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NSF International Standard/
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for Food Equipment —

Special purpose food equipment
and devices

Standard Developer
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American National Standards Institute
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The purpose of this Standard is to establish minimum food protection and sanitation requirements for the materials, design, fabrication, construction, and performance of special purpose food handling and processing equipment and devices not fully covered by other individual standards.

This Standard uses inch-pound units as the primary units with SI (metric) units provided in parentheses for informational purposes. The Joint Committee carried a motion that this convention be adopted in future revisions to this Standard. The SI units provided in parenthesis generally represent a hard conversion of the inch-pound units, meaning that the SI value may have been rounded to provide a reasonable and measurable dimension.

Issue 7

This revision updated normative references in section 2 and affirm proposed new language for section 5 covering the use of casters and gliders.

This Standard was developed by the NSF Joint Committee on Food Equipment using the consensus process described by the American National Standards Institute.

Suggestions for improvement of this Standard are welcome. Comments should be sent to Chair, Joint Committee on Food Equipment at standards@nsf.org, or c/o NSF International, Standards Department, P.O. Box 130140, Ann Arbor, Michigan, 48113-0140, USA.

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1 General

1.1 Purpose

This Standard establishes minimum food protection and sanitation requirements for the materials, design, fabrication, construction, and performance of special purpose food handling and processing equipment and devices not fully covered by other individual standards.

1.2 Scope

Equipment covered by this Standard includes, but is not limited to, specialty equipment items or devices that have special, complex, or multiple functions such as refrigeration heating equipment, and refrigerated tumblers equipment. These are applicable provisions and additional specific requirements or exceptions as might be needed for proper evaluation of devices or equipment for which individual standards do not exist.

The requirements of this Standard shall apply to all specialty equipment items except when equipment components and materials are covered under other NSF or NSF/ANSI Standards or criteria. Components and materials covered by other NSF or NSF/ANSI Standards or criteria shall comply with the requirements of each relevant standard or criteria to which that particular equipment component or material applies. This Standard is not intended to restrict new unit design, provided that such design meets the minimum specifications described herein.

1.3 Alternate materials, design, and construction

While specific materials, design, and construction may be stipulated in this Standard, equipment that incorporates alternate materials, design, or construction may be acceptable when such equipment meets the applicable requirements herein.

1.4 Measurement

Decimal and SI conversions provided parenthetically shall be considered equivalent. Metric conversions and significant figure rounding 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/ANSI Standard. At the time this Standard was balloted, the editions listed below were valid. All documents are subject to revision, and parties are encouraged to investigate the possibility of applying the recent editions of the documents indicated below. The most recent published edition of the document shall be used for undated references.

40 C.F.R. §180.940 Tolerance exemptions for active and inert ingredients for use in antimicrobial
formulations (Food-Contact Surface Sanitizing Solutions)\(^3\)


ANSI/ASSE 1001 – 2008. *Atmospheric Type Vacuum Breakers*\(^5\)


ANSI/ASSE 1022 – 2003. *Backflow Preventer for Beverage Dispensing Equipment*\(^6\)

ANSI/ASSE 1024 – 2004. *Dual Check Backflow Preventers*\(^5\)

ASSE 1032 – 2004. *Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers – Post Mix Type*\(^6\)

IAPMO – *Uniform Plumbing Code 2015*\(^6\)

ICC – *International Plumbing Code 2015*\(^7\)


NSF/ANSI 2. *Food equipment*

NSF/ANSI 4. *Commercial cooking, rethermalization, and powered hot food holding and transport equipment*

NSF/ANSI 7. *Commercial refrigerators and freezers*

NSF/ANSI 51. *Food equipment materials*

NSF/ANSI 170. *Glossary of food equipment terminology*


UL 471 – 2010. *Commercial Refrigerators and Freezers*\(^9\)

3 Definitions

Terms used in this Standard that have special technical meaning are defined in NSF/ANSI 170.


\(^6\) International Association of Plumbing and Mechanical Officials (IAPMO), 5001 E. Philadelphia St., Ontario, CA 91761 <www.iapmo.org>.

\(^7\) International Code Council (ICC), 5203 Leesburg Pike, Suite 600; Falls Church, VA 22041 <www.iccsafe.org>.

\(^8\) ASTM International, 100 Barr Harbor Dr., West Conshohocken, PA 19428 <www.astm.org>.

\(^9\) Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062 <www.ul.com>.
4 Materials

The requirements contained in this section are intended to protect food from contamination and ensure that the materials used in the manufacture of food handling and processing equipment resist wear, penetration by vermin, and the effects of foods, heat, cleaning compounds, sanitizers, and other substances that may contact the materials in the intended use environment. Materials used in unexposed non-food zone areas shall be exempt from all requirements in 4.

4.1 Conformance with NSF/ANSI 51

Materials shall conform to the requirements in NSF/ANSI 51 applicable to the zone in which the material is used.

4.2 Solder

Solder containing lead as an intentional ingredient shall not be used in a food zone or splash zone.

4.3 Sound dampening materials

Sound dampening materials shall meet the requirements of the zone in which they are located except that they are not required to be smooth. Non-curing sound dampening materials shall not be used in exposed areas.

5 Design and construction

This section contains design and construction requirements for equipment covered within the scope of this Standard.

5.1 General sanitation

5.1.1 Equipment shall be designed and manufactured to prevent the harborage of vermin and the accumulation of dirt and debris, and to permit inspecting, maintaining, servicing, and cleaning of the equipment and its components.

5.1.2 Equipment shall be designed and manufactured so that food may be added, processed, finished, dispensed, removed, and/or served in a sanitary manner.

5.1.3 Food zones shall be readily accessible and easily cleanable or shall be designed for in-place cleaning when a readily accessible design is not feasible.

5.1.4 Food zones for which in-place cleaning is intended shall be designed and manufactured so that cleaning and sanitizing solutions may be circulated or passed throughout the fixed system. The design shall ensure that cleaning and sanitizing solutions contact all food contact surfaces. The system shall be self-draining or capable of being completely evacuated. Equipment and appurtenances designed for in-place cleaning shall have a section of the cleaned area accessible for inspection or shall provide for other acceptable inspection methods. The manufacturer shall provide written instructions for the cleaning and sanitizing of all food zone surfaces for which in-place cleaning is intended. The type and concentration of sanitizing agent recommended in the instructions by the manufacturer shall comply with 40 CFR §180.9403.

5.1.5 Splash zone surfaces shall be accessible and easily cleanable.

5.1.6 Non-food zone surfaces shall be accessible and cleanable.
5.1.7 Unexposed non-food zone surfaces shall be accessible or closed.

5.2 Internal angles and corners, food zone

5.2.1 All internal angles or corners of less than 135° shall be smooth and have minimum continuous radii of \( \frac{1}{8} \) in (0.13 in, 3.2 mm).

5.2.1.1 Lesser radii may be used where necessary for proper functioning of parts (sealing ring grooves, holes, grooves, etc.) if they are easily cleanable.

5.2.1.2 Greater radii may be used if necessary for cleaning, product flow, and maintenance.

5.2.2 For metals, solder or other fillet material shall not be used to effect the required minimum radius of an internal angle or corner.

5.2.3 For materials other than metal, the radii specified in 5.2.1.1 and 5.2.1.2 shall be effected using parent material or a material proven to be bonded and otherwise equal to or better than the parent material.

5.3 External angles and corners

Exposed external angles and corners in a food zone shall be sealed and smooth (see figure 1a).

5.4 Joints and seams

5.4.1 Permanent joints and seams in a food or splash zone shall be sealed and smooth.

5.4.2 Permanent joints and seams in a nonfood zone shall be closed. Welded joints and seams in a nonfood zone shall be deburred.

5.4.3 Joints formed by overlapping sheets of material shall not create upwardly facing horizontal ledges (see figure 1b).

5.4.4 Sealants shall only be used to seal joints and seams that are structurally sound and are less than \( \frac{1}{8} \) in (0.13 in, 3.2 mm) wide before sealing. Sealants may be used to fill spaces around collars, grommets, and service connections.

5.4.5 Solder and other fillet material shall be securely bonded to its substrate. All flux and catalytic materials shall be removed.

5.4.6 Equipment shall be designed and manufactured so that field joints may be made sanitary with the use of trim strips, welding, soldering, properly designed draw fastening, or other appropriate methods (see figure 2).

5.5 Fasteners

5.5.1 Fasteners shall not be used in a food zone.

5.5.2 Fasteners shall be easily cleanable. Fasteners meeting this requirement include, but are not limited to, slot-head and Phillips-head screws, hex head fasteners, and flush-break pop rivets. Hex key screws and non flush-break pop rivets may be used in a splash zone or a nonfood zone provided that the heads are capped or filled.

5.5.3 Fasteners shall be tight fitting to the surface except as permitted in 5.5.4.

5.5.4 No more than one locking washer and one flat washer shall be used per fastener head. The
diameter of the washer adjacent to the fastening surface shall not be less than the diameter of the washer under the fastener head. External-tooth lock washers shall not be used.

5.5.5 Unless exempted in 5.5.5.1, there shall be no exposed threads, projecting screws, or studs in a food or splash zone. There shall be no more than two and one-half exposed threads or ¼ in (0.25 in, 6.4 mm) of exposed threads, whichever is less, in a nonfood zone. Exposed threads on electrical cord strain relief devices in a nonfood zone shall be exempt.

5.5.5.1 Exposed or unexposed threads used in a food zone, which are necessary because of functional requirements, shall be American Standard 60° Stub or equal, and shall have not more than 14 threads per 1.0 in (25 mm) with a major diameter of not less than 5/16 in (0.31 in, 7.9 mm).

5.5.6 The sharp point of a fastener shall not be exposed.

5.6 Insulation

Insulated spaces shall conform to the applicable requirements of NSF/ANSI 2, NSF/ANSI 4, and NSF/ANSI 7.

5.7 Reinforcing and framing

5.7.1 Exposed reinforcing and framing members and gussets shall be easily cleanable. Reinforcing and framing members shall be designed and manufactured to prevent the harborage of vermin (see figure 3).

5.7.2 Horizontal surfaces of reinforcing and framing members and gussets shall not be located where debris may accumulate.

5.7.3 Vertical channels that form hollow sections shall be closed at each end, open at each end, or readily accessible along the entire channel. All other hollow sections shall be closed at each end.

5.8 Inspection and maintenance panels

When necessary for equipment inspection and maintenance, removable panels of adequate size shall be provided. Each panel shall be sized to permit removal and replacement by one person.

5.9 Doors

5.9.1 Doors shall be sized to fit their openings and shall close properly.

5.9.2 Sliding doors shall slide freely and shall be readily removable.

5.9.3 Exposed channel sections on single panel doors shall be inverted or easily cleanable. Clean-outs shall be provided if channels are not inverted (see figure 4).

5.9.4 Exposed edges of glass doors shall be protected by tight fitting channels, stripping materials, or other means such as rounding the edges of tempered glass to protect against chipping. The glass shall conform to the requirements of 5.21.3 (see figure 5).

5.10 Door tracks and guides

5.10.1 Door tracks and guides shall be easily cleanable. Channel tracks shall not have a depth greater than the width of the channel top.
5.10.2 Tracks and guides shall:

— have clear open slots continuously or at intervals along their entire lengths; or
— have clean-out holes at each end; or
— terminate at least ½ in (0.50 in, 13 mm) short of framing at each end; or
— be integral with the equipment surface and have no square corners.

This shall not apply to lower guides for overhead door suspension that are integral with the equipment surface and channel-type bottom tracks equipped with readily removable strips.

5.11 Cutting boards

Cutting boards shall be readily removable and comply with the requirements and performance tests of NSF/ANSI 2.

5.12 Hinges

5.12.1 Hinges located in a food zone shall be easily cleanable while in place, or shall be designed to be disassembled without the use of tools for routine cleaning. Hinges located in a splash zone shall be easily cleanable while in place or shall be designed to be disassembled (with or without the use of tools) for routine cleaning.

5.12.2 Continuous hinges shall not be used in a food zone.

5.12.3 Hinges on splash zone doors and covers weighing 80 lbs (36 kg) or more shall have no more than five knuckles in total per hinge set and shall have sealed joints and seams on the hinge body (except for seams at the pivot joint).

5.12.4 Hinges on splash zone doors and covers weighing less than 80 lbs (36 kg) shall conform to the requirements in 5.12.3 or each of the following:

— the hinge shall be lift-off style or have a removable pin;
— the diameter of the hinge pin shall be greater than or equal to 3/16 in (0.19 in, 5.0 mm); and
— mating surfaces of the hinge (such as the joint between a knuckle and leaf) shall be closed or separated by at least ⅛ in (0.13 in, 3.2 mm).

5.13 Covers

5.13.1 Covers protecting a food zone shall overlap the opening and shall be sloped to provide drainage from the cover surface. Inset covers for stackable pans are exempt from the slope requirement. Areas of handles and knobs of covers are not required to be sloped.

5.13.2 Covers having slotted openings designed to allow serving utensils to remain in the food shall be exempt from 5.13.1. Slotted openings shall be no larger than 1½ x 1 in (38 x 25 mm) and shall be protected by a raised rim of at least 3/16 in (0.19 in, 5.0 mm).

5.13.3 Port openings through a food zone cover shall be flanged upward at least 3/16 in (0.19 in, 5.0 mm) and shall have a cover overlapping the flange.

5.13.4 Hinges and pivots shall conform to 5.12.

5.13.5 Covers shall be readily removable or hinged and easily cleanable.

5.13.6 Sliding covers and hinged covers protecting a food zone shall be designed and manufactured to
prevent accumulation of liquid or debris on the covers and contamination of the food zone during opening or closing.

5.13.7 Internal corners and angles of roll covers, tilt covers, and other similar covers that are less than 135° shall have a minimum smooth radius of \( \frac{1}{8} \) in (0.13 in, 3.2 mm). Solder or other fillet material may be used to provide a minimum radius on the underside of roll-type covers.

5.14 Edges and nosings

If a shelf or unit top is reinforced by forming its edge into a structural shape (nosing) and there is an adjoining vertical surface (i.e., cabinet body), the following requirements shall apply:

— the nosing shall be integral with the shelf or unit top; and
— the edge shall be deburred; and
— the nosing and adjoining vertical surface shall be closed or have a clearance of at least \( \frac{3}{4} \) in (0.75 in, 19 mm) or \( \frac{1}{3} \) of the nosing’s vertical dimension, whichever is greater.

If the profile edge is turned in to form a channel-like configuration, the return (horizontal) shall not exceed \( \frac{1}{2} \) in (0.50 in, 13 mm) and shall be angled downward at least 5° from the horizontal plane. This requirement does not apply to readily removable or knockdown shelves.

5.15 Openings into food zones

Openings into food zones shall be protected to prevent the entry of seepage, condensation, and spills. In areas where liquids may accumulate, top openings into food zones shall be protected by a raised rim that extends at least \( \frac{3}{16} \) in (0.19 in, 5.0 mm) above the liquid level (see figure 6).

5.16 Louvers

5.16.1 Louvers that may be subject to overhead splashes, spills, and drips shall be of a deflecting design, or they shall be readily removable and the space immediately behind the louver easily cleanable.

5.16.2 If electrical safety requirements prohibit the use of readily removable louvers, then such louvers need only be removable.

5.16.3 Louvers shall be deburred and shall have spaces large enough to allow for easy cleaning.

5.16.4 Screening on louvered openings, if provided, shall be 16 mesh (16 strands per 1.0 in [25 mm]) or greater and removable.

5.17 Equipment mounting

5.17.1 Floor-mounted equipment shall be designed and manufactured to be:

— portable; or
— mobile; or
— sealed to the floor; or
— elevated on legs that provide a minimum unobstructed clearance beneath the unit of 6.0 in (150 mm); or
— elevated on legs that provide a minimum unobstructed clearance beneath the unit of 4.0 in (100 mm) provided that no part of the floor under the equipment is more than 6.0 in (150 mm) from the point of cleaning access.

5.17.2 Counter-mounted equipment shall be designed and manufactured to be:

— portable; or
— sealed to the counter; or
— elevated on legs that provide a minimum unobstructed clearance beneath the unit of 4.0 in (100 mm); or
— elevated on legs that provide a minimum unobstructed clearance beneath the unit of 3.0 in (76 mm) provided that no part of the counter top under the footprint of the equipment is more than 16 in (41 cm) from the point of cleaning access; or
— elevated on legs that provide a minimum unobstructed clearance beneath the unit of 2.0 in (50 mm) provided that no part of the counter top under the footprint of the equipment is more than 3.0 in (76 mm) from the point of cleaning access.

5.17.3 Portable equipment shall not weigh more than 80 lbs (36 kg) and shall not exceed 36 in (90 cm) in any plane.

5.17.4 Utility connections on portable equipment and mobile equipment shall be designed to be disconnected without the use of tools or shall be of sufficient length to permit the equipment to be moved for cleaning.

5.17.5 Kick plates on floor-mounted equipment shall be removable.

5.18 Legs and feet

5.18.1 Legs and feet shall be fastened to the body of the machine and shaped at their floor or counter contacts to minimize the accumulation of dirt and the harborage of vermin.

5.18.2 Legs and feet shall be sufficiently rigid to support the machine with a minimum of cross bracing.

5.18.3 If the outer dimension of a leg exceeds the outer dimension of its foot by ½ in (0.50 in, 13 mm) or more in the same plane, then the foot shall extend 1.0 in (25 mm) below the leg at the minimum adjustment (see figure 7a).

5.18.4 Hollow sections between leg and foot shall be closed. Legs and feet shall have no exposed threads at the maximum adjustment.

5.18.5 Gussets shall be assembled to the equipment and shall be easily cleanable and designed to prevent vermin harborage. The resultant assembly shall have no recessed areas (see figure 7b).

5.19 Casters and gliders

5.19.1 If used, casters and/or gliders shall comply with NSF/ANSI 2.

5.20 Shelving

5.20.1 Shelving shall be easily cleanable.

5.20.2 Readily removable shelves shall be sized to permit handling by one person. Shelves used as
readily removable false bottoms shall have flanged corners that are closed or are sufficiently notched to permit cleaning (see figure 8).

5.20.3 Diverting shelves intended to prevent seepage or retain splashes and spills shall have sealed corners and seams. The back and end edges shall be turned up a minimum of 1.0 in (25 mm) and the corners and seams shall be sealed. Shelf surfaces exposed to unpackaged foods shall conform to 5.2 (see figure 9).

5.20.4 Where solid knock-down shelving is provided with a solid shelf, the seam between the leg and shelf shall be equal to or above the flood level of the shelf. If pressure cleaning is recommended for knock-down shelving, joints and seams shall be either sealed or accessible for cleaning, and shall be capable of being completely drained.

5.20.5 The back and end edges of fixed interior shelving shall:

- be turned upward a minimum of 1.0 in (25 mm) and form a closed seam along an adjacent back and side panel; or
- be spaced at least 1.0 in (25 mm) from an adjacent back or side panel; or
- form sealed seams with an adjacent back or side panel (see figure 10).

5.21 Gaskets

5.21.1 Exposed surfaces of gaskets shall be easily cleanable. Hollow sections shall be sealed.

5.21.2 Door gaskets, if provided, shall be capable of being removed and reinstalled by hand or with the use of simple tools or adhesives. Staples, pop rivets, nails, and other items that cannot be reattached easily shall not be used to secure door gaskets.

5.21.3 Retaining grooves or devices for holding gaskets shall be easily cleanable.

5.21.4 Fixed gaskets, if not readily removable, shall be securely fastened and sealed to minimize accumulations of condensation, spillage, and foreign matter.

5.22 Breakable glass components

5.22.1 Fixtures and devices that, if impacted, may break and contaminate food shall be protected by guards. This requirement shall not apply to view ports and windows constructed of heat tempered glass.

5.22.2 Light bulbs that have been plastic coated or otherwise treated to resist shattering shall have a permanent label affixed near the bulb indicating that the lamp has been treated to resist shattering and must be replaced with a similarly treated lamp.

5.22.3 Glass shall conform to the requirements in NSF/ANSI 51 applicable to the zone in which the glass is used.

5.23 Thermometers

5.23.1 If required, a temperature sensing or indicating device shall be provided for each temperature zone of the unit.

5.23.2 Thermometers shall conform to the requirements of NSF/ANSI 2.
5.24 Plumbing connections

5.24.1 Water and waste piping and fittings attached to the equipment shall comply with the material requirements for the applicable zones.

5.24.2 Water and waste piping and connections shall comply with the ICC International Plumbing Code\(^7\), or the IAPMO Uniform Plumbing Code\(^6\).

5.24.3 Waste lines shall not drain into or through a food zone.

5.24.4 Backflow prevention

5.24.4.1 Units intended to be connected to a water supply system under pressure shall have one of the following:

- an air gap at least twice the diameter of the water supply inlet but not less than 1.0 in (25 mm);
- a vacuum breaker that conforms to ANSI/ASSE 1001\(^5\), *Atmospheric Type Vacuum Breakers* (for intermittent pressure conditions);
- a vacuum breaker that conforms to ANSI/ASSE 1020\(^5\), *Pressure Vacuum Breaker Assembly* (for continuous pressure conditions);
- a backflow prevention device that conforms to ANSI/ASSE 1022\(^5\), *Backflow Preventer for Beverage Dispensing Equipment*;
- a backflow prevention device that conforms to ANSI/ASSE 1024\(^5\), *Dual Check Backflow Preventers*;
- a backflow prevention device that conforms to ASSE 1032\(^5\), *Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers – Post Mix Type*; or
- a statement in the installation instructions and on a label permanently affixed to the equipment that clearly indicates that the equipment is to be installed with adequate backflow protection to comply with applicable federal, state, and local codes.

5.24.4.2 A screen of at least 100 mesh (minimum 100 strands per inch) shall be installed immediately upstream of all check valve type backflow preventers used for water supply protection. The screen shall be accessible and removable for cleaning or replacement.

5.25 Cleanability

Waste pans and housing areas shall be readily accessible for cleaning.

6 Performance

6.1 Equipment that has an application or function for which performance criteria has been established in another NSF Standard or Standards shall perform in accordance with such criteria. The methods of test used to evaluate such equipment shall be the same as those prescribed in the relevant NSF Standard(s).

6.2 Equipment that has a performance-related application or function for which no performance criteria has been established in another NSF Standard shall perform in accordance with criteria established in any applicable statute, regulation, model code, or other guidance that is relevant to the process or function of the equipment.
In the absence of such criteria, performance requirements shall be established based on a review of the best available science. They shall provide a level of safety equivalent to that provided for by other similar NSF Standards (if any) or by related statutes, regulations, model codes, or other guidance. These performance requirements may be used to evaluate equipment while performance requirements are being established for incorporation into an ANSI Standard. A copy of the performance requirements shall be made available to all interested parties upon request.

7 Food equipment provided with a security package

7.1 General

Food equipment provided with a security package may require the removal of security fasteners and other devices in order to be inspected, serviced, maintained, or cleaned.

7.2 Special tools

For food equipment provided with a security package, the use of special tools is acceptable for components that are required to be removable or accessible.

7.3 Fastening methods (splash zone)

Security fasteners may be used in a splash zone of food equipment provided with a security package.

7.4 Fastening methods (nonfood zone)

Security fasteners may be used in a nonfood zone of food equipment provided with a security package.

7.5 Hinges

Hinges in a splash or nonfood zone of food equipment provided with a security package are not required to be of simple take-apart design. Fixed pin, fixed by other means, and continuous hinges are acceptable.

7.6 Hardware

Hardware on food equipment provided with a security package is not required to be easily replaced. Hardware that is removable or permanently attached is acceptable.

7.7 Shelf brackets, pilasters, slides, or cleats

Shelf brackets, pilasters, slides, or cleats on food equipment provided with a security package are not required to be readily removable. Shelf brackets, pilasters, slides, or cleats that are removable or permanently attached are acceptable, provided that they are easily cleanable.

7.8 Kick plate

Kick plates on food equipment provided with a security package are not required to be readily removable. Kick plates that are removable are acceptable.

7.9 Drawers

Drawers and drawer pan assemblies in food equipment provided with a security package are not required to be readily removable. Drawers and drawer pan assemblies that are removable are acceptable.
7.10 Conveyor units

Access panels on the base of conveyor units on food equipment provided with a security package are not required to be readily removewable. Access panels that are removable are acceptable.

7.11 Labeling

Food equipment provided with a security package shall have a permanent, conspicuous label stating: “Intended for use only in environments where security is a concern, such as correctional facilities, mental health facilities, or some schools.”

8 Supplemental requirements for marine food equipment

The requirements contained in this section pertain to equipment specifically designated for use aboard marine vessels. These requirements are intended to ensure that marine food equipment is designed and manufactured so that it may be operated, cleaned, and maintained in a sanitary manner under shipboard conditions. In most cases, the requirements in this section serve to modify or expand upon the requirements contained in other sections of this Standard. Unless otherwise specified, the requirements in the other sections of this Standard shall also apply to marine warewashing equipment.

8.1 Materials

8.1.1 Corrosion resistance

8.1.1.1 Coatings, including metallic coatings such as zinc (galvanized), zinc alloys, or chrome plating, shall not be used to render exposed materials corrosion resistant except on hinges, latches, and similar replaceable hardware.

8.1.1.2 Structural metal used in the fabrication of equipment, including panels, enclosures, and reinforcing and framing members, shall be AISI10 Type 304 or Type 316 stainless steel. Type 316 stainless steel shall be used on equipment designed for outdoor (weatherdeck) use.

8.1.1.3 Fasteners shall be AISI10 Type 304 or Type 316 stainless steel.

8.2 Design and construction

8.2.1 General

Splash zone design and construction requirements shall apply to nonfood zones on wheeled equipment covered by this Standard. Casters and wheels on such equipment shall meet nonfood zone design and construction requirements:

8.2.2 Joints and seams

8.2.2.1 Food zone surfaces on marine food equipment shall be seamless or shall have all permanent joints and seams continuously welded and polished smooth.

8.2.2.2 Permanent joints and seams in a splash zone shall be sealed or welded and polished smooth. Seams wider than ¼ in (0.13 in, 3.2 mm) shall be sealed by continuous weld or shall be flashed and sealed.

10 American Iron and Steel Institute (AISI), 25 Massachusetts Ave., NW, Suite 800, Washington, DC 20001
8.2.2.3 If exposed to seepage or condensation, permanent joints and seams in a nonfood zone shall be sealed or welded and polished smooth. Seams wider than $\frac{1}{8}$ in (0.13 in, 3.2 mm) shall be sealed by continuous weld or shall be flashed and sealed.

8.2.3 Reinforcing and framing members

Hollow sections of reinforcing and framing members, including vertical channels, shall be closed at each end. Seams wider than $\frac{1}{32}$ in (0.031 in, 0.79 mm) that are formed by reinforcing and framing members shall be sealed.

8.2.4 Doors

Double panel doors shall be seamless or shall have all seams sealed.

8.2.5 Shelving

Internal angles and corners on fixed shelving, regardless of its application, shall conform to the minimum food zone radius requirement.
Figure 1a – External corners or angles

Figure 1b – Examples of joints and seams formed by Overlapping sheets of metal
Where equipment is intended to be joined in the field, the resulting seam shall meet the applicable requirement of 5.4.6.

Figure 2 – Field Joints

Figure 3 – Examples of acceptable reinforcing and framing
Channel Sections shall be shallow and wide enough to be easily cleanable, with clean-out holes.

Figure 4 – Single panel door

Figure 5 – Glass Doors
When $X$ exceeds $Y$ by $\frac{1}{2}$ in (0.50 in, 13 mm) or greater then $Z$ must be 1.0 in (25 mm) below the leg at the

![Diagram of solid adjustable foot](image)

**Figure 7a– Example of Leg and Foot**
Legs must be closed against underside of top

Channel Bracing

Space to facilitate cleaning

Corner or flange notched to permit cleaning or closed tight

Sectional removable false bottoms

Figure 7b – Legs and Feet

Figure 8 – Perforated false bottom
Figure 9 – Diverting shelves

Figure 10 – Interior fixed shelves
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## Annex A\(^1\) (informative)

### Food Equipment Joint Committee\(^2\)

<table>
<thead>
<tr>
<th>Name</th>
<th>Company / organization</th>
<th>Interest category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northcutt, Kirk</td>
<td>Auto-Chlor System</td>
<td>Industry</td>
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<tr>
<td>Perez, Michael(^1)</td>
<td>Baring Industries</td>
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<td>Industry</td>
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1\(^1\)Committee or task group chair

1\(^2\)The information contained in this annex is not part of the American National Standard (ANS) and has not been processed in accordance with ANSI’s requirements for ANS. As such, this annex may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

2\(^2\)Food Equipment Joint Committee members on the date of publication - subject to change 1/25/2017
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Standards

The following standards established and adopted by NSF as minimum voluntary consensus standards are used internationally:

2 Food equipment
3 Commercial warewashing equipment
4 Commercial cooking, rethermalization, and powered hot food holding and transport equipment
5 Water heaters, hot water supply boilers, and heat recovery equipment
6 Dispensing freezers
7 Commercial refrigerators and freezers
8 Commercial powered food preparation equipment
12 Automatic ice making equipment
13 Refuse processors and processing systems
14 Plastics piping system components and related materials
15 Manual food and beverage dispensing equipment
20 Commercial bulk milk dispensing equipment
21 Thermoplastic refuse containers
24 Plumbing system components for recreational vehicles
25 Vending machines for food and beverages
29 Detergent and chemical feeders for commercial spray-type dishwashing machines
35 High pressure decorative laminates (HPDL) for surfacing food service equipment
36 Dinnerware
37 Air curtains for entranceways in food and food service establishments
40 Residential wastewater treatment systems
41 Non-liquid saturated treatment systems
42 Drinking water treatment units – Aesthetic effects
44 Residential cation exchange water softeners
46 Evaluation of components and devices used in wastewater treatment systems
49 Biosafety cabinetry: Design, construction, performance, and field certification
50 Equipment for swimming pools, spas, hot tubs, and other recreational water facilities
51 Food equipment materials
52 Supplemental flooring
53 Drinking water treatment units – Health effects
55 Ultraviolet microbiological water treatment systems
58 Reverse osmosis drinking water treatment systems
59 Mobile food carts
60 Drinking water treatment chemicals – Health effects
61 Drinking water system components – Health effects
62 Drinking water distillation systems
140 Sustainable carpet assessment
169 Special purpose food equipment and devices
170 Glossary of food equipment terminology
173 Dietary supplements
177 Shower filtration systems – Aesthetic effects
184 Residential dishwashers
222 Ozone generators
223 Conformity assessment requirements for certification bodies that certify products pursuant to NSF/ANSI 60: Drinking water treatment chemicals – health effects
240 Drainfield trench product sizing for gravity dispersal onsite wastewater treatment and dispersal systems
245 Wastewater treatment systems - nitrogen reduction
305 Personal care products containing organic ingredients
321 Goldenseal root (Hydrastis canadensis)
330 Glossary of drinking water treatment unit terminology
332 Sustainability assessment for resilient floor coverings
336 Sustainability assessment for commercial furnishings fabric
342 Sustainability assessment for wallcovering products
347 Sustainability assessment for single ply roofing membranes
350 Onsite residential and commercial water reuse treatment systems
350-1 Onsite residential and commercial greywater treatment systems for subsurface discharge
355 Greener chemicals and processes information
358-1 Polyethylene pipe and fittings for water-based ground-source “geothermal” heat pump systems
358-2 Polyethylene pipe and fittings for water-based ground-source “geothermal” heat pump systems
359 Valves for crosslinked polyethylene (PEX) water distribution tubing systems
360 Wastewater treatment systems – Field performance verification
363 Good Manufacturing Practices (GMP) for Pharmaceutical Excipients
372 Drinking water treatment system components – Lead content
401 Drinking water treatment units - Emerging compounds / incidental contaminants
416 Sustainability Assessment for Water Treatment Chemical Products
418 Residential wastewater effluent filters longevity testing
419 Public Drinking Water Equipment Performance – Filtration
14159-1 Hygiene requirements for the design of meat and poultry processing equipment
14159-2 Hygiene requirements for the design of hand held tools used in meat and poultry processing equipment
14159-3 Hygiene requirements for the design of mechanical belt conveyors used in meat and poultry processing equipment

13 The information contained in this Standards page is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI’s requirements for an ANS. Therefore, this Standards page may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.
THE HOPE OF MANKIND rests in the ability of man to define and seek out the environment which will permit him to live with fellow creatures of the earth, in health, in peace, and in mutual respect.