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Ag 31.05 Dairy plant cleanliness. All rooms in which milk and dairy products are handled, processed or stored, or in which containers, utensils, ingredients or equipment are washed or stored, shall be kept neat, clean, and free of evidence of insects and rodents. Only equipment and ingredients directly related to processing operations or to the handling of containers, utensils and equipment shall be permitted in the pasteurizing, processing, cooling, packaging, and bulk milk storage rooms. Any exhaust stacks, elevators and elevator pits, conveyors and similar facilities shall be inspected and cleaned at regular intervals. Pesticides shall be used only for purposes for which they have been registered and in accordance with label directions.

History: Cr. Register, October, 1978, No. 274, eff. 1-1-79.

Ag 31.06 Facilities and equipment. (1) **EQUIPMENT; GENERAL.** (a) All product contact equipment, piping or connections used in the processing, manufacturing, handling or packaging of dairy products, shall be constructed of stainless steel or other equally corrosion-resistant material which can be readily cleaned. No processing equipment shall be used which is rusted or corroded or in such a defective condition that it may result in contamination of milk and dairy products. Plastic, rubber and rubberlike materials, or other non-metallic parts having product contact surfaces shall meet requirements generally considered acceptable in the food processing industry. All equipment and piping shall be so designed as to be easily accessible for cleaning and be kept in good repair and free from cracks and corroded surfaces.

(b) Stationary equipment, including welded sanitary lines designed for cleaning-in-place, may be used subject to department approval. Where rigid pipelines are not practicable, flexible pipeline of approved plastic or other sanitary materials may be used for the transfer of partially processed products during intermediate stages of production in the manufacture of cheese and for the loading and unloading of bulk tank trucks, provided the flexible pipeline does not exceed 25 feet in length. Not more than 48 inches of approved flexible pipeline may be used between different pieces of equipment to eliminate vibration.

(c) Product pumps shall be of a sanitary type, which can be easily dismantled for cleaning, or of approved C-I-P construction. Cleaned-in-place sanitary piping and equipment shall be self-draining.

(d) Newly installed processing equipment shall be located at least 24 inches from any wall or any other piece of equipment more than 48 inches long. This does not apply to storage and silo tanks where the face of such tanks extends through a wall in the processing room.

(2) **UTENSILS.** All utensils used in the receiving, storing, processing, manufacturing, packaging and handling of milk or milk products, or any ingredients thereof, shall be of smooth, non-absorbent, stainless steel, approved plastic or equally corrosion-resistant material with flush seams. No utensils which are badly worn, rusted or corroded or which cannot be rendered clean and sanitary by washing shall be used. No lead solder shall be permitted to come in contact with milk or dairy products.

(3) **PASTEURIZATION AND PASTEURIZATION EQUIPMENT.** (a) 1. Whenever pasteurization of a product is required by a standard of identity under 21 CFR 131, 133, and 135, or rules of the department, or a product is otherwise represented as having been pasteurized, it shall be pasteur-

ized in accordance with time and temperature requirements which may be specified for the product or as otherwise set forth under par. (b), and in equipment which will heat every particle of milk or other dairy product to the required temperature and continuously hold them at such temperature for the required period of time.

2. Equipment used in the pasteurization of product shall conform to accepted industry standards for the sanitary construction, installation, testing and operation of the equipment, and the requirements of pars. (c) and (d) relating to high-temperature short-time (HTST) and non-coil batch pasteurizers. Dairy plants subject to the requirements of chs. Ag 70 and 80, Wis. Adm. Code, shall also be subject to pasteurization and pasteurization equipment standards and requirements of this subsection. Pasteurizing equipment requirements specified under par. (c) for HTST pasteurizers shall apply to all other dairy plants after July 1, 1981, except as provided under par. (e).

(b) 1. Milk and other dairy products as identified in the table below shall be pasteurized in accordance with the following time and temperature standards and requirements for the pasteurization of product in non-coil batch or high-temperature short-time (HTST) pasteurizers:

PRODUCT	NON-COIL BATCH PASTEURIZATION	HTST PASTEURIZATION
Milk or skim milk	145° F. for 30 minutes	161° F. for 15 seconds
Cream and other fluid dairy products	150° F. for 30 minutes	166° F. for 15 seconds
Cream for butter	165° F. for 30 minutes	185° F. for 15 seconds
Condensed milk products	155° F. for 30 minutes	166° F. for 15 seconds
Frozen dessert mixes	155° F. for 30 minutes	175° F. for 25 seconds
Process cheese	150° F. for 30 seconds	—

2. This subsection does not prohibit the use of any other process which is equally as effective in the pasteurization of product and approved by the department.

(c) All component equipment or optional component equipment of high-temperature short-time pasteurizers (HTST), except heating and cooling equipment, shall be connected to each other with sanitary pipelines and fittings and so installed as not to have an adverse effect on the time, temperature, and pressure relationships of the HTST system. All parts and equipment of the HTST system shall be installed to facilitate easy access for cleaning, maintenance and inspection, and in accordance with the following standards and requirements:

1. The raw product constant level tank shall be installed so that all contents will drain to the outlet before the outlet becomes uncovered. The tank outlet shall be directly connected to the raw product inlet of the regenerative section, or when a raw product booster pump is used, the tank outlet shall be connected to the inlet of the booster pump. The tank shall be installed so that its top rim is always lower than the lowest product level in the regenerator.

2. When product to product regeneration is employed, the pasteurized product, between its outlet from the regenerator and the nearest point downstream open to the atmosphere, shall rise to a vertical elevation of at least 12 inches above the highest raw product level downstream from the constant level tank, and shall be open to the atmosphere at this or a higher elevation. An effective vacuum breaker of sanitary design shall be considered as being open to the atmosphere.

3. When a plate type heat exchanger is installed, the processor shall have available for the department a diagram showing the plate port arrangement in proper operating sequence.

4. The timing pump or device shall be installed upstream from the holder and the driving motor and starter shall be interwired with all components.

5. Holding tube supports shall be installed and adjusted to maintain all parts of the holding tube in a fixed position, and to maintain the minimum upward slope.

6. The timing electrode fitting to the inlet of the holding tube shall be installed with sanitary fittings.

7. HTST pasteurizers shall be equipped with an automatic temperature recorder-controller device. The temperature sensor of the recorder-controller shall be installed in the connection provided for in the recorder-controller, and be examined by the department for accuracy and sealed at the required temperature and holding time. The department seal shall not be removed without prior notice to the department except in an emergency. If the seal is removed because of an emergency, the department shall be notified of such removal within 24 hours.

8. The flow-diversion device shall be so interconnected with the recorder-controller that at sublegal and legal temperatures the flow-diversion device will automatically assume the diverted and forward-flow positions, respectively, except that during circulating cleaning the flow-diversion device may assume the forward-flow position or be cycled at sublegal temperatures provided the control required to do this is a programmed control that is failsafe and interlocked with the timing pump so that the timing pump cannot run under this condition.

9. The timing pump shall be interwired with the flow-diversion device and the recorder-controller so that the timing pump cannot run at sublegal temperatures, unless the flow-diversion device is in its fully diverted position.

10. The hot product temperature control shall be installed as part of the heating media system.

11. The hot product indicating thermometer shall be installed in the fitting at the outlet end of the holding tube.

12. The cold product indicating thermometer, if provided, shall be installed in the pipeline from the outlet of the cooling section and close to the press.

13. Connecting sanitary pipe and fittings of all components of the HTST pasteurizer shall be without dead-ends, except for openings on sanitary fittings.

14. When the heating media system is not built integral with other components of the pasteurizer, it may be installed in other than the product processing room.

15. Sanitary piping is not required for connecting the heating media unit with the heating section of the pasteurizer. However, when a plate type heat exchanger is used, the piping shall not prevent movement of the plates.

16. Water supply to the heating media system shall be protected against back flow by an air gap of not less than 2 diameters with a minimum of one inch, or other effective back flow preventive device.

17. The equipment used in recooling and recirculating of the cooling medium shall be installed, whenever practical, in other than product processing rooms.

18. Sanitary piping is not required for connecting the cooling medium unit with the cooling section of the pasteurizer. However, when a plate type heat exchanger is used, the piping shall not prevent movement of the plates.

19. Water supply of the cooling medium system shall be protected against back flow by an air gap of not less than 2 diameters with a minimum of one inch, or other effective back flow preventive device.

20. Where recirculating cooling medium is used, it shall be properly protected from contamination.

21. Control devices shall be inter-wired or piped with all component equipment or optional component equipment. The control panel shall be supported to minimize vibration.

22. If a homogenizer is used as a timing pump, or if inter-wiring of homogenizer and timing pump is required, a time delay relay may be installed in the electrical circuit to the homogenizer, so that during the normal transit time of the flow-diversion device the homogenizer motor will remain running. The time delay relay shall provide a delay of not more than one second. If the homogenizer motor stops, it shall not restart automatically and will not restart at sublegal temperatures, unless the flow-diversion device is in its fully diverted position. The time delay relay may be of the fixed time or adjustable time type. If the time delay relay is adjustable, means of sealing the unit shall be provided.

23. When an auxiliary pump is used in a HTST pasteurizer system, it must be installed and operated in such a way that it will not 1) interfere with the detection of, or stoppage of, the forward flow of unpasteurized product, 2) influence the proper pressure relationship within the regenerator, and 3) reduce the holding time below the required minimum.

24. In a HTST pasteurizing system supplying pasteurized product to an evaporator, when a circulating auxiliary pump is installed to obtain a greater velocity through a heater than that which would be produced by the timing pump, a sanitary recirculating pump shall be provided.

25. The sanitary recirculating line shall be of the same size or larger than the inlet of the circulating pump without valves or restrictions, provided that when a smaller size line than the inlet to the circulating pump

is used, and contains valves or other restrictions, the circulating pump motor shall be inter-wired with the timing pump motor.

26. All electric wiring interconnections shall be in a permanent conduit, except that rubber covered cable may be used for final connection in accordance with the local electrical code, with no electrical connections to defeat the purpose of any provision of these rules.

(d) Batch pasteurization equipment shall be of the non-coil type. Vats shall be constructed so that every particle of milk or dairy product is heated to the appropriate batch pasteurization temperature and held continuously at or above that temperature for the required time. All pasteurization vessels shall be equipped with leak detector valves. Batch pasteurizers shall have recording thermometers, mercury column product thermometers and a thermometer to record the temperature of the air space above the pasteurizer.

(e) 1. Dairy plants making cheese from pasteurized milk utilizing high-temperature short-time pasteurization equipment not having a flow diversion device, a recorder-controller, and a timing pump or device shall manually keep a record of the plant's pasteurization processes. The records shall include the dairy plant number, vat identification numeral or letter, date of manufacture abbreviated by month, day and year, pasteurization temperature, pasteurization starting and finishing time, and volume or weight of milk pasteurized. All cheese from each vat shall be marked with the dairy plant number, vat identification numeral or letter, and date of manufacture abbreviated by month, day and year until it is processed or cut and wrapped in consumer size packages.

2. A representative sample from each vat of pasteurized milk or cheese, identified by the same information contained in the record of the plant's pasteurization process under subd. 1, shall be taken and analyzed by the phosphatase test as described in 21 CFR 133.113. Records of all phosphatase tests shall be maintained at the dairy plant for 6 months. Any vat of cheese from pasteurized milk having a positive phosphatase test shall be handled as raw milk cheese and held at 35° F. for not less than 60 days. The department may sample at all levels of distribution to determine compliance with this subdivision.

(4) C-I-P SYSTEMS. (a) All product contact surfaces of sanitary piping utilized in C-I-P systems shall be at least as smooth as number 4 mill finish on stainless steel sheets.

(b) The finish of solution contact surfaces, whether sheet, tube, casting, or other type of surface, shall be equal in cleanability to stainless steel with number 4 finish, or number 2-B mill finish, as applied to stainless steel sheet and shall be pit free.

(c) Product lines, including equipment and solution lines shall have C-I-P fittings or welded joints.

(d) Welded joints shall be smooth and free from pits, cracks, or other defects.

(e) Removable fittings may be used with or without gaskets and shall be of such design as to form substantially flush interior joints.

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(f) Appurtenances having product contact surfaces shall be cleanable, either when in an assembled position or when disassembled. Removable parts shall be readily dismountable.

(g) All internal angles of 135° or less on product contact surfaces, or on solution contact surfaces, shall have minimum radii of ¼" except where smaller radii are required for essential functional reasons, such as for sealing ring grooves and in pumps.

(h) All solution contact surfaces shall be cleanable, either when in an assembled position or when disassembled. They shall contain no pockets or crevices that are not readily cleanable. Removable parts shall be readily demountable. Solution system appurtenances shall be accessible for inspection to determine freedom from biological, chemical, or physical soil contamination.

(i) Non-product contact surfaces shall have a smooth finish, be free of pockets and crevices, and be readily cleanable.

(5) INSTALLATION OF C-I-P PIPELINE CIRCUITS. (a) Prior to installation of C-I-P pipeline circuits a drawing or equivalent plan shall be made available to the department by the plant operator for each installation, or subsequent addition or modification, showing each permanent circuit to be cleaned, noting thereon the size and length of piping, fittings, pitch, drain points, access points, relative elevations, locations and specifications of circulating unit, and other pertinent data.

(b) The C-I-P pipeline together with gaskets if used, shall be supported so that they remain in alignment and position. The support system shall be designed so as to preclude electrolytic action between supports and pipelines.

(c) Each separate cleaning circuit, including product and solution lines, shall be provided with a sufficient number of access points, such as valves, fittings, or removable sections to make possible adequate inspection and examination of the interior surfaces.

(d) Relatively horizontal lines shall be self-draining and pitched to drain points.

(e) The circulating unit, consisting of a motor driven pump and solution tank, shall provide a minimum average solution velocity at any instance of not less than 5 feet per second through each pipe or fittings in the circuit. If split flow arrangement, pressure differential must be maintained to serve the 5 feet per second minimum flow rate. This operation is to be checked by observation and tests.

(f) C-I-P systems shall be designed so that the suction intake of the primary circulating pump shall be flooded at all times during the cleaning cycle.

(g) Solution temperature shall be automatically controlled by the use of a temperature regulator with a response range of plus or minus 5° F.

(h) The system shall be provided with a recording thermometer having a scale range of 60° to 180° F. with extension of scale on either side permitted, graduated in time scale divisions of not more than 15 minutes. Between 110° and 180° F., the chart shall be graduated in temperature divisions of not more than 2° F., spaced not less than 1/16 inch

apart, and be accurate within 2° F., plus or minus. The sensor shall be protected against damage at 212° F. The sensing element of the recording thermometer shall be located in the return solution line as near the solution tank as possible.

(i) All connections between the solution circuit and the product circuit shall be so constructed as to positively prevent the commingling of the product and the solution during processing.

(j) All welding of sanitary product pipelines and solution lines shall be made by the Tungston Shield Arc Method or its equivalent. The following precautions shall be taken:

1. Inner backup gas shall be used to protect and control the interior of the weld.

2. The weld surface interior, face and exterior shall be cleaned and free of all foreign matter and surface oxide before welding. Iron free abrasives shall be used when cleaning surfaces.

3. All tube and fitting ends shall be square cut and deburred.

4. Welding procedures shall assume uniform and complete penetration of weld at all times.

5. All welds having pits, craters, ridges, or imbedded foreign materials shall be removed and the joints shall be properly rewelded.

6. Internal and external grinding or polishing of welds is not required.

7. An acceptable sample weld piece shall be provided at the beginning of each day or when required.

8. A boroscope or other acceptable inspection device, to inspect representative welds, shall be made available by the plant operator.

Note: Systems and milking and milk handling equipment which conform to the current "3-A Accepted Practices for the Design, Fabrication and Installation of Milking and Milk Handling Equipment", published by the International Association of Milk, Food and Environmental Sanitarians, Inc., Box 701, Ames, Iowa, will meet the requirements of this section.

History: Cr. Register, October, 1978, No. 274, eff. 1-1-79; am. (1) (b), Register, November, 1980, No. 299, eff. 12-1-80; am. (3) (a) 1. and 2., r. (3) (a) 3., renum. (3) (b) to be (3) (c) and am. (intro.) and 7., cr. (3) (b), (d) and (e), Register, July, 1981, No. 307, eff. 8-1-81.

Ag 31.07 Equipment cleaning and sanitizing. (1) **STANDARDS AND PROCEDURES; GENERAL.** (a) Equipment, sanitary piping and utensils used in receiving, storing, processing, manufacturing, packaging and handling milk or dairy products and ingredients thereof, and all product contact surfaces of homogenizers, high pressure pumps and lines, shall be kept clean. All such equipment shall be cleaned at the end of each day's operation. Before use, all equipment coming in contact with milk products shall be subject to an effective bactericidal or sanitizing treatment. Equipment not designed for cleaned-in-place cleaning shall be disassembled, thoroughly cleaned and sanitized. No cleaners, detergents, wetting or sanitizing agents adversely affecting or capable of contaminating milk or dairy products or ingredients thereof, shall be used.