Firm Name:	**FEI Number:**
City, State	**FCE Number:**
Inspection Date(s):	**Investigators:**

DEPARTMENT OF HEALTH AND HUMAN SERVICES
FOOD AND DRUG ADMINISTRATION

PROCESSING IN STEAM IN HYDROSTATIC RETORTS
(Retort Survey)

INSTRUCTIONS

Complete the question blocks below. Narrative responses to each item can be entered in the item's "comments" area or where otherwise prompted.

Before entering the interior of the retort, you must confirm with the firm that you are following the firm's Standard Operating Procedures designed to meet OSHA confined space requirements. If the firm insists that only plant personnel enter the retort, witness the measurement procedure and data collection. To obtain OSHA confined space information and safety procedures, see the confined space presentation on the FDA training web site. If the firm is not aware of the OSHA confined space requirements or does not have a confined space program, DO NOT ENTER THE RETORT.

If problems are found with the firm's retort equipment or processing system, refer the reader to the EIR for a narrative description of specific problems with supporting evidence, under "Objectionable Conditions and Management's Response." Submit the completed form as an EIR attachment.

PROCESS ESTABLISHMENT AND SCHEDULED PROCESSES - 21 CFR 108.35

1. Report the Product(s) and SID number(s) covered on this inspection.

Product(s)	SID(s)

2. Has the firm registered the facility with the FDA and filed a process for all LACF products manufactured? - *21 CFR 108.35 (c)* ☐ Yes ☐ No

3. Does the firm have a process letter or other process source documentation listing critical factors necessary to control in the attainment of commercial sterility? ☐ Yes ☐ No

Based on the processing authorities' evaluation critical factors are specific to an individual product or on occasion listed for a grouping of products (eg: turnip greens in brine, kale in brine, mixed greens in brine etc.).

4. Do critical factors or limits listed in source documents match critical factors or limits for selected products and processes filed with FDA? ☐ Yes ☐ No

RETORT DESCRIPTION

5. Retort Manufacturer and Retort Number(s):

6. Container Size(s)

7. Cooker capacity

8. Number of carrier chains ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

9. Number of carriers in steam dome

10. Number of containers/carrier

11. Does a computer control any of the retort functions? ☐ Yes ☐ No

12. Does the firm have documentation on hand which indicates that the computer system has been validated? ☐ N/A ☐ Yes ☐ No

HEAT AND TEMPERATURE DISTRIBUTION - 21 CFR 113.83

13. Have there been any changes to the retorts or thermal processing system since the last temperature distribution study that could affect temperature distribution? ☐ Yes ☐ No

While reviewing the process authority's supporting documentation, compare the study parameters to actual operating conditions.

Pay attention to any changes during operating conditions that do not match the PA documentation. These could include (static cook vs. rotary cook; circulating water system turned off; changes to plumbing for the retort installation; different loading configurations, change in container size and other factors that can affect the attainment of temperature distribution or heat penetration in the retort.

If a change has been made in the thermal processing system that could affect temperature distribution, the firm must have on file documentation of the change, including the review and approval by a qualified process authority.

PRODUCT PREPARATION - 21 CFR 113.81

15. Are products prepared according to the method (rehydrating, drying, acidifying, blanching etc.) and / or formulation specified in the recommended scheduled process? ☐ Yes ☐ No

Be aware of changes in starches and other minor ingredients. If the wrong starch is used it can change the heat penetration inside the container.

16. When maintenance of pH (above 4.6) of a normally low acid food is a basis for a scheduled process does the firm ensure that the equilibrium pH of the finished product meets the value specified in the scheduled process? ☐ N/A ☐ Yes ☐ No

In this case the firm must monitor pH as a critical factor at intervals of sufficient frequency and prepare maintain records the pH meter should be calibrated to ensure its accuracy. (113.81(e))

17. For water activity controlled processes is the water activity (Aw) carefully controlled to ensure that the Aw of the finished product meets that of the scheduled process? ☐ N/A ☐ Yes ☐ No

When normally low acid foods require sufficient solute to permit safe processing at low temperatures such as in boiling water there shall be careful supervision to ensure that the equilibrium water activity of the finished product meets that of the scheduled process 113.81(f)). In this case the firm must monitor water activity at intervals of sufficient frequency and prepare maintain records the water activity meter should be calibrated to ensure its accuracy (117.40(f)).

18. Is the formulation of the product and retorting process etc. conducted in a timely manner to prevent incipient spoilage? ☐ N/A ☐ Yes ☐ No

CRITICAL FACTORS - 21 CFR 113.40(f)(9)

19. Are all critical factors defined in the scheduled process measured and recorded at intervals of sufficient frequency to ensure the process is under control? ☐ Yes ☐ No

20. If maximum fill weight or drained weight are critical, are they measured and recorded as specified in the scheduled process? ☐ N/A ☐ Yes ☐ No

21. If minimum closing machine vacuum for a vacuum-packed product, maximum fill-in or drained weight, minimum net weight and / or percent solids is required, is it as specified in the scheduled process? ☐ N/A ☐ Yes ☐ No

22. Is minimum headspace of containers as specified in the scheduled process? ☐ N/A ☐ Yes ☐ No

23. Are the product characteristics (formulation, particle size, viscosity, brix, etc.) as specified in the scheduled process? ☐ N/A ☐ Yes ☐ No

THERMAL PROCESSING ROOM OPERATIONS - 21 CFR 113.87

24. Is the system operated in the same state that was used during the last temperature distribution study? ☐ Yes ☐ No

The retort design loading configuration, changes in divider plates, smallest container size and many other factors can affect the attainment of temperature distribution in the retort - see pp. 21-22 of LACF guide part 2. A change in any of these factors could necessitate a new temperature distribution study and possibly a new vent schedule. If a change has been made in the thermal processing system that could affect temperature distribution the firm should have on file documentation of the change including the review and approval by a qualified process authority.

25. Are scheduled processes and venting procedures (if applicable) posted in the retort room or readily available to the retort operator? ☐ Yes ☐ No

21 CFR 113.87(a)

26. Has the firm established an adequate system for product traffic control in the retort room to prevent un-retorted product from bypassing the retort process? ☐ Yes ☐ No

Containers shall be plainly marked with heat-sensitive indicator tape dye or paint or by other effective means visually indicating to thermal processing personnel those units that have been retorted. A visual check shall be performed to determine whether or not the appropriate change has occurred in the heat-sensitive indicator as a result of retorting to ensure that each unit of product has been retorted. A written record of these checks should be made. (113.87(b))

27. Is the initial temperature ("IT") of the contents of the coldest containers to be processed determined and recorded with sufficient frequency? ☐ Yes ☐ No

Measure the "IT" of at least 1 retort load with a calibrated thermometer and report the results in "comments." (113.87(c))

28. Are records maintained demonstrating that IT thermometers are properly calibrated? ☐ Yes ☐ No

29. Are thermal process timing devices (clocks, charts, stopwatches etc.) accurate? ☐ Yes ☐ No

CONTAINERS - 21 CFR 113.60

30. For products covered during this inspection describe the method of filling containers (hand, vibration, pocket, etc.). If other, describe below. ☐ Hand ☐ Piston ☐ Vibration ☐ Other ☐ Pocket

31. Is this method the same as that used during process establishment tests? ☐ Yes ☐ No

32. Are can flanges free of damage after filling? ☐ Yes ☐ No

33. Do product codes comply with part 113.60(c)? ☐ Yes ☐ No

The code shall be permanently visible to the naked eye and shall identify the packer, product, year, day and period of packing. Describe the coding system including a code breakdown for products produced during this inspection.

34. Are regular observations performed during production for container defects? ☐ Yes ☐ No

35. Are records of visual and destructive tests of containers performed and documented by qualified individuals? ☐ Yes ☐ No

36. Are corrective actions for defects taken and recorded? ☐ Yes ☐ No

37. For metal cans, are destructive tests performed on cans from each seaming head by qualified individuals and are all required measurements documented? ☐ N/A ☐ Yes ☐ No

Collect supporting evidence for sealing closing parameters or specification values necessary for sealing/closing

38. For glass containers, are cold water vacuum tests for capper efficiency performed and recorded? ☐ N/A ☐ Yes ☐ No

Collect supporting evidence for sealing closing parameters or specification values necessary for sealing/closing

39. For other containers, are appropriate tests and detailed inspections performed to ensure a consistently reliable hermetic seal? ☐ N/A ☐ Yes ☐ No

Collect supporting evidence for sealing closing parameters or specification values necessary for sealing/closing

40. What type of container testing is performed?

Identify all that apply. For additional details on package integrity, refer to the FDA BAM (Bacteriological Analytical Manual)

☐ Abuse	☐ Air leak	☐ Burst	☐ Conductivity	☐ Dye	☐ Electrolytic
☐ Etching	☐ Gas leak	☐ Incubation	☐ Light	☐ Machine Vision	☐ Pull Up
☐ Peel (Tensile)	☐ Proximity	☐ Seam scope	☐ Security	☐ Sound	☐ Squeeze
☐ Teardown	☐ Torque	☐ Vacuum	☐ Visual	☐ Other	

RETORT SYSTEM - 21 CFR 113.40(f)

Temperature Indicating Device

41. Is the retort equipped with at least one temperature-indicating device (TID) that accurately indicates the temperature during processing? ☐ Yes ☐ No

42. When the scheduled process specifies maintenance of particular temperatures in the hydrostatic water legs, is a TID located in each hydrostatic water leg in a position near the bottom automatic recorder? ☐ Yes ☐ No

43. Is the TID sensor installed in the steam dome near the steam water interface or within a well attached to the steam dome? ☐ Yes ☐ No

44. Is the TID installed where it can be accurately and easily read? ☐ Yes ☐ No

45. Is the TID used as the referenced instrument during processing? ☐ Yes ☐ No

46. Are calibration records for the TID established and maintained? ☐ Yes ☐ No

47. Is the TID accurate to 1 °F (0.5 °C)? ☐ Yes ☐ No

Temperature Recording Device

48. Is the retort equipped with a temperature recording device? ☐ Yes ☐ No

49. Is the temperature chart adjusted to agree as nearly as possible with but not higher than the known accurate TID during the processing period? ☐ Yes ☐ No

50. Is a temperature recording device In the Steam Chamber between the steam-water interface and the lowest container position? ☐ Yes ☐ No

51. Is a temperature recording sensor installed near the top and the bottom of each Hydrostatic Water Leg if the scheduled process specifies maintenance of particular temperatures in the legs? ☐ Yes ☐ No

The temperature recorder sensor shall be installed either in the steam dome or in a well attached to the dome - 113.40(f)(2)

52. Does the temperature recording device record temperatures to a permanent record? ☐ Yes ☐ No

53. Is the appropriate chart paper used with the temperature recording device? ☐ Yes ☐ No

*Chart paper must have both the appropriate **range** (2 °F or 1 °C) within a range of 10 °F (5 °C) of the process temperature and **working scale** (< 55 °F per inch or 12 °C per centimeter) within a range of 20 °F (10 °C) of the process temperature.*

54. If the chart is a multipoint plotter, does it record at intervals that assures that the parameters of the process time and process temperature were met? ☐ N/A ☐ Yes ☐ No

Shall requirement

55. Does the digital temperature recorder record data at sufficient intervals to assure that the parameters of the process time and process temperature were met? ☐ N/A ☐ Yes ☐ No

Processing Steam

56. Is the retort equipped with an automatic steam control valve? ☐ Yes ☐ No

Each retort shall be equipped with an automatic steam controller to maintain the retort temperature.

57. Is the retort vented to remove air prior to processing? ☐ Yes ☐ No

Bleeders

58. Are bleeders installed on the retort to ensure adequate removal of air and circulation of steam in the system? ☐ Yes ☐ No

On hydrostatic retorts, at least 1/4" (6 mm) bleeder openings shall be located at the top of the steam chamber(s) opposite the steam inlet.

59. Are the bleeders observed during operation? ☐ Yes ☐ No

60. Are the bleeders wide open and continually emitting steam during the entire process, including the come-up time? ☐ Yes ☐ No

Processing Water

61. Is the retort equipped with a method for determining water level in the retort during temperature drops? ☐ Yes ☐ No

If containers in the steam dome contact water during temperature drops, those containers must be segregated from other containers and handled as part of a process deviation.

Retort Speed

62. Is the speed of the container conveyor chain speed adjusted, as necessary, to ensure that the speed is as specified in the scheduled process? ☐ Yes ☐ No

Shall requirement

63. Is the speed of the container conveyor chain determined and recorded at the start of processing and at least once every 4 hours during processing? ☐ Yes ☐ No

The speed shall be determined and recorded at the start of processing and at intervals of sufficient frequency to assure that the retort speed is maintained as specified. the speed should be determined and recorded every 4 hours. Carrier conveyor speed may be measured as the number of flights per minute using a stopwatch, or electronically with a sensing probe. electronic measurement of the conveyor speed should be verified by using a stopwatch on a routine basis.

64. Determine the carrier conveyor speed (times 50 carriers) using a calibrated stopwatch. Is the retort speed as specified in the scheduled process? ☐ Yes ☐ No

*The number of **desired** carriers per minute to meet process time requirements is determined by the following formula: carriers per minute = number of carriers in steam chamber/process time in minutes*

*The **actual** number of carriers per minute is determined by using the following formula: carriers per minute = (number of carriers in steam dome) /seconds for 50 carriers*

65. Is the retort speed sufficient to allow for a process time at least equal to the minimum process time filed with FDA? ☐ Yes ☐ No

66. Is there a means for preventing unauthorized speed changes? ☐ Yes ☐ No

A lock, notice or password protection posted at or near the speed adjustment controls which provides a warning that only authorized personnel are permitted to make adjustments is a satisfactory means of preventing unauthorized changes.

67. Is container cooling water chlorinated or otherwise sanitized for recirculated water supplies? ☐ Yes ☐ No

There should be a measurable residual of the sanitizer employed at the water discharge point of the container cooler.

POST PROCESS HANDLING - 21 CFR 113.60(d)

68. Are container handling procedures and conveyance equipment adequate to protect container bodies and seals from damage that could result in leakage and post-process contamination? ☐ Yes ☐ No

Conveyor tracks should be maintained in a clean sanitary dry way. These conveyors are often neglected and contain build-up of food and dirt residues. The seams are most vulnerable to post-process leakage at this time because of the negative pressure developing inside the container as the contents cool. Conveyor tracks should not contain sharp edges or projections that could dent and damage can bodies and seams.Conveyors should be designed so that excessive heavy contact between cans does not occur and the double seams do not roll on or contact the conveyor during conveyance.

69. Are lots containing spoiled or swollen cans properly investigated? ☐ Yes ☐ No

Note that an acceptable level for can food spoilage in the LACF industry is 0.01% or 1 abnormal container per 10,000 containers - at levels above this the firm should perform a spoilage diagnosis including microbiological analysis to determine the cause of the spoilage. In addition the firm should determine the cause of the problem and document this and any corrective action taken to prevent the problem from reoccurring.

PROCESS DEVIATIONS - 21 CFR 113.89

70. Does the firm maintain a separate file or log for documenting process deviations? ☐ Yes ☐ No

71. Did the firm properly handle all scheduled process deviations? ☐ Yes ☐ No

RECORDS - 21 CFR 113.100

72. Are all lots that are shipped in interstate commerce free from instances of public health significance and otherwise not injurious to health? ☐ Yes ☐ No

73. Do operators document processing and production information on forms that include the product, code number, date, retort or processing system, container size, approximate number of containers, initial temperature, actual processing time, TID readings, temperature recorder device readings and other appropriate processing data? ☐ Yes ☐ No

74. Is processing and production information recorded at the time it is observed by the retort operator? ☐ Yes ☐ No

75. Are recording thermometer charts (analog, graphical or digital) identified by date, retort number, and other data as necessary so that they can be correlated with the written record of lots processed? ☐ Yes ☐ No

76. Are processing and production records signed or initialed by the retort operator and reviewed for completeness and signed or initialed and dated by plant management within 1 working day after the actual process to assure that the product received the scheduled process? ☐ Yes ☐ No

77. Are all operators of thermal processing systems and container closure inspections under the operating supervision of a person who has attended a Better Process Control School (BPCS) or other school approved by FDA? ☐ Yes ☐ No

78. Does the firm have recall procedures on file that comply with 108.35(f)? ☐ Yes ☐ No

79. Does the firm maintain initial distribution records per 113.100(f)? ☐ Yes ☐ No

Still Retort Records – 113.100(a)(1)

80. Are records maintained documenting the temperature in the steam chamber between the steam-water interface and the lowest container position and the speed of the container conveyor chain? ☐ Yes ☐ No

81. Are records maintained for the temperatures near the top and the bottom of each hydrostatic water leg? ☐ Yes ☐ No

82. Are records maintained for all critical factors specified in the formulation of the product and the scheduled process? ☐ Yes ☐ No

TID and Reference Device Records - 113.100(c) and 113.100(d)

83. Do the TID calibration records include: A reference to the tag or seal, the name of the manufacturer, the ID of the reference device, NIST traceability, ID of the person who performed the test, the date and results of the testing including adjustments, and the date the next test is to be performed? ☐ Yes ☐ No

84. Do the reference device calibration records include: A reference to the tag or seal, the name of the manufacturer, the ID of the reference device, NIST traceability, ID of the person who performed the test, the date and results of the testing including adjustments, and the date the next test is to be performed? ☐ Yes ☐ No

Container Integrity Records - 113.100(e)

85. Do container closure records include the product code, date, time, measurements and corrective actions taken? ☐ Yes ☐ No

86. Are container integrity records signed and dated by the inspector and reviewer? ☐ Yes ☐ No

87. Are container integrity records reviewed with sufficient frequency to ensure containers are hermetically sealed? ☐ Yes ☐ No

COMMENTS