



*System Assessment and Validation for Emergency Responders (SAVER)*

# Shelf Stable, Ready-to-Eat Food Packs Technical Guide

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**Homeland  
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System Assessment and Validation for Emergency Responders

*Prepared by U.S. Army Natick Soldier Research, Development and Engineering Center*

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## FOREWORD

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The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems, and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL). The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency responder equipment; and
- Providing information that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.

Information provided by the SAVER Program will be shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: “What equipment is available?” and “How does it perform?”

As a SAVER Program Technical Agent, the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC) has been tasked by DHS to provide expertise and analysis on key subject areas, such as personal protective equipment, rapid deployment shelters, and shelf stable food. In support of this tasking, NSRDEC prepared a technical guide on shelf stable, ready-to-eat food packs. Shelf stable, ready-to-eat food packs fall under the AEL reference number 21CR-00-FOOD.

Visit the SAVER website at [www.dhs.gov/science-and-technology/SAVER](http://www.dhs.gov/science-and-technology/SAVER) for more information on the SAVER Program or to view additional reports on shelf stable, ready-to-eat food packs or other technologies.

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## 1. INTRODUCTION

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The System Assessment and Validation for Emergency Responders (SAVER) Program developed this technical guide to provide emergency responders with information on shelf stable, ready-to-eat food packs (Authorized Equipment List [AEL] reference number 21CR-00-FOOD). The information provided gives insight into some of the factors that should be taken into consideration when determining the appropriate shelf stable food packs for procurement.

Shelf stable, ready-to-eat food packs (hereinafter referred to as shelf stable food packs) provide nourishment in the absence of other means of sustenance. They contain a variety of component items including entrées, snacks, and beverages to meet the user's nutritional needs.

The information presented in this document is based on subject matter expertise from the U.S. Army Natick Soldier Research, Development and Engineering Center, as well as information gathered from Internet searches, industry publications, vendors, other government agencies, and practitioners.

The information in this report represents an effort to exercise due diligence in the collection of valuable support information for emergency responders. It is not intended to cover all aspects of operations and procurement.

## 2. SHELF STABLE FOOD PACKS OVERVIEW

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Shelf stable food packs are those that do not require refrigeration during transport or storage for a specified amount of time, generally from 1 to 3 years. Ready-to-eat refers to shelf stable food packs that require neither reconstitution with potable water, nor heating to consume. An exception to this is the powdered beverages that are sometimes included, which do require reconstitution with potable water for consumption. In addition, although not required for consumption, food packs labeled as ready-to-eat often come with a flameless heater to heat the entrée and/or side dish, which may increase the palatability of the meal.

Food is made shelf stable by utilizing food processing techniques, packaging methods, and food science principles. Examples of these include thermal processing, a process similar to canning, and utilizing a vacuum seal on a product to remove all available oxygen from the container.

Shelf stable food packs consist of individually wrapped food and beverage components that combine to meet the user's nutritional needs. They may also contain accessory items such as a fork, spoon, or napkin. Shelf stable food packs are packaged in a case of 10 to 20 food packs. The case protects the individual food packs during shipping and storage. Most shelf stable food packs are designed to represent a meal, which is defined as a specified amount of food provided to one individual during a serving period.

Other types of shelf stable food packs, such as freeze-dried meals, that are commercially available but require reconstitution are not considered ready-to-eat, and as such, are not addressed in this report.

For information about shelf stable food packs that are available commercially, please refer to the *Shelf Stable, Ready-to-Eat Food Packs Market Survey Report* available in the SAVER section of the Responder Knowledge Base (RKB) website at <https://www.rkb.us/saver>.

### 3. SHELF STABLE FOOD PACK CONTENTS

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Shelf stable food packs generally contain a number of individually wrapped items to include food, beverages, accessory packets, and a flameless heater. A brief description of each category that may be included in a shelf stable food pack is provided.

#### 3.1 Food

Shelf stable food packs generally contain an entrée, a side, breads/crackers, spreads, and snacks/candy.

- Entrées are considered the main dish of the food pack and may be liquid based, (i.e., a stew), solid (i.e., a portion of meat), or in the form of a pocket sandwich;
- Sides include items such as rice, beans, and potatoes;
- Breads, crackers, or tortillas may be included in the food packs;
- Spreads are typically included when breads or crackers are provided. Examples of spreads include peanut butter, cheese spread, and jams/jellies; and
- Snacks such as nut and fruit mixes, beef jerky, dried fruit, pretzels, and candy may be included to increase variety and maximize the nutritional content.

#### 3.2 Beverages

Beverages may be included in a box, can, or dehydrated form. Dehydrated forms reduce the volume and weight of the food pack, but require the addition of potable water for consumption. Beverages are the only component in the packs that may not be ready to eat.

#### 3.3 Accessory Packets

Accessory packets provide the user with items such as utensils, napkins, toilet tissue, seasonings, condiments, and/or gum.

#### 3.4 Flameless Heater

A flameless heater allows the user to heat the entrée or side dish if desired. Although not required for consumption, heating an entrée or side may increase the palatability of the shelf stable food component.

Flameless heaters require the addition of water or salt water for activation, which may be included in the shelf stable food pack. When the water or solution is added to the heater, an exothermic chemical reaction occurs to produce heat without generating a flame. Instructions on how to properly use the heater are usually printed on the heater itself. An example of the aforementioned instructions can be found in appendix A.



Sample Flameless Heater

## **4. PROCUREMENT**

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There are a variety of factors to consider when determining the most appropriate shelf stable food pack for procurement. Key considerations—shelf life, nutrition, and dietary restrictions—are discussed in this section.

### **4.1 Shelf Life**

Each shelf stable food pack has a limited shelf life. To ensure utilization of high quality and safe food, shelf stable food packs must be consumed within their specified shelf life, which is generally from 1 to 3 years when stored at or below a maximum storage temperature.

Purchasing food packs with a longer shelf life will provide more time for the organization to consume them. However, purchasing food packs with a shorter shelf life may be appropriate when the food packs will be consumed quickly and when funding is available to replace them more often. Purchasing meals with a shorter shelf life may allow for increased variety due to the increased quantity of items that meet the shorter shelf life requirements.

### **4.2 Nutrition**

Age, gender, and activity level are some of the factors that influence the number of calories needed to meet an individual's daily energy requirements. When evaluating an appropriate calorie level to support emergency responders, operational scenario and activity level heavily influence needs. As emergency responders may perform strenuous physical activities, caloric needs will likely be significantly different compared to those of the general population.

Based on information obtained from the U.S. Food and Drug Administration, 2,500 calories per day fulfills the energy requirements of most men and active women. Utilizing this guideline, a caloric content of approximately 850 calories per meal, based on 3 meals a day, will provide adequate energy for most individuals. In scenarios that require high levels of activity, higher calorie food packs or consumption of additional meals should be considered.

To meet the needs of a variety of users, consideration may be given to purchasing food packs with a higher calorie content. Each individual can choose which items in the food pack to consume based on their own personal needs, preferences, and/or activity level.

### **4.3 Dietary Restrictions**

A limited number of shelf stable food packs are available for individuals with dietary restrictions, including those who are vegetarian, have religious restrictions, and require low sodium diets. In addition, some vendors allow customization to meet the user's dietary restrictions.

## **5. STORAGE**

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Shelf stable food packs are designed to provide an advantage over fresh food as they remain safe for consumption for a longer period of time. However, to ensure maximum shelf life is achieved, proper storage conditions must be maintained.

## 5.1 Storage Time

Each shelf stable food pack has a limited shelf life. To indicate this shelf life, manufacturers generally print a use by date or lot number on the outer case and/or the individual food packs.

The lot number utilizes a four digit code that indicates when the case was packaged. The first number represents the year, and the next three numbers represent the Julian calendar day of the year. An example lot number is 1301, as depicted in Figure 5-1. The first number represents the year packed, in this case 2011. The next three digits, 301, indicate the day of the year, in this case October 28<sup>th</sup>.

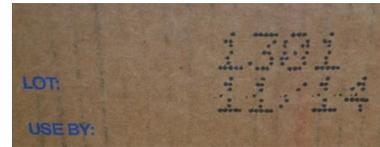


Figure 5-1  
Sample Lot Number and Use by Date

The use by date indicates the month and year by which the shelf stable food packs should be inspected or consumed. Since most agencies do not have the personnel, training, or equipment for proper inspection, it is recommended that the shelf stable food packs be discarded once the use by date has been surpassed.

## 5.2 Storage Temperature

The temperature at which the shelf stable food packs are stored will affect the quality and shelf life of the product. Most manufacturers recommend that shelf stable food packs be stored at or below ambient temperature, typically defined as 80° Fahrenheit (F) (27° Celsius). The technical data provided by the manufacturer should be referenced to confirm their specific recommendations. Storing the shelf stable food packs at temperatures higher than indicated by the manufacturer may lead to rapid degradation of the food products. In contrast, storing shelf stable food packs under refrigeration may extend the shelf life.

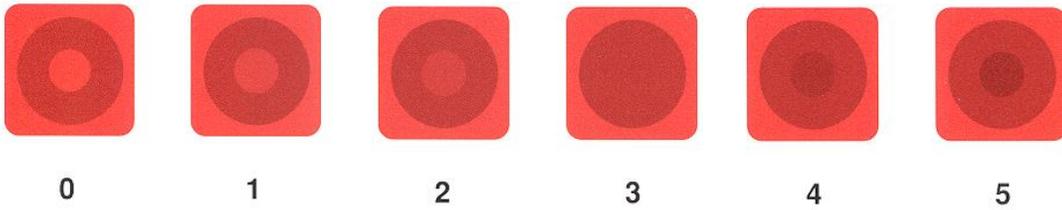
## 5.3 Time-Temperature Indicator

To determine the quality of the shelf stable food packs when stored in facilities that are not temperature controlled, manufacturers may apply a time-temperature indicator (TTI) label on the case containing the shelf stable food packs. The TTI helps indicate the approximate remaining shelf life. The TTI has an inner core circle with an outer ring. The outer ring's color remains constant, while the inner core darkens with time and temperature exposure. When cases are stored at temperatures higher than recommended, the inner core will darken more quickly, indicating a loss in product quality. When the color of the inner core is darker than that of the outer ring, the case should be discarded. Table 5-1 shows a sample TTI progression.

**Table 5-1. Sample TTI Progression**

Appearance	Numerical Stage	Shelf Life Interpretation
Center much lighter than outer ring.	0	Shelf life remains.
Center lighter than outer ring.	1	Shelf life remains.
Center slightly lighter than outer ring.	2	Shelf life remains.
Center same shade as outer ring.	3	End of expected shelf life.
Center slightly darker than outer ring.	4	Exceeds expected shelf life.
Center much darker than outer ring.	5	Exceeds expected shelf life.

*Table adapted from Defense Logistics Agency – Troop Support*



#### 5.4 Placement

Food packs should be held in dry storage away from hazardous chemicals and should be stored at least 6 inches (15 centimeters) off the floor and away from walls. Dry storage areas should be cool, dry, free of pests, and well ventilated to ensure consistent temperature is maintained throughout the storage area.

#### 5.5 Inventory Control

Upon receiving cases of shelf stable food packs, the lot number or use by date should be verified. Shelf stable food packs should be stored in their shipping cases to protect them during storage. They should be stored and utilized using the first-in, first-out (commonly referred to as FIFO) method. This is accomplished by placing the newest food packs behind older food packs on the shelving unit, so that the oldest food packs are distributed first.

If cases display a TTI, the shelf stable food packs should be stored and utilized using least fresh, first out principles. This means that regardless of when they were produced or purchased, cases that have been exposed to higher temperatures should be distributed first, before the shelf life has expired.

#### 5.6 Opened Items

Individual items within the shelf stable food packs are designed to be consumed immediately after opening. When individual components are opened within the pack, liquid items (e.g., soups, stews, and entrées) should be consumed within 4 hours, and dry items (e.g., crackers, candies, cookies, and cakes) should be consumed within 24 hours. Food must be repackaged, wrapped, or otherwise protected in order for it to last this duration once opened.

## 6. DISPOSAL

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If the shelf stable food packs have not been consumed by the end of the manufacturer's specified shelf life, the packs should be discarded. If unable to inspect for quality, food packs should also be discarded if the TTI on the outer case indicates the shelf life has expired. Unless specified by the manufacturer, all components, including the flameless heater, may be discarded in trash receptacles.

## 7. STANDARDS/REGULATIONS

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Depending on the type of food product, food manufacturers must comply with regulations declared by Federal, state, and local agencies, which may include the U.S. Department of Agriculture and the U.S. Food and Drug Administration.

## 8. ADDITIONAL RESOURCES

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The following resources were referenced for supplementary information included in this report:

Defense Logistic Agency – Troop Support. *Inspection of Composite Operational Rations*. <http://www.troopsupport.dla.mil/subs/support/qapubs/4155-2.pdf>; accessed May 1, 2012.

Defense Logistics Agency – Troop Support. *Operational Rations Inspection Procedure*. [http://www.troopsupport.dla.mil/subs/support/qapubs/opratsip/OPRATS\\_IP05\\_Rev7.pdf](http://www.troopsupport.dla.mil/subs/support/qapubs/opratsip/OPRATS_IP05_Rev7.pdf); accessed May 1, 2012.

Natick Soldier Research, Development and Engineering Center, Combat Feeding Directorate. Fact Sheets. <http://nsrdec.natick.army.mil/media/fact/index.htm>; Combat Feeding: Rations & Packaging: *Time-Temperature Indicator Labels on Meal, Ready-to-Eat Rations*; and *Meal, Ready-to-Eat, Individual (MRE™)*; accessed May 1, 2012.

National Restaurant Association Educational Foundation. ServSafe® Coursebook, 5<sup>th</sup> edition. Chicago, IL; 2008.

United States Department of Agriculture. *Nutritive Values of Food*. [http://www.nal.usda.gov/fnic/foodcomp/Data/HG72/hg72\\_2002.pdf](http://www.nal.usda.gov/fnic/foodcomp/Data/HG72/hg72_2002.pdf); accessed May 1, 2012.

## APPENDIX A. FLAMELESS HEATER DIRECTIONS

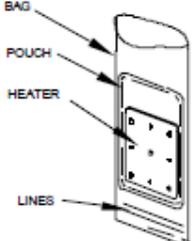
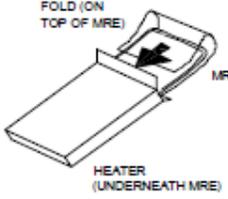
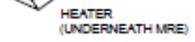
The following illustration is an example of the instructions included on the flameless heater.

**WARNING**

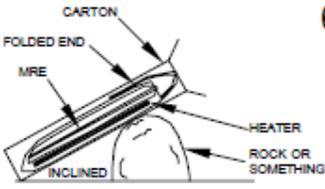
1. Vapors released by activated heater contain hydrogen, a flammable gas. Do not place an open flame in the vapor.
2. Vapors released by activated heater can displace oxygen. When ten or more heaters are used inside a vehicle or shelter, ensure the ventilation system is operating or a top hatch or door is open.
3. Hot water leakage can burn and cause a cold weather injury. Use caution if carrying activated heater in pocket.
4. After heating, the heater bag and MRE pouch will be very hot. Use caution when removing MRE pouch from bag.
5. Discard heater and bag after use. Do not drink the water remaining in the bag or use it in food items.

**HEATER AND ITS BYPRODUCTS ARE NOT INTENDED FOR HUMAN CONSUMPTION.**

**OPERATING INSTRUCTIONS**

- 1 Remove MRE pouch from carton and save carton.
- 2 Tear off top of bag. Place MRE pouch in bag with heater.
- 3 While holding MRE pouch and heater above lines on bag, pour water into bag until it reaches a level between lines. Slide heater and MRE to bottom of bag and fold top of bag to side opposite heater.
- 4 Stuff assembly into carton with top of bag folded over top of MRE and heater underneath.
- 5 With heater UNDERNEATH MRE, hold carton level until heater feels warm or until one minute elapses.
- 6 To prevent water from escaping and to maximize heat output, always keep: HEATER located UNDERNEATH MRE; BAG folded OVER TOP of MRE; and CARTON INCLINED, with FOLDED END of bag UP. After ten to fifteen minutes (depending on air temperature) top half of bag can be torn off and the MRE can be removed and eaten.





Knead MRE to ensure uniform temperature. CAUTION: The contents will be hot.

TEAR HERE TO USE BAG

TEAR HERE TO REMOVE MRE

MRE = Meal, Ready-to-Eat™