

3-A[®] Sanitary Standard for Batch and Continuous Freezers for Ice Cream, Ices and Similarly Frozen Foods, Number 19-07

*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)*

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

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Disclaimers

3-A Sanitary Standards and 3-A Accepted Practices are developed through the efforts of experts, working on a volunteer basis, using science-based information and their professional experiences to reach consensus decisions on the sanitary (hygienic) criteria in these 3-A documents.

3-A SSI, its employees and its volunteer committees/working groups shall not incur any obligation or liability for damages, including consequential damages, arising from or in connection with the development, use, interpretation, or reliance upon this 3-A Sanitary Standard.

3-A Sanitary Standards and 3-A Accepted Practices do not include provisions for mechanical, electrical, or personnel safety. Such safety criteria are established by government regulations and other standards development organizations (SDOs). Other SDO standards may be referenced.

Drawings and illustrations contained herein are examples to assist in understanding the criteria in this 3-A Sanitary Standard. Appendix drawings and illustrations are not intended to show all variations of the equipment or system nor are they exclusive of alternate approved methods. Appendix drawings and illustrations are non-normative.

Foreword

This 3-A Sanitary Standard establishes minimum sanitary (hygienic) requirements for design, materials, fabrication, and/or installation of Batch and Continuous Freezers for Ice Cream, Ices and Similarly Frozen Foods.

This 3-A Sanitary Standard is for use on a voluntary basis by directly and materially affected organizations such as equipment and machinery fabricators, processors, regulatory agencies and by other SDOs to assure adequate public health protections exist for the equipment or systems and covered products. 3-A SSI uses these documents as its source of sanitary criteria for 3-A Symbol authorization.

This 3-A Sanitary Standard was developed jointly by 3-A SSI, the United States Public Health Service (USPHS), the United States Department of Agriculture – Dairy Programs (USDA), and the European Hygienic Engineering & Design Group (EHEDG).

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It is our intent to encourage inventive genius and provide a forum to discuss new developments. Suggestions for improvement and new technology are welcome at any time for consideration by 3-A SSI. Please forward comments to 3-A SSI, 6888 Elm Street, Suite 2D; McLean, VA 22101-3829, USA or by fax: 703-761-6284, or by e-mail to: 3-ainfo@3-a.org.

A SCOPE

- A1 These standards cover the sanitary aspects of batch and continuous freezers for ice cream, sherbets, sorbets, ices, and other similarly-frozen foods and equipment integral therewith, including pumps, equipment for incorporating air or introducing flavoring material into the product and mix supply tanks attached to and made as a part of the freezer. These standards do not cover equipment designed for the freezing of soft-serve type ice cream, ices, and similarly-frozen products which are served to the consumer without further hardening.
- A2 In order to conform to these 3-A Sanitary Standards, batch and continuous freezers for ice cream, sherbets, sorbets, ices, and other similarly frozen foods shall conform to the following design, material, fabrication criteria and the applicable documents referenced herein.

B Normative References:

The following listed 3-A Sanitary Standards, 3-A Accepted Practices and other documents shall be considered as Normative References and the provisions of the referenced documents shall apply to this Standard without further reference in this document unless necessary to describe special considerations.

- B1 Doc.No. 3-A Sanitary Standards for:
- 02- Centrifugal and Positive Rotary Pumps
 - 04- Homogenizers and Reciprocating Pumps
 - 18- Multiple-Use Rubber and Rubber-Like Materials
 - 20- Multiple-Use Plastic Materials
 - 28- Flow Meters
 - 33- Polished Metal Tubing
 - 58- Vacuum Breakers and Check Valves
 - 63- Sanitary Fittings
 - 74- Sensors and Sensor Fittings and Connections Used on Equipment
 - 88- Machine Leveling Feet and Supports

Doc. No. 3-A Accepted Practices for:

- 604- Supplying Air Under Pressure in Contact with Product, and Product Contact Surfaces

B2 Other References and Standards

Ref. No. Title

- 1 *Advanced Materials and Processes*, Volume 137(1), "Coatings and Coating Practices" by H. Herman, "Surface Modification" by F. A. Smidt, p. 61. ASM International, Materials Park, OH 44073 (216) 338-5151.
- 2 AMS-S-13165, *Shot Peening of Metal Parts*. Society of Automotive Engineers (AWS), Commonwealth Dr., Warrendale PA 15096-0001.
- 3 SAE-AMS-QQ-C-320, Chromium Plating (Electrodeposited). SAE-AMS QQ-N-290A, Nickel Plating (Electrodeposited). Society of Automotive Engineers (AWS), 400 Commonwealth Dr., Warrendale, PA 15096-0001.
- 4 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).
- 5 Steel Founders Society of America, 780 McArdle Dr., Unit G, Crystal Lake, IL 60014, Phone: (815) 455-8240, Fax: (815) 455-8241, Internet: www.sfsa.org.
- 6 ASTM specifications for Cast Grades A351/A351M, A743/A743M and A744/A744M. Available from ASTM,

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

- 7 ASTM specifications for Wrought Grades A-276, A-582, and A-666. Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Phone: (610) 832-9500.
- 8 (ANSI)/American Society of Mechanical Engineers(ASME) B46.1 – Surface Texture. Available from ASME, 345 East 47th Street, New York, NY 10017-2392 (212-705-7722).
- 9 The Code of Federal Regulations (CFR), Title 21, Parts 175 – Indirect Food Additives: Adhesives and Components of Coatings. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 512-1800.
- 10 ASHRAE test 52.2-1999 method of testing general ventilation air-cleaning devices for removal efficiency by particle size. Available from American Society of Heating, Refrigeration and Air Conditioning Engineers, 1791 Tullie Circle, N.E., Atlanta, GA 30329 Phone: 404-636-8400.
- 11 ISO 14644-1 designating standard classes of air particulate cleanliness and specifies methods for verifying air cleanliness classifications. Available from The International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland, Phone: +41-22-734-1240.
- 12 *Machinery's Handbook*, published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157, Phone: (888) 528-7852.
- 13 Aerospace Standard (AS) 568, Aerospace Size Standards for O-rings, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086. Phone: (412) 776-4970.
- 14 AWS/ANSI D18.1 – Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications. Published by American Welding Society, 550 N.W. LeJeune Rd., Miami FL, Phone: (800) 443-3953, www.aws.org.
- 15 EHEDG Doc. 9 – Welding Stainless Steel to Meet Hygienic Requirements. European Hygienic Engineering & Design Group. Published by EHEDG, www.ehedg.org
- 16 ISO 3601-1: The International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland. Phone: +41-22-734-1240.

C DEFINITIONS

- C1 *Batch Freezers*: Equipment designed to be operated intermittently with the cycle consisting of (1) admitting the product to the freezing cylinder, (2) partially freezing and incorporating air into the product, (3) adding fruits, nuts, and flavoring materials when desired and (4) discharging the product, the cycle to be repeated as required.
- C1.1 The Batch Freezer begins at the product infeed connection or hopper inlet and ends at the exit of the discharge valve or gate and includes all equipment in between.
- C2 *Continuous Freezers*: Unitized equipment designed to be operated in such a manner as to (1) partially freeze the product as it flows continuously through the freezing cylinder(s) and (2) discharge the product(s). Air may or may not be incorporated into the product as it flows through the freezing cylinder.
- C2.1 The Continuous Freezer begins at the product infeed connection of the unitized equipment and ends at the exit of the discharge pump or cylinder or barrel outlet valve or product connection outlet and includes all equipment in between and,

when provided, the air inlet device. It does not include equipment for the continuous adding of fruits, nuts and other additives.

- C3 *Integral Mix Supply Tank or Hopper:* A covered vessel which is part of the unit and can be attached to the freezer and holds unfrozen, cooled mix.
- C3.1 The Mix Supply Tank or Hopper begins at the product infeed connection or hopper inlet and ends at the outlet connection and includes all equipment in between.
- C4 *Pre-Aerator:* A device to intermix and combine air with the unfrozen mix prior to the product entering the freezing cylinder or barrel.
- C5 *Dasher or Mutator:* A rotating assembly within the cylinder or barrel to which scraper blades and beaters or flights may be affixed.
- C6 *Air Inlet Device:* A type of air flow control device having product contact surfaces installed in the air inlet through which environmental air is drawn into a continuous freezer.
- C7 *Bond:* The adhesive or cohesive forces holding materials together. This definition excludes press and shrink fits.
- C8 **Cleaning**
- C8.1 *Clean-in-Place (CIP) Cleaning.* (CIP—previously referred to as mechanical cleaning.): The removal of soil from product contact surfaces in their process position by circulating, spraying, or flowing chemical solutions and water rinses onto and over the surfaces to be cleaned. Components of the equipment, which are not designed to be cleaned in place, are removed from the equipment to be COP or manually cleaned.
- C8.2 *Clean-Out-of-Place (COP):* Removal of soil when the equipment is partially or totally disassembled. Soil removal is effected by circulating chemical solutions and water rinses in a wash tank, which may be fitted with circulating pump(s).
- C8.3 *Manual Cleaning:* Removal of soil when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, and high or low pressure hoses, with cleaning aids manipulated by hand.
- C8.4 *Cleanable or Cleanability:* The suitability of materials of construction, design and fabrication required to assure that the equipment can be freed from soil.
- C8.5 *CIPable:* The design and fabrication of equipment which allows the equipment surfaces to be cleaned by CIP methods for a prescribed time and at a prescribed concentration, flow rate, pressure, and temperature demonstrated to be effective.
- C9 *Essential Functional Reason:* A condition or feature of design or fabrication that cannot be modified and is required for the proper operation of the equipment
- C10 *Environmental Air:* Air in a food processing, packaging or storage area and air supplied to these areas.
- C11 *Inspectable:* Designed, fabricated and installed to make product contact surfaces available for close visual observation.
- C12 *Product:* Partially frozen (not hardened) ice cream, sherbets, sorbets, ices and other similarly frozen foods and the liquid mixes from which they are made, and to which may have been added fruits, nuts and other flavoring/coloring materials. During the partial freezing phase, air may or may not be incorporated.
- C13 *Processing Area:* A room or area suitable for the manufacturing and packaging of products.