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Standard Guide for Use and Handling of Flexible Retort Food Pouches in the Processing Environment¹

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^{ε1} NOTE—The Keywords Section was added editorially in November 2021.

1. Scope

1.1 This guide is recommended for use by all producers of food in retort pouches. Adherence to this guide will help prevent damage to the pouches by preventing and avoiding known causes of damage that occur in the processing environment.

1.2 This guide for flexible retort food pouches is based on the recommendations of a task force created by the Department of the Army in 1986.² The purpose of the task force was to determine the possible causes of holes in pouches of food product produced for operational rations for the Department of Defense at that time. Members of the task force visited several food processors to observe and evaluate manufacturing methods commonly being used for processing retort pouches. The recommendations in this guide should be useful as the basis for good manufacturing practices and employee training programs used by food pouch processors.³

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Terminology

2.1 Definitions:

2.1.1 *defect, n*—any damage to a flexible pouch that would allow the entrance of foreign substances or the escape of the pouch contents.

2.1.2 *flexible retort food pouch, n*—a flat container formed from flexible materials, sometimes laminated with a layer of metallic or other barrier material. It is designed to be hermetically sealed, compatible with the thermal sterilization process, and to protect the contained food from recontamination. Because of the generally flat profile when filled, the product may be easily reheated.

2.1.3 *retort racks, n*—compartmented shelf-like racks intended to be stacked in layers in retort carts during use. Racks should be designed to hold, separate, and often restrain individual pouches during the retorting cycle. To prevent pouch damage, the rack design must provide for support of the pouch during retorting, while still allowing heat transfer from the heating and cooling medium.

3. Significance and Use

3.1 Use of this guide, supplemental to the use of properly designed and maintained equipment and effective management of the production unit process, is expected to minimize costs and product loss. Training of operational personnel is essential. Each of the topics stated in this guide should be addressed in the producers program of training for operators and supervisors to ensure that each individual is aware of them and consciously employs them wherever the need or opportunity exists.

4. Personnel Considerations

4.1 Employee Training:

4.1.1 *Careful Handling*—Employees should be trained to handle pouches very carefully to avoid causing defects.

NOTE 1—A keen awareness of factors affecting pouch integrity must be promoted through on-going employee training and education. Employees

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² For additional information, see Report by Meal, Ready-to-Eat (MRE) Task Force, July 1986, sponsored by the Office of the Deputy Chief of Staff for Logistics Headquarters, Dept. of the Army, Pentagon, Washington, DC 20310.

³ For additional information, see *Flexible Package Integrity Bulletin* (Bulletin 41-L), available from National Food Processors Assoc., 1401 New York Avenue, NW, Washington, DC 20005 and *Classification of Visible (Exterior) Flexible Package Defects*, published by Assoc. of Official Analytical Chemists, 2200 Wilson Blvd, Suite 400, Arlington, VA 22201.

should demonstrate an attitude of care and concern for pouch integrity. While pouches are moving through the production process, being filled, sealed, heated, and handled by inspectors and other operators, they are most susceptible to damage. They are relatively safe from being damaged once they have been put into protective cartons or shipping containers. Until then, extreme care must be taken to avoid possible damage to the pouches which can lead to food spoilage later.

4.1.2 *Recognizing Defects*—Management should provide training manuals and selected examples of defects to employees for training, and as reminders of conditions to be avoided.

4.2 *Safety Conditions*—Employees and inspectors should be prohibited from wearing jewelry, wrist watches, neckties, or other items which could cause either pouch damage or personal injury.

4.3 *Hand Protection*—Suitable gloves should be provided on the production line for handling hot products. Gloves also protect pouches from rips caused by fingernails.

4.4 *Adequate Staffing*—Adequate numbers of trained personnel must be assigned to perform all operations with the required proficiency.

4.4.1 *Avoidance of Conveyor Jams*—Assign enough operators to enable them to prevent jamming and bunching of pouches on conveyors and other work surfaces.

4.4.2 *Avoidance of Damage at Retorts*—Assign enough people for loading or unloading retort racks to enable them to prevent rough handling, or dropping of individual pouches, or of racks filled with pouches.

4.4.3 *Production Rate Changes*—When production rates are increased and longer shifts are used, care must be taken to ensure that equipment and people are prepared to cope with these increases without allowing damage to pouches.

NOTE 2—To prevent boredom and a decrease in quality that can occur from extended assignment at one position, personnel trained in several work functions should be alternated or reassigned, allowing them to perform a variety of different tasks.

5. Work Environment

5.1 *Conditions*—Work station conditions should be made conducive to high morale and productivity, according to good manufacturing practices.

5.2 *Work Area*—Adequate space should be provided so that each individual can perform the assigned work carefully.

5.3 *Sanitizing Facilities*—Hand washing and sanitizing facilities for food and pouch handlers should be provided in the same room, adjacent to the work stations, especially between the retort operation and the cartoning operation where warm wet pouches are susceptible to contamination.

5.4 *Lighting*—High illumination non-glare lighting should be used throughout the production area, with emphasis given to work surfaces.

6. Pouch Handling Procedures

6.1 *General*—The best type of quality assurance is the prevention of pouch defects through careful analysis and monitoring of the entire process to eliminate the causes of pouch defects. Elimination of the causes of defects is preferable to detecting defects by inspection.

6.2 *Pouch Filling*:

6.2.1 *Pouch Fill Temperature*—If not otherwise provided, appropriate filling temperature ranges should be established for each product. Improper fill temperatures may result in problems such as pouch deformation, excessive head space, or poor seal integrity.

6.2.2 *Air Removal*—Use an appropriate evacuation system (steam or vacuum) for the type of product being filled: vacuum for placeable foods (such as frankfurters or ham) and steam for pumpable foods (such as chicken a la king or beef stew).

6.3 *Pouch Sealing*:

6.3.1 *Pouch Seal Time*—Synchronize line speed of pouches with required sealing time to assure adequate time to form good seals on each pouch.

6.3.2 *Pouch Seal Temperature*—Seal bar temperature should be set and monitored for optimum seal characteristics.

6.3.3 *Pouch Seal Pressure*—Seal bar pressure should be set and monitored for optimum seal characteristics.

6.4 *Pouch-to-Pouch Contact*—Pouches should not be allowed to fall on or contact other pouches: the firm sharp edges of one pouch can damage the sides of other pouches.

NOTE 3—Using pouches with rounded corners helps to decrease the potential for pouches to be punctured or scratched if pouch-to-pouch contact does occur.

6.5 *Excessive Handling*—Avoid excessive handling and manipulation of pouches, especially during sampling and inspection. Pouches should be handled individually, one at a time, rather than in bunches. Gently pick one up, turn it over, examine it, and gently lay it down when finished.

NOTE 4—To avoid excessive handling and manipulation of pouches during sampling and inspection, it is recommended that machine vision applications be considered. While currently available machine vision devices are not foolproof, there are opportunities for replacing present material handling and inspection positions with machine vision, or sensor stations, or both. These devices can automatically and repetitively determine the quality of heat seals, presence of alphanumeric or bar codes, cleanliness of completed packages and other conditions.

6.6 *Folding*—Avoid folding or creasing pouches. Never fold or crease filled pouches prior to the retorting operation.

6.7 *Dropping*—Avoid dropping pouches, and prohibit tossing pouches onto other pouches or anywhere. Dropped pouches should be set aside for further examination and disposition.

6.8 *Bulk Packing*—Whenever possible, avoid temporary bulk packing of filled or retorted pouches, since this brings pouches in contact with other pouches and risks damage.

6.9 *Sliding*—Avoid sliding pouches across conveyor belts, retort racks, or other pouch handling surfaces.

6.10 *Loading Retort Racks*—Carefully place pouches in single layers to prevent pouches overlapping compartments or protruding above or out of the retort rack compartments. Avoid dropping pouches into retort racks. Carefully place each pouch individually into the rack.

6.11 *Handling Empty Retort Racks*—Carefully stack empty racks to avoid damaging one rack with another rack.

6.12 *Handling Full Retort Racks*—Carefully load full racks into carts so upper racks do not damage pouches in lower racks.

6.13 *Unloading Retort Racks*—Carefully unload racks by lifting individual pouches to avoid snagging or dragging pouches on rack surfaces.

6.14 *Pouch Drying*—Air-dry pouches as soon after retorting as possible. The use of mechanical air drying devices rather than hand wiping is preferred to avoid excessive handling and possible contamination.

NOTE 5—Some significant reasons for drying pouches soon after retorting include: (1) drying can be accomplished with air easier when the pouches are still warm from the retort, and (2) the dry pouch will not pick up contamination as easily as will a wet pouch.

6.15 *Visual Inspection*—Visually inspect pouches between removal from retort racks and just prior to placing into pouch cartons or shipping containers to avoid temporary bulk storage. Check for the presence of holes, tears, abrasions, inadequate seals, product leakage or any combination thereof.

6.16 *Placement*—When placing pouches into pouch cartons or shipping containers avoid damaging the pouch by contact with the sharp edges of any pouch contact surface or the sharp edges of the carton or shipping container.

7. Design, Inspection and Maintenance of Equipment

7.1 *General*—Equipment used in the manufacture and handling of food pouches must be free of features that could allow the integrity of the pouch to be compromised. Such features include burrs, sharp corners, exposed nuts and bolts, and places for pouches to drop or bunch up on each other. Equipment should be constructed so that all areas that may come in contact with pouches may be easily and routinely accessed. All such equipment should be maintained and routinely inspected to ensure that the potential for pouch damage by the equipment is minimized.

7.2 *Equipment Monitoring*—When pouch inspection reveals the presence of defects, the cause should be determined immediately by checking equipment and conditions on the production line preceding that inspection station. Corrective action should be promptly taken.

7.3 *Maintenance and Inspection*—Pouch-to-machine contact points (at filling and sealing, along conveyors, at retorts, and at inspection and packaging positions) should be checked for sharp burrs and snags on a routine basis. Contact points should be checked especially following maintenance work, because tools such as wrenches, etc., can leave burrs in the

metal. Burrs can be easily detected by wiping the equipment with hosiery materials. A burr will snag the material.

7.4 Filling Equipment:

7.4.1 *Alignment*—Align filling equipment so that nozzles do not distort or otherwise adversely affect the pouch during filling.

7.4.2 *Clean Nozzles*—Maintain and clean filler nozzles as needed to prevent seal area contamination by dripping product.

7.5 Conveying Equipment:

7.5.1 *Material Selection*—While seamless belts are preferred, belts with metal parts and joints may be used, provided they are kept smooth to avoid damaging pouches.

7.5.2 *Synchronization*—All equipment should be arranged to ensure an even, continuous flow of product through the operation, without allowing damage to pouches by dropping them onto conveyors or onto other equipment. Conveyor line speeds should be synchronized with production machinery to prevent piling or bunching of pouches.

7.6 Retort Racks:

7.6.1 *Design*—Compartments for pouches must be large enough to avoid the need to force pouches into them and to avoid folding or overlapping, and small enough to prevent lateral movement during retorting. Retort racks should be designed for horizontal placement of pouches, except in the case of special items such as cakes. Racks should be coated or made of smooth non-metallic material to avoid metal-to-pouch contact. However, if metal racks are used, extra care should be practiced by the employees placing pouches into the cavities.

7.6.2 *Maintenance*—Retort racks selected for processing pouches should be handled, inspected, and maintained in a manner that does not lead to the occurrence of defects that may cause damage to the pouches.

7.7 Retorts:

7.7.1 *Water Treatment*—If needed, a descaling solution, or surfactant agreeable to the authorities having jurisdiction, may be added to the retort water to prevent scaling and to facilitate drying.

7.7.2 *Inspection*—The appearance of film and loose scale on pouches being removed from retorts indicates that conditions within the retort need to be checked. Interior surfaces of retorts must be inspected for loose scale as often as necessary, and scale must be removed before it collects on pouches and causes damage.

8. Keywords

8.1 food producers; handling; processing environments; retort pouches