

3-A[®] Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 54-02

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
The Farm Industry Committee (FIC)

It is the purpose of the IAFIS, IAFP, USPHS, DIC and FIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Diaphragm-type valves 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 IAFIS, IAFP, USPHS, DIC and FIC at any time. The 3-A Sanitary Standards and 3-A Accepted Practices provide hygienic criteria applicable to equipment and systems used to produce, process, and package milk, milk products, and other perishable foods or comestible products. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A	SCOPE	B3	Surface Modification²
A1	These standards cover the sanitary aspects of diaphragm-type valves (reference drawing, number 3-A 54-01-01) used on processing equipment and on equipment and lines which hold or convey milk or milk products. The valve shall consist of a bonnet assembly (hand-wheel or power [air] operated), a diaphragm, and a suitable body.	B3.1	<i>Surface Treatments:</i> Shall mean a process whereby chemical compositions or mechanical properties of the existing surface are altered. There is no appreciable, typically less than 1 µm, build-up of new material or removal of existing material.
A2	In order to conform to these 3-A Sanitary Standards, diaphragm-type valves shall comply with the following design, material, and fabrication criteria and the applicable documents referenced herein ¹ .	B3.1.1	Surface treatments include: 1. Mechanical (polishing) 2. Electropolishing
B	DEFINITIONS	B3.2	<i>Coatings:</i> Shall mean the results of a process where a different material is deposited to create a new surface. There is appreciable, typically more than 1 µm, build-up of new material.
B1	<i>Product:</i> Shall mean the milk and milk products.	B3.2.1	<i>Electrodeposition:</i> Shall mean coated with chromium or nickel to a specific dimension or processed to a specific dimension after coating ³ .
B2	Surfaces		
B2.1	<i>Product Contact Surfaces:</i> Shall mean all surfaces that are exposed to the product or from which liquid may drain, drop, or be drawn into the product.		
B2.2	<i>Nonproduct Contact Surfaces:</i> Shall mean all other exposed surfaces.		

¹ Use current revisions or editions of all referenced documents cited herein.

² Additional information on surface modification is contained in *Advanced Materials and Processes*, Volume 137(1), January 1990; "Coatings and Coating Practices" by H. Herman, p. 59; "Surface Modification" by F. A. Smidt, p. 61. ASM International, Materials Park, OH 44073 (216) 338-5151.

³ Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited), June 1954 with Amendment 4 on April 10, 1987. Federal Specification #QQ-N-290A for Nickel Plating (Electrodeposited), November 12, 1971. Available from the General Services Administration, Federal Supply Services Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, DC 20407 (202) 755-0325.

C MATERIALS

- C1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series⁴ or corresponding Alloy Cast Institute (ACI) types⁵ (See Appendix, Section F), or metal which is equal in cleanability to stainless steel of the foregoing types, and which under conditions of intended use is equally corrosion resistant, nontoxic, and nonabsorbent, except that:
- C1.1 Valve bodies made of the materials provided for in C1 may have their product contact surfaces modified by surface treatment or coating(s).
- C1.2 Valve bodies may also be made of other nontoxic structurally suitable metals that have their product contact surfaces modified by surface coatings.
- C1.3 Rubber and rubber-like materials may be used for gaskets (either bonded or removable), diaphragms, O-rings, seals, and parts used in similar applications.
- C1.4 Rubber and rubber-like materials, when used, shall conform to 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-.
- C1.5 Plastic materials may be used for covering the interior surface of the bonnet of diaphragm-type valves, gaskets (either bonded or removable), diaphragms, O-rings, seals, and parts used in similar applications.
- C1.6 Plastic materials, when used, shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.
- C1.7 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 fittings, valves, tubing, gaskets, 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.

D FABRICATION

- D1 Product contact surfaces shall be at least as smooth as a No. 4 finish on stainless steel sheets free of imperfections such as pits, folds, and crevices. (See Appendix, Section G.)
- D2 **Coatings**
- D2.1 The minimum thickness of electrodeposited coatings shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces when used on stainless steel. When these surfaces are other than stainless steel, the minimum thickness of electrodeposited coatings shall not be less than 0.002 in. (0.05 mm).
- D3 Product contact surfaces of valves shall be readily accessible, visible, and readily cleanable either when in an assembled position or when removed. Removable parts shall be readily disassembled.
- D4 Product contact surfaces shall be self draining when properly installed.
- D5 Internal angles on product contact surfaces shall have minimum radii of 1/16 in. (1.59 mm), except gasket recesses and grooves, in which all sharp corners shall be avoided.
- D6 There shall be no threads in contact with the product.
- D7 The rubber or rubber-like covering or the plastic covering of valve parts shall be bonded in such a manner that the bond is continuous and mechanically sound, and so that in the environment of its intended use the rubber or rubber-like material or the plastic material does not separate from the base material.

⁴The 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, 186 Thorn Hill Rd., Warrendale, PA 15086 (724) 776-1535.

⁵Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.