

Page E. Inspection of Evaporated Milk or Sweetened Condensed Milk Operations. (Form DA - 151 - 5)

Processing

Item E1—Room Construction (58.126).

See the guidelines for Item A1—Room Construction.

Item E2—Lighting & Ventilation (58.126d, e).

See the guidelines for Item A2—Lighting & Ventilation.

Item E3—Pumps, Pipelines, & Valves (58.128, 58.146a).

See the guidelines for Items A3—Pumps, Pipelines, & Valves.

In the manufacture of sweetened condensed milk, the pumps, pipelines, valves, etc., are often sanitized by flowing steam. This is a satisfactory practice when they are part of an enclosed system and a temperature of 170° F is maintained for at least 15 minutes, or 200° F for at least 5 minutes. Such high temperatures can cause deterioration to gaskets and valve plugs and seats. Check these areas carefully for sanitation and condition.

Item E4—Preheaters (58.128j, k).

See the guidelines for Item A27—Product Cooler.

Tubular type heaters are most frequently used in the evaporated milk industry. However, there has been a trend in recent years toward use of plate type regenerative units and scraped surface types (for very viscous products) to accomplish part of the preheating. In most cases, multistage heating is used.

The final heater should be equipped with automatic temperature regulating controls and should have an indicating thermometer to help assure uniform preheating treatment.

It is not necessary to describe preheating equipment when condition and sanitation is satisfactory.

Item E5—Hotwell (58.919).

See the guidelines for Item D7—Hotwell.

When preheat treatment is in hold tubes rather than hot wells, inspect the hold tubes and show any needed recommendations under this item. Hold tubes may have welded joints. In such case, determine sanitation by inspecting inlet or outlet piping. Also inspect the pump (usually a positive displacement type) which induces flow through the hold tubes. If there are any pump condition or cleaning deficiencies, use this item to recommend correction.

Many evaporated milk plants use recording thermometers (formerly recommended on USDA inspections) to monitor the preheat treatment. While this is desirable, it is no longer a requirement.

In the manufacture of sweetened condensed milk, very high preheat treatments are also given to the standardized milk prior to condensing. Although there is no subsequent thermal processing, keeping quality of the finished product is assured by the high sugar-water ratio. The *General Specifications* do not show a minimum preheat treatment for sweetened condensed milk, but treatments in excess of 180° F for 10 minutes are commonly applied.

Item E6—Carrageenan Equipment.

The use of carrageenan is optional, and if it is not used, show this item as NA. When it is used, the feed pump should be constructed of stainless, but need not be easily dismantled nor of sanitary construction. The solution tank and agitator should be stainless steel and a cover provided. In most instances, the solution is heated with live steam. In this case, the steam shall be culinary quality (see the guidelines for Item A36—Culinary Steam).

Item E7—Evaporator(s) (58.913, 58.921).

See the guidelines for Item D8—Evaporator(s).

It is usual practice in the evaporated milk industry to employ very high preheat temperatures (200-250° F) and long hold times (2-20 minutes). Provision of a timed and sealed HTST system is not required to assure adequate preheat treatment before the evaporator (although all pumps, pipelines, valves, etc. must comply with the applicable 3-A Sanitary Standards). Bacteriological safety of evaporated milk is achieved by the subsequent thermal processing, usually accomplished with a continuous retort after canning.

Item E8—Evaporator Vapor Condenser (58.127, 58.217).

See the guidelines for Item D9—Evaporator Vapor Condenser.

Item E9—Filters (58.128a).

See the guidelines for Item A3—Pumps, Pipelines, & Valves.

Dismantle and check filter units for sanitation and condition. When a disc-type filter unit is used, remove sufficient discs to determine if cleaning procedures are adequate.

Item E10—Homogenizer (58.916).

See the guidelines for Item D19—High pressure Pump.

Have the homogenizer dismantled for inspection and pay particular attention to pistons, piston seal assemblies, intake manifold and strainer, pressure gauge fitting, and homogenizing valve assembly. When cleaning deficiencies are noted, recommend daily dismantling for hand cleaning. Recirculation procedures may clean much of the interior surfaces, but are often ineffective on one or more of the above-mentioned areas.

Item E11 —Product Cooler (58.128i, j, k).

See the guidelines for Item A27—Product Cooler.

Item E12—Standardizing Ingredient Handling (58.143).

Standardization of evaporated milk may be by the addition or removal of cream or skim milk or by the addition of condensed skim milk or nonfat dry milk. When considerable adjustment of fat and total solids ratio is necessary, it is common practice to make the modifications of the product prior to the evaporator. Afterward, tests of the product in each batch tank are the basis for any further needed standardization.

If the plant is adding one or more of these products, determine if they are originating from outside plants and whether or not such plants are USDA approved (see Item A31—Source Ingredients and record the deficiency under Item E50—Source Ingredients).

Inspect tanks, pipes, and pumps used for dairy standardization ingredients. If NDM is used, check the storage area and also the equipment and procedures used for reconstitution.

Sometimes water is added for standardizing purposes. There should be no criticism of iron, brass, or copper lines and valves for directing the water to the tanks. However, any portion of a water line which projects into a dairy ingredient tank or connects directly to a milk line should be of sanitary stainless steel construction back to and including the shut-off device, check valve, or backflow preventer.

Item E13—Standardizing Tanks (58.128d, 58.143).

See the guidelines for Item A29—Storage Tanks - Horizontal.

This item refers to storage or "batch" tanks used for final standardizing of product composition. Product storage temperature of 45° F or lower is satisfactory. If noted above 45° F, recommend improved cooling.

Item E14—Sugar Handling & Equipment.

If the plant does not request the code for sweetened condensed milk show NA for this item.

For sweetened condensed milk operations, use this item to check procedures used to dissolve and add sugar if crystalline type sugar is used. If sugar is dissolved in water, it shall receive a minimum heat treatment of 180° F, for 10 minutes or equivalent time-temperature. Show heating treatment applied. Also check that bags of sugar are opened and dumped in a sanitary manner. If liquid sugar is used (syrup) check the facilities for unloading bulk trucks and also the storage tanks for the syrup.

The sugar tanks and lines are not required to comply with the 3-A Sanitary Standards. Plastic, copper, or fiberglass can be used for the tanks, lines and valves. However, any portion of a line that projects into a dairy ingredient tank or connects directly to a milk line shall be of sanitary stainless steel construction back to and including the shut-off device, check valve, or backflow preventer.

Item E15—Cut-Back Equipment (58.128a).

During the evaporated milk filling and processing operations, a certain number of cans may be "cutback" because of slack fill, dents, seal failures, etc. Certain finished lots may also need reprocessing because of steam or mechanical failures during the retort process, stability or fat separation problems, etc. Equipment used to open and recover product from such cans shall be made of stainless steel and be of sanitary construction. Check it carefully for condition and sanitation, including any related pumps, piping, and storage tanks. Also, check for prompt cooling or timely reuse of the product.

The cutback operation shall be conducted in a processing room or area (the filler room is satisfactory).

Item E16—Storage Tanks (58.128d, 58.143).

See the guidelines for Items A28—Storage Tanks - Silo & A29—Storage Tanks - Horizontal.

This item refers to storage tanks used for raw milk prior to evaporating. If milk temperature is unsatisfactory (above 45° F), show a recommendation for improved cooling.

Item E17—Housekeeping (58.126e, 58.127f, 58.146d).

See the guidelines for Item A7—Housekeeping.

Thermal Processing & Packaging

Item E19—Room Construction (58.126).

See the guidelines for Item A1—Room Construction.

A separate room is not necessary for the evaporated milk filling operations. However, construction of floors, walls ceiling, etc. should be equivalent to requirements for a processing area. Related doors or windows shall be effectively protected or screened against the entrance of flies and other insects. If a large common room is used for both filling and sterilizing operations, the entire area shall be so protected or screened. If the operations are located in separate rooms, the “processing area” requirement would apply only to the filler room. Inspect for effective screening and insect control in accordance with this guideline.

Filling of sweetened condensed milk into retail size cans should be conducted in a separate room which is suitably constructed for near aseptic filling operations.

Item E20—Lighting & Ventilation (58.126d, e).

See the guidelines for Item A2—Lighting & Ventilation.

Item E21 —Pumps, Pipelines, & Valves (58.128a, 58.146a).

See the guidelines for Items A3—Pumps, Pipelines, & Valves.

If steam sanitizing is employed, check that the minimum treatment is 170° F for at least 15 minutes or 200° F for at least 5 minutes.

Item E22—Surge Tank to Filler(s) (58.128a).

Inspect the surge tank and level control parts for sanitation and condition. Dismantle the float control assembly for thorough inspection. The tank shall be provided with covers, which should be in place during tank use and be easily removable for cleaning.

Item E23—Filler(s) (58.914, 58.923).

Many fillers have product contact parts made of brass or chromed brass. This is satisfactory provided the parts are in good condition and free of corrosion and definite pitting. When definite pitting of product contact surfaces is noted recommend replacement of the pitted parts. When the condition is slight, no recommendation is necessary.

Inspect the rotary connection for the pipe which brings product into the filler and the areas underneath that lead to the “spider” tube distribution system. Inspect some of the “spider” tubes and the rubber or plastic connector hoses to the cylinders. Check sufficient cylinders, pistons, caps, gaskets, valves, foam checks and rubber filling nipples to determine if satisfactory

cleaning is performed. Remember that both sides of the piston are product contact surfaces. Similarly inspect all interior surfaces of each cylinder and also the hole which conveys product to the can.

Note:

During the inspection process, be sure to place pistons, valves and other parts back into the same original tray or cylinder location. These parts are machined and calibrated for a specific cylinder and must not be mixed up.

Pay special attention to inspection of fillers That are "cleaned-in-place." Dickerson fillers are not easily adaptable for cleaning by recirculation methods. The construction metals will not permit use of strong cleaning solutions without damage to the surfaces. Also, solution flow through the assembled parts is quite slow and may not be effective in removing the product soil. For these reasons, cleaning is usually accomplished by dismantling of all parts for thorough hand brushing. Cleaned cell parts should then be placed in a tray, hosed with hot water to facilitate air drying and then be stored in a clean dry place until reassembly.

A variety of fillers are used for sweetened condensed milk and for large cans of evaporated milk of the No. 10 or confectioners sizes. Inspect as outlined above, the same guidelines apply except that exposed brass or copper construction should be criticized (sanitary stainless steel fillers are available for large cans).

Inspect the exterior surfaces of the filler equipment, including the iron frame, which should also be maintained clean and in good condition.

For sweetened condensed milk where aseptic filling is used, the cans and lids are usually subjected to a steam sterilizing treatment just prior to filling. Inspection of this equipment is not necessary except for cleanliness of exterior surfaces. Culinary steam is not required for steam sterilization treatment of cans and lids.

Item E24—Filler Parts Storage.

In addition to checking the filler parts as noted above, inspect the storage cabinet used to store parts. It should be maintained in a sanitary and orderly manner and parts should be kept covered until used.

Item E25—Thermal Processing Equipment (58.922).

For continuous operations, this equipment will usually consist of a preheater which then transmits the hot cans of evaporated milk to a second stage "sterilizer" or continuous retort. Check this item satisfactory if the exterior surfaces of the preheater and the retort are clean and in good condition. It is not necessary to report processing temperatures.

When batch type retorts are employed, show this item satisfactory if exterior surfaces are clean. For sweetened condensed milk operations, show NA.

Item E26—Control of Thermal Processing (58.915, 58.922).

In-can retort systems, whether batch or continuous, shall be equipped and operated in accordance with FDA requirements for *Thermally Processed Low Acid Foods Packaged in Hermetically Sealed Containers* (21 CFR 113). This regulation is applicable to Evaporated Milk, which is considered a "low acid food." The regulation specifies necessary retort equipment and controls, such as types and accuracy of thermometers, thermometer bulb location, pressure gauge, automatic steam controls, bleeders, vents, condensate removal, etc. Similarly, the regulations specify the required operating procedures, retort speed timing, emergency stop procedures, critical factor control, container and closure inspection, maintenance of process control records, and procedures to follow when there are processing deviations. The regulations also require that all operators of retorts, processing systems, and aseptic processing and packaging systems, and container closure inspectors shall be under the operating supervision of a person who has successfully completed an approved school for such operations.

This brief summary of the regulation indicates the wide scope of the equipment controls and operating procedures necessary for reliable thermal processing. It is not intended that USDA surveys would include checks for plant conformance with all of these requirements. Considerable time and special training would be necessary to make such evaluations. In lieu of inspecting the sterilizer instrumentation and operating procedure, ask the manager about plant compliance with the FDA regulation, including retort operation under supervision of trained personnel. Such training should be evidenced by a certificate(s) showing satisfactory completion of the required training course. If the manager supplies such evidence and also indicates compliance with the other requirements of the regulation, show this Item as satisfactory.

Item E27—Product Cooler (58.128j, k).

Check that the exterior surfaces of the cooler unit are clean and in good condition.

Show the temperature to which the canned milk is cooled (do not report the temperature of cooling water in the cooler). When this check is made during actual operations, ask the sterilizer operator to select a can coming out of the cooler. Plant can-opening and thermometer equipment may be used to make this temperature check. When milk temperature is above 100° F, recommend cooling to 100° F or below.

Note:

Cooling the product too much may lead to wet cans at time of labeling and casing. This is an unsatisfactory condition which can cause exterior rust development.

Item E28—Pellet Detector (58.928, 58.929).

The plant should employ means of detecting and rejecting cans with solder pellets inside.

Pellet detectors usually operate by vibrating cans of filled product. A sensitive electronic detector differentiates the vibratory pattern of cans with solder pellets and rejects them. This test usually is made directly after the filler.

Item E29—Can Leak Detection (58.928).

A number of test methods are used in the evaporated milk industry to detect leaky cans.

1. A suction cup device is applied over the soldered end of each can immediately after filling and sealing. Cans with faulty soldered closures will be rejected. Seam leaks are not detected by this type of unit.
2. Compressed air is applied through a rubber sleeve to the soldered closure area of each can immediately after filling. If the soldered closure is faulty, air will enter the can, bulge the other end of the can and cause it to be rejected. Seam leaks are not detected by this type of unit.
3. Filled sealed cans are passed continuously through a 160° F hot water bath. The slight heating of air in the head space will cause bubbles to escape. An inspector watches the bath and removes leaky cans.
4. Continuous type preheaters cause bulging of can ends due to thermal expansion of the contents. As the preheated cans leave the unit, two precisely set rotating discs will reject any cans which are not bulged, indicating that they are leaky.
5. After preheating, retort treatment, and cooling, sound leak-free cans will return to their normal shape, that is, no bulged ends. Leaky cans do not contract to their normal shape upon cooling. Thus, another pair of precisely set rotating discs located at the cooler outlet is used to reject bulged cans.

The aforementioned FDA regulations concerning thermally processed low-acid foods requires qualified personnel to conduct detailed inspections and tests for reliable airtight seals when the cans are not the double seam type. Special instructions for the applicable personnel of evaporated milk plants is arranged in connection with training of retort operators. The FDA regulations also require maintenance of "Records of Container Closure Examinations."

Check that at least two of the five outlined test procedures are in use under the supervision of qualified (trained) personnel and that records are being maintained about number of leak defects by type and apparent cause, corrective action, etc. together with identifying details about date, codes, filler or retort line, number of cans tested, etc.

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Net weight control is accomplished primarily by careful adjustment of each filler cell to deliver the correct amount of product. Adjustment is based on periodic test weighing of filled cans from each cell. (To obtain net weight, cans are gross weighed, emptied, washed, dried and weighed back.) Since these are volumetric type fillers, cell delivery will be quite constant if product composition and temperature remain the same. In addition to this periodic calibration of filler cells, some companies employ continuous monitoring devices on filled cans. Gross weight is often checked by means of a continuous rotary scale device located directly after the filler. Minor fill variations may be checked with electronic devices which can sense the product level in the filled can.

It is not necessary to review plant control of product net weight as part of the plant survey. Official test weighing is the responsibility of inspectors who perform requested product inspections.

Item E30—Can Drying.

Check this item satisfactory if cans are dry at time of labeling. When wet cans are noted, recommend correction. This is an unsatisfactory condition which can cause exterior rust development.

Correction can be achieved by varying the final cooling temperature (maximum temperature, as stated above, is 100° F), provision of more drying time on conveyors, installation of special blowers on the line to hasten drying, etc.

Item E31—Can Bin Storage (58.126e.2).

Can bin storage areas shall be maintained in a neat and orderly manner. Check for evidence of moisture, poor housekeeping, or other unsatisfactory conditions. Cans may be stored in a number of different ways; in boxes, in large paper bags, in neatly stacked rows in can bins, or loose in can bins. All these methods are satisfactory.

Where the plant uses cans directly from railroad cars or trucks, use this item to cover the transfer facilities as well as the area where the emergency can inventory is stored.

Item E32—Housekeeping (58.126e, 58.127f, 58.146d).

See the guidelines for Item A7—Housekeeping

Items E33—37.

If the plant has batch as well as continuous retort systems, use these items to describe and report on the batch operations.

If the plant makes sweetened condensed milk, these items may be used as needed to cover crystallizing (58.925) and aseptic filling operations (58.924).

Labeling & Coding

Item E38—Room Construction (58.126e.2).

Use general guidelines of Item A1 to evaluate construction. However, when there are no fluid processing operations in the room used for labeling and coding, construction need not be at the level required for processing rooms. Nevertheless, surfaces of walls, ceilings, floors, etc. should be sound and maintained in clean condition.

Item E39—Lighting & Ventilation (58.126d, e).

Check lighting intensity with a meter and report unsatisfactory readings. There shall be at least 30 F/C in the immediate labeling area.

When the area is large, the areas peripheral to the labeling and coding operations shall have at least 5 F/C.

Item E40—Labeling Equipment.

As the labeling equipment for filled cans has no direct sanitary significance, your inspection may be limited to exterior condition and cleanliness. Also, check for good housekeeping at the labeling equipment and immediate area. Check that supplies used in the immediate labeling area are maintained in a neat and orderly manner.

Item E41—Coding - Cans & Boxes (58.931).

Codes for cans of evaporated and sweetened condensed milk may be applied in a variety of ways—rotary inked stamps, embossing, label notching, etc.

Check a few cans at random for legible coding, which usually denotes plant, date, and batch number. It is not necessary to show the key to the plant code on the report. If coding is not legible, check the item unsatisfactory and recommend correction. Also check the coding on a few boxes and handle in the same manner.

Item E42—Boxing Equipment.

This equipment and surrounding area shall be maintained in a neat and orderly manner.

Item E43—Label - Storage (58.126e.2).

Check the label storage room or area for maintenance in a neat and orderly manner. When unsatisfactory conditions are noted, recommend correction.

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Item E44—Housekeeping (58.126e, 58.127f, 58.146d).

See the guidelines for Item A7—Housekeeping.

Product Storage

Item E46—Room Construction - Warehouse (58.126, 58.927).

See the guidelines for Item B53—Room Construction - Warehouse.

Inspect floor, walls, ceiling, windows, and doors for condition and cleanliness. Wood floors are satisfactory if they are sound, smooth, and kept clean. Check screening and fit of windows and doors to exclude insects and rodents. When large doors are used to load out rail road cars or trucks, check for birds or bird evidence in the warehouse. If found, record the deficiency under Item E56—Pest Control.

Finished products (evaporated or sweetened condensed milk) which are to be held more than 30 days should be stored at temperatures below 72° F. (If stored above 72° F, make a verbal recommendation to management.) Precautions shall be taken to prevent freezing of the product.

Item E47—Lighting & Ventilation (58.126d, e).

See the guidelines for Item B54—Lighting & Ventilation.

Lighting shall be at least 5 F/C. Ventilation shall be adequate to minimize or prevent condensation and mold problems. Some companies provide refrigerated storage, but this is not a requirement.

Item E48—Housekeeping (58.126e, 58.127f, 58.146d).

See the guidelines for Item B56—Housekeeping.

Check for storage of boxes in an orderly manner approximately 18 inches from the walls so that the room perimeter is easily accessible for cleaning, pest control, and inspection.

Check that no other items are stored in proximity to the evaporated milk which might cause shipping box problems with odor absorption, mold, or insect infestation. Similarly, animal feed products, any off-condition evaporated milk, etc., should be stored separately.

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General Items

See the guidelines for Page A — General Items