

# **3-A® Sanitary Standards for Centrifugal and Positive Rotary Pumps, Number 02-10**

*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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Drawings and illustrations contained herein are to assist in understanding the criteria in this 3-A Standard. Drawings and illustrations are not intended to show all variations of the equipment or system nor are they (it) to exclude alternate methods meeting this standard. Drawings and illustrations are non-normative.

## Foreword

This 3-A Standard is to establish minimum sanitary (hygienic) requirements for Centrifugal and Positive Rotary Pumps. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

This 3-A Standard is for voluntary use by directly and materially affected organizations such as equipment and machinery fabricators, processors, regulatory agencies and by 3-A Sanitary Standards, Inc. to assure adequate public health protection exist for the devices and covered products. 3-A Sanitary Standards, Inc. use these documents as the source for sanitary criteria as part of 3-A Symbol authorization.

This 3-A Standard was developed jointly by 3-A Sanitary Standards, Inc. (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).

It is our purpose to encourage inventive genius and provide a forum to discuss new developments. Suggestions for improvement and new technology are welcome any time for consideration by the 3-A Sanitary Standards Committees. Please forward comments to the 3-A SSI, 1451 Dolley Madison Boulevard, Suite 210, McLean, VA 22101-3850, USA. By fax: 703-761-6284. By e-mail to: [3-ainfo@3-a.org](mailto:3-ainfo@3-a.org).

**A SCOPE**

A1 These standards cover the sanitary aspects of centrifugal and positive rotary pumps for milk and milk products.

A2 In order to conform to these 3-A Sanitary Standards, centrifugal and positive rotary pumps shall comply with the following design, materials, and fabrication criteria.

**B DEFINITIONS**

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

**B2 Surfaces**

B2.1 *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.

B2.2 *Nonproduct Contact Surfaces*: Shall mean all other exposed surfaces.

**B3 Cleaning**

B3.1 *Mechanical Cleaning or Mechanically Cleaned*: Shall mean soil removal by impingement, circulation or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B3.2 *Manual (COP) Cleaning*: Shall mean soil removal 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, high or low pressure hoses and tanks(s) which may be fitted with recirculating pump(s) and with all cleaning aids manipulated by hand.

**B4 Surface Modification<sup>1</sup>**

B4.1 *Surface Treatments*: Shall mean a process whereby chemical compositions or mechanical properties of the existing surfaces are altered. There is no

<sup>1</sup> Additional information on surface modification is contained in *Advanced Materials and Processes*, Volume 137(1). "Coatings and Coating Practices" by H. Herman, "Surface Modification" by F. A. Smidt, ASM International, Materials Park, OH 44073 (216) 338-5151.

appreciable, typically less than 1 µm build-up of new material or removal of existing material.

**B4.1.1 Surface treatments include:**

1. Mechanical (shot peening<sup>2</sup>, glass beading, polishing)
2. Thermal (surface hardening laser, electron beam)
3. Diffusion (carburizing, nitriding)
4. Chemical (etching, oxidation)
5. Ion Implantation
6. Electropolishing

B4.2 *Coatings*: 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.

**B4.2.1 Coating processes include:**

1. Chemical (conversion coatings)
2. Electrodeposition<sup>3</sup>
3. Spraying (pneumatic, flame, plasma, arc spray)
4. Physical Vapor Deposition
5. Chemical Vapor Deposition

B5 *Simple Hand Tools*: Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench or hammer.

B6 *Substantially Flush*: Shall mean mating surfaces or other juxtaposed surfaces shall be within 1/32 in. (0.794 mm).

B7 *Readily or Easily Removable*: Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B8 *Easily or Readily Accessible*: Shall mean a location which can be safely reached by an employee from the floor, platform, or other permanent work area.

<sup>2</sup> AMS-S-13165, *Shot Peening of Metal Parts*. Available from Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA.

<sup>3</sup> SAE-AMS-QQ-C-320, Chromium Plating (Electrodeposited). SAE-AMS QQ-N-290A, Nickel Plating (Electrodeposited). Society of Automotive Engineers (AWS), 400 Commonwealth Drive, Warrendale, PA 15096-0001.

**C MATERIALS****C1 Metals**

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series<sup>4</sup> or corresponding Alloy Cast Institute (ACI)<sup>5</sup> types (See Appendix, Section E4) 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:

C1.1.1 Rotors, shafts, seals, rotor and impeller retaining devices, and housings may also be made of a metal or an alloy that is as corrosion resistant as AISI 300 Series Stainless Steel and be nontoxic and nonabsorbent under the conditions of intended use. (See Appendix, Section E5.)

C1.1.2 Product contact surfaces made of the materials provided for in C1.1 and C1.1.1 may have their surfaces modified by surface treatment or coating(s).

C1.1.3 Solder, when used, shall be silver bearing solder and shall be corrosion resistant, free of cadmium, lead and antimony, nonabsorbent, and shall not impart any toxic substance to the product when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

**C2 Surface Modification Materials**

C2.1 Surface modification materials that become a part of the parent material on product contact surfaces shall comply with the appropriate provisions of one or more of the following:

C2.1.1 FDA Regulation 21 CFR 175 Subpart C<sup>6</sup>, Substances for Use as Components of Coatings.

C2.1.2 FDA Regulation 21 CFR 177 Subpart B<sup>6</sup>, Substances for Use as Basic Components of Single and Repeated Use Food Contact Surfaces.

C2.1.3 FDA Regulation 21 CFR 177 Subpart C<sup>6</sup>, Substances for Use Only as Components of Articles Intended for Repeated Use.

**C3 Nonmetals**

C3.1 Rubber and rubber-like materials may be used for rotors, stators, liners, gaskets, O-rings, seals and parts having the same functional purposes.

C3.1.1 Rubber and rubber-like materials when used for the above specified application(s) shall conform to 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C3.2 Plastic materials may be used for rotors, stators, liners, gaskets, O-rings, seals and parts having the same functional purposes.

C3.2.1 Plastic materials when used for the above specified application(s) shall conform to 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C3.3 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.

C3.3.1 Materials used for O-rings, gaskets, or seals covered by D11.2.2 shall conform to Table 1.

<sup>4</sup> The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1. Available from the American Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412) 776-1535.

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

<sup>6</sup> For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 783-3238.