

3-A[®] Sanitary Standard for Belt-Type Feeders, Number 75-01

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

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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 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 Belt-Type Feeders. 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), United States Food and Drug Administration (USFDA), 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 3-A SSI, 6888 Elm Street, Suite 2D, McLean, VA 22101-3829 USA. By fax: 703-761-6284. By e-mail to: 3-ainfo@3-a.org.

A SCOPE

A1 This 3-A Sanitary Standard applies to the sanitary aspects of belt-type feeders used to convey products at a controlled rate. Product enters the feeder at the inlet hopper/chute and exits at the head pulley or enclosure discharge opening.

A2 To conform to this 3-A Sanitary Standard, belt-type feeders shall comply with the following design, material, and fabrication criteria and the current revisions of applicable documents cited herein.

B NORMATIVE REFERENCES

B1 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.

B2 3-A Sanitary Standards

<u>Doc. No.</u>	<u>Title (3-A Sanitary Standard for:)</u>
18-	Multiple-Use Rubber and Rubber-Like Materials
20-	Multiple-Use Plastic Materials
33-	Metal Tubing
50-	Level Sensing Devices for Dry Products
63-	Sanitary Fittings
74-	Sensors and Sensor Fittings and Connections Used on Equipment
88-	Machine Leveling Feet and Supports

B3 Other References and Standards

<u>Ref. No.</u>	<u>Title</u>
1.	SAE AMS 2406, Chromium Plating (Electrodeposited). SAE-AMS QQ-N-290A, Nickel Plating (Electrodeposited). SAE International, 400 Commonwealth Dr., Warrendale, PA 15096-0001, Internet: http://www.sae.org
2.	(American Society of Mechanical Engineers (ASME) B46.1 - <i>Surface Texture Waviness and Lay</i> . Available from the American Society of Mechanical Engineers, Three Park Ave., New York, NY 10016-5990, Phone: (212) 705-7722 or at http://www.asme.org
3.	<i>Advanced Materials and Processes</i> , Volume 137(1), "Coatings and Coating Practices" by H. Herman, "Surface Modification" by F. A. Smidt. ASM International, Materials Park, OH 44073, Phone: (216) 338-5151, Internet http://asminternational.org
4.	AMS-S-13165, <i>Shot Peening of Metal Parts</i> . SAE International, 400 Commonwealth Dr., Warrendale, PA 15096-0001, Internet: http://www.sae.org
5.	<i>AIST Stainless Steels: A Steel Products Manual</i> , Association for Iron & Steel Technology, 186 Thorn Hill Road, Warrendale, PA 15086, Phone: (724) 814 3000, Internet: www.aist.org
6.	<i>Steel Casting Handbook, Supplement 2</i> , 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
7.	MIL-C-26074E. <i>Military Specification: Coatings, Electroless Nickel Requirements For</i> . Standardization, Document Automation & Production Service (Department of Navy), 700 Robbins Avenue, Building 4, Section D, Philadelphia, PA 19111-5094, Phone: (215) 697-2179, Fax: (215) 697-1462.

8. 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, Phone: (202) 512-1800, Internet: <http://www.gpoaccess.gov/cfr/index.html>
9. *Machinery's Handbook*, published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157, Phone: (888) 528-7852, Internet: <http://new.industrialpress.com>
10. EHEDG Guideline 2, *A Method for Assessing the In-Place Cleanability of Food Processing Equipment*. European Hygienic Engineering & Design Group. Published by EHEDG, www.ehedg.org
11. 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
12. EHEDG Doc. 9 – *Welding Stainless Steel to Meet Hygienic Requirements*. European Hygienic Engineering & Design Group. Published by EHEDG, www.ehedg.org.
13. Aerospace Standard (AS) 568, *Aerospace Size Standards for O-rings*, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086, Phone: (724)-776-4841, Internet: <http://www.sae.org>
14. ISO 3601-1:2002: *Fluid Power Systems, Sealing Devices – O-Rings – Part 1: Inside diameters, cross-sections, tolerances and size identification code*, The International Organization for Standardization (ISO), 1 ch. de la Voie-Creuse, Postale 56, CH -1211, Geneva 20, Switzerland, Phone: +41-22-749-01-11, Internet: www.iso.org
15. 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 or at <http://www.astm.org>

C DEFINITIONS

C1 Belt-Type Feeders: Equipment in which a belt(s) is used to feed or meter products and may include integral mechanisms to assist or maintain flow of product.

C2 Cleaning

C2.1 Clean-in-Place (CIP) 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. Product contact surfaces to be CIP cleaned shall be inspectable.

C2.2 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).

C2.3 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.

C2.4 Dry Cleaning: Cleaning with a vacuum cleaner and /or dry brushes and other tools.

C3 Coatings, Overlays and Encapsulations: A process where a different material is deposited to create a product contact surface. There is a build-up of new material. The coating, overlay, or encapsulation material does not alter the physical properties of the substrate.

C3.1 Coating processes include:

1. Chemical (conversion coatings except anodizing)
2. Engineering plating (e.g., Electrodeposition) (Refer to B3, Reference. No. 1), gold plating)
3. Thermal spraying (e.g., flame, plasma, arc spray)
4. Physical vapor deposition
5. Chemical vapor deposition

C4 Corrosion Resistant: A surface or material which has the property to retain its original surface characteristics for its predicted service period, when exposed to the conditions encountered in the environment of intended use, including contact with product, cleaning and sanitizing chemicals, steam, or sterilization compounds or solutions.

C5 Drift: The unintended movement of product in the form of airborne dust particles.

C6 Dry: In the context of describing conveyed product, dry shall mean a property characterizing the product's inability to flow uncontrolled, or flood, relative to the conveyor belt motion.

C7 Inspectable: Designed, fabricated and installed to make product contact surfaces available for close visual observation.

C8 Nontoxic Materials: Substances, which under the conditions of their use, are in compliance with applicable requirements of the FDA.

C9 Product: Dry milk, dry milk products and other dry food products.

C10 Pulleys: Devices used to drive and return the conveying belt.

C11 Readily Accessible: A location that can be safely reached by personnel from the floor, other permanent work area or stable platform (permanent or moveable).

C12 Readily Removable: Designed, fabricated, and installed to be quickly separated from the equipment with or without the use of simple hand tools.

C13 Rollers: Devices used to support and guide the conveying belt.

C14 Roughness Average (Ra): An arithmetical mean of the absolute values of the surface profile departure within a sampling length. (Refer to B3, Reference No. 2.)

C15 Simple Hand Tools: A screwdriver, wrench, mallet, or readily available dedicated tool(s) normally used by operating and cleaning personnel.

C16 Surfaces

C16.1 Product Contact Surfaces: All surfaces which are exposed to the product and surfaces from which splashed product, liquids or material may drain, drop, or be drawn into the product or onto product contact surfaces.

C16.2 Nonproduct Contact Surfaces: All exposed surfaces from which splashed product, liquids, or other materials cannot drain, drop, or be drawn into or onto the product, product contact surfaces, open packages, or the product contact surfaces of package components.

C17 Substantially Flush: Mating surfaces or other juxtaposed surfaces that are not more than 1/32 in. (0.794 mm) off-set from each other, except for pipeline and tubular piping welds which must meet AWS/ANSI D18.1.

C18 Surface Modification (Refer to B3, Reference No. 3)

C18.1 Surface Treatments: Processes where chemical composition or mechanical properties of the existing surface are altered. There is no appreciable build-up of new material or removal of existing material.

C18.1.1 Surface treatments include:

1. Mechanical (grinding, polishing, shot peening) (Refer to B3, Reference No. 4)
2. Thermal (surface hardening laser, electron beam)
3. Diffusion (carburizing, nitriding)
4. Chemical (etching, oxidation, passivation)
5. Ion Implantation
6. Electropolishing

C19 Synthetic Fiber: A filament or elongated strand of non-toxic material composed of plastic or rubber elements, which may be spun, woven and/or coated into composite final forms (e.g. belts).

D MATERIALS**D1 Product Contact Surfaces**

All 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, including cleaning and sanitizing treatment.

D1.1 Metals

D1.1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AIST) 300 Series, excluding 301, 302, and 303, (Refer to B3, Reference No. 5) or corresponding Alloy Cast Institute (ACI) types (Refer to B3, Reference No. 6) or metal which under conditions of intended use is at least as corrosion resistant as 304 stainless steel, and is nontoxic and nonabsorbent. (Refer to Appendix, Section F.) Where welding is involved, the carbon content of the stainless steel shall not exceed 0.08%.

D1.1.2 The inlet hopper, inlet chute, feeder frame, weigh bridge, belt tensioning and tracking devices may be covered by a coating of electroless nickel alloy. (Refer to B3, Reference No. 7 and Appendix, Section H.)

D1.1.3 The inlet hopper, inlet chute, feeder frame, pulleys, rollers, weigh bridge, belt tensioning or tracking devices, scrapers, slider deck(s) made of the materials provided for in D1.1.1 may have their product contact surfaces modified by surface coating(s).

D1.1.4 Load cells may be made of stainless steel of AISI 302, 303, 400 series, or nontoxic, nonabsorbent metal which is as corrosion resistant, under the conditions of intended use, such as 304 stainless steel.

D1.1.5 Solder, when used, shall be gold- or silver-containing 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, including cleaning and sanitization treatment.

D1.2 Nonmetals

D1.2.1 Rubber and rubber-like materials may be used for, or as a coating for, inlet chutes, belts, skirts, wipers, rollers, pulleys, gaskets, O-rings, seals, protective boots, flexible connectors, and parts having the same functional purposes and when used for the specified application(s), shall conform to the applicable provisions of 3-A Sanitary Standard, Number 18-.

D1.2.2 Plastic materials may be used for, or as a coating for, inlet hoppers, inlet chutes, covers, product guards, bushings, rollers, pulleys, wear strips, flexible connectors, skirts, wipers, belts, load cell protection, boots, gaskets, seals, view ports, fasteners, handles, and parts having the same functional purposes and when used for the above-specified application(s), shall conform to the applicable provisions of 3-A Sanitary Standard, Number 20-.

D1.2.3 Carbon and ceramic materials (including tungsten carbide) may be used for seal components, and when used, shall be inert, nonporous, nontoxic, nonabsorbent, insoluble, resistant to scratching, scoring, and distortion when exposed to the conditions encountered in the environment of intended use, including cleaning and sanitizing treatment.

D1.2.4 Adhesives used for bonding rubber and rubber-like materials, bonding plastic materials, and bonding of carbon or ceramic seal components shall be nontoxic. Adhesives shall comply with 21 CFR 175 - Indirect Food Additives: Adhesives and Components of Coatings (Refer to B3, Reference No. 8).

D1.2.5 Materials comprising of cotton, linen, silk, wool or synthetic fibers may be used for flexible connections, dust socks and vent filter media. These materials shall be non-shedding, nontoxic, relatively insoluble, easily cleanable, and shall not impart a flavor to the product.

D2 Nonproduct Contact Surfaces

D2.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If the surfaces are coated, including painted surfaces, the coating shall adhere. All 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.

E FABRICATION

E1 Product Contact Surfaces

E1.1 Surface Texture

E1.1.1 Surfaces, including fabricated, welded and soldered joints, shall be at least as smooth as a 32 $\mu\text{in.}$ (0.8 μm) R_a finish and shall be free of pits, folds, crevices, and cracks in the final fabricated form. (Refer to Appendix, Section G.), except that;

E1.1.1.1 Sanitary tubing joints, welded in accordance with E1.2.2, and free of pits, folds, crevices, and cracks, and misalignments, may have an as-welded interior surface finish.

E1.1.1.2 Vent filter media, flexible connections, and dust socks may have a surface finish rougher than 32 $\mu\text{in.}$ (0.8 μm) R_a .

E1.2 Permanent Joints

E1.2.1 All permanent joints in metallic surfaces shall be continuously welded, except that:

E1.2.1.1 Press-fits or shrink-fits may be used to produce crevice-free permanent joints only when neither welding nor brazing is practical. Joints of these types may only be used to assemble metallic parts having circular cross sections, free of shoulders or relieved areas. Press-fitting or shrink-fitting may be used for bearings, bearing housings, pins, and bushings. (Refer to B3, Reference No. 9.) (See the following illustrations of acceptable press-fits.)