

FINAL
RECOMMENDED SHIPBUILDING CONSTRUCTION GUIDELINES FOR
CRUISE VESSELS DESTINED TO CALL ON U.S. PORTS

THE VESSEL SANITATION PROGRAM
NATIONAL CENTER FOR ENVIRONMENTAL HEALTH
CENTERS FOR DISEASE CONTROL AND PREVENTION
U.S. PUBLIC HEALTH SERVICE

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Use of trade names is for identification purposes only and does not constitute endorsement by the U.S. Department of Health and Human Services, or the Centers for Disease Control and Prevention.

**Final Recommended Shipbuilding Construction Guidelines for Cruise Vessels
Destined To Call on U.S. Ports**

I. BACKGROUND

As a result of several major disease outbreaks on cruise vessels, the Centers for Disease Control and Prevention (CDC) established the Vessel Sanitation Program (VSP) in 1975, as a cooperative activity with the cruise ship industry. This program assists the cruise ship industry in fulfilling its responsibility for developing and implementing comprehensive sanitation programs to protect the health of the traveling public. The VSP fosters cooperation between government and industry in order to define and reduce health risks associated with cruise ships and to ensure a healthful and clean environment for ships' passengers and crew. Every vessel that has a foreign itinerary and that carries thirteen (13) or more passengers is subject to twice-yearly inspections and, when necessary, re-inspection by VSP personnel. It should be noted that VSP operations are supported entirely by user fees.

The VSP also provides construction plan reviews for "new buildings" and "major retrofits," and on-site construction reviews when VSP determines it is necessary. Construction reviews are normally conducted when a ship is near completion or when it first enters a U.S. port. As a public health agency, CDC places a high value on this service, especially as it relates to the prevention of illness aboard cruise ships. Shipbuilders pay the costs and expenses of VSP staff traveling to shipyards to conduct on-site construction reviews.

The primary objective of this document is to provide a framework for consistency in the sanitary design, construction, and construction inspections of cruise ships. CDC is committed to promoting the highest construction standards for public health related areas and believes compliance with these construction guidelines will help ensure a healthful environment on cruise ships. In developing this document CDC reviewed several standards, regulations, and criteria from a variety of sources for general guidance. These sources are listed under Acknowledgments part B.

New cruise ships must comply with all international code requirements (e.g., International Maritime Organization (IMO) Conventions, including the Safety of Life at Sea Convention (SOLAS), the International Convention for the Prevention of Pollution from Ships (MARPOL), the Tonnage and Load Line Convention, International Electric Code (IEC), International Standards Organization (ISO)). This document does not cross reference related, and sometimes overlapping, standards that new cruise ships must meet.

Construction guidelines are provided for various components of the ship's facilities that relate to public

health such as food service and water. CDC also believes that ship owners and operators should have the option of selecting the type of equipment that meets their individual needs. They should keep in mind, however, that the equipment chosen must be maintained over time to meet the VSP routine inspection criteria.

It is not CDC's intention to limit the introduction of new technology or new designs for shipbuilding. A shipbuilder, owner, manufacturer, or other interested party may request VSP to review a construction guideline based on new technologies, concepts and/or methods. VSP will review the request and respond in writing as to the functional merit of the proposed changes.

The CDC *Recommended Shipbuilding Construction Guidelines for Passenger Vessels Destined to Call on U.S. Ports* will apply to all new buildings (i.e., ships) in which the keel is laid after February 1, 1997. The construction guidelines will also apply to major retrofits planned after February 1, 1997. A major retrofit is defined as any change in the structural elements of the ship (e.g., galleys, pantries, dining rooms, water treatment systems, plumbing systems, waste management systems, pools, spas). These guidelines will not apply to minor retrofits. Minor retrofits are small changes like equipment replacement, installation or removal of single-use equipment (e.g., refrigerator units, bains-marie units), or single pipe runs.

CDC recognizes that the shipbuilding and cruise industries are constantly evolving and that these guidelines may require periodic revision. Our intent is to periodically ask ICCL and other knowledgeable parties to meet with us to review the guidelines and determine whether changes are necessary to keep up with the innovations in the industry.

II. GENERAL DEFINITIONS

Accessible -- Capable of being exposed for cleaning and inspection with the use of simple tools such as a screwdriver, pliers, or an open end wrench.

Air-break -- A piping arrangement in which a drain from a fixture, appliance, or device discharges indirectly into another fixture, receptacle, or interceptor at a point below the flood-level rim (Figure 1).

Air gap -- The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to



Figure 1

a tank, plumbing fixture, or other device and the flood-level rim of the receptacle or receiving fixture. The air gap must be at least twice the diameter of the supply pipe or faucet (Figure 2).

Backflow -- The flow of water or other liquids, mixtures, or substances into the distribution pipes of a potable supply of water from any source or sources other than the potable water supply. Back-siphonage is one form of backflow.

Backflow, check, or nonreturn valve -- A mechanical device installed in a waste line to prevent the reversal of flow under conditions of back pressure. In the check-valve type, the flap should swing into a recess when the line is flowing full, to preclude obstructing the flow.

Backflow preventer -- An approved backflow-prevention plumbing device that must be used on potable water distribution lines where there is a direct connection or a potential connection between the potable water distribution system and other liquids, mixtures or substances from any source other than the potable water supply. Some devices are designed for use under continuous water pressure, while others are nonpressure types. To ensure proper protection of the water supply, a thorough review of the water system should be made to confirm that the appropriate device is selected for each specific application. The following lists general types and uses:



Figure 2

Atmospheric vacuum breaker -- An approved backflow prevention plumbing device utilized on potable water lines where shut-off valves do not exist downstream from the device. The device is not approved for use when installed in a manner such that it will be under continuous water pressure. An atmospheric vacuum breaker must be installed at least 6 inches above the flood level rim of the fixture or container to which it is supplying water.

Hose bib connection vacuum breaker -- An approved backflow prevention plumbing device that attaches directly to a hose bib via a threaded head. This device utilizes a single check valve and vacuum-breaker vent. It is not approved for use under continuous pressure, for example, when a shut-off valve is located downstream from the device.

Continuous pressure backflow preventer -- An approved backflow prevention plumbing device that is designed and approved for use under continuous water pressure, for example, when

shut-off valves or other restrictions such as filters are located downstream from the device.

Back-siphonage -- The flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel or other source into a water supply pipe as a result of negative pressure in the pipe.

Corrosion-resistant -- Capable of maintaining original surface characteristics under prolonged influence of the use environment, including the expected food contact and the normal use of cleaning compounds and sanitizing (bactericidal) solutions.

Coved -- Having a concave surface or molding that eliminates the usual angles of ninety degrees or less

Cross-connection -- Any physical connection between two otherwise separate piping systems that allows a flow from one system to the other. These cross-connections are particularly important when one of the piping systems carries potable water.

Easily cleanable -- Readily accessible and fabricated with a material, finish, and design that allows for cleaning by normal methods.

Food contact surfaces -- Surfaces of equipment and utensils with which food normally comes in contact, and surfaces from which food may drain, drip, or splash back onto surfaces normally in contact with food.

Food handling areas -- Any area where food is stored, processed, prepared, transported, or served.

Food preparation areas -- Any area where food is processed, cooked, or prepared for service.

Food service areas -- Any area where food is presented to passengers or ship personnel.

Food storage areas -- Any area where food or food products are stored.

Food transport areas -- Any area through which unprepared or prepared food is transported during food preparation, storage and service operations.

Nonfood contact surfaces -- All exposed surfaces, other than food contact or splash contact surfaces, of equipment located in food storage, preparation, and service areas.

Nonpotable fresh water - Fresh water intended for use in technical and other areas where potable water is not required, e.g., laundries, the engine room, toilets, waste treatment areas, and for washing decks in areas other than the ship's hospital, food service, preparation and storage areas.

Potable water (PW) -- Fresh water intended for drinking, washing, bathing, or showering; for use in the ship's hospital; for handling, preparing, or cooking food; and for cleaning food storage and preparation areas, utensils, and equipment. Potable water must meet the *International Standards for Drinking Water*, especially the bacteriological, chemical, and physical requirements.

Potable water tanks -- All tanks into which potable water is bunkered for distribution and used as potable water.

Readily accessible -- Exposed or capable of being exposed for cleaning or inspection without the use of tools.

Readily (or easily) removable -- Capable of being detached from the main unit without the use of tools.

Removable -- Capable of being detached from the main unit with the use of simple tools such as a screwdriver, pliers, or an open end wrench.

Sealant -- Material approved by the National Sanitation Foundation, the United States Department of Agriculture (USDA), or the Food and Drug Administration (FDA) for the filling in of seams 1/32-inch (0.8 mm) or less.

Sealed -- Having no openings that will permit the entry of soil or seepage of liquids.

Sealed Seam -- A seam having no openings that will permit the entry of soil or liquid seepage.

Seam -- An open juncture between two similar or dissimilar materials. Continuously welded junctures, ground and polished smooth, are not considered seams.

Sewage -- Any liquid waste containing animal or vegetable matter in suspension or solution, including liquids containing chemicals in solution.

Smooth -- A surface, free of pits and inclusions, having a cleanability equal to a No. 3 finish (100 grit) on stainless steel.

Splash contact surfaces -- Surfaces that are subject to routine splash, spillage, or other soiling during normal use.

Direct splash surfaces -- Areas adjacent to food contact surfaces that are subject to splash, drainage, or drippage onto food contact surfaces.

Indirect splash surfaces -- Areas adjacent to food contact surfaces that are subject to splash, drainage, drippage, condensation, or spillage from food preparation and storage.

III. GENERAL FACILITIES REQUIREMENTS

A. Sizing

Sizing and flow, whenever possible, are determined during the plan review process. The adequacy of size and the appropriateness of the flow are dependent on numerous factors, e.g., ship's total size, the number of passengers and crew, and the ship's itinerary. In general, food storage, preparation, and service areas; dish washing areas; and waste management areas must be of adequate size to accommodate the number of passengers being served, the type of menu, and the type of operations. Food storage areas (frozen, dry, and refrigerated) must be designed to meet maximum expected itineraries allowing for scheduled re-provisioning. Adequate cold and hot storage, including temporary storage, must be available for each type of service and for foods being transported to service areas remote from the galley.

B. Flow

Functions and work stations must be arranged in a logical sequence which minimizes cross-traffic, backtracking, and allows for adequate separation of clean and soiled operations. An orderly flow of food from the purveyor through the storage, processing, and preparation areas to the service areas, and finally to the waste management area must be provided. The goal is smooth, rapid production and service, conducted in accordance with strict temperature control requirements, and a minimum expenditure of worker time and energy and food handling. Flow patterns are discussed during the plan review process.

C. Equipment/Devices

1. The following is a list of equipment required in galleys and lido food service areas:
 - i. Drinking fountains.
 - ii. Blast chillers are to be incorporated into the design of each crew and passenger galley. Two or more units may be required depending on the size of the vessel, their intended application, and the distances between the chillers and the storage and service areas.
 - iii. Food preparation sinks are to be located in as many areas as necessary, i.e., in all meat, fish, and vegetable preparation rooms, cold pantries or garde mangers, and in any other areas where washing or soaking of food is conducted. An automatic vegetable washing machine may replace food preparation sinks in

vegetable preparation rooms.

- iv. Storage cabinets, shelves, and/or racks are to be provided for food products, condiments, and equipment in preparation areas, beverage container storage rooms, and bar storage rooms.
 - v. Portable tables, carts, or pallets are needed in areas where food is dispensed from cooking equipment, such as soup kettles, steamers, braising pans, and tilting skillets. They are also needed for ice bins.
 - vi. Easily cleanable knife lockers that meet food contact standards are to be provided.
 - vii. Storage areas, cabinets, or shelves are to be provided for waiter trays .
 - viii. Dishware lowerators or similar dish storage and dispensing cabinets are to be provided.
2. Bakeries, pot wash stations, and other heavy use areas shall have a prewash station (including overhead spray) or a four-compartment sink with an insert pan and an overhead spray. In addition, the main pot washing station(s) should have an automatic washing machine designed to handle the largest piece of equipment for that area. Automatic washing machines can be substituted for three-compartment sinks with separate prewash stations provided they are sized to the equipment being washed and have a prewash area with a sink. A single-door pass through ware washing machine is preferable to an undercounter model.
 3. All preparation areas shall have easy access to a three-compartment utensil washing sink or a ware washing machine equipped with a dump sink and a prewash hose.
 4. Soup stations and other bulk cooking stations shall have portable or stationary stands for removal of cooked product and a storage location or rack for large items such as ladles, paddles, whisks, and spatulas.
 5. Bulk milk and juice stations and other beverage dispensing equipment shall have readily removable drain pans. Coffee, water, and ice dispensing equipment may have built-in drains in the tabletop.
 6. Storage areas must be provided for all equipment and utensils, such as ladles and cutting blades used in food preparation areas (e.g., vegetable preparation, bakery, and cold pantry areas).

7. All installed equipment requiring a drain must be designed so that food and wash water drainage flows into a container, floor drain scupper, or floor sink, rather than directly onto a deck.
8. Top openings and rims of food cold tops, bains-maries, ice wells and other food and ice holding units must be protected by a raised rim of at least 3/16 inch (4.8 mm) flanged upward above the level that liquids may accumulate.

D. **Equipment Surfaces**

1. All food contact surfaces shall consist of materials that are appropriate for food contact and shall be: smooth; easily cleanable and maintainable; provided with coved corners; and preferably seamless. External corners and angles shall be formed with sufficient radii to permit proper drainage and exhibit no sharp edges. Seams sealed with approved sealant may be utilized in limited application when practical function and/or design requires. Questions as to the applicability of the limited use of sealed seams may be directed to the VSP.
2. Splash contact surfaces shall consist of materials that are appropriate for food contact and shall have smooth, easily cleanable surfaces exhibiting no sharp edges.
3. Nonfood contact surfaces shall be durable and non-corroding. Exposed surfaces shall be smooth and easily cleanable. Floor material shall be non-skid and non-absorbent.
4. In general, all food contact, splash contact and nonfood contact surfaces shall be smooth, durable, and noncorroding. Surfaces shall be designed to preclude unnecessary edges, projections or crevices and shall be readily accessible.

E. **Bulkheads, Deckheads, and Decks**

1. Bulkhead and deckhead construction precludes the use of exposed fasteners. All seams between adjoining panels that are more than 1/32" (0.8 mm) shall be covered with profile strips.
2. All bulkheads shall be sufficiently reinforced to prevent panels from buckling or becoming detached under operating conditions.
3. Door penetrations shall be completely welded indentations and not open voids. Locking pins shall be inserted into inverted nipples. This also applies to the

penetrations around fire doors, in the thresholds, and in bulkhead openings.

4. Coving of at least a $\frac{1}{4}$ -inch (9.5 mm) radius shall be provided where decks and bulkheads interface, and at the juncture between decks and equipment foundations. Stainless steel coving, if applied, shall be of sufficient thickness so as to be durable and be adequately secured.

F. Floor Drains and Scuppers

1. Floor drains, scuppers, and sink covers shall be of stainless steel, or other approved material which meets the requirements of a smooth, easy to clean surface, strong enough to maintain its original shape, and exhibit no sharp edges. They should be tight fitting, removable for cleaning, and uniform in length (e.g., 3 feet or 1 meter) so they are interchangeable.
2. Floor drains, scuppers, and sinks shall be sized to eliminate spillage from overflow to adjacent deck surfaces, and they should be located in nontraffic spaces, such as in front of soup kettles, boilers, tilting pans, and braising pans.
3. Floor scupper channels shall be of stainless steel, with smooth finished surfaces, and be sized to preclude ponding and spillage.
4. Deck scupper drain lines should be a minimum of 2 ½-inches (6.4 cm) in diameter and sloped to the collecting drain. Cross-drain connections should be provided to preclude ponding and spillage from the gutter when the ship is listing.
5. Ramps over thresholds shall be easily removable or sealed in place, sloped for easy roll-in and roll-out of trolleys, and be strong enough to maintain their shape. Ramps over scupper covers can be constructed as an integral part of the gutter system provided they are cleanable and durable.
6. If deck drains are provided in walk-in refrigerators and freezers, they shall have air breaks or air gaps in the drain lines below the deck level in which the rooms are located.

IV. GENERAL HYGIENE FACILITIES

A. Hand-Washing Facilities

1. Ensure that hand washing facilities are constructed of stainless steel and provide hot and cold running water from a single mixing faucet.
2. Ensure that hand washing facilities include a suitable soap dispenser, a paper towel dispenser, a corrosion-resistant waste receptacle, and splash panels where necessary to protect adjoining equipment. It is recommended that a waste receptacle be attached to the bulkhead and be readily removable for cleaning.
3. Provide a hot and cold water supply complete with faucet and mixing valve below the hand washing sink for the filling of cleaning buckets.
4. Install hand washing sinks throughout the food service, preparation, and ware washing areas in such a manner that no food handler has to walk more than 25-feet (7.6 m) to reach a station.
5. Install a sufficient number of hand washing sinks at the soiled dish drop-off area in the main galley to allow adequate turn around time for individuals bringing soiled dishware back from the dining rooms or other food service areas.
6. Install foot pedals, knee pedals, elephant ears, or electronic sensors on hand washing facilities in food service areas.
7. Install permanent signs in English indicating that hand washing is required.

B. Toilet Facilities

1. Install toilet facilities in close proximity to the contiguous work area, including all galley and lido food service areas.
2. Ensure that the toilet room is well ventilated and equipped with a Hand washing station. Install permanent signs in English indicating that hand washing is required.
3. Ensure that the door to the toilet room is self-closing.
4. Ensure that the decks are constructed of hard, durable tile and are coved to provide at least a **d**-inch (9.5 mm) radius.
5. Ensure that deckheads and bulkheads are easily cleanable.

6. Provide toilet facilities and diaper changing stations with a covered waste receptacle inside all child care or child activity areas (where children are separated from their parent or guardian). These facilities are to be located in a way that does not require children or providers to exit the immediate care area.

C. **Child Care Facilities**

1. Child care facilities and children's play areas shall be provided with child-size toilets and hand washing facilities that are easily accessible to children.
2. Separate toilet and hand washing facilities shall be provided for child care workers.
3. Hand washing sinks shall be accessible without barriers, such as doors, to each Child care area.
4. If diaper changing facilities are provided, hand washing sinks should be provided adjacent to diaper changing tables.
5. Diaper changing tables shall be easily cleanable and constructed of nonabsorbent materials.
6. Durable, easily cleanable waste containers with tight fitting lids for disposing of soiled diapers should be provided for each diaper changing table.
7. Contamination of hands, toys, and equipment in child play areas has appeared to play a role in the transmission of diseases in child care settings. The provision of toys and equipment that are easy to clean and sanitize must be considered.

V. **EQUIPMENT MOUNTING AND PLACEMENT**

- A. Permanently installed equipment may be sealed to the bulkhead and/or to adjacent equipment. For permanently installed equipment that is not sealed to bulkheads and adjacent equipment, spacing shall be based on the following to allow accessibility for cleaning. These guidelines do not apply to open racks or other equipment of open design.

1. For single pieces of equipment less than 2-feet long (0.61 m), provide at least 6-inches (15.2 cm) of clear unobstructed space between adjacent equipment and between the equipment and bulkheads.

2. For pieces of equipment more than 2-feet long (0.61 m) but less than 4-feet long (1.22 m), provide at least 8-inches (20.3 cm) of clear unobstructed space between adjacent equipment and between the equipment and bulkheads.

 3. For pieces of equipment more than 4-feet long (1.22 m) but less than 6-feet long (1.83 m), provide at least 12-inches (30.5 cm) of clear unobstructed space between adjacent equipment and between the equipment and bulkheads. This specification does not apply to open racks or open designs.

 4. For pieces of equipment more than 6-feet long (1.83 m), provide at least 18-inches (46 cm) of clear unobstructed space between adjacent equipment and between the equipment and bulkheads.
- B. All equipment that is not classified as portable shall be fixed by continuous welding to stainless steel pads or plates on the deck. The stainless steel welding shall have smooth edges, rounded corners, and no gaps. Equipment may also be attached as an integral part of the deck surface by the use of glue, epoxy, or other durable, adhesive product provided the arrangement is smooth and easily cleanable. Equipment that locks in place shall be constructed to be free of gaps and crevices and be easily cleanable.
- C. Elevate all deck-mounted equipment on legs that extend at least 6-inches (15.2 cm) above the finished deck. Seal the equipment to the deck as noted in V.B. above. (Note: There

are pieces of equipment such as pulpers and dish washing machines that have pipelines, motors, and cables underneath for which the 6-inch clearance from the deck may not be practical. Exceptions may be granted if there is no barrier to cleanab

ility). If the deckhead clearance is not at least 6-inches (15.2 cm), the equipment should extend through the ceiling panels and be sealed to the sides.)

- D. When mounting equipment on a foundation or coaming, ensure that the foundation/coaming is at least 4-inches (10.2 cm) above the finished deck. Use cement or a continuous weld to seal equipment to the foundation/coaming. Provide a sealed-type foundation/coaming for equipment not mounted on legs. Ensure that the overhang of the equipment from the foundation/coaming does not exceed 4-inches (10.2 cm). Completely seal any overhang of equipment along the bottom (Figure 3).

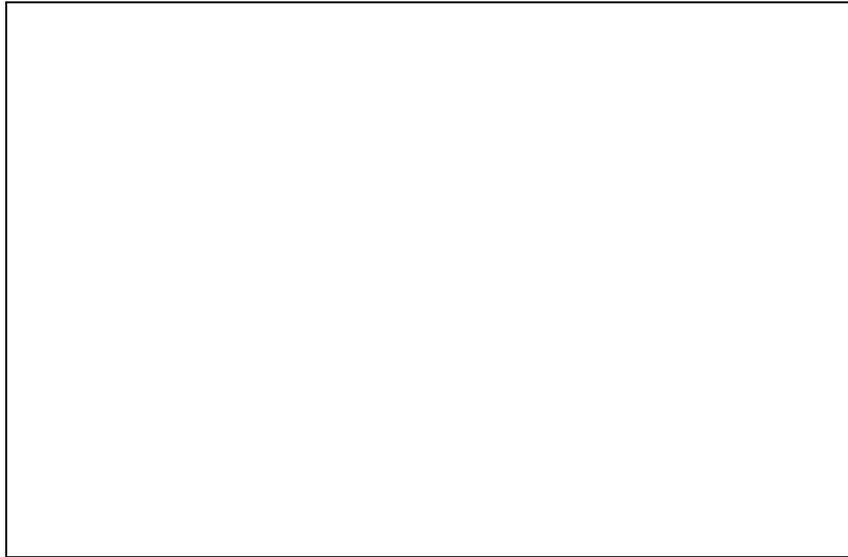


Figure 3

- E. Ensure that table-mounted equipment, unless easily movable, is either sealed to the tabletop or mounted on legs at least 4-inches (10.2 cm) above the tabletop.

VI. FASTENERS AND REQUIREMENTS FOR SECURING EQUIPMENT

- A. The back splash attachment to the bulkhead must be continuous or tack-welded, polished, and sealed tight.
- B. Use continuous welds for attaching all food contact surfaces, or connections from food contact surfaces, to adjacent splash zones to ensure a seamless coved corner. Use only continuous polished welds for food contact surfaces and splash zones adjacent to food contact surfaces. For splash zone attachments to the bulkhead, decking, or other equipment, use a continuous or tack-weld, polished and sealed tight. All gaps shall be less than 1/32-inch (0.8 mm) prior to being sealed. If used, fasteners must be low profile, nonslotted, and noncorroding such that the resulting gap is less than 1/32-inch (0.8 mm). All bulkheads, deckheads, or decks receiving such attachments should be reinforced.
- C. Do not leave gaps or seams or use exposed slotted screws, Phillips head screws, or pop rivets in food splash zones or on food contact surfaces.
- D. For non-food contact surfaces of equipment, the gaps and seams must not exceed 1/32-inch (0.8 mm). Gaps less than 1/8-inch (3.2 mm) shall be sealed with an approved sealant.

For those surfaces exposed to extreme temperatures or for gaps greater than $\frac{1}{8}$ -inch (3.2 mm), use only stainless steel profile strips.

- E. Ensure that pop rivets, Phillips head and slotted screws, and other fasteners used in non-food contact areas are constructed of corrosion-resistant materials.

VII. LATCHES AND HINGES

Ensure that built-in equipment hinges and latches are durable, noncorroding, and capable of being easily cleaned.

VIII. GASKETS

- A. Ensure that equipment gaskets for reach-in refrigerators, steamers, ice bins, and ice cream freezers are constructed of smooth, nonabsorbent, nonporous materials.
- B. Close and seal gaskets at their ends and corners, and seal hollow sections.
- C. Ensure that refrigerator gaskets are designed to be removable.
- D. Ensure that fasteners used to install gaskets conform with the requirements specified for *Section VI*.

IX. EQUIPMENT DRAIN LINES

- A. Construct a minimum 1-inch (2.5 cm) internal diameter drain line from cold top tables, bains-marie, ice cream scoop dipper wells, and food preparation sinks, so that they can either be cleaned in place with a long brush or be readily removable for cleaning.
- B. Ensure that drain lines with angles, corners, or sections longer than 3-feet (0.9 m) are readily removable for cleaning.
- C. Drain lines may be constructed of stainless steel or easily cleanable flexible or rigid materials. Air breaks are acceptable for equipment drain lines.
- D. All installed equipment drain lines including condensate drain lines from refrigeration units must minimize the piping distance from the drain line outlet to the deck scupper drain.

1. When possible, drain lines should extend in a straight vertical line to a deck scupper drain. When this is not possible, the horizontal distance of the line should be kept to a minimum.
2. Drain lines which run horizontally under equipment mounted on legs shall not extend for a distance of greater than 12-inches (30.5 cm) and shall be positioned at least 4-inches (10.2 cm) above the deck.

X. ELECTRICAL CONNECTIONS, PIPELINES, AND OTHER ATTACHED EQUIPMENT

- A. Ensure that the electrical connections and control panels on all equipment and on the bulkhead are watertight and drip proof (i.e., electrical enclosures located in catering spaces shall meet the International Electrical Code). Use stainless steel to encase electrical wiring from permanently installed equipment.
- B. Do not install ozone or ultra-violet equipment in provisions rooms or food preparation areas unless such equipment is constructed of noncorroding stainless steel with fasteners meeting the requirements under *Section VI*.
- C. Ensure that other bulkhead mounted equipment installations, such as phones, speakers, and cameras, are sealed-tight with the bulkhead panels and are not placed in areas exposed to moisture, food splash, or grease.
- D. Tightly seal any areas where electrical lines, steam, or water pipelines penetrate the panels or tiles of the deck, bulkhead, or deckhead. Also, seal any openings between the electrical lines or the steam or water pipelines and the surrounding conduit or pipelines.
- E. Encase steam and water pipelines to kettles and boilers in stainless steel cabinets, or position the pipelines behind bulkhead panels. A minimal amount of exposed pipeline is acceptable.

XI. HOOD SYSTEMS

- A. Install hood systems and/or direct duct exhaust over ware washing equipment, including three compartment sinks in pot wash areas (does not apply to undercounter dishwashing machines).
 1. For ware washing machines with direct duct exhaust, such exhaust should be directly connected to the hood exhaust trunk.

2. All exhaust hoods over ware washing equipment or three-compartment sinks should be designed with a minimum six inch overhang from the edge of equipment so as to capture excess steam and vapors.
 3. Ware washing machines with direct duct exhaust to the ventilation system shall have a clean-out port in each duct, located between the top of the ware washing machine and the hood system or deckhead.
 4. The flat condensate drip pans located in the ducts from the ware washing machines shall be removable for cleaning.
- B. Install hood systems above cooking equipment to ensure they adequately remove excess steam and grease laden vapors. For bains-marie or steam tables, excess heat and steam will be controlled by either hood systems or dedicated local ventilation extraction.
- C. Select proper size exhaust vents and locate them appropriately so as to capture heat and steam.
- D. Where filters are used, ensure that they are easily removable.
- E. Ensure that vents and duct work are accessible for cleaning. (Hood washing systems are recommended for removal of grease generated from cooking equipment.)
- F. In constructing hood systems, use stainless steel with coved corners to provide at least a **d**-inch (9.5 mm) radius. Use continuous welds or profile strips on adjoining pieces of stainless steel. A drainage system is not required for draining grease or manually applied cleaning solutions from hood assemblies. Drainage systems are required for hood assemblies utilizing an automatic wash down systems.
- G. Ventilation systems shall be in compliance with manufacturers' recommendations.

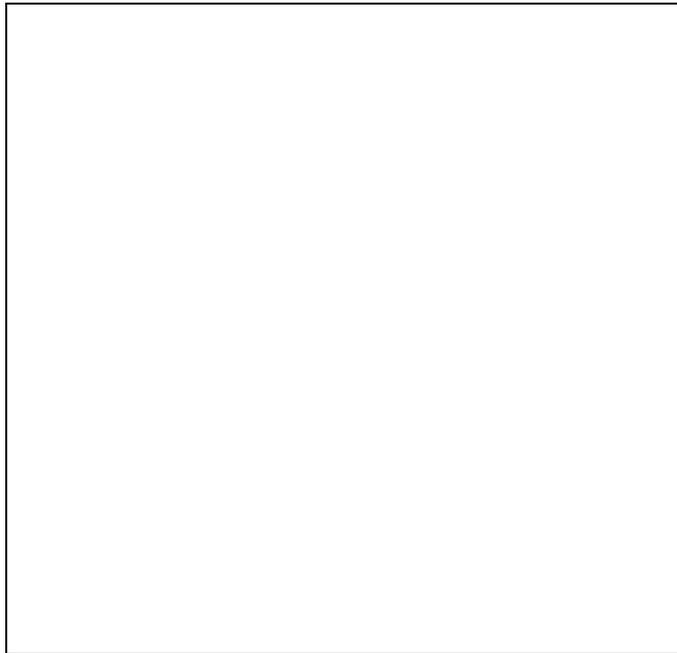
XII. PROVISIONS ROOMS

A. Bulkheads and Deckheads

1. Tight-fitting (i.e., seams less than 1/32-inch (0.8 mm)) stainless steel panels are required in walk-in refrigerators and freezers. Stainless steel panels are preferable for dry storage areas.
2. Painted steel may be used for provisions passageways and drystores areas.

B. Deck Covering

Either hard, durable, nonabsorbent tiles, durable epoxy decking, or corrugated (e.g., diamond plate) stainless steel deck panels are to be used in provisions rooms. All bulkheads and deck junctures shall be coved and sealed tight. If a forklift will be used in this area, the stainless steel panels should be sufficiently reinforced to prevent buckling. (Note: Corrugated stainless steel panels or painted steel must be used in all provisions passageways).



C. Provision Evaporators, Drip Pans, and Drain Lines

1. Ensure that the evaporators located in the walk-in refrigerators, freezers, and dry stores are constructed with stainless steel panels that cover piping, wiring, coils, and other difficult-to-clean components.
2. Ensure that the drip pans are constructed of stainless steel, have coved corners, are sloped to drain, and are of sufficient strength to maintain slope.
3. Place non-metal spacers between the drip pan brackets and the interior edges of the pans.
4. Ensure that all fasteners comply with the guidelines in *Section VI*.
5. For freezer drip pans, provide a heater coil and attach it to a stainless steel insert panel or to the underside of the drip pan. The panel must be easily removable for cleaning of the drip pan. Ensure that heating coils provided for drain lines are installed inside the lines.

Figure 4

6. Ensure that drain lines from the evaporators are sloped and extend through the bulkheads or deck and drain to a deck scupper or that they drain through an accessible air gap or air break.
7. The thermometer probe shall be encased in stainless steel conduit.

XIII. GALLEYS, FOOD PREPARATION ROOMS, AND PANTRIES

A. Bulkheads and Deckheads

1. Construct bulkheads and deckheads with a high quality, noncorroding stainless steel. Ensure that the gauge is thick enough so that the panels do not warp, flex, or separate under normal conditions. Seams must be less than 1/32-inch (0.8 mm). For seams larger than 1/32-inch (0.8 mm) but smaller than 3/16-inch (1.5 mm), use an approved sealant. For gaps greater than 3/16-inch (1.5 mm), use only stainless steel profile strips.
2. All bulkheads to which equipment is attached shall be of sufficient thickness and/or reinforcement to allow for the reception of fasteners or welding without compromising the quality and construction of the panels.
3. Utility line connections should be through a stainless steel conduit that is mounted away from bulkheads for ease in cleaning.
4. Back splash attachments to the bulkhead must be continuous or tack welded, polished, and made watertight with an approved (e.g., NSF, FDA, USDA) sealant.

B. Deck Covering

1. Use hard, durable, nonabsorbent, non-skid tiles or a durable epoxy material in galleys, food preparation rooms, and all pantries. Stainless steel panels, which are continuously welded and are proven non-skid may also be used. All bulkheads and deck junctures shall be coved and sealed tight.
2. Seal all deck tiling with a durable, water-tight grouting material. Seal stainless steel panels with a continuous weld.
3. In technical spaces between undercounter cabinets or refrigerators, the deck covering may be tile, non-skid stainless steel, or other hard, durable, and easily cleanable surfaces.

XIV. BUFFET LINES, BAR SERVICE AREAS, WAITER STATIONS, AND OTHER FOOD SERVICE AREAS

A. Bulkheads and Deckheads

1. Bulkheads and deckheads may be constructed of decorative tiles, pressed metal panels, or other hard, durable, noncorroding materials. Stainless steel is not required in these areas; however, the materials used shall be easily cleanable.

B. Deck Covering

1. Ensure that buffet lines located in crew and officers' mess rooms have a hard, durable, nonabsorbent deck covering that is at least 3-feet (0.9 m) in width measured from the edge of the service counter or from the outside edge of the tray rail, if such a rail is present.
2. Ensure that the dining room service stations have a hard, durable, nonabsorbent deck covering (e.g., sealed granite, marble) at least 2 feet (0.6m) from the edge of the working sides of the service station.
3. Ensure that the deck surfaces behind the bar service counters and under equipment are constructed of hard, durable, nonabsorbent tiles, epoxy, or stainless steel.
4. Durable linoleum tile or durable vinyl deck covering materials may be used only in crew and officer dining areas, except as specified in *Section XIII. B.1.*
5. All bulkheads and deck junctures shall be coved and sealed tight.

C. Sneeze Guards/Sneeze Shields

1. Sneeze guards shall be provided in all areas from which food will be displayed for consumer self-service.
2. Sneeze guards may be built-in, permanent, and integral parts of display tables, bains-marie, or cold top tables.
3. The sneeze guard panels must be durable plastic or glass that is smooth and easily cleanable. Sections in manageable lengths must be removable for cleaning.

4. The sneeze guards shall be positioned in such a way that the shielding panels intercept the line between the consumer's mouth and the displayed foods (Figure 5). This should take into account such factors as the height of the display table, the presence or absence of a tray rail, and the distance between the edge of the display table and the actual placement of the food (e.g., the bains-marie well).

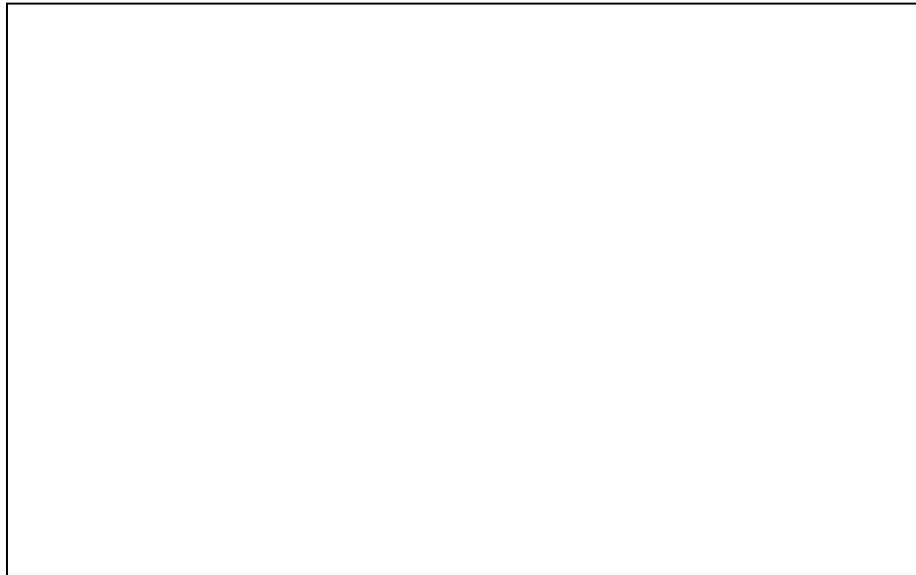


Figure 5

XV. BARS

- A. Install a stainless steel, vented, double-check valve backflow prevention device in all bars that have carbonation systems (e.g., multiflow beverage dispensing systems). Install the device before the carbonator and downstream from any copper in the potable water supply line.
- B. Encase supply lines to the dispensing guns for the carbonating system in a single tube. If the tube penetrates through any bulkhead or counter top, grommet the intersection.
- C. Bulk dispensers of soft drinks should be designed and located so as to minimize the length of the dispensing lines carrying the liquid mixes. The systems shall provide a means for flushing the interior of the lines carrying liquids.
- D. Bar construction shall follow the guidelines relating to equipment and to food and splash contact

surfaces noted in *Sections III and V*.

XVI. WARE WASHING

- A. For pre-washing, provide a rinse hose(s). Provide a garbage grinder or pulper system with adequate table space for all food preparation areas. Grinders are optional in pantries and bars. If a sink is to be used for pre-rinsing, provide a removable strainer. (Note: Shock absorbing materials may be used for the installation of pulpers and grinders to protect against vibration damage and to dampen noise.)
- B. For soiled dish tables with pulper systems, ensure that the trough extends the full length of the table and that the trough slopes toward the pulper.
- C. To prevent water from pooling, equip clean landing tables with across the counter scuppers with drains at the exit from the machine and sloped to the scupper. Install a second scupper and drain line if the length of table is such that the scupper at the exit from the machine will not effectively eliminate all pooling. (The length of drain lines shall be minimized and when possible be straight vertical lines with no angles.)
- D. Seal the back edge of the soiled landing table to the bulkhead or provide an 18-inch (46-cm) clearance between the table and the bulkhead.
- E. Provide sufficient space for cleaning around and behind equipment (i.e., pulpers and dishwashers). If large equipment is positioned away from the bulkhead, making surfaces inaccessible for cleaning, provide a minimum of 18-inches (46 cm) clearance.
- F. Encase pulper wiring in a stainless steel or non-metallic liquid tight conduit, and raise it at least 6-inches (15.2 cm) above the deck. Except for any necessary piping, elevate all components at least 6-inches (15.2 cm) above the deck.
- G. Make all pump housings, electrical boxes, and other component equipment corrosion resistant and splash tight (i.e., refer to IEC IP-44).
- H. Construct removable side panels of stainless steel around the pulper motor wiring and piping where the motor is exposed to splashes or spills of liquid waste.
- I. Construct grinder cones, pulper tables, and dish landing tables with continuous welding.
- J. Ensure that ware washing machines are of an appropriate type (e.g., flight type vs. rack type) and of an appropriate size for the volume of equipment to be washed.

- K. Ensure that three-compartment ware washing sinks are of the correct size for their intended use and that they are large enough to submerge the largest piece of equipment. Ensure that the sinks have coved, continuously welded, internal corners that are integral to the interior surfaces.
- L. Install either; a) an across the counter scupper with a drain dividing the wash compartment from the rinse compartment; b) a splash shield at least 4-inches (10.2 cm) above the flood level rim of the sink between the wash and rinse compartments; or c) an overflow drain in the wash compartment 4-inches (10.2 cm) below the flood level.
- M. Equip hot water sanitizing sinks with thermometers, a long-handled stainless steel wire basket, and a jacketed or coiled steam supply with a temperature control valve to control water temperature so as to prevent condensation on the deckhead.
 - 1. Provide three-compartment ware washing sinks with a separate pre-wash station for the main galley and crew galley pot washing areas.
 - 2. For meat, fish, and vegetable preparation areas, provide at least one three-compartment sink or an automatic dishwashing machine(s) with a pre-wash station.
 - 3. Provide ware washing facilities accessible to all food preparation areas, such as the bakery, lido, and pantries.
- N. Construct overhead racks according to an open tubular design (unless the racks are of solid panel construction, in which case they should drain at each end to the landing table below).
- O. Provide for adequate ventilation to prevent condensation on the deckhead or adjacent bulkheads.

XVII. LIGHTING

- A. Ensure that a minimum of 20 foot candles (220 lux) is available at counter level in all food-preparation and ware washing areas. For equipment storage and food storage areas, including provisions, galley walk-in refrigerators and freezers, garbage and food lifts, and garbage and toilet rooms, 20 foot candles (220 Lux) of lighting shall be provided at a distance of 30-inches (76.2 cm) above the deck.

Lighting levels of 20 foot candles (220 lux) in provision rooms are based on measurements taken while the rooms are empty. Lighting levels of at least 10 foot candles must be maintained

at all times.

In bars and dining room waiters' station designed for lowered lighting during normal operations, 20 foot candles (220 lux) must be provided during cleaning operations.

- B. Ensure that light fixtures are installed tightly against the bulkhead and deckhead panels or in a manner that allows easy cleaning around the fixtures.
- C. Ensure that each light shield is shatterproof, easily removable, and completely covers and encloses the entire bulb.
- D. For effective illumination, it is recommended that the deckhead mounted light fixtures be placed above the work surfaces and positioned in an "L" pattern rather than an in-line arrangement.
- E. Heat lamps do not have to meet the shielding requirements; however, the bulbs should be shatter proof or recessed within the outer shell of the lamp.
- F. Deckhead mounted lights for bars and the lido buffet areas may be recessed within the deckhead panels without being shielded.
- G. Ensure that light bulbs, including fluorescent lights, installed in or near bar counters are effectively shielded.

XVIII. WASTE MANAGEMENT

A. Food and Garbage Lifts

1. Ensure that the interiors of food and garbage lifts are constructed of stainless steel and meet the same facility requirements as other food service areas.
2. Ensure that the decks are constructed of a durable, non-absorbent, non-corroding material (e.g., stainless steel, diamond plate aluminum) and covered at least $\frac{1}{4}$ -inch (9.5 mm) all along the sides.
3. Position bulkhead mounted vents in the upper third of the panels.
4. Install a floor drain at the bottom of the lift shaft. Avoid open channels in the shaft.
5. Ensure that the interiors of dumbwaiters are constructed of stainless steel and meet the same facility requirements as other food service areas. Ensure that the bottom of the dumbwaiter is a stainless steel panel covered to provide a $\frac{3}{8}$ -inch (9.5 mm) radius.
6. Ensure that electrical panel controls are watertight (i.e., refer to IEC IP-44).
7. Ensure that lighting fixtures are recessed or fitted with stainless steel guards to prevent breakage.
8. Trash or garbage chutes for transfer of waste material to storage or processing areas are prohibited.

B. Trolley and Waste Container Wash Rooms

1. Construct decks, bulkheads, and deckheads according to facility requirements for food service areas. Provide a bulkhead mounted pressure washing system with a deck basin and drain connected directly to the waste system. (An enclosed automatic washing machine may be used in place of the pressure washer and deck basin.)
2. Provide Hand washing facilities.
3. Provide adequate ventilation and extraction of steam and heat.
4. Provide cleaning lockers. If wet storage of brooms, mops, or other equipment is intended for the cleaning lockers, then the lockers shall be vented.
5. Facilities such as a deep utility sink provided with hot and cold water or a pressure washing system with a deck basin and drain shall be provided for cleaning of maintenance equipment such as brooms and mops. Wall mounted racks or hooks shall

be provided for hanging the equipment for drying. A room(s) designated for this purpose shall be provided separate from food preparation and ware washing areas.

C. **Garbage Holding Facilities**

1. Construct a garbage and refuse storage or holding room of adequate size to hold unprocessed waste for the longest expected points of disposal. The refuse storage room shall be physically separated from all food-preparation and storage areas.
2. Ensure that the storage room is well ventilated, is temperature and humidity controlled, and contains a sealed, refrigerated space for storage of wet garbage.
3. Provide hand washing facilities and a potable hot and cold water tap for a hose connection.
4. Provide deck drainage to prevent pooling of any water.
5. Ensure that deckheads, bulkheads, and decks (other than the refrigerated spaces) are easily cleanable, with a berm/coaming provided around all waste-processing equipment, and that they have proper deck drainage.

D. **Garbage Processing Areas**

1. Ensure that the garbage processing area is of adequate size for the operation and has a sufficient number of tables for sorting.
2. Ensure that the sorting tables are constructed of stainless steel and have rounded edges. Deck Coaming, if provided, should be at least 3-inches (7.6-cm) and coved. If the tables are provided with drains, direct the table drains to a deck drain and provide the deck drain with a strainer.
3. Ensure that the processing area includes hand washing facilities, a potable hot and cold water tap for a hose connection, and an adequate number of deck drains.
4. Provide a cleaning materials storage locker.
5. Ensure that all decks and bulkheads are easily cleanable. Deck drains shall be provided.
6. Ensure adequate lighting of at least 20 foot candles (220 LUX) is provided.

7. A sink equipped with a pressure washer or an automatic washing machine shall be provided for the washing of equipment, storage containers, and garbage cans.

E. Sewage Systems

1. Sewage systems shall be U.S. Coast Guard certified and meet any applicable Marpol Standards as well as U.S. Water Pollution Standards for Marine Sanitation Waste (MSW).
2. Black and grey water lines that are above or that penetrate into the decks containing galleys or other food preparation or storage areas must not have any mechanical couplings. Press fitted piping is not acceptable for these areas.
3. Black and grey waste drain systems from cabins, catering areas, and public spaces shall be designed to prevent the back-up of waste and the emission of odors or gases into these areas.
4. Sewage holding tanks shall be vented independent of all other tanks, to the outside of the vessel and away from any air intakes.

XIX. WATER SYSTEM

A. Bunker Stations

1. Ensure that the filling line is positioned at least 18-inches (46 cm) above the deck and is painted blue.
2. Ensure that the filling line has a screw cap fastened by a noncorroding chain so it does not touch the deck when hanging.
3. Ensure that the screw connections for the hose attachments are unique to only fit potable water hoses.
4. Label the filling line "POTABLE WATER FILLING" with at least ½-inch (12.7-mm) lettering, high stamped, stenciled, or painted on the bulkhead in the area of the bunker line.

5. Filters may be used in the bunkering line prior to halogenation. Filters must be accessible for inspection and removable for cleaning.

B. Filling Hoses

1. Provide special hoses that are durable and have smooth, impervious linings, caps on each end, and unique fittings for potable water.
2. Provide at least two 50-foot (15.2-m) hoses per bunker station.
3. Ensure that each hose dedicated to potable water filling is properly labeled or tagged so that it is not used for any other purpose.

C. Filling Hose Storage

1. Provide a self-draining, smooth, easily cleanable (e.g., stainless steel), closable locker or cabinet, installed at least 18-inches (46 cm) above the deck and used for no other purpose.
2. Label lockers "POTABLE WATER HOSE STORAGE ONLY."
3. Provide storage space for at least four 50-foot (15.2-m) potable water bunker hoses per bunker station.

D. Fire and Technical Connections

1. Install a reduced pressure zone (RPZ) backflow prevention device where hoses from shore will be connected.

E. Storage Capacity for Potable Water

1. Provide a minimum of 2 days storage capacity.

F. Potable Water Storage Tanks

1. General Requirements:
 - i. Ensure that the tanks are independent of the shell of the ship. Skin or double-bottom tanks are not allowed for potable water storage. Provide an 18-inch (46-cm) cofferdam above and between other tanks and also between the tanks and the hull.

- ii. Ensure that the coating of the tanks is approved for use in potable water tanks, specifications are provided to VSP, and that all manufacturers' recommendations for application and drying or curing are followed.
- iii. Coat all items that penetrate the tank (e.g., bolts, pipes, pipe flanges) with the same product as the tank interior.
- iv. Ensure that the system is designed to be superchlorinated one tank at a time through the filling line.
- v. Ensure that lines for nonpotable liquids do not pass through potable water tanks. Minimize the use of non-potable lines above potable water tanks. All lines above tanks shall not have any mechanical couplings. If coaming along the edges of the tank is present, provide slots along the top of the tank to allow leaking liquid to run off and be detected.
- vi. Re-treat welded pipes to make them corrosion resistant.
- vii. Treat all potable water lines inside potable water tanks so as to make them jointless and corrosion resistant.
- viii. Identify each tank with a number, and the words "POTABLE WATER" in letters ½-inch (12.7 mm) high.
- ix. Install sample cocks above the deck plating on each tank.
- x. Ensure that sample cocks point downward and are identified and numbered.

2. Storage Tank Manholes

Install manholes on the sides of potable water tanks.

3. Storage Tank Water Level

Provide an automated method for determining the water level for potable water tanks.

4. Storage Tank Vents

- i. Ensure that air relief vents end well above the water line outside the ship. The cross sectional areas of the vent must be equal to or greater than those of the filling line to the tank. The vent shall terminate with the open end pointing down and shall be screened with 16-mesh corrosion-resistant screen.
- ii. A single pipe may be used as a combination vent and overflow.
- iii. Do not connect the vent of a potable water tank to the vent of a nonpotable water tank.

5. Storage Tank Drains

- i. Design tanks to drain completely.
- ii. Ensure that the drain opening is at least 4-inches (10.2 cm) in diameter, ideally the same diameter as that of the inlet pipe.
- iii. When drainage is by suction pump, the liquid shall drain from a sump. Use separate pumps to drain tanks. In addition, locate the drain in the pump discharge line ahead of any branch take-off to the distribution system. Install a valve on the main immediately beyond the drain line take-off (Figure 6).



Figure 6

G. **Suction Lines**

Locate suction lines at least 6-inches (15.2 cm) from the tank bottom or sump bottom.

H. **Distribution System**

1. Locate distribution lines at least 18-inches (46 cm) above the bilge plating or the normal bilge water level.
2. Ensure that the distribution lines are not cross-connected with the piping of any nonpotable water systems.
3. Ensure that no lead or cadmium pipes or fittings are used.
4. Ensure that only potable water taps are installed in the galleys, the hospital, and the cabin showers and sinks.
5. Paint potable water piping and fittings in blue or stripe them with a blue band at 15-foot (4.6-m) intervals on each side of partitions, decks, and bulkheads.
6. Ensure that technical steam to be applied indirectly to food, utensils, and equipment is made from potable water and provided through coils, tubes, or separate chambers. Steam applied directly to food and food contact surfaces shall be produced from potable water and generated locally by the food service equipment designed for this purpose, e.g., vegetable steamers, combi-ovens, etc.
7. Ensure that an air gap or approved backflow prevention device is present if water is supplied to a bilge, waste, ballast, or laundry tank.

I. **Potable-Water Pressure Tanks**

1. Ensure that potable water hydrophore tanks are not cross-connected to nonpotable water tanks through the main air compressor.
2. Provide a filtered air supply from a nonpermanent, quick-disconnect, or independent compressor. The compressor must not emit oil into the final air product.

J. **Pumps**

1. Ensure that the potable water pumps have adequate capacity for service demands and are not used for any other purpose.
2. Ensure that pumps are automatic priming, not manual. Use a direct connection, not an airgap, when supplying water to a potable water pump.
3. Ensure that pumps and distribution lines are large enough so that pressure will be maintained at all times and at levels adequate to operate all equipment.
4. Provide a pressure type back-flow prevention device in the potable water line prior to the automatic ejectors.

K. Evaporators/Distillation

1. Locate the seawater inlet line forward from the overboard discharge pipes.
2. Use only direct connections to the potable water system. Swing lines are not allowed.
3. Provide an air gap or RPZ backflow preventer between the potable water system and the nonpotable water system.
4. Post manufacturer's instructions near the evaporator or distillation plant.
5. Ensure that high and low pressure units connected directly to the potable water lines have the ability to go to the waste system if the distillate is not fit for use.
6. Ensure that units have a low range salinity indicator, an operation temperature indicator, an automatic discharge to waste, and an alarm with trip setting.
7. Ensure that the high saline discharge goes to bilge through an airgap or goes overboard through an RPZ backflow preventer.

L. Halogenation

1. Bunkering and Production
 - i. Provide labeled potable water taps with appropriate backflow preventers at each halogen supply tank.
 - ii. Provide a labeled sample cock at least 10-feet (3 m) after the halogen injection

point.

- iii. Ensure that halogen injection is flow meter or analyzer controlled.
- iv. Ensure that pH adjustment equipment is provided for bunkering. The analyzer, controller (e.g., proportional integral derivative), and dosing pump should be balanced to accommodate changes in flow rates.

2. Distribution

- i. Provide a completely automatic halogenation system that is controlled by an analyzer.
- ii. Ensure that the halogenation probe measures free or active halogen that is linked to the analyzer, controller, dosing pump, and flow meter if used in conjunction with an analyzer.
- iii. Provide a backup system with automatic switch-over.
- iv. Ensure that an analyzer and recorder are located at a distant point in the system. The analyzer shall measure and indicate free halogen.
- v. Provide an audible alarm in the engine control room to indicate low halogen residual readings at the distant point analyzer.
- vi. Provide labeled potable water taps with appropriate backflow preventer at halogen injection points.
- vii. Locate a labeled sample cock at least 10-feet (3 m) after the halogen injection point.
- viii. Ensure that chart recorders are circular, have a minimum of 24-hour recording capacity, and express halogen content from at least 0 to 5 ppm.

XX. BACKFLOW PREVENTION

- A. All non-potable connections to the potable water system must use appropriate backflow prevention (e.g., airgaps, reduced pressure principal backflow preventers, pressure vacuum breakers, atmospheric vacuum breakers, pressure-type backflow preventers, or double-check valves with intermediate atmospheric vent).

- B. Ensure that airgaps (i.e., the most reliable method of backflow protection) are twice the diameter of the supply pipe.
- C. In high hazard situations where airgaps are impractical or cannot be installed, use an RPZ backflow preventer.
- D. If RPZ backflow preventers are used, provide a test kit for testing the device annually, and keep records of such tests.
- E. Use air gaps or mechanical backflow prevention devices when water must be supplied under pressure.
- F. Install atmospheric vacuum breakers 6-inches (15.2 cm) above the fixture flood level rim with no valves downstream from the device.
- G. Pressure-type backflow preventers (e.g., carbonator backflow preventer) or double-check valves with intermediate atmospheric vents prevent both back-siphonage and backflow caused by back pressure, and must be used in continuous pressure-type applications.
- H. Ensure that the following connections to the potable water system are protected against backflow or back-siphonage by mechanical back-flow prevention devices or air gaps:
 - 1. The connection between potable water tanks and nonpotable water tanks.
 - 2. The connection between evaporators and any nonpotable water system.
 - 3. The potable water supply to the boiler or boiler feed tanks.
 - 4. The potable water supply to priming pumps used for non-potable applications.
 - 5. The potable water supply to the lube and fuel oil separators.
 - 6. The potable water supply to beverage system carbonators.
 - 7. Flexible shower hoses in cabin showers, if the hoses can be submerged.
 - 8. The connection between potable water and air conditioning supply or expansion tanks.
 - 9. The potable water supply to the beauty salon rinse hoses.
 - 10. The potable water supply line to photo developing equipment and on all potable water

taps in the photo labs.

11. The potable water supply to garbage grinders and pulpers.
12. The potable water supply to waste and garbage rooms.
13. The potable water supply to the laundry machines.
14. All threaded faucets supplying potable water.
15. All ware washing machines.
16. The potable water supply to x-ray developing tanks, sterilizers, and other hospital equipment.
17. The potable water supply to the fire prevention or sprinkler system.
18. The connection between fresh water and salt water ballast systems.
19. The potable water supply to swimming pools and whirlpools.
20. The potable water supply to toilet systems.
21. All potable water deck washing and engine room threaded faucets.
22. The potable water supply to the engine room pressure washing system.
23. The potable water supply to window washing systems.
24. Water softener for nonpotable fresh water if it is located prior to an airgap.
25. The water softener and mineralizer drain lines must be air gapped.

XXI. SWIMMING POOLS

- A. Use sea water, or a potable water supply passing through an air gap or backflow preventer to fill swimming pools.
- B. Ensure that drains are independent. If swimming pool drains are connected to another drainage

- system, ensure that they have a double-check valve. Install a drain at the lowest point in the pool.
- C. Ensure that the bottom of the pool slopes toward the drains to effect complete drainage.
 - D. Ensure that drain covers are anti vortex in design and constructed of easily visible, shiny metal and that they fit securely.
 - E. Ensure that the fill level of the pool is above the skim gutter level.
 - F. Install recirculation, filtration, and disinfection equipment.
 - G. Pool water must be turned over at least 4 times every 24-hours (i.e, once every 6-hours or less).
 - H. Use self-priming, centrifugal pumps to recirculate pool water.
 - I. Install pumps large enough to recirculate the entire volume of the pool in 6-hours.
 - J. Ensure that surface skimmers are capable of handling approximately 80 percent of the filter flow of the recirculation system.
 - K. Provide at least one skimmer for each 500 square feet (46.45 m²) of pool surface.
 - L. Provide a hair strainer between the pool outlet and the suction side of the pumps to remove hair, lint, pins, etc.
 - M. The removable portion of the strainer shall be corrosion resistant and have holes no larger than 1/8-inch (3.2 mm) in diameter.
 - N. Ensure that filters are able to filter (i.e., remove all particles larger than 10 micrometers) the entire contents of the pool in 6-hours or less.
 - O. Filters shall be cartridge, rapid-pressure sand filters, high-rate sand filters, diatomaceous earth filters, or gravity sand filters. Filter sizing will be made consistent with ANSI standards for public pools.
 - P. All media filters must be capable of being back washed.

- Q. Ensure that all filter accessories, such as pressure gauges, air-relief valves, and rate-of-flow indicators are provided.
- R. Ensure that pool overflows are either directed by gravity to the make-up tank for recirculation through the filter system or disposed of as waste.
- S. The make-up tank may be used to replace water lost by splashing and evaporation. If the tank is supplied with potable water, ensure that the supply enters through an airgap or backflow preventer. An overflow line at least twice the diameter of the supply line and located below the tank supply line may be used.
- T. Provide automatic dosing of chemicals for disinfection and pH adjustment.
- U. Provide easy access to the sand filters so that they can be monitored weekly and changed frequently.
- V. Ensure that drains are installed so as to allow for rapid drainage of the entire pump and filter system, and that a minimum 3-inch (7.6-cm) drain is installed on the lowest point of the system.
- W. Ensure that disinfection is accomplished by chlorination or bromination and is controlled by an analyzer.
- X. Ensure that pH adjustment is accomplished by using appropriate acids and bases and that a buffering agent (alkalinity) is used to stabilize the pH. Injection must be controlled by an analyzer.
- Y. Ensure that the recirculation/halogenation room is accessible and well ventilated, and provide a potable water tap in this room.
- Z. Mark all piping with directional-flow arrows.
- 1A. Clearly post a flow diagram and operational instructions.
- 1B. Ensure that the system is designed for easy and safe storage of chemicals and refilling of chemical feed tanks.
- 1C. Sample points shall be provided on the system for the testing of halogen levels and routine calibration of analyzer.
- 1D. Wading pools may be part of the main swimming pool recirculation system.

1. Ensure that the turnover rate of water is at least every 30 minutes.
2. Install anti-vortex drain covers.

XXII. RECREATIONAL SPAS & WHIRLPOOLS

- A. When the potable water supply is used for the spa or whirlpool system, it shall be supplied through an airgap or approved backflow preventer.
- B. Provide water filtration equipment that ensures a turnover rate of at least once every 30 minutes and halogenation equipment that is capable of maintaining adequate levels of free halogen throughout the use period.
- C. Design the overflow system so that water level is maintained.
- D. Provide one skimmer for each 150 square feet (13.93 m²) or fraction thereof of water surface area.
- E. Provide drains to completely drain the whirlpool.
- F. Install an anti-vortex drain cover.
- G. Follow the same recirculating, disinfection, and filtration requirements (except turnover rate) outlined in *Section XXI*.
- H. Design and install filters in a manner that allows easy access for inspection and maintenance.
- I. Design the system to permit daily shock treatment or superhalogenation in accordance with the *Final Recommendations To Minimize Transmission of Legionnaires' Disease From Whirlpool Spas On Cruise Ships*.
- J. Install systems in a manner that permits routine visual inspection of the granular media filters in accordance with the *Final Recommendations To Minimize Transmission of Legionnaires' Disease From Whirlpool Spas On Cruise Ships*.

XXIII. MISCELLANEOUS

- A. **Facilities and Lockers for Cleaning Materials**

1. Provide stainless steel cleaning lockers with coved floor and wall junctures for the storage of buckets, detergents, sanitizers, cloths, and sponges.
2. Provide wall-mounted racks on which to hang brooms and mops or provide sufficient space and hanging brackets within a cleaning locker. Wall-mounted units may be located only in nonfood preparation or service areas.
3. The number of lockers and the location and size of lockers is determined during the plan review process.

B. Filters

1. Chlorine filters may only be used on coffee machines, juice machines, ice machines, and soda dispensing machines.

C. Drinking Fountains

1. Ensure that the waterjets from drinking fountains are slanted and that the orifice is protected by a cover (i.e., to prevent contamination via water dripping from mouths) 1-inch (2.5 cm) above the rim of the basin and that the water is lead free.
2. Provide cabinet constructed stainless steel drinking fountains with a strainer.
3. Ensure that the pressure of the water stream from drinking fountains is controlled by the users..
4. Ensure that drinking fountains are readily accessible to galley personnel.

XXIV. VENTILATION SYSTEMS

A. Air Supply Systems

1. Fan rooms shall be designed and located for accessibility to conduct periodic inspections and changing of air intake filters.

2. Fan rooms shall be maintained free of accumulations of moisture. Condensate drainage from air chiller units shall be through closed piping to prevent pooling of wastewater on the decks.
3. Fan rooms shall be located so that any ventilation or processed exhaust air may not be drawn back into the ship spaces.
4. All food preparation, ware washing, and toilet rooms shall have a sufficient air supply.
5. All cabin air diffusers shall be designed for easy removal and allow for easy access for cleaning.
6. All air supply trunks shall have access panels to allow for periodic inspection and cleaning.
7. A single independent air supply system shall be provided for the engine room and other mechanical compartments, such as fuel separation or purifying rooms, which are located in and around the engine room.

B. Air Exhaust Systems

1. Air handling devices in the following areas shall exhaust air through independent systems that are completely separated from systems utilizing recirculated air:
 - a. Engine rooms and other mechanical spaces.
 - b. Hospitals, infirmaries, and any wards used for patient care.
 - c. Indoor swimming pools, recreational spa facilities, and supporting mechanical rooms.
 - d. Galleys and other food preparation areas.
 - e. Cabin and public toilet rooms.
 - f. Waste processing areas.
2. Negative air pressure shall be maintained in the listed areas under *Section XXIV. B.1.*
3. A sufficient exhaust system shall be provided in all food preparation, ware washing, and toilet

rooms to keep them free of excessive heat, humidity, steam, condensation, vapors, obnoxious odors, and smoke.

XXV. ACKNOWLEDGMENTS

A. Individuals

The following individuals initiated the development of this document. Their names (without titles) are presented in alphabetical order:

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B. Standards, Criteria, and Regulations Reviewed For Guidance

1. Vessel Sanitation Program Operations Manual, 1989
2. World Health Organization Guide To Ship Sanitation, 1967
3. American National Standards Institute/National Spa & Pool Institute
Standard for Public Swimming Pools, 1991
Standard for Public Spas, 1991
4. NSF International Standards 2, 18, 50; 1996
5. National Health and Safety Performance Standards: Guidelines for Out-of-Home Child
Care Programs, 1993
6. Underwriters Laboratories (UL 1996)

