

3-A Sanitary Standards for Stainless Steel Automotive Milk and Milk Products Transportation Tanks for Bulk Delivery and/or Farm Pick-Up Service, Number 05-14

*Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee*

It is the purpose of the IAMFES, 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. Milk transportation tank specifications 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 the IAMFES, USPHS, and DIC at any time. **NOTE: Use current revisions or editions of all referenced documents cited herein.**

A SCOPE

A1 These standards cover the sanitary aspects of automotive transportation tanks for milk and fluid milk products.

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

B DEFINITIONS

B1 *Bulk Milk Transportation Tank:* Shall mean an over the road truck or trailer tank used to transport milk and milk products. It may have more than one compartment.

B2 *A Farm Pick-Up or Multiple Pick-Up and Delivery Tank:* Shall mean a bulk milk transportation tank as defined in B1 with milk transfer attachments and facilities, including a pump and/or hose cabinet, as specified herein.

B3 *Product:* Shall mean the milk or fluid milk product transported in the tank.

B4 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop or be drawn into the product.

B5 *Non-Product Contact Surfaces:* Shall mean all other exposed surfaces.

B6 *Product Outlet:* Shall mean the opening in the lining

of a tank or a compartment and the outlet passage for product to the exterior of the tank or compartment. The outlet passage starts at the opening in the lining and terminates at the connection for the outlet valve.

B7 *Pump and/or Hose Cabinet:* Shall mean a cabinet used to house the pump and/or transfer hose and may also house a compartment for product sample trays and samples.

B8 *Deck Plate:* Shall mean the manhole dust cover seat or that part of the outer jacket on which the cover rests.

B9 *Mechanical Cleaning or Mechanically Cleaning:* 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.

C MATERIALS

C1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series¹ or corresponding Alloy Cast Institute (ACI) types² (See Appendix, Section E), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing

¹The 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.

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

types, and is nontoxic and nonabsorbent, except that:

- C1.1 Rubber and rubber-like materials may be used for flexible transfer tubing, gaskets, seals, vents and parts having the same functional purposes.
- C1.2 Rubber and rubber-like materials, when used for the above specified application(s), shall comply 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 for flexible transfer tubing, gaskets, seals, vents, hose/pump cabinets and parts having the same functional purposes.
- C1.4 Plastic materials, when used for the above specified application(s), shall comply 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 Where functional properties are required for specific applications such as agitator bearing surfaces and rotary seals, where dissimilar materials are necessary, carbon, and/or ceramics may be used. Ceramic materials shall be inert, non-porous, non-toxic, non-absorbent, insoluble, resistant to scratching, scoring, and distortion when exposed to the conditions encountered in the environment of intended use and cleaning and bactericidal treatment.
- C1.6 **Bonded rubber and rubber-like materials and bonded plastic materials** having product contact surfaces shall be of such composition as to retain their surface and conformation characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.
- C1.7 The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be non-toxic³.
- C2 The gauge of material for the lining shall be not less than the following:
16 U.S. Standard Gauge for tanks of capacities of 1,000-gallons (4,000-liters) or less;

14 U.S. Standard Gauge for tanks of capacities of over 1,000-gallons (4,000-liters) and not exceeding 2,000-gallons (7,500-liters);

12 U.S. Standard Gauge for tanks of over 2,000-gallons (7,500-liters) capacity, except that lighter gauges of material shall be permitted if they are so supported that they will have equal resistance to denting, buckling and sagging, as provided by the three gauges specified above for the respective sizes of tanks.

- C3 All non-product contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion-resistant. If coated, the coating shall adhere. All non-product contact surfaces shall be relatively non-absorbent, durable and cleanable. Parts removable for cleaning having both product contact and non-product contact surfaces shall not be painted.
- C4 The lining of the pump and/or hose cabinet shall be stainless steel, plastic or equally corrosion-resistant durable material.
- C5 Gasket material for pump and/or hose cabinet doors shall be smooth, easily cleanable and non-absorbent.
- C6 Sample trays and insulated sample boxes that will be in the pump and/or hose cabinet shall be made of stainless steel, plastic or other equally corrosion-resistant durable material.

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 metallic joints in product contact surfaces shall be continuously welded. All welded areas on product contact surfaces shall be at least as smooth as a No. 4 ground finish on stainless steel sheets free of imperfections such as pits, folds, and crevices.
- D3 All product contact surfaces shall be easily accessible for cleaning and inspection, either when in an assembled position or when removed. Removable parts shall be readily demountable.
- D4 All product contact surfaces shall be self-draining

³Adhesives 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) 783-3238.

except for normal clingage. Tanks shall be so constructed that the lining will not sag, buckle or prevent complete drainage of water when the tank has a pitch of not more than 1 in. (25.4 mm) in 100 in. (254 mm).

- D5 The height of the vertical axis of the lining of the tank shall not be less than the minimum heights shown in the following tables:

TABLE 1. Tanks Having Uniform Vertical Axes
Note: 1 in. = 2.54 cm

Tank Size	Minimum Height
Up to and including 500 gal (2,000 L)	36 in. (91 cm)
Over 500 gal (2,000 L) and up to and including 2,000 gal (7,500 L)	40 in. (102 cm)
Over 2,000 gal (7,500 L) and up to and including 2,800 gal (10,500 L)	42 in. (107 cm)
Over 2,800 gal (10,500 L) and up to and including 3,500 gal (13,000 L)	44 in. (112 cm)
Over 3,500 gal (13,000 L)	46 in. (117 cm)

TABLE 2. Tanks Having Varying Vertical Axes
Note: 1 in. = 2.54 cm

Tank Size	Min. Front Height	Min. Rear Height
Up to and including 500 gal (2,000 L)	36 in. (91 cm)	36 in. (91 cm)
Over 500 gal (2,000 L) and up to and including 2,000 gal (7,500 L)	40 in. (102 cm)	40 in. (102 cm)
Over 2,000 gal (7,500 L) and up to and including 2,800 gal (10,500 L)	41 in. (104 cm)	51 in. (130 cm)
Over 2,800 gal (10,500 L) and up to and including 3,500 gal (13,000 L)	43 in. (109 cm)	55 in. (140 cm)
Over 3,500 gal (13,000 L)	43 in. (109 cm)	57 in. (145 cm)

- D6 All internal angles of 135° or less on product contact surfaces shall have minimum radii of 1/4 in. (6 mm) except that:

- D6.1 Where the head(s) and the partition wall(s) join the lining of the tank, the radius shall not be less than 3/4 in. (19 mm).

- D7 There shall be no threads on product contact surfaces.

- D8 All sanitary tubing shall conform with 3-A Sanitary Standards for Polished Metal Tubing, Number 33-.

- D9 All sanitary fittings and connections shall conform with the applicable provisions of the 3-A Sanitary Standards for Fittings, Number 08-17 rev., and supplements thereto except 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.

- D10 The outer shell shall be smooth and effectively sealed except for a vent or weep hole in the outer shell of the tank. The vent or weep hole shall be located in a position that will provide drainage from the outer shell and shall be vermin proof. The outer jacket and doors of the pump and/or hose cabinet shall be smooth and effectively sealed. Outside welds need not be ground.

- D11 Nonproduct contact surfaces shall be smooth, free of pockets and crevices and be readily cleanable and those to be coated shall be effectively prepared for coating.

- D12 The amount of insulating material shall be:

- D12.1 The farm pick-up tank and divider between the compartments of a multi-compartment tank shall be insulated in such a manner that, in a 24-hour period, when the tank is full of water, the average change in the temperature of the water will not exceed 2°F (1°C) when the average difference between the temperature of the water and that of the atmosphere surrounding the tank is 30°F (17°C). Insulating material shall be installed in such a manner as to prevent shifting or settling.

- D12.2 The bulk delivery tank and divider between the compartments of a multi-compartment tank shall be insulated in such a manner that, in a 48-hour period, when the tank is full of water, the average change in the temperature of the water will not exceed 4°F (2°C) when the average difference between the temperature of the water and that of the atmosphere surrounding the tank is 30°F (17°C). Insulating material shall be installed in such a manner as to prevent shifting or settling.

- D13 *Outlet and Outlet Valve:*

- D13.1 Each tank or compartment shall have a separate outlet passage. The outlet shall be of all welded construction with the exception that a rolled-on fitting may be used on the terminal end. The inside diameter of the outlet shall be at least as large as that of 2 in. (5 cm) 3-A sanitary tubing. The outlet(s) shall provide complete drainage of the tank(s) or compartment(s). In multi-compartment or multi-tank units, the top of the outlet passage(s) of the front compartment(s) or the front tank(s) shall be as low as the low point of the lining at the outlet and shall provide for complete drainage toward the outlet. The horizontal distance from the opening in the lining to this point shall not be more than four times the diameter of the outlet passage. The outlet passage downstream of this point shall pitch towards the connection for the outlet valve. The terminal end shall have a bolted or a clamp-type flange or a 3-A sanitary threaded connection. The terminal end of the outlet passage shall not extend more than 6 in. (15 cm) beyond the inside lining of the tank or compartment(s). The outlet passage may be increased in length provided that:
- D13.1.1 The outlet passage is straight or is straight downstream of the elbow(s) or bend(s) used either to change the direction of product flow from a bottom outlet or to comply with the requirement in D13.1 that at a specified point the top of the outlet passage shall be as low as the low point of the lining at the outlet.
- D13.1.2 The outlet and outlet passage may be adequately cleaned manually or the tank or compartment with the increased outlet passage is provided with a fixed spray device(s) so that the outlet passage may be mechanically cleaned and sanitized.
- D13.1.3 The outlet passage is insulated sufficiently that the temperature rise of water in the outlet passage does not exceed the allowable average temperature rise of the tank full of water specified in D12.1 or D12.2.
- D13.1.4 The outlet passage is protected against damage (denting) and is braced and sloped.
- D13.2 *Outlet valves:* Valves, when provided, shall conform to D9 or if the valve is within the lining or in the outlet passage, and the seat is an integral part of the lining or the outlet passage, a compression-type valve conforming to the applicable provisions of D13.2.1 may be used.
- D13.2.1 *Compression-type valve in the tank or outlet passage:* This type of valve shall have a metal to metal or rubber or rubber-like materials to metal seat. The rubber or rubber-like material may be either removable or bonded.
- D13.3 The tank outlet and valve bore shall be the same size and concentric or the product passage of the outlet valve (s) shall have an inside diameter no less than that of the tank outlet and (2) shall be self-draining.
- D13.4 A sanitary 3-A cap conforming to D9 shall be furnished for the outlet opening of the outlet valve, except when the outlet opening of the valve is located in the pump and/or hose cabinet that is connected to the pump piping.
- D14 Unless the outlet valve is located in the pump and/or hose cabinet, it shall be provided with a dust cover which (1) encloses the entire valve assembly, (2) is dustproof and (3) has a smooth interior finish. Dust covers shall be provided with means of sealing to prevent opening or removing the cover without breaking the seal.
- D15 *Manhole Opening and Cover:*
- D15.1 A manhole(s) opening shall be provided and shall be not less than 16 in. (41 cm) by 20 in. (51 cm) oval or 18 in. (46 cm) in diameter. It shall be located in the top portion of the tanker and approximately in the center of each compartment.
- D15.2 The upper edge of a top manhole opening shall be not less than 3/8 in. (10 mm) higher than the surrounding area and if an exterior flange is incorporated in it, it shall slope and drain away from the opening.
- D15.3 Manholes shall be located so that the solutions from mechanical cleaning device(s) are applied to all product contact surfaces. Permanently installed mechanical device(s), if used, shall be designed and installed so that solutions are applied to all product contact surfaces.
- D15.4 Manhole cover gaskets shall be readily removable and may have any one of the following cross-sections: flat, rectangular, square, oval, round, "L" or "Z" shape, or any other section which is easily cleanable.
- D15.5 Gasket grooves or gasket retaining grooves shall not exceed 1/4 in. (6 mm) in depth or be less than 1/4 in.

(6 mm) wide. The minimum radius of any internal angle in a gasket groove or gasket retaining groove shall be not less than 1/16 in. (2 mm).

D15.6 A sanitary vent of sufficient free opening to prevent excess vacuum and/or internal pressure, shall be installed under the manhole dust cover.

The air vent shall be designed so that parts are readily accessible, easily removable and readily cleanable. (See Appendix, Section G.)

D16 *Manhole Dust Cover:*

D16.1 Each manhole shall be provided with a dust cover.

D16.2 The interior finish of the dust cover shall be smooth, readily cleanable and free from bolts and screws. Round or oval head rivets shall be deemed acceptable.

D16.3 Welded interior attachments shall have minimum radii of 1/16 in. (2 mm).

D16.4 A suitable vent shall be provided to relieve vacuum and pressure when the dust cover is closed. The vent shall be located in the side wall of the rear half of the dust cover.

D16.5 The dust cover when closed shall provide an effective seal to prevent entrance of dust.

D16.6 The dust cover shall be provided with means of sealing to prevent opening the dust cover without breaking the seal.

D16.7 If a rubber or rubber-like, or plastic gasket is used as a seal, it shall be smooth, either removable or firmly bonded to the dust cover to provide a smooth, easily cleanable surface without crevices.

D16.8 Deck plate, if attached to the outer jacket, shall be effectively sealed and firmly bonded.

D17 *Agitation:*

D17.1 When specified, the tank or compartment thereof shall be provided with means for mechanical and/or air agitation (See Appendix, Section J) that when operated 20 min. in whole milk that has been stored 24 hrs. at 40°F (4.4°C) will result in the milk fat content of the product throughout the tank or compartment being within a variation of $\pm 0.1\%$ by an

official AOAC⁴ milk fat test.

D17.2 The agitator, if not designed for mechanical cleaning, shall be located in such a manner that it shall be readily accessible for manual cleaning and inspection.

D17.3 A mechanical agitator shall have a seal of the packless type, sanitary in design with all parts accessible for cleaning.

D18 *Air Under Pressure and/or Mechanical Cleaning:* (See Appendix, Section J.)

D18.1 Tubing and related fittings within the tank shall be designed to be mechanically cleaned.

D18.2 Openings for air agitation and/or mechanical cleaning applications shall be protected against contamination by means of a removable dust cover, except where such openings are within the pump and/or hose cabinet.

The dust cover shall be provided with means of sealing to prevent opening the dust cover without breaking the seal.

D18.3 Permanently mounted air or solution tubing shall be constructed and installed so that it will not sag, buckle, vibrate or prevent complete drainage of the tank or tubing, and shall be located so that the distance from the outside of the tubing to the lining is at least 2 in. (51 mm), except at point of entrance. The tubing and all related fittings shall be self-draining.

D18.4 Means for mechanically cleaning the tank or compartment, when provided, shall clean the product contact surfaces and all non-removable appurtenances thereto except those areas that may be manually cleaned without entering the tank. (See Appendix, Section H.)

D19 *Baffles:*

D19.1 Baffles, when provided, shall not interfere with the free drainage of the tank or compartment.

D19.2 The area of any one baffle plate shall not exceed 40% of the cross-sectional area of the tank and the entire

⁴The method of making these tests will be found in the following reference: Official Methods of Analysis; Available from the Association of Official Analytical Chemists, 1111 N 19th St., Suite 210, Arlington, VA 22209.

baffle shall be on one side of the longitudinal center line of the tank. If more than one baffle is installed, consecutive baffles shall be installed on opposite sides of the tank and shall be at least 48 in. (122 cm) apart. Baffles shall be so designed that walk-through accessibility will be provided to all areas for inspection, and if the tank is not provided with means for mechanically cleaning the tank or compartment, for cleaning purposes.

D19.3 Baffles shall be permanently attached to the tank. The radius of inside corners formed where baffles are attached to the lining shall be at least 1/4 in. (6 mm). There shall be no sharp edges on baffles.

D20 *Hose/Pump Cabinets:*

D20.1 Hose/pump cabinets shall comply with the following as well as other applicable provisions of the Fabrication Section D:

D20.2 The lining of cabinets, doors and fixed attachments shall be smooth.

D20.3 All permanent metallic joints in the lining shall be continuously welded. All welded areas in the lining shall be at least as smooth as the adjoining surfaces.

D20.4 If plastic material is used to fabricate or to line the hose/pump cabinets, it shall meet the applicable criteria found in 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-. It shall be fabricated so that all joints are welded, bonded, or permanently sealed to be watertight and as smooth as the adjoining surfaces.

D20.5 The bottom shall be constructed so that it will not sag, buckle or prevent complete drainage when the truck is on a level surface.

D20.6 All inside corners shall have minimum radii of 1/8 in. (3 mm).

D20.7 Cabinets shall be dust tight and doors shall be equipped with a compression type closing device. Gasket material for sealing cabinet doors may be installed on the face of the cabinet or on doors except along a drainage area where it shall be attached to the doors. Gasket material shall be removable or firmly bonded to provide smooth, easily cleanable surfaces without crevices.

D20.8 A roof overhang or suitable drip molding shall be

provided over the cabinet doors.

D20.9 The cabinet and doors shall be insulated with an insulating material having an insulating value of not less than R-4. (See Appendix, Section L.)

D20.10 A carrier bracket shall be provided to support the flexible transfer tubing. Means shall be provided to support the loose end of the tubing above the cabinet floor.

D20.11 Fixed attachments such as pump support brackets, tubing carrier brackets and brackets for belt and pulley guards shall be easily accessible for cleaning. A pump having a base area of 1 sq. ft. (930 sq. cm) shall be installed so that there will be a minimum clearance of 2 in. (5 cm) between the base and the cabinet floor and 3 in. (8 cm) between the pump assembly and the cabinet walls. The minimum clearance between the base and the cabinet floor shall be increased to 3 in. (8 cm) if the base area of the pump exceeds 1 sq. ft. (930 sq. cm). A pump assembly that is to be mounted on the floor of the cabinet shall have solid base and be installed with a non-absorbent sealing gasket. It shall be installed in a position that (1) will not interfere with drainage and (2) will provide minimum clearance of 3 in. (8 cm) between the pump assembly and the cabinet walls. A side wall mounted pump assembly shall be installed with a non-absorbent sealing gasket.

D20.12 The size and location of the cabinet shall be such that will afford easy accessibility for assembly and disassembly of removable parts and provide ample clearance around permanently installed equipment and parts. (See Appendix, Section I, Facilities for Extra Fittings.)

D21 *Pumps:*

D21.1 Pumps, when furnished, shall conform to the 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps, Number 02-. A sanitary closure shall be furnished for the outlet opening of the pump.

D22 *Motors for Pumps:*

D22.1 An electric or hydraulic motor when located in the pump compartment, shall be totally enclosed and nonventilated. Electric wiring, if used, shall be waterproof and shall be conducted through the wall of the pump cabinet with water-tight connections.

D22.2 Storage space for the pump motor electrical extension cord shall be located outside the pump compartment.

D23 *Flexible Transfer Tubing:*

D23.1 Single lengths of transfer tubing shall not exceed 8 ft. (2.4 m) except where adequate acceptable cleaning facilities are available at the place of cleaning. The minimum inside diameter of the tubing shall be 2 in. (5 cm). A sanitary closure shall be furnished for the open end(s) of the tubing.

D23.2 If two lengths of flexible tubing are used, they shall be connected either by the use of sanitary coupling or by a piece of rigid 3-A sanitary tubing.

D23.3 A piece of flexible tubing may be used for the connection from the pump to the tank.

D23.4 Flexible tubing shall be attached to rigid 3-A sanitary tubing, or to the tank or to the pump in such a manner that the flexible tubing may easily be removed or permanently vulcanized and/or bonded. If clamps are used they shall be readily removable.

D24 *Sample Tray, Insulated Sample Box and Sample Compartments:*

D24.1 Sample trays and insulated sample boxes that are to be in the pump and/or hose cabinet shall be of sanitary design and readily cleanable.

D24.2 Facilities shall be provided for keeping the samples cold.

D24.3 Permanently installed insulated sample boxes shall (1) be attached to the cabinets by continuously welding or with bolted connections which have non-absorbent sealing gaskets in the joints, (2) have the supporting member(s) continuously welded if supported from the floor of the cabinet and (3) be installed so there is a minimum clearance of 6 in. (15 cm) between the insulated sample box and the cabinet floor.

APPENDIX

E STAINLESS STEEL MATERIALS

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the

carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications⁵ A351/A351M, A743/A743M and A744/A744M.

F PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein.

G AIR VENTING

To insure adequate venting of the tank which will protect it from internal pressure or vacuum damage, the critical relationship between minimum vent size and maximum filling or emptying rates should be observed.

A venting system of sufficient capacity to provide for venting during filling and emptying is not adequate during mechanical cleaning. During the cleaning cycle, tanks when cleaned mechanically should be vented adequately by opening the manhole cover to prevent vacuum or pressure build-up due to sudden changes in temperature of very large volumes of air⁶.

Means should be provided to prevent excess loss of cleaning solution through the manhole opening. The use of tempered water of about 95°F (35°C) for both pre-rinsing and post-rinsing is recommended to reduce the effect of flash heating and cooling.

H MECHANICAL CLEANING

The mechanical cleaning system shall be so designed that solution is applied to all product contact surfaces except those areas requiring manual cleaning. When

⁵ Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Phone: (610) 832-9500.

⁶ For example, when a 6,000 gal tank with 800 cu. ft. of 135°F (57°C) hot air after cleaning is suddenly flash cooled by 50°F (28°C) water sprayed at 100 gpm the following takes place: Within one second, the 800 cu. ft. of hot air shrinks approximately 51 cu. ft. in volume. This is the equivalent in occupied space of approximately 382 gal of product. This shrinkage creates a vacuum sufficient to collapse the tank unless the vent, manhole, or other openings allow air to enter the tank at approximately the same rate as it shrinks. It is obvious, therefore, that a very large air vent such as the manhole opening is required to accommodate this air flow.

being cleaned, the tank bottom should have sufficient pitch to accomplish draining and to have a fast flushing action across the bottom. The pitch should be at least 1/4 in. per ft. (6.4 mm per 30 cm). Means should be provided for manual cleaning of all surfaces not cleaned satisfactorily by mechanical cleaning procedures.

NOTE: Cleaning and/or sanitizing solutions should be made up in a separate tank--not in the transportation tank.

I FACILITIES FOR EXTRA FITTINGS

If extra sanitary fittings are supplied by the manufacturer of the farm pick-up tank, facilities should be provided in the pump compartment to adequately protect such items.

J AIR UNDER PRESSURE AND/OR MECHANICAL CLEANING

Equipment and means for applying air under pressure for air agitation or solutions for mechanical cleaning, when provided, shall conform to the applicable provisions of the 3-A Accepted Practices for Air Under Pressure, Number 604-. Clamp or threaded type fittings shall not be used in the product zone.

K TEMPERATURE OF THE PRODUCT

The temperature of the product being loaded into the pre-cooled tank must be sufficiently below the final receiving temperature requirements to make up for heat gain during transportation as outlined in Sections D12.1 and D12.2.

L INSULATING VALUES

Table A-1 lists the insulating value for some common insulating materials.

TABLE A-1. Amount of Insulation Material Equivalent to R=4.0 at 75°F (24°C)

Material Type	Amount
High Density Fiberglass Sheets	0.88 in. (2.23 cm)
Soft Fiberglass Rolls	1.12 in. (2.84 cm)
Polystyrene Foam Sheets	1.02 in. (2.59 cm)
Corkboard Sheets	1.04 in. (2.64 cm)
Polyurethane Sheets	0.66 in. (1.68 cm)

These standards shall become effective November 1, 1989 at which time the 3-A Sanitary Standards for Stainless Steel Automotive Milk and Milk Products Transportation Tanks for Bulk Delivery and/or Farm Pick-Up Service, Number 05-13 are rescinded and become null and void.