

Hygiene requirements for the design of mechanical belt conveyors used in meat and poultry processing

**NSF International Standard/
American National Standard
and 3-A Standard**

NSF/3-A/ANSI 14159-3 – 2003



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NSF International Standard/
American National Standard
for Food Processing Equipment —

Hygiene requirements for the design of mechanical belt conveyors used in meat and poultry processing

Standard Developer
NSF International

Adopted May 16, 2003
NSF International

Designated as an ANSI Standard
May 16, 2003
American National Standards Institute

Recommended for Adoption by
The NSF Joint Committee on Food Processing Equipment
The NSF Council of Public Health Consultants

Adopted by
NSF International
May 2003

Published by

NSF International
PO Box 130140, Ann Arbor, Michigan 48113-0140, USA

For ordering copies or for making inquiries with regard to this Standard, please reference the designation "NSF/3-A/ANSI 14159-3-2003."

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Foreword²

The purpose of this Standard is to establish minimum public health and sanitation requirements for mechanical belt conveyors used in meat and poultry processing.

This Standard was developed by the NSF Joint Committee on Food Processing Equipment using the consensus process described by the American National Standards Institute. During the development of NSF/3-A 14159-1 it was determined by the Joint Committee that the sanitary design and construction requirements for mechanical belt conveyors should be included in a separate standard so as to not cause confusion with the requirements for general processing equipment.

Suggestions for improvement of this Standard are welcome. Comments should be sent to Chair, Joint Committee on Food Processing Equipment, c/o NSF International, Standards Department, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA.

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NSF/3-A Standard 14159-3 For Food Processing Equipment —

Hygiene requirements for the design of mechanical belt conveyors used in meat and poultry processing

1 General

1.1 Purpose

This American National Standard establishes minimum food protection and sanitation requirements for the materials, design, fabrication, construction, and performance of meat and poultry processing equipment. This Standard does not contain operator safety requirements.

1.2 Scope

This American National Standard applies to exposed product mechanical belt conveyors, either singularly or as a component of equipment, intended for use in the slaughter, processing, and packaging of meat and poultry products.

1.3 Measurement

Decimal and Metric (SI) conversions provided parenthetically shall be considered equivalent. Metric conversions have been made according to IEEE/ASTM SI 10.

2 Normative references

The following documents contain provisions that, through reference, constitute provisions of this NSF/3-A/ANSI Standard. At the time of publication, the editions indicated were valid. All referenced documents are subject to revision, and parties are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

3-A Accepted Practice, No. 604-04 1994, *Supplying air under pressure in contact with milk, milk products, and product contact surfaces*³

ANSI/ASME B46.1 – 1995, *Surface texture (surface roughness, waviness, and lay)*⁴

Code of Federal Regulations, Title 21, (21 CFR) Parts 170-199, *Food and Drugs* (U.S. Government Printing Office, Washington, DC 20402)⁵

³ 3-A, International Association of Food Industry Suppliers, 1451 Dolley Madison Boulevard, McLean, VA 22101-3850

⁴ American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990

⁵ U.S. Government Printing Office, Washington, DC 20402

Federal Food, Drug, and Cosmetic Act of 1938, as amended⁶

IEEE/ASTM SI 10-1997, *Standard for the Use of the International System of Units (SI): The Modern Metric System*⁷

NSF/3-A/ANSI 14159-1 – 2002, *Hygiene requirements for the design of meat and poultry processing equipment*

3 Definitions

For the purposes of this Standard, the following definitions apply.

3.1 associated equipment: All appurtenances associated with a piece of equipment, not defined as equipment, that are essential to the functioning of the equipment for it to hygienically process a product (e.g., fittings, piping, tubing).

3.2 bond: The adhesive or cohesive forces holding materials together. This definition excludes press-fits and shrink-fits.

3.3 cleaned in place: Cleaning of equipment by impingement or circulation of flowing chemical solutions, cleaning liquids, and water rinses, without dismantling, into, onto, and over surfaces in equipment or systems designed for this specific purpose.

3.4 cleaning: Removal of soil.

3.5 coating: The results of a process where a different material is deposited to create a new surface. There is appreciable, typically more than 40 μ in (1 μ m), build-up of new material. The coating material does not alter the physical properties of the substrate. Coating processes include, but are not limited to: chemical (conversion coatings), engineering plating (e.g., electrodeposition), thermal spraying (e.g., flame, plasma, arc spray), physical vapor deposition, chemical vapor deposition, and overlays and encapsulation.

3.6 corrosion resistant: Capable of maintaining original surface characteristics under prolonged contact with the intended end use environment, and the normal use of cleaning compounds and sanitizing solutions.

3.7 crevice: A sharp, cleft-like, irregular opening of small depth that adversely affects cleanability.

3.8 dead space: Space wherein product, cleaning or sanitizing agents, or soils can be trapped, retained, or not completely removed during the operation of cleaning.

3.9 easily accessible: A location that can be reached by an employee from the floor, other permanent work area, or other stable (permanent or movable) platform.

3.10 easily removable: Capable of being detached and taken away from the parent unit without or with the use of simple hand tools.

3.11 equipment: An assembly of parts or components, with the appropriate actuators, controls, and power circuits, joined together for a specific application, in particular for the processing, treatment, moving, or packaging of product.

3.12 hygiene: The taking of all measures during product handling, preparation, and processing to ensure its suitability for use by humans.

⁶ Superintendent of Documents, U.S. Government Printing Office, Mailstop SSOP, Washington, DC 20402-0001

⁷ ASTM International, 100 Barr Harbor Dr., West Conshohocken, PA 19428

- 3.13 inspectable:** Designed such that all product contact surfaces can be made available for close visual observation.
- 3.14 joint:** Junction of two or more pieces of material.
- 3.15 manual cleaning:** Removal of soil by various methods that are manipulated by hand when equipment is open or partially or totally disassembled.
- 3.16 microorganism (relevant):** Bacteria, fungi, yeasts, molds, spores, and viruses that are able to contaminate, multiply, or survive in a product and are able to be harmful.
- 3.17 non-absorbent materials:** Those materials that under the intended conditions of their use do not retain substances with which they come in contact.
- 3.18 non-product contact surface:** The exposed equipment surfaces that are not in contact with the product and from which product or other materials cannot drain, drip, diffuse, or be drawn (self-returned) into the product or product container
- 3.19 nontoxic materials:** Substances that, under the conditions of their use, are in compliance with applicable requirements of the Food, Drug, and Cosmetic Act of 1938, as amended.
- 3.20 practical test:** Activities performed following a documented set of procedures and parameters used to determine an evaluation.
- 3.21 product:** Any substance intended for human consumption (e.g., by ingestion, injection, topical application, insertion).
- 3.22 product contact surface:** Equipment surfaces that are exposed to the product and from which the product or other materials can drain, drip, diffuse, or be drawn (self-returned) into the product or product container.
- 3.23 sanitization:** The application of cumulative heat, chemicals, or other approved agents on clean surfaces that is sufficient to reduce the population of disease organisms by at least 99.999% (5 log reduction).
- 3.24 seal:** To close an aperture so as to effectively prevent the entry or passage of unwanted matter.
- 3.25 self-draining:** The combination of design, construction, installation, and surface finish so as to prevent the retention of liquid except for normal surface wetting.
- 3.26 sensors:** Devices or instrumentation attached to equipment for process monitoring/control.
- 3.27 smooth:** The condition of a surface that satisfies hygienic requirements and is free of pits, pinholes, cracks, crevices, inclusions, rough edges, and other surface imperfections detectable by visual and tactile inspection.
- 3.28 soil:** Any unwanted matter.
- 3.29 surface treatment:** The results of a process whereby chemical compositions or mechanical properties of the existing surface are altered. There is no appreciable, typically less than 40 μ in (1 μ m), build-up of new material or removal of existing material. Surface treatments include, but are not limited to, mechanical (shot peening, glass beading, polishing), thermal (surface hardening laser, electron beam), diffusion (carburizing, nitriding), chemical (etching, oxidation), ion implantation, or electropolishing.

4 Materials of construction

4.1 General

Materials shall be suitable for their intended use.

Surfaces of materials, coatings, and surface treatments shall be durable, cleanable, and if necessary, capable of being sanitized without breaking, cracking, chipping, flaking, delamination, erosion, corrosion, and/or abrasion, and shall be resistant to the penetration of unwanted matter under intended use.

Equipment used in the slaughter, processing, and packaging of meat and poultry products shall be constructed of materials that will withstand the generally humid operating environment, high pressure, hot water cleaning with chemical cleaning agents, and antimicrobial treatment.

4.1.1 Unacceptable materials

The following materials shall not be used in product contact surface areas or non-product contact surface areas:

- materials containing antimony, arsenic, cadmium, lead, or mercury;
- metals containing selenium in excess of 0.50%;
- materials classified as hazardous substances (such as carcinogens, mutagens, and teratogens);
- asbestos and asbestos containing materials;
- wood;
- enamelware;
- porcelain;
- leather;
- uncoated aluminum and aluminum alloys;
- uncoated anodized aluminum and aluminum alloys; or
- glass

4.1.2 Paint

Paint shall not be used on product contact surfaces. Parts removable for cleaning having both product contact and non-product contact surfaces shall not be painted.

4.2 Product contact surfaces

In addition to the general requirements (see 4.1), materials used for product contact surfaces shall:

- be corrosion resistant to both product and cleaning/sanitization materials;
- be non-toxic;
- not contaminate or otherwise have any adverse effect on the product;
- be non-absorbent (except where technically or functionally unavoidable); or
- be temperature resistant to processing and heat treatments where necessary (e.g., freezing, heat-sterilization).

4.2.1 Metals

4.2.1.1 Product contact surfaces shall be:

- AISI 300 series stainless steel; or