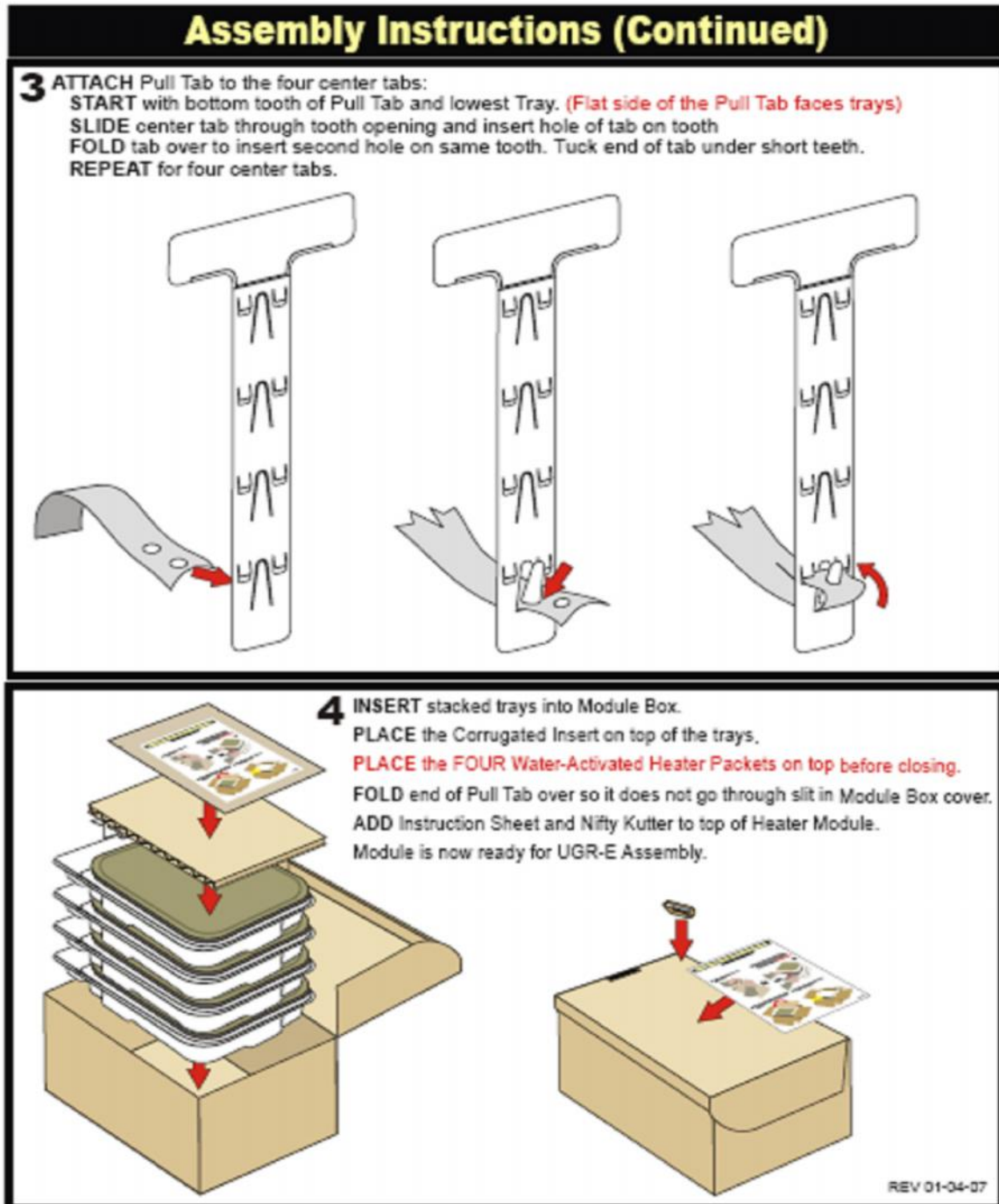
ASSEMBLY COMPONENTS:

- (1) Stackable Tray (quantity 4)
- (2) Polycarbonate Food Tray (quantity 4)
- (3) Water-Activated Heaters w/ Instructions (quantity 4)
- (4) Saline Pouch (quantity 4)
- (5) Pull Tab (quantity 1)
- (6) Nifty Cutter (quantity 1)
- (7) Corrugated Insert (quantity 1)
- (8) Heater Module Box (quantity 1)



Guidance continued on next page.

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FIGURE 11. Assembly instructions

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II. Single heater capacity test.

The objective of the heating capacity test is to verify that a single heater increases the temperature of the water in the polymeric tray by 85°F, from 40°F to 140°F in 30 minutes or less. In this test, one sub-unit (polymeric tray of water in the heating tray with the heater and the activation fluid unit) is tested. The following procedures are recommended:

- Pre-condition 96 oz. water-filled test tray to 35°F to 40°F.
- Align matching bi-metallic (copper-constantan) pegs of C-10 Locking Connector to bi-metallic holes in C-9 Locking Receptacle. Thread C-10 Locking Receptacle and C-9 together until seated.
- Connect Thermocouple wire installed on Locking Receptacle to data acquisition or computer terminal calibrated to the copper-constantan thermocouple.
- Assemble heater and food tray within the heating tray and add 330 ml of saline, or use activator pouch, to activate heater.
- Record temperature for at least 45 minutes at 1 minute intervals or more frequently.

III Notes.A. Part identifiers and sources of supply.

1. Heater. The Heater is identified as Part # TT31110222. The heater is available from:

Truetech Inc.
680 Elton Ave.
Riverhead, NY 11901-2585
(631) 727-8600

2. Heater barrier pouch. The barrier pouch material is available from:

Winter-Wolff International
131 Jericho Turnpike
Jericho, NY 11753
(516) 997-3300

3. Activation fluid unit. The activator pouch is identified as Part # HP-AP-003. The material CADPACK N for the construction of the activation fluid unit pouch is available from:

Cadillac Products
5800 Crooks Road
Troy, Michigan 48098-2830
(248) 813-8200

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The filled and sealed activation fluid units are available from:

Heritage Packaging
400 Mason Rd
Fairport, NY 14450
(585) 223-1336

4. Heating tray. The heating tray is identified as Part # UGR-E-V1. The heating tray is available from:

Transform Plastics
45 Prince St.
Danvers, MA 01923
(978) 777-1440

5. Pull tab. The pull tab is identified as Part # R16-4-WCSHCE-4. The pull tab is available from:

Southern Imperial
1400 Eddy Avenue
P.O. Box 2308
Rockford, IL 61103
(800) 747-4665 x203

6. Thermocoupled polymeric trays. Water filled thermocoupled polymeric trays or instructions on how to construct them are available from:

US Army Research, Development and Engineering Command
Natick Soldier Research, Development and Engineering Center
AMSRD-NSC-CF-G
15 Kansas Street
Natick, MA 01760-5018
508-233-4939

B. References.

MIL-PRF-131 Barrier Materials, Watervaporproof, Greaseproof, Flexible, Heat-Sealable

MIL-PRF-44073 Packaging of Food in Flexible Pouches

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(Copies of these documents are available from <http://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Ave, Building 4D, Philadelphia, PA 19111-5094.)

Custodians:

Army – GL
Navy – SA
Air Force – 35

Preparing activity:

Army – GL
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Review Activities:

Army – MD, QM
Navy – MC
DLA – SS

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