

ACCEPTABLE MEAT AND POULTRY EQUIPMENT GUIDELINES



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ACCEPTABLE MATERIALS

Equipment shall be constructed of materials that will not deteriorate from normal use under the anticipated environment. Therefore, equipment in meat and poultry plants must be constructed of materials that will withstand the generally humid operating environment and high pressure, hot water cleaning with strong chemical cleaning agents. In addition, equipment surfaces shall be smooth; corrosion and abrasion resistant; shatterproof; nontoxic; non-absorbent; and not capable of migrating into food product (staining).

EXEMPTED MATERIALS - The following materials are exempt from the requirement for coverage by a letter of guaranty when used in accordance with their specific exemption criteria.

Materials used on equipment currently listed in the "Accepted Meat and Poultry Equipment" publication. Those materials used on equipment already listed, which have been reviewed and found to be acceptable for their approved use, are exempt from coverage by a letter of guaranty. Any change in formulation, design, or use pattern voids this exemption.

The series 300 (18-8) stainless steel is acceptable for general use. Other series have been used for construction of meat and poultry equipment, but their use is limited because they tend to rust or discolor in certain applications. The abbreviation "S/S" is used throughout this publication to denote stainless steel construction.

Aluminum may pit and corrode when exposed to certain chemicals. When friction occurs between aluminum and meat or fat, a black oxide is produced which discolors the meat. Anodizing the aluminum does not eliminate this problem. Therefore, the use of aluminum is limited to applications where the metal does not contact the product or in which the product is suspended in water.

Surface coatings and platings may be used if the base material is non-toxic and rendered non-corrosive and the plating material is USDA acceptable. Chrome, nickel, tin, and zinc (galvanization) platings will generally be acceptable for most appropriate applications. USDA clearance of other plating materials and processes can be obtained by receiving a favorable opinion for the intended use from the FDA, Office of Premarket Approval, and then backing the material by a letter of guaranty. Surface coatings and platings must remain intact. If a surface coating or plating begins to peel or crack, the local FSIS inspector will disallow the use of the equipment.

Hardwood may be used for dry curing meat. In addition, solid (unlaminated) pieces of hardwood are acceptable as removable cutting boards provided the wood is maintained in a smooth, sound condition and is free from cracks. Hardwood cutting boards must be the shortest dimension which is practical [preferably not exceeding 3 or 4 feet (.91 or 1 .22m.)].

UNACCEPTABLE MATERIALS

Cadmium, antimony, and lead are toxic materials that cannot be used as materials of construction either as a plating or the plated base material. Lead, however, may be used in acceptable alloys in an amount not exceeding 5%.

Enamelware and porcelain are not acceptable for handling and processing food product.

Copper, bronze, and brass are not acceptable for direct product contact. These materials may be used in air and water lines or for gears and bushings outside the product zone. Brass is acceptable for potable water systems and direct contact with brine, but not for brine, or any solution, that is recirculated.

Leather and fabric are not acceptable materials.

DESIGN AND CONSTRUCTION

1. Equipment shall be designed so that all product contact surfaces can be readily and thoroughly cleaned with high temperature, high pressure water and caustic soap solution. Components such as electric motors, electric components, etc., which cannot be cleaned in this manner shall be completely enclosed and sealed.
2. All product contact surfaces shall be smooth and maintained free of pits, crevices, and scale.
3. The product zone shall be free of recesses; open seams; gaps; protruding ledges; inside threads; inside shoulders; bolts; rivets; and dead ends.
4. Bearings (including greaseless bearings) shall not be located in or above the product zone. In addition, bearings shall be constructed so that lubricants will not leak or drip or be forced into the product zone.
5. Internal corners or angles in the product zone shall have a smooth and continuous radius of one-fourth inch (16.35 mm.) or greater. (Lesser radii may be used for proper functioning of parts or to facilitate drainage provided these areas can be readily cleaned).
6. Equipment shall be self-draining or designed to be evacuated of water.
7. Framework of equipment (if not completely enclosed and sealed) shall be designed to use as few horizontal frame members as possible. Furthermore, these components shall be rounded or tubular construction. Angle is not acceptable except as motor supports.
8. Equipment shall be designed, constructed, and installed in a manner to protect personnel from safety hazards such as sharp edges; moving parts; electric shocks; excessive noise; and any other hazards. Safety guards shall be removable for cleaning and inspection purposes.
9. All welds, in both product and non-product contact areas, shall be smooth, continuous, even, and relatively flush with the adjacent surfaces.
10. Equipment shall not be painted on areas which are in or above the product zone.
11. External surfaces shall not have open seams, gaps, crevices, and inaccessible recesses.
12. Where parts must be retained by nuts or bolts, fixed studs with wing nuts shall be used instead of screws to a tapped hole.
13. Gasketing, packing materials, O-rings, etc., must be nontoxic, nonporous, nonabsorbent, and unaffected by food products and cleaning compounds.

INSTALLATION

Stationary equipment or equipment not easily moveable (i.e., no casters) shall be installed far enough from walls and support columns to allow thorough cleaning and inspection. In addition, there must be ample clearance between the floor and the ceiling. If these clearances are not possible, then equipment shall be sealed watertight to the surfaces. All wall mounted cabinets; electrical connections; and electronic components shall be at least one inch from the wall or sealed watertight to the wall.

Major pieces of equipment shall be shown on approved blueprints before installation. Drawings shall be submitted within 30 days of acceptance for equipment which is initially installed on an experimental basis.

WATER USAGE

1. Water wasting equipment - Water wasting equipment shall be installed so that waste water is delivered into the drainage system through an interrupted connection without flowing over the floor, or is discharged into a properly drained curbed area. Waste water from cooking tanks, soaking tanks, chilling tanks, and other large vessels may be discharged for short distances across the floor to a drain after operations have ceased and all product has been removed from the area.
2. Protection of water supply - An air gap shall be provided between the highest possible level of liquids in equipment and a directly connected water supply line(s). The air gap must be at least twice the diameter of the supply side orifice. If submerged lines are unavoidable due to design considerations, then the equipment must include a functional vacuum breaker which will, without fail, break the connection in the event of water pressure loss.
3. Re-circulation of water – Equipment which re-circulates water as part of its intended function shall be equipped with sanitary recirculating components if the water directly or indirectly contacts food product or the product contact surfaces. For examples, recirculating pumps shall be accepted for direct product contact and piping must be easily demountable with quick disconnect mechanisms at each change of direction.

MAGNETIC TRAPS AND METAL DETECTORS

The extensive exposure of some products to metal equipment such as grinders, choppers, mixers., shovels, etc., causes the possibility of metal contamination. Magnetic traps have been found effective in removing iron particles from chopped or semi-liquid products. However, these magnetic traps are not useful for removing nonmagnetic metals such as stainless steel or aluminum. Therefore, the use of electronic metal detectors is highly recommended for sausage emulsions, can filling lines (especially baby foods), etc. Metal detectors are usually installed so an alarm (either a bell or light or both) is activated when a metal fragment is in the detection zone. The production line should stop automatically when the detector is activated. Alternatively, some systems are arranged so that the portion of the product containing the metal contaminant(s) is automatically removed from the production line.

The Food Safety and Inspection Service does not currently regulate the use of metal detectors for normal production. The agency does encourage meat and poultry plant operators to voluntarily use metal detectors whenever possible. The Equipment Branch reviews and evaluates metal detectors using the same sanitary standards applied to other types of equipment.

The sensitivity and reliability of metal detectors varies depending on aperture size, type of food product, frequency and method of calibration, and numerous other variables. Since many of the involved factors are not related to the design of the unit itself, the Equipment Branch does not currently classify metal detectors. However, the following classification standard is offered on a voluntary basis.

Classification*	Spherical Diameter	Type of Metal
A	1/32 inch (.794 mm.)	316 stainless
B	1/16 inch (1.588 mm.)	316 stainless
C	1/8 inch (3.175 mm.)	316 stainless
D**	---	---

* To test a metal detector, a metal sphere of the size and type indicated (generally imbedded in an

acceptable, non-metallic material) is passed through the center of the aperture. The detector must detect in at least 9 of the 10 pass throughs to qualify for the applicable classification.

** The "D" classification identifies those detectors which are either not sensitive to the 1/8 inch (3.175 mm.) level or are installed in a manner that prevents testing in the described fashion.

CONVEYOR BELTS

Conveyor belts used in direct contact with food product must be moisture resistant and nonabsorbent. Cotton carcass belts must have the edges sealed with the same material as is used for the food contact surface. In addition, belting material must be chemically acceptable and covered by a letter of guaranty. Conveyors with trough like sides and bed should have a quick belt tension release device to allow cleaning under the belt.

JET-VACUUM EQUIPMENT

Equipment used for cleaning jars or cans shall have safety devices to indicate malfunction of either jet or vacuum elements. If necessary, vents to the outside shall be provided to control exhaust currents and to prevent dust and/or paper particles from being blown back into cleaned containers.

HOSES

Hoses used for product contact shall be accepted by the Equipment Branch. The hose material must be installed in a manner which allows for inspection of the interior surface. Sanitary connectors can be installed at appropriate intervals to allow breakdown for visual inspection or use of inspection devices, such as, boroscopes.

Hoses without sanitary connectors are acceptable for steam and water lines where breakdown for cleaning and inspection is not necessary. However, hoses used for re-circulating water into and out of product contact areas must satisfy the requirement for product contact hoses.

PICKLE LINE

Pickle lines shall be either stainless steel or some other USDA acceptable material. If re-circulated, pickle shall be filtered and re-circulated through a system that can be disassembled to the extent necessary for thorough cleaning and inspection.

SMOKEHOUSES, OVENS

Smokehouses or ovens must be designed for easy cleaning and inspection of all inner and outer surfaces. Ducts shall be designed to be easily disassembled to the extent necessary for thorough cleaning and inspection. Spray heads for dispensing liquid smoke must be mounted below the level of the rails and trolleys. If liquid smoke is to be recirculated, the pump and pipelines must be of sanitary type construction. Liquid smoke cannot be recirculated if product is on rack trucks.

SCREENS AND FILTERS

Screens and straining devices shall be readily removable for cleaning and inspection and shall be

designed to prevent incorrect installation. Permanent screens shall be constructed of non-corrosive metals. Synthetic filter materials shall be USDA acceptable. Filters intended for direct product contact must be covered by a letter or guaranty. Filter paper shall be single service. Filter cloths shall be washable. Asbestos is not acceptable for use as filtering material or for any other purpose.

VENT STACKS FROM HOODS

Vent stacks from covered cooking vats or hoods over cook tanks and CO₂ equipment should be arranged or constructed so as to prevent drainage of condensate back into the product zone.

ULTRAVIOLET (UV) LAMPS

Ultraviolet lamps which generate ozone are restricted for use as described under Ozone Producing Equipment. UV lamps which do not produce ozone may be used in any area provided shields are used to prevent exposure of inspectors to direct or reflected UV rays. Otherwise, rooms where unshielded UV lights are used shall be equipped with switches at all entry points so the units may be turned off before inspectors enter. These switches shall be identified with suitable placards such as, "Ultraviolet Lights". Inspectors shall not enter areas where unshielded UV lights are burning because of possible damage to skin and eyes.

HEAT EXCHANGERS

Heat exchangers may be used to heat or cool product. Heat exchangers may also be used to heat or cool gasses or liquids which directly contact product. However, extreme caution shall be exercised to prevent contamination. Inspectors and plant personnel shall be alert to the following conditions and requirements.

1. Only heat exchanger media authorized by the Compounds and Packaging Branch (see def.) can be used for applications involving food product. Common materials such as brine or ammonia need not be submitted for review. Under no circumstances can toxic materials be used.
2. Heat exchangers shall be routinely pressure tested to ensure that pinholes, hairline cracks, loose fittings, or other similar defects are not present. Presence of off-color, off-odor, and/or off-flavor may indicate leakage. Frequent depletion of heat exchange media may also indicate leakage.
3. Pressure on the product side shall be higher than the media side.

INPLANT TRUCKS

Trucks used to transport product within the plant should be constructed of stainless steel. However, galvanized metal is acceptable provided it is maintained in a good state of repair and is regalvanized when necessary. Trucks should be free of cracks and rough seams. Metal wheels should be avoided as they cause deterioration of the floor surfaces. All trucks should have some means of affixing a tag. This can be accomplished by drilling two holes approximately 1 inch (25.4 mm.) apart in the lip of the truck to accommodate string or wire.

AIR COMPRESSORS

Compressed air may be used to directly contact product and/or product contact surfaces provided the air

is filtered before entering a compressor and it is clean and free of moisture, oil, or other foreign material when contacting product or product contact surfaces. Lubricants and coolants directly contacting air shall be authorized by the Compounds and Packaging Branch (see def.).

Compressed air storage tanks shall have a drain. Water and oil traps must be located between storage tanks and the point of use. Spent air must be exhausted in a manner to prevent product contamination.

Air directly contacting product or product contact surfaces shall be filtered as near the air outlet as feasible. Filters shall be readily removable for cleaning or replacement and shall be capable of filtering our 50 micron particles (measured in the longest dimension). Air intake on votators shall also be filtered.

PRODUCT RECONDITIONING EQUIPMENT (for meat)

Product which is accidentally soiled may be cleaned on a separate, conveniently located wash table or sink. This wash station shall be properly equipped with sprays and a removable, perforated plate to hold product off the bottom. The station shall be identified as a "product wash station" and cannot be used for hand or implement washing.

ELECTRIC CORDS

Accepting the use of electric cords shall be based on both sanitary and safety considerations. Drop cords suspended from the ceiling may be retractable and used to connect portable equipment on an as needed basis if the cords are properly wired to the power source. Electric cords shall not be strung across the floor even on a temporary basis.

ELECTRIC INSECT TRAPS

Electric insect traps may be used in edible product handling and storage areas provided the following conditions are met.

1. The equipment shall be made of acceptable non-corrosive materials.
2. The traps must not be placed above uncovered product or above uncovered product traffic ways.
3. The electrified components are either apparent or properly identified; insulated from non-electrified components; and covered with a protective grille to prevent electric shock hazard.
4. The equipment shall have a removable shelf or drawer which collects all trapped insects.
5. The equipment is designed and constructed so that all dead insects are trapped in the removable shelf or drawer. (Insects must not collect on the protective grille).

Removable drawers or shelves shall be emptied as often as necessary. If the drawer or shelf becomes full of dead insects, then the fourth requirement above cannot be met so the equipment shall be rejected for use. Dead insects must be removed from the unit before they create an odor problem. They cannot be left in the unit as "bait".

INEDIBLE PRODUCT EQUIPMENT

Containers for handling and transporting inedible products shall be watertight; maintained in a good state of repair (no rust or corrosion); and clearly marked with an appropriate identification. All inedible product containers in the plant shall be uniformly identified. Inedible product containers shall be cleaned before being moved into an edible products department.

Metal barrels, tanks, or trucks may be used for holding inedible poultry products in specially designated inedible product rooms. Alternatively, the containers may be stored outside the building provided the storage area is paved, drained, and conveniently located. These storage areas shall also be equipped with nearby hose connections for cleanup.

BAND-TYPE CARCASS SPLITTING SAWS

Wasted flush water must not be allowed to contact carcasses, operators, or surrounding equipment. Accepted band-type saws include drain hoses designed to contain and divert wasted flush water to a convenient drain without having the water flow across the floor. The following guidance is provided on the basic conditions which normally must be met to assure sanitary use of band-type splitting saws:

1. As currently designed and constructed, band-type saws are not acceptable for use prior to viscera inspection. Until a determination based on the viscera inspection can be made and the affected carcass is suitably identified, each carcass is presumed to be potentially suspect. Consequently, splitting saws would require sanitization between each carcass. This is an unrealistic condition of use given the current design.
2. If used following viscera inspection, band-type saws need only be sanitized after splitting carcasses which have been marked or tagged for further inspection or when abscesses or other hidden disease conditions or contamination are cut into during splitting.
3. A suitable area and accessory equipment (such as sterilizing tanks, racks, etc.) must be available for sanitizing the band-type splitting saws. A sanitization method is not acceptable unless all bone dust and other debris is removed from the housing PRIOR to the exposure of the saw blade to 180 degree F. (82.2 degree C.) water. In addition, the blade must be exposed to the 180 degree F. (82.2 degree C.) water for a minimum of eight seconds.

PIPING SYSTEMS

Piping systems used to convey edible product (including pickle solutions) shall be readily disassembled for cleaning and inspection. Pumps, valves, and other such components shall comply with the sanitary requirements for USDA acceptable. Piping systems must be designed so that product flow will be smooth and continuous i.e., no traps or dead ends. Pipes must be either 300 series stainless steel or a USDA acceptable plastic.

Clear demountable rigid plastic piping may be used for two way flow provided it is chemically and functionally acceptable. Opaque plastic piping may be used for one way purposes only.

The above requirements apply to systems for conveying raw fat and to re-circulate cooking and frying oils. Black iron pipes with threaded or welded joints are acceptable for conveying completely finished, rendered fats. Continuous rendering is not considered complete until after the final centrifuge.

DEFINITIONS

Accessible: Easily exposed for regular cleaning and inspecting with simple tools such as those normally carried by cleaning personnel.

Readily accessible: Easily exposed to sight and touch for regular cleaning and inspecting without the use of tools.

Removable: A component part can be separated from the principal part with simple tools such as a screwdriver, pliers, or open-end wrench.

Readily cleanable: The equipment can be cleaned with hot water, cleaning agents, and scrubbing implements normally used by cleaning personnel.

Corrosion resistant material: A material which maintains its original surface characteristics under prolonged exposure to the normal environment including product, ingredients, ambient conditions, and cleaning and sanitizing materials.

Acceptable materials: For direct product contact, materials must be covered by a letter of guaranty (see Chemical Acceptability section in this publication). For incidental product contact they need not be formulated in strict compliance with FDA regulations. However, they may not contain any unacceptable materials (see page 8) including heavy metals or other materials classified as toxic or hazardous substances. Both direct and incidental product contact materials must be found to be physically suitable for the purpose intended.

Unacceptable materials: Preparations containing antimony, arsenic, cadmium, lead, mercury, selenium, or other materials such as carcinogens, mutagens, and teratogens classified as hazardous substances may not be used for any purpose anywhere within a plant. Lead, however, may be used in acceptable alloys in an amount not exceeding 5%.

Authorized Compounds: Products listed in the "List of Proprietary Substances and Nonfood Compounds" which have been reviewed and found chemically acceptable for the intended use in a Federally Inspected Meat and Poultry Plant. Examples include heat exchanger media, lubricants, coolants and other nondurable or replenishable supplies.

Sealed: Having no openings that permit the entry of product, dirt, or moisture.

Product zone: All surfaces of the equipment which may normally be directly or indirectly exposed to product or ingredients.