



IFPA

Sanitary Equipment Design Buying Guide & Checklist

Guidelines, Definitions, Illustrations, and
Instructions for the Use of the
Sanitary Design Checklist for Equipment
Used in Processing Fresh-cut Fruits and Vegetables

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I. Introduction

The IFPA Associate Member Committee under the direction of the IFPA Board of Directors has created this document for use by processing members in evaluating processing equipment for use in fresh-cut processing facilities (some recommendations may also be relevant to packaging equipment). With that task in mind the committee worked with the following purpose statement. “This design checklist should help inform processors about equipment features and assist them in choosing products that best meet their needs for proper sanitation, worker safety and processing efficiency.”

The HACCP approach of minimizing the risk of biological, chemical, and physical hazards is essential in the design, fabrication, and installation of equipment for food processing, whether it be meat, poultry, fruits and vegetables, fresh-cut produce or the many fully-cooked and ready to eat food products.

Processing equipment is one of the key areas where sanitary design must be considered. Food in process can build up in hidden areas, on surfaces, or under the equipment. Equipment suppliers are more aware of the need to provide manufacturing equipment that is of sanitary design, is easily cleanable, and will not contaminate or contribute to the contamination of food.

To accomplish this, the food contact surfaces must meet the following criteria

- The surface must be non-toxic to the food.
- The surface must be non-reactive with the food.
- The surface must be non-contaminating to the food.
- The surface must be non-corrosive.
- The surface must be cleanable.

The attached checklist has been developed for use in evaluating new or used equipment or equipment made from in-company sources in fresh-cut processing operations.

This document provides **voluntary** recommended guidelines on sanitary design considerations in selecting processing equipment for the fresh-cut produce industry. The information and procedures provided have been developed with input from a broad cross-section of our industry and represent the best efforts of IFPA to provide information on sanitary design considerations in a manner consistent with existing applicable regulations, standards and guidelines, but are not necessarily exhaustive or exclusive of all issues to consider. The information provided herein is offered in good faith and believed to be reliable, but is made without warranty, express or implied, as to merchantability, fitness for a particular purpose, or any other matter. This information is not necessarily exhaustive or exclusive, and was not designed to apply to any specific facility or process. It is the responsibility of the user of this document to verify that these recommendations are appropriate for the intended facility. IFPA, its members and contributors do not assume any responsibility for compliance with applicable laws and regulations, and recommends that users consult with their own legal and technical advisors to be sure that they meet applicable requirements.



II. Definitions: Sanitary Equipment Checklist

Accessible — **readily or easily** — quickly exposed for inspection and cleaning using simple tools used by operating, maintenance or cleaning personnel

Adequate — equal to a requirement of occasion: sufficient: suitable

ASME — American Society of Mechanical Engineers

AWS — American Welding Society

Bins. Portable — receptacles or vessels used to transport and/or store raw materials, food in process, or finished foods during the manufacturing process.

Bins. Stationary — receptacles or vessels used for the storage of raw materials, food in process, or finished foods during the manufacturing process.

BISSC — Bakery Industry Sanitation Standards Committee 1400 West Devon Avenue, Suite 422 Chicago, IL 60660. Telephone: (773) 761-4100, Fax: (773) 274-3032, www.bissc.org

BMP — Best Management Practices — those practices, both management and structural, that a fruit & vegetable operator utilizes to minimize the impacts of the farming operation on the product and environment.

CE —Conformité Européne — The CE Mark is a visible declaration by the manufacturer (or his representative, importer, etc.) that the equipment, which is marked, complies with all the requirements of all the applicable directives. Having ensured that the equipment does indeed meet all these requirements (including all the administrative requirements involved in being able to demonstrate compliance), the CE Mark may then be affixed and the product released.

Cleanable — **Readily or easily** — made of such materials, so finished, and so fabricated that soil may be effectively removed by normal cleaning means.

Cleaning — the removal of soil. Soil is defined as: unwanted organic, or inorganic matter on or in equipment, including product residue.

Cleaning — Dry — the removal of product residue and soil by scraping, vacuuming, or other dry methods.

Cleaning — Wet — the removal of product residue and soil by washing, flooding, or spraying methods.

Cleaning-in-place — a procedure dependent upon circulating appropriate cleaning and sanitizing solutions at relatively high velocities (5 feet per second) or onto and over the surface for a specified time and specified temperature in a closed system specifically designed for this purpose. (See 3-A Accepted Practices for details).

Cleaning. Manual — cleaning with brushes, scouring pads (other than steel wool), scrapers, hoses providing water, cleaning solutions, or steam under pressure, all manipulated by hand.

Closed, airtight — two parts fitted together tightly by means of a gasket or other means so that air cannot pass either way with a pressure differential of 5 psi (35 kPa).

Container — any type of rigid or non-rigid packaging enclosure designed to hold food.

Contamination — the presence of soil, unwanted or unacceptable numbers of microorganisms, or any other unwanted organic or inorganic matter.

Corrosion resistant — capable of maintaining original surface characteristics under prolonged influence of the use environment, including expected food contact, cleaning methods, compounds, and sanitizing solutions.



Cover — a protective shield, which is used to prevent materials from entering or escaping from the protected area.

Dead end — a space wherein a product, ingredient, cleaning or sanitizing agent, extraneous matter or water may be trapped, retained, or not completely displaced in operational or cleaning procedures.

Detergent — a chemical cleaning agent, which is suitable for use in washing operations and which, when used effectively, aids the removal of soil.

Equipment — a general term including material, fittings, devices, appliances, fixtures, apparatus and machines.

Excessive amount — an amount, which may cause contamination of the food.

FDA — Food and Drug Administration

Food-drug-beverage — any edible raw, cooked, or processed substance, liquid, drug, or ingredient used or intended for use in whole or in part for human consumption. May also apply to animal consumption.

Food contact surfaces — those surfaces of the equipment with which the food comes in contact, with which the food is likely to come into contact and from which it returns to surfaces in contact with the food; from which contaminants may drain, drop, or be drawn into the food. Elements that must not be used in food contact surfaces or in food zones are: antimony, cadmium, copper, copper alloys (brass & bronze), lead, monel, wood, glass. (FDA regulations 21 CFR, sections 170-190).

Food zone — all of the food contact surfaces and the volume that the food occupies.

GMP — Good Manufacturing Practices. See 21CFR Part 110 Food and Drug Regulations.

Guarded — shielded, fenced, enclosed, or otherwise protected by means of enclosure guards, covers, railings, or by the nature of the location (remoteness from floor, platform, working level, etc.) so as to remove the likelihood of accidental contact or approach dangerous to persons or objects.

HACCP — An acronym that stands for Hazard Analysis Critical Control Point. A systematic, science based approach used in food production as a means to assure food safety. The system is built upon the seven principles identified by the National Advisory Committee on Microbiological Criteria for Foods (1992) (US). Web site: <http://www.fsis.usda.gov/OPHS/nacmcf/>

IP — An acronym that stands for Ingress Protection. A three-digit number developed by IEC and used to provide an IP Rating to a piece of electronic equipment or to an enclosure for electronic equipment.

IEC — International Electrotechnical Commission, a standards organization dealing with electrical, electronic and related technologies. Many of its standards are developed jointly with the ISO and are required to be met by many European governing bodies. IEC Central Office, 3, rue de Varembe, P.O. Box 131, CH-1211 GENEVA 20, Switzerland Telephone: +41 22 919 02 11 Fax: +41 22 919 03 00 Web site: <http://www.iec.ch/>

Joints or Seams — The junction of two or more pieces of material

Location accessible — A location, which can be safely and easily reached by an employee standing on the floor, platform, or other permanent working area.

NEMA — National Electrical Manufacturers Association, 1300 N. 17th Street, Suite 1847, Rosslyn, VA, 22209. Telephone (703) 841-3200, Fax (703) 841-5900, Web site www.nema.org, e-mail webmaster@nema.org.



Non-absorbent — A material to be non-absorbent under ordinary conditions of use shall not retain an excessive amount of substances with which it normally comes into contact.

Non-food contact surfaces — all surfaces other than the product zone.

Non-food zone — all surfaces and volumes other than the food zone.

Non-toxic materials — materials, which under conditions of their use, are in compliance with the applicable requirements of the Food, Drug and Cosmetic Act and Regulations, as amended. (FDA regulations 21 CFR, sections 170-190).

NSF — National Sanitation Foundation. The registered NSF Certification Mark on a food equipment product confirms that NSF has assessed — and certified — its conformity with the relevant NSF/ANSI Standard. NSF International, P.O. Box 130140, 789 N. Dixboro Road, Ann Arbor, MI 48113-0140, USA. Telephone: (+ 1) 734-769-8010, Fax: 734-769-0109, E-mail: info@nsf.org, Web site: www.nsf.org

OSHA — U.S. Occupational Safety and Health Administration and its state counterparts.

Passivation — The treatment of stainless steel to form an oxide layer, creating a metal surface that is resistant to chemical corrosion. Passivation is typically performed on newly fabricated or welded stainless steel by thorough cleaning with a detergent, followed by treatment with nitric acid, citric acid, phosphoric acid or a strong chelating agent to remove all surface impurities. The stainless steel surface is then exposed to air, which allows the oxide layer to form. (ASTM A-967, for referenced ASTM standards, visit the ASTM Web site, www.astm.org)

Plastic — Plastics generally are organic high polymers (i.e., they consist of large chainlike molecules containing carbon) that are formed in a plastic state either during or after their transition from a small-molecule chemical to a solid material. The two basic groups of plastic materials are thermoplastics and thermosets. Thermoplastic resins consist of long molecules, each of which may have side chains or groups that are not attached to other molecules (i.e., are not cross-linked). Thus, they can be repeatedly melted and solidified by heating and cooling so that any scrap generated in processing can be reused. No chemical change generally takes place during forming. Thermoset plastics react during processing to form cross-linked structures that cannot be re-melted and reprocessed.

Product Zone — Includes all areas 12 inches on either side of unprotected food zone, 12 inches below food zone and extending to top of enclosure.

Protective coating — a substance applied over a base material, which protects the base material.

Removable, readily — Quickly separated from the machine or equipment, using simple tools normally used by operating, maintenance or cleaning personnel.

Sanitize — Treatment of surfaces by a process that is effective in destroying vegetative cells of pathogenic bacteria and substantially reducing other microorganisms. Such treatment shall not adversely affect the product and shall be safe for the consumer when applied as labeled.

Sealed — the condition resulting from the filling of a crack, crevice, joint, or opening so as to effectively prevent the entry or passage of liquids, gasses and/or solids.

Self-draining — that the design and construction is of such shape, material and surface finish as to prevent liquid from standing except for normal clingage.

Shall — a required condition.

Should — a preferred condition.

Simple Hand Tools — implements normally used by operating, maintenance and cleaning personnel such as a screwdriver, wrench, or mallet.



Splash contact surfaces — any surfaces other than food contact surfaces, which are subject to routine splash (wet or dry) spillage, and contamination during normal use.

SOP's — Standard Operating Procedures

SSOP's — Sanitation Standard Operating Procedures

3-A Sanitary Standards — provides accepted criteria to equipment manufacturers for sanitary design & fabrication and establishes guidelines for uniform evaluation and compliance by sanitarians. Available through 3-A Sanitary Standards Symbol Administrative Council, 1500 Second Avenue S.E., Suite 209, Cedar Rapids, Iowa 52403

Wash Down Duty — complies with NEMA Type 3R or NEMA Type 4, defined as

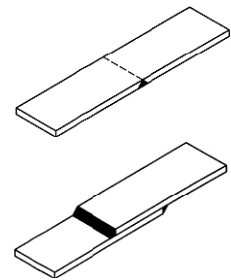
Type 3R — Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, and snow; and that will be undamaged by the external formation of ice on the enclosure.

Type 4 — Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water; and that will be undamaged by the external formation of ice on the enclosure. (From NEMA standards, see above)

Welds

Butt Welds — Two surfaces are placed side by side with ends joining and are continuously welded.

Overlap Welds — Two surfaces are placed one on top of the other and the ends welded to the other plate. This leaves a gap between the plates, which can allow microbes to enter. Or the plates will flex cracking the weld and allow moisture and organisms to enter.



Product Zone Welds — Continuously welded, smooth and free of cracks, pits and crevices. Refer to AWS sanitary weld standards.

Stitch or Spot Welds — Intermittent welds with intervening spaces between each weld on the same surface being welded.

UL™ — Underwriters Laboratories

USDA — United States Department of Agriculture



III. Instructions on Using the Checklist

The attached checklist should be used to evaluate all processing equipment under consideration for installation in any **Company** Facility, domestic or international. The questions are all worded so the correct answer is yes. If any of the checkpoints are answered in the negative, then a detailed explanation is required. If there is insufficient space on the form to explain, then please attach a separate sheet.

Please use a separate checklist for each system, type or piece of equipment under consideration including, but not limited to, conveyers, processing equipment, tanks, kettles, pumps, pipelines, and packaging equipment.

If any of the checkpoints do not apply, please mark, N/A and initial.

Please submit the completed checklist to _____

at _____

If there are any questions about the terms used, please refer to the attached definitions and illustrations.

Any other questions please call _____

at _____



IV. IFPA Sanitary Equipment Design Checklist

Type of Equipment _____
 Function _____
 Installation Location _____

Checklist Items	Yes	No	Explanation If No Attach Separate Sheet if Necessary	Initial
1. Do the food contact materials meet the FDA criteria for surfaces that are non-reactive, non-corrosive, non-contaminating, non-absorbent and cleanable?				
2. Is the equipment paint free?				
3. Are all welds in the food contact zone sanitary welds and the product zone free of overlap welds?				
4. Is the equipment free of stitch or spot welds?				
5. Is the equipment free of metal-to-metal moving parts?				
6. Is the product zone free of bolts, nuts, or other fasteners that may become loose and present a foreign object hazard?				
7. Are horizontal food contact/zone surfaces free of recessed fasteners (e.g. Allen heads, Phillips screw heads, etc.)?				
8. Are all nuts (cap, wing or other) mounted on the outside of the equipment?				
9. Are all exposed threads in product zones covered with sealed cap nuts?				
10. Are leg and framework supports either tubular (round) or square and turned 45 degrees to provide a diamond shape, where applicable?				
11. Are all tubular frame members sealed with no open holes?				
12. Are hidden crevices and open tubes sealed?				



Checklist Items	Yes	No	Explanation If No Attach Separate Sheet if Necessary	Initial
13. If there are any rolled edges on the equipment in product or splash zones, are they rolled so they do not exceed 180 degrees? (See Fig. #2)				
14. Is the equipment free of internal hidden ledges?				
15. Are the equipment legs designed so there are no areas for moisture or debris to collect? Are they easy to clean around?				
16. Is there adequate space (six inches minimum) between the floor and the body of the equipment for adequate cleaning? (Evaluate on a case-by-case basis.)				
17. Are all faceplates on gauges/sensors/sight glasses made from shatterproof material such as polycarbonate?				
18. Are all control panels mounted on support posts, framework or standoffs with space behind them (1-2 inches) for adequate cleaning?				
19. Do control boxes and other switch boxes have sloped tops?				
20. Are control boxes, switch boxes and other hinged doors free of piano hinges?				
21. Are all motors and gearboxes mounted out of the product zone?				
22. Are all motors, bearings and drive components mounted on easily cleaned supports?				
23. Are motors, drives, control boxes, and other sensitive pieces of equipment wash down duty?				
24. Are all bearings sealed or capped if inside the product zone?				
25. Are all bearings outside of product zone able to withstand cleaning/sanitizing procedures?				



Checklist Items	Yes	No	Explanation If No Attach Separate Sheet if Necessary	Initial
26. If any compressed air is used in product contact zones, is the line equipped with a coalescing filter and air filter at (99.99% efficiency at 0.2 microns) located downstream from pressure regulators or other potential contaminating devices?				
27. Are all carry and return rollers on conveyers solid rollers or slides rather than hollow tube rollers?				
28. Is the piping system free of dead legs greater than two pipe diameters?				
29. Have new stainless steel pipelines undergone passivation?				
30. Is there quick and easy access to all innermost parts of the equipment for cleaning and sanitation?				
31. Has the cleaning and sanitation procedure been defined?				
32. Can the equipment be dismantled and reassembled using simple hand tools?				
33. Are all gaskets, seals and fittings approved for food contact in the product zone?				
34. If the equipment has belts, can the belts be easily tracked, centered and adjusted?				
35. If the equipment has belts, are there quick releases or other access points to clean around the belt pulleys?				
36. If the equipment has belts, can belting material be adequately cleaned?				
37. Is the equipment compliant with current OSHA regulations?				
38. Is the equipment compliant with current federal, state and local regulations?				

Name of Reviewer (Print) _____

Date _____

Location _____

Signature _____

Title _____

Comments _____



V. Illustrations

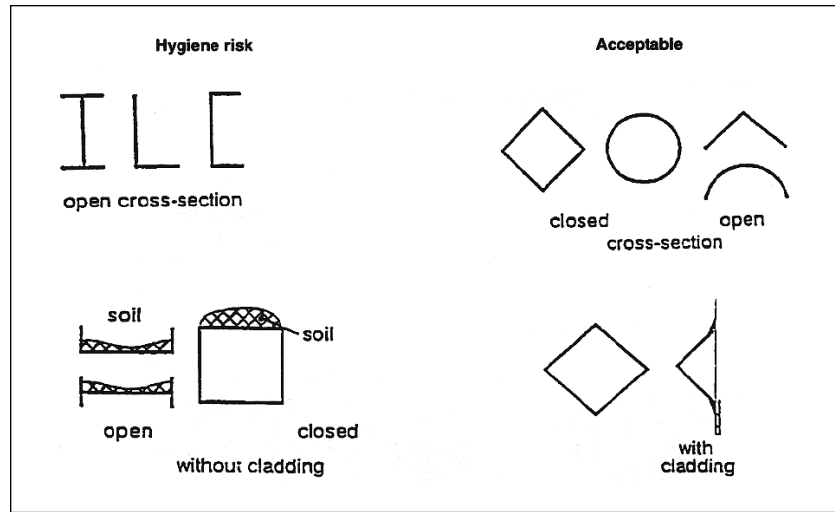


Figure 1. Framework (Supports): Illustration derived from *Hygiene requirements for the design of meat and poultry processing equipment*. NSF International Draft Standard/3-A Draft Standard NSF/3-A 14159-1-1999.

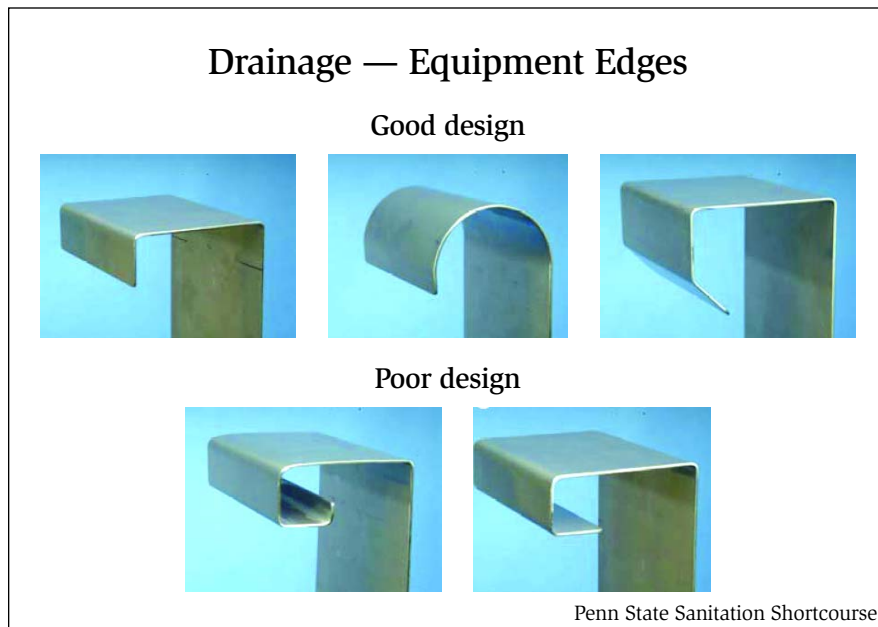


Figure 2. Rolled Edges: From Penn State Sanitation Short Course 2004. For additional information please contact Dr. Luke LaBorde at Ll15@psu.edu, Web site: foodsafety@cas.psu.edu.



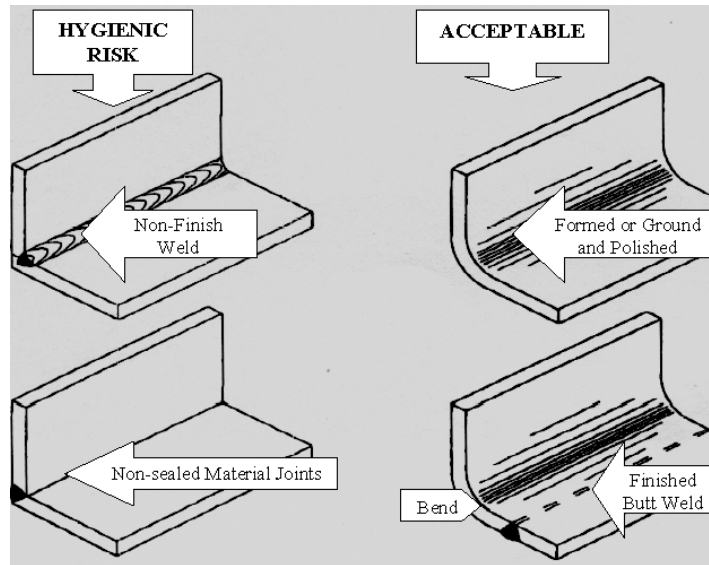


Figure 3. Internal Angles: Illustration derived from *Hygiene requirements for the design of meat and poultry processing equipment*. NSF International Draft Standard/3-A Draft Standard NSF/3-A 14159-1-1999.



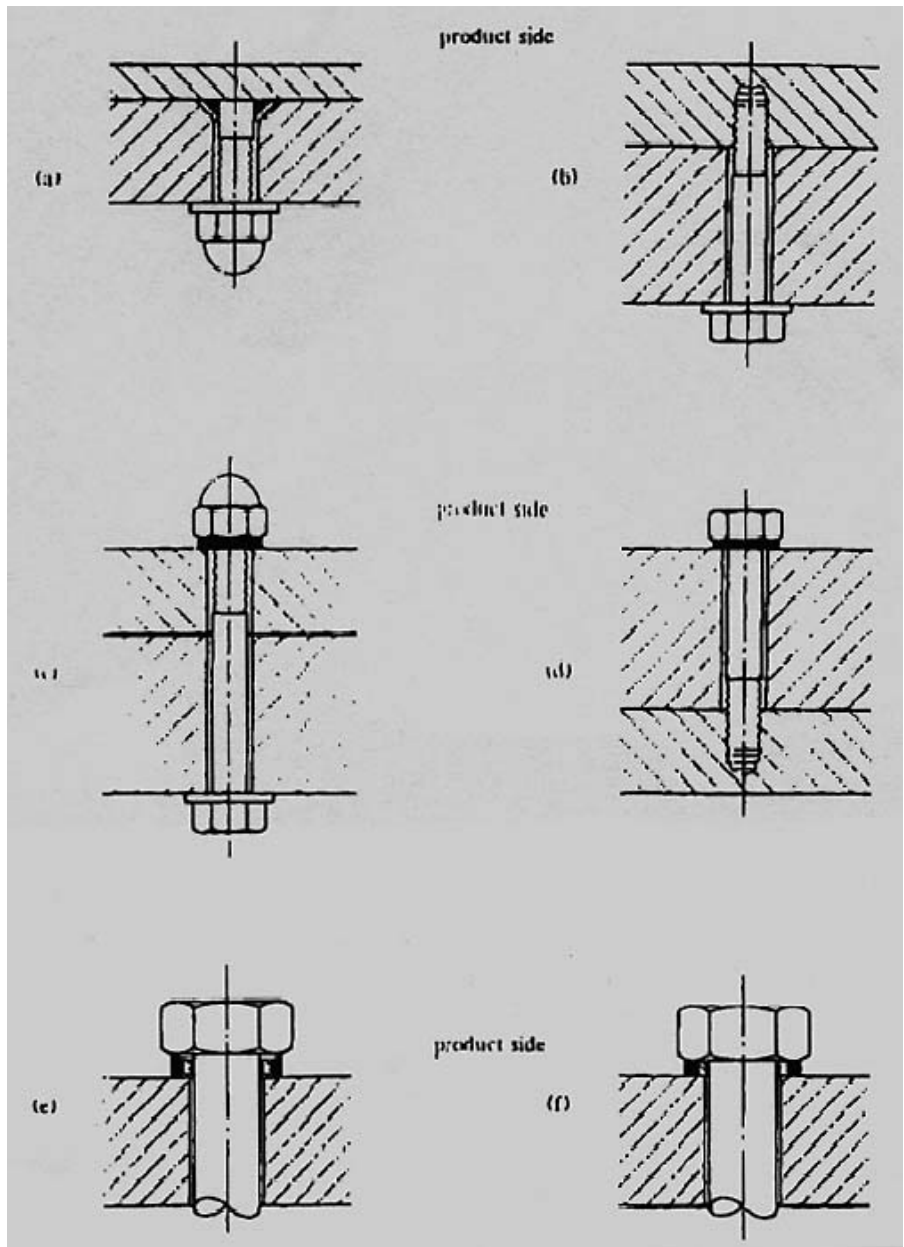


Figure 4. Hygienic Fasteners: Illustration derived from *Hygiene requirements for the design of meat and poultry processing equipment*. NSF International Draft Standard/3-A Draft Standard NSF/3-A 14159-1-1999.



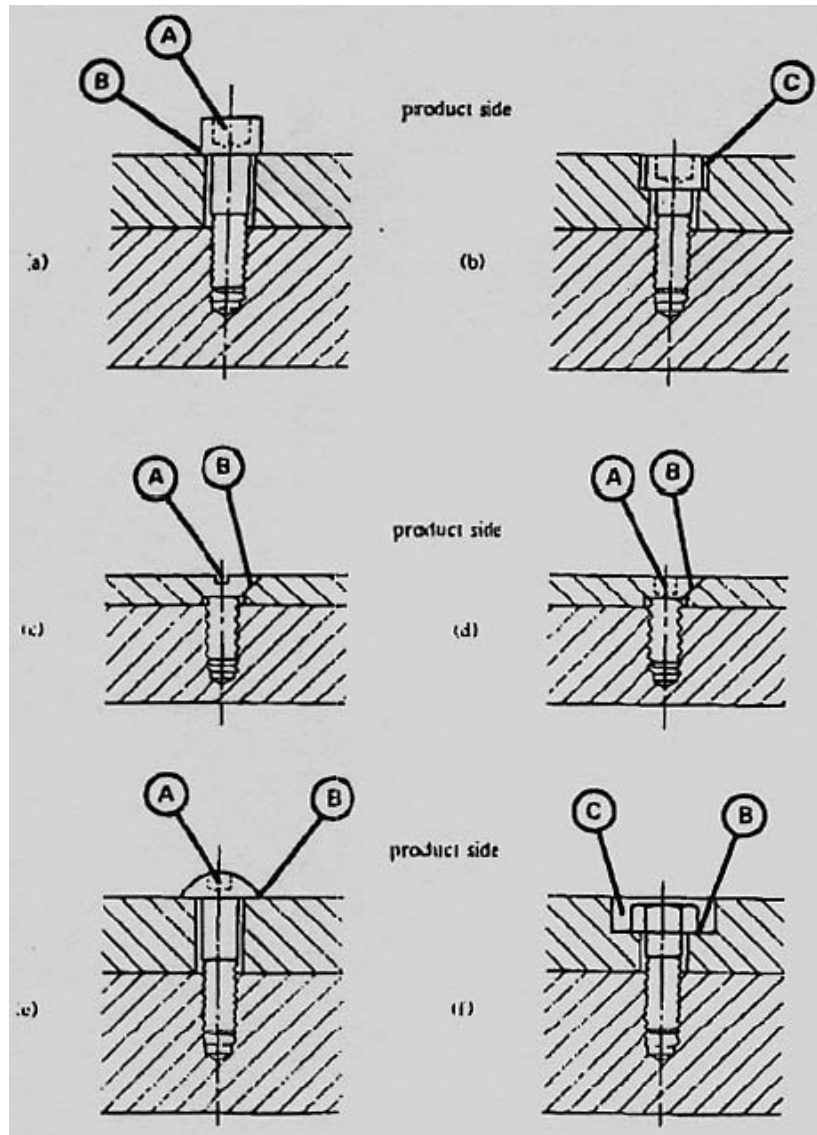


Figure 5. Non-Hygienic Fasteners: A = Soil Traps; B = Metal to Metal Contact; C = Dead Spaces. Illustration derived from *Hygiene requirements for the design of meat and poultry processing equipment*. NSF International Draft Standard/3-A Draft Standard NSF/3-A 14159-1-1999.



VI. Additional Sources of Information

NSF/3-A Standard 14159-1. *Hygienic Design and Construction Requirements for Meat and Poultry Processing Equipment.* Available from NSF International, 789 Dixboro Road, P.O. Box 130140, Ann Arbor, Michigan 48113-0140. Telephone: (734) 769-8010. Fax: (734) 769-0109. E-mail: info@nsf.org. Web: <http://www.nsf.org>.

USDA-FSIS Code of Federal Regulations (9 CFR), Parts 302-406.3 *Sanitation Performance Standards for Meat and Poultry Processing.*

AMI (American Meat Institute) — AMI Info Memo — Equipment Design Task Force (July 2002), *Ten Principles of Sanitary Design of Equipment for Meat Processing.*

Contact: AMI, 1700 North Moore St., Suite 1600, Arlington, VA 22209. Telephone: (703) 841-2400. Fax: (703) 527-0938. Web: <http://www.meatami.com>

3-A Sanitary Standards — provides accepted criteria to equipment manufacturers for sanitary design & fabrication and establishes guidelines for uniform evaluation and compliance by sanitarians. Available through the 3-A Sanitary Standards Symbol Administrative Council, 1500 Second Ave. S.E., Suite 209, Cedar Rapids, Iowa 52403

IEC — International Electrotechnical Commission, a standards organization dealing with electrical, electronic and related technologies. Many of its standards are developed jointly with the ISO and are required to be met by many European governing bodies. IEC Central Office, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland. Telephone: + 41 22 919 02 11. Fax: + 41 22 919 03 00. Web: <http://www.iec.ch/>.

