

3-A[®] Sanitary Standards for Inlet and Outlet Leak-Protector Plug-Type Valves for Milk and Milk Products, Number 56-00

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)

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. Inlet and outlet leak-protector 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, and DIC 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	B3 <i>Inlet and Outlet Leak-Protector Plug Valves for Batch Pasteurizers:</i> Shall mean plug valves, which, when the valve is in any closed position, will prevent leakage of product past the valve. Note: In the following definitions the words “valve” or “valves” refer to inlet and/or outlet leak protector plug valves for batch pasteurizers.
A1	These standards cover the sanitary aspects of inlet and outlet leak-protector plug valves for batch pasteurizers, hereinafter called valves, (reference 3-A drawings, numbers 3-A-100 E-1, 3-A-100 E-2, 3-A-100 E-3, 3-A-100 E-4, 3-A-100 E-5, 3-A-100 E-6, 3-A-100 E-7, and 3-A-100 E-8.)	B3.1 <i>Valve Stops:</i> Shall mean guides which permit turning the valve plug to, but not beyond, the fully closed position.
A2	In order to conform to these 3-A Sanitary Standards, inlet and outlet leak-protector plug valves shall comply with the following design, material and fabrication criteria.	B3.1.1 <i>90 Degree Stop:</i> Shall mean a stop so designed as to prevent turning the plug more than 90 degrees.
B	DEFINITIONS	B3.1.2 <i>180 Degree Stop:</i> Shall mean a stop which prevents turning the plug more than 180 degrees, but which permits two fully closed positions, each diametrically opposite the other.
B1	<i>Product:</i> Shall mean milk and milk products.	B3.1.3 <i>Single-quadrant stop:</i> Shall mean a 90 degree stop in a valve with an irreversible plug.
B2	Surfaces	B3.2 <i>Valve with an Irreversible Plug:</i> Shall mean one in which the plug cannot be reversed in the body.
B2.1	<i>Product Contact Surfaces:</i> Shall mean all surfaces which are exposed to the product and surfaces from which liquid may drain, drop or be drawn into the product.	B3.3 <i>Fully Open Position:</i> Shall mean that position
B2.2	<i>Nonproduct Contact Surfaces:</i> Shall mean all other exposed surfaces.	

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of the plug which permits the maximum flow into or out of the pasteurizer.

B3.4 *Closed Positions:* Shall mean any position of the plug which stops the flow of product into or out of the pasteurizer.

B3.4.1 *Just-Closed Position:* Shall mean that closed position of the plug in which the flow into or out of the pasteurizer is barely stopped, or any closed position within 5/64 in. (2 mm) thereof as measured along the maximum circumference of the valve seat.

B3.4.2 *Fully-Closed Position:* Shall mean that closed position of the plug which requires the maximum movement of the plug to reach the fully open position.

B3.5 *Leakage:* Shall mean the entrance of unpasteurized product into a pasteurizer during the holding or emptying period, or the entrance of unpasteurized product into a pasteurized product line at any time.

B4 *Engineering Plating:* Shall mean plated to specific dimensions or processed to specified dimensions after plating¹.

C MATERIALS

C1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series² or corresponding Alloy Cast Institute³ (ACI) types (See Appendix,

¹Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited), June 17, 1995 with Amendment 4 on June 7, 1985. 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, D.C. 20407 (202) 755-0325.

²The 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.

³Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

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 Plugs and valve bodies made of materials provided for in C1 may be covered with an engineering plating of chromium.

C1.2 Rubber and rubber-like materials may be used for gaskets, O-rings, seals and parts used in similar applications.

C1.3 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-.

C1.4 Plastic materials may be used for gaskets, seals and parts used in similar applications.

C1.5 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-.

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 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 G.)

D2 The minimum thickness of engineering plating shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces when used on

- stainless steel.
- D3 Product contact surfaces of leak-protector plug valves by design cannot be cleaned by mechanical cleaning techniques, therefore all product contact surfaces shall be easily accessible for cleaning and inspection either when in an installed position or when removed. Removable parts shall be readily demountable.
- D4 Product contact surfaces shall be self-draining.
- D5 Internal angles on product contact surfaces shall have minimum radii of 1/16 in. (2 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 Valves shall not have stuffing boxes.
- D8 Inlet and outlet valves shall be provided with leak-protector grooves which shall be at least 3/16 in. (5 mm) wide, and at least 3/32 in. (2 mm) deep at the center. Mating grooves shall provide these dimensions throughout their combined length whenever the valve is in, or approximately in, the fully closed position. All single leak-protector grooves, and all mating leak-protector grooves shall extend throughout the entire depth of the seat, so as to divert leakage occurring at all points throughout the depth of the seat, and so as to prevent air binding. Washers or other parts shall not obstruct leak-protector grooves. Leak-protector grooves shall begin to function within 5/64 in. (2 mm), measured along the maximum circumference of the valve seat, after the just closed position is passed in closing.
- D9 A stop shall be provided on valves in order to guide the operator in closing the valve so that unpasteurized product may not inadvertently be permitted to enter the outlet line or the pasteurizer. The stop shall be so designed that the plug will be irreversible when the plug is provided with any grooves or their equivalent, unless duplicated, diametrically opposite grooves are also provided. In the case of 2-way valves (i.e., those having only one inlet and one outlet), a 180 degree stop, or any combination of stops permitting two fully closed positions, may be substituted for a 90 degree stop, provided that there are no air relief grooves in the plug and that all leak grooves are located symmetrically with respect to the valve inlet. Stops shall be designed that the operator cannot turn the valve beyond the stop position, either by raising the plug or by any other means.
- D9.1 The stop may be cut or cast in the body and/or plug. If a stop pin is used, it shall have:
- D9.1.1 A minimum shear strength of 30,000 psi (210,000 kPa).
- D9.1.2 The pin shall be attached with a thread having a Class 3⁴ fit and a minimum length of 1/2 in. (13 mm).
- D9.1.3 The pin shall have a minimum diameter of not less than 5/16 in. (8 mm) O.D. throughout its entire length except at root of thread at threaded end.
- D9.1.4 The pin shall be made of material that will withstand the repeated impact that occurs in continued operation without breaking or becoming sufficiently distorted to cause improper alignment of the leak-protector ports.
- D10 The handle of a valve should be at right angles to the direction of flow when in fully closed position. If valve handle is so positioned as not to be at 90 degrees when fully closed, the valve shall be clearly marked to show the fully closed position.
- D11 Outlet valves shall comply with the provisions of D11.1 and either D11.2 or D11.3 which follow:
- D11.1 They shall be designed to prevent the
- ⁴ American Machinery's Handbook; 22nd Edition, Copyright 1984, Industrial Press, Inc., 200 Madison Ave., New York, NY 10157.

accumulation of unpasteurized product in the product passages of the valve when the valve is in any closed position.

D11.2 They shall be designed to be attached to a pasteurizer so that the combined length of the valve inlet passage in the valve body and of any passage of corresponding diameter in the pasteurizer does not exceed the diameter of the passage in the valve. (See 3-A drawings number 3-A-100 E-4 and 3-A-100 E-8.)

D11.3 The design of the valve and the pasteurizer outlet shall be such that (a) the pasteurizer outlet is so flared that the smallest diameter of the large end of the flare is not less than the diameter of the passage in the valve, plus the depth of the flare, and (b) the greatest distance from the valve seat to the small end of the flare is not greater than the diameter of the passage in the valve. (See 3-A drawing number 3-A-100 E-5.)

D12 Inlet valves shall be provided with grooves to provide air-relief to the inlet line to the pasteurizer when in any closed position.

D13 All sanitary fittings and connections shall conform with the applicable provisions of 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D14 Nonproduct contact surfaces shall have a smooth finish, be free of pockets and crevices, and be readily cleanable and those to be coated shall be effectively prepared for coating.

E SPECIAL CONSIDERATIONS

E1 Special sanitary fittings on inlet and outlet leak-protector plug valves may be used where interchangeability is not required. These special fittings must conform to the provisions of this standard with respect to material, finish, construction thread dimensions (if used) and use of gaskets but do not have to conform to the face-to-face or center line-to-face dimensions in the drawings. All product contact surfaces of such fittings shall be accessible for cleaning and inspection.

APPENDIX

F 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 302, 303, 304, and 316 are designated CF-20, 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.

G 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 D1 herein. A maximum Ra of 32 $\mu\text{in.}$ (0.8 μm), when measured according to the recommendations in ANSI/ASME B46.1 - Surfaces Texture, is considered to be equivalent to a No. 4 finish⁶.

H DIAGRAMS

These diagrams are intended to demonstrate general principles only, and are not intended to limit individual ingenuity. The design used should conform with the sanitary requirements set forth in these 3-A Sanitary Standards. The following examples are included in this Appendix:

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

⁶ Available from American Society of Mechanical Engineers; 3455 East 47th Street, New York, NY 10017 (212-705-7722).