3-A® Sanitary Standards for Uninsulated Tanks for Milk and Milk Products, Number 32-03

Standards Developing Organizations
3-A Sanitary Standards, Inc. (3-A SSI)
In Collaboration With
United States Public Health Service (USPHS)/
United States Food and Drug Administration (USFDA)
United States Department of Agriculture (USDA)
European Hygienic Engineering & Design Group (EHEDG)

Note: The highlighted text denotes changes to the previous document.

It is the purpose of the IAFIS, IAFP, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Specifications for uninsulated tanks heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of 3-A SSI, USPHS, USFDA, USDA, and EHEDG at any time. **NOTE:** Use current revisions or editions of all referenced documents cited herein. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A SCOPE

A1 These standards cover the sanitary aspects of uninsulated tanks, both open top and closed types, and both single and multiple compartment types, that are intended to be used for one of the following purposes:

A1.1 Mixing of milk and milk products and ingredients.

A1.2 Storage of milk and milk products in uninsulated tanks intended to be located in a room in which the air surrounding the tank will maintain the product temperature.

A1.3 Storage of milk and milk products in uninsulated tanks having heat exchange surfaces to maintain the product temperature.

A1.4 As a raw product constant level tank in a pasteurizing system.

A1.5 As a product surge or feed tank within a milk or milk products processing system, and farm milk handling equipment.

A2 In order to conform with these 3-A Sanitary Standards, uninsulated tanks shall comply with the following design, material, and fabrication criteria.

B DEFINITIONS

B1 *Product:* Shall mean milk and milk products.

B2 *Uninsulated Tank:* Shall mean a cylindrical, rectangular, oval, or other equally satisfactorily shaped tank that is not insulated and is used as described in Sections A1.1 through A1.5 of these 3-A Sanitary Standards.

B3 *Open Top Type Tank:* Shall mean an uninsulated tank that (1) can only be operated at atmospheric pressure and (2) the opening(s) for inspection and/or access for manual cleaning have removable or hinged cover(s) other than pressure type cover(s).

B4 *Closed Type Tank:* Shall mean an uninsulated tank that (1) can be operated at atmospheric pressure or at a pressure above or below that of the atmosphere and (2) the opening(s) for inspection and/or access for manual cleaning is a manhole(s) with a pressure type cover(s).

B5 **Surfaces**

B5.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product, or from which liquids may drain, drop, or be drawn into the product.

B5.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B6 *Mechanical Cleaning or Mechanically Cleaned:* Shall denote cleaning, solely by circulation and/or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned, by mechanical means.

B7 *Control Area(s):* Shall mean the area(s) in which all appurtenances for the operation of the uninsulated tank and vent lines terminate and shall be a part of one or more of the following:

B7.1 A processing area.

B7.2 An area in the plant at least the equivalent of a processing area.

C **MATERIALS**

C1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[1] or corresponding Alloy Cast Institute[2] (ACI) types (See Appendix, Section E), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.1 Rubber and rubber-like materials may be used for umbrellas, slingers, and drip shields for vertical agitator assemblies, agitator seals, gaskets, seals, caps, and parts having the same functional purposes.

C1.2 Rubber and rubber-like materials, when used for the above specified application(s), shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C1.3 Plastic materials may be used in sight and/or light openings and for umbrellas, slingers, and drip shields for vertical agitator assemblies, bearings, gaskets, seals, caps, outlet valves, direct reading gauge tubes and parts having the same functional purposes.

C1.4 Plastic materials, when used for the above specified application(s), shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C1.5 Rubber and rubber-like materials and plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

C1.6 The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic[3].

C1.7 Where materials having certain inherent functional properties are required for specific applications, such as bearing surfaces and rotary seals, carbon and/or ceramic materials may be used. Carbon and/or ceramic materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble, resistant to scratching, scoring, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C1.8 In a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher, all materials having product contact surface(s) used in the construction of uninsulated tanks and nonmetallic component parts shall be such that they can be (1) sterilized by saturated steam or water under pressure (at least 15.3 psig or 106 kPa) at a temperature of at least 250°F (121°C) and (2) operated at the temperature required for processing.

C2 Nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. Nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

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[1] The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, November 1990, Table 2-1, pp. 17-20. Available from the American Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412) 776-1535.

[2] Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

[3] Adhesives shall comply with 21 CFR 175 - Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 512-1800.

D FABRICATION

D1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds, and crevices in the final fabricated form. (See Appendix, Section F.)

D2 All permanent joints in metallic product contact surfaces shall be continuously welded. Welded areas on product contact surfaces shall be at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds, and crevices. (See Appendix, Section F.)

D3 Uninsulated tanks that are to be mechanically cleaned shall be designed so that the product contact surfaces of the uninsulated tank, including the product contact surfaces of the opening for a vertical mechanical agitator, and all nonremovable appurtenances thereto can be mechanically cleaned and are accessible for inspection.

D4 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an assembled position or when removed. Removable parts shall be readily demountable.

D5 Appurtenances having product contact surfaces shall be easily removable for cleaning, or shall be readily cleanable in place.

D6 All product contact surfaces shall be self-draining except for normal clingage.

D6.1 Horizontal cylindrical uninsulated tanks shall have a bottom pitch of at least 1/4 in. per ft (20 mm per m) toward the outlet.

D6.2 Vertical cylindrical uninsulated tanks shall have a built-in bottom slope of at least 3/4 in. per ft (60 mm per m) toward the outlet, or if the bottom is of the reverse-dish type, that portion of the bottom adjacent to the sidewall shall have a minimum slope of 3/4 in. per ft (60 mm per m) toward the outlet.

D6.3 Uninsulated tanks other than vertical cylindrical types shall have a built-in bottom slope of at least 3/4 in. per ft (60 mm per m) toward the centerline and the centerline shall have a slope of at least 1/4 in. per ft (20 mm per m) toward the outlet.

D6.4 All uninsulated tanks shall be constructed so they will not sag, buckle, or prevent complete drainage.

D7 The bottom of a raw product constant level tank to be used in a pasteurizing system shall have a built-in slope of at least 1/4 in. per ft (20 mm per m) toward the outlet.

D8 Uninsulated tanks having an inside height of more than 96 in. (2500 mm) shall be provided with means that will facilitate manual cleaning and inspection of all product contact surfaces (See Appendix, Section J) or means shall be provided for mechanically cleaning the product contact surfaces of the uninsulated tank and all nonremovable appurtenances thereto. (See Appendix, Section J.)

D8.1 The top head of a vertical uninsulated tank of more than 96 in. (2500 mm) in height, designed for mechanical cleaning, shall be dished or otherwise shaped so that it readily facilitates mechanical cleaning.

D9 **Gaskets**

D9.1 Gaskets having a product contact surface shall be removable or bonded.

D9.2 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in such a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D9.3 Grooves in gaskets shall be no deeper than their width unless the gasket is readily removable and reversible for cleaning.

D9.4 Gasket grooves or gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6 mm) in depth or be less than 1/4 in. (6 mm) wide except those for standard O-rings smaller than 1/4 in. (6 mm), and those provided for in Section D12.

D10 **Radii**

D10.1 All internal angles of less than 135° on product contact surfaces shall have radii of not less than 1/2 in. (13 mm), except that:

D10.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those of agitator shaft bottom supports or guides, if used, and in covers and agitator assemblies. In no case shall such radii be less than 1/8 in. (3 mm).

D10.1.2 The radii in gasket grooves, gasket retaining grooves, or grooves in gaskets, except those for standard 1/4 in. (6 mm) and smaller O-rings, shall be not less than 1/16 in. (2 mm).

D10.1.3 The radii in grooves for standard 1/4 in. (6 mm) O-rings shall be not less than 3/32 in. (2 mm) and for standard 1/8 in. (3 mm) O-rings shall be not less than 1/32 in. (1 mm).

D10.1.4 The minimum radii for fillets of welds in product contact surfaces shall be not less than 1/4 in. (6 mm) except that the minimum radii for such welds may be 1/8 in. (3 mm) when the thickness of one or both parts joined is less than 3/16 in. (5 mm).

D11 There shall be no threads on product contact surfaces.

D12 All sanitary fittings and valves shall conform to the applicable provisions of 3-A Sanitary Standards for Plug-Type Valves for Milk and Milk Products, Number 51-, 3-A Sanitary Standards for Thermoplastic Plug-Type Valves for Milk and Milk Products, Number 52-, 3-A Sanitary Standards for Compression-Type Valves for Milk and Milk Products, Number 53-, 3-A Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 54-, 3-A Sanitary Standards for Boot Seal-Type Valves for Milk and Milk Products, as amended, Number 55-, 3-A Sanitary Standards for Inlet and Outlet Leak-Protector Type Valves for Milk and Milk Products, Number 56-, 3-A Sanitary Standards for Tank Outlet Valves for Milk and Milk Products Equipment, Number 57-, and 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D12.1 Sanitary fittings made of optional metal alloy shall not be used.

D13 All sanitary tubing shall conform to the applicable provisions of the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D14 An exception is made to D12 and D13 in that materials conforming to C1.2 or C1.4 may be used for caps of sanitary design for the protection of terminal ends of sanitary tubes, fittings, or vents.

D15 **Covers**

D15.1 Covers shall be furnished for all openings in the uninsulated tank except those fitted with permanently attached sanitary fittings.

D15.2 Main covers for open top type uninsulated tanks shall (1) be of a type which can be opened and maintained in an open position, (2) be sufficiently rigid to prevent buckling, (3) be self-draining in the closed position, (4) be provided with an adequate, conveniently located and durable handle(s) of sanitary design, which is welded in place or formed into the cover materials, (5) have downward flanges not less than 3/8 in. (10 mm) along all edges and (6) be close fitting. The design shall be such that when raising the cover(s) any liquid on the top will not enter the uninsulated tank. When the cover(s) is in its fully opened position, the drops of condensate formed on the underside of the cover(s) shall not drain into the uninsulated tank.

D15.3 Bridges and fixed covers for open top type uninsulated tanks shall pitch to the outside edge(s) of the uninsulated tank for complete drainage, and shall have a raised flange not less than 3/8 in. (10 mm) in height where the edge(s) meets the main cover(s). The bridges and fixed covers shall be integral with or continuously welded to the lining, and shall be installed so the underside is accessible for cleaning and inspection without completely entering the uninsulated tank.

D15.4 Manhole covers for closed type uninsulated tanks in the side walls and/or ends shall be either the inside or outside swing type. If the cover swings inside, it shall also swing outside away from the opening. Threads or ball joints employed to attach the manhole cover(s) and its appendages shall not be located within the lining. Covers for manholes in the top of uninsulated tanks shall be of the outside swing type and shall have downward flanges not less than 3/8 in. (10 mm) along all edges and shall be close fitting.