



Vessel Sanitation Program

2025 Construction Standards



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Protecting Public Health on Cruise Ships for 50 Years

Significant changes from the *VSP 2018 Construction Guidelines* are noted in yellow highlight with a vertical rule.

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

The *Vessel Sanitation Program 2025 Construction Standards* are available at www.cdc.gov/vessel-sanitation/php/guidance/index.html.

Suggested citation: CDC. Vessel Sanitation Program 2025 construction standards. Atlanta, GA: Centers for Disease Control and Prevention; 2025.

Acknowledgments

VSP would like to acknowledge the following organizations and companies for their cooperative efforts in the revisions of the *VSP Construction Standards*.

Cruise Lines

- Azamara Cruises
- Carnival Maritime (AIDA Cruises and Costa Cruises)
- Carnival Corporation & PLC
- Carnival Cruise Line
- Carnival UK (P&O Cruises and Cunard)
- Disney Cruise Line
- Holland America Group (Holland America Line and Princess Cruises)
- Lindblad Expeditions
- Margaritaville at Sea
- MSC Cruise Management
- Norwegian Cruises
- NYK Cruises
- Royal Caribbean Group (Royal Caribbean International, Celebrity Cruises, Silversea Cruises, TUI Cruises, and Hapag-Lloyd Cruises)
- Saga Cruises
- Viking Cruises
- Virgin Voyages
- Windstar Cruises

Shipyards

- Chantiers de l'Atlantique
- Fincantieri S.p.A.
- Meyer Werft GmbH
- Meyer Turku

Other Organizations

- ALMACO Group, SAS
- The Apollo Group
- Culligan Italiana S.p.A. (CWTS S.r.l.)
- Cruise Lines International Association (CLIA)
- D2 Marine Solutions
- DL-SERVICES
- HOBART Global Marine
- IMA Holding
- JP Schnoor Consulting
- MEIKO Maschinenbau GmbH & CO KG
- MEIKO USA
- SeaKing Ltd.
- TGMG, Inc.
- Vikand Medical Solutions, LLC

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1.0 Background and Purpose

The Centers for Disease Control and Prevention (CDC) established the Vessel Sanitation Program (VSP) in the 1970s as a cooperative endeavor with the cruise vessel industry. VSP assists the cruise industry in fulfilling its responsibility for developing and implementing comprehensive performance-based systems to protect the health of the traveling public.

Every vessel that has an international voyage with a stop at a U.S. port and carries 13 or more passengers is subject to twice-yearly unannounced inspections and, when necessary, reinspection. The vessel owner pays a fee, based on gross tonnage (GT) of the vessel, for all operational inspections. The *VSP Environmental Public Health Standards*, which is available on the VSP website (www.cdc.gov/vessel-sanitation/about/index.html), covers details of these inspections.

CDC is committed to promoting high construction standards to protect the public's health. Compliance with these standards will help to ensure a healthy environment on cruise vessels.

Cruise vessel owners or shipyards that build or renovate cruise vessels may voluntarily request plan reviews, onsite shipyard construction inspections, and/or final construction inspections of new or renovated vessels before their first or next operational inspection. The vessel owner or shipyard pays a fee, based on GT of the vessel, for onsite and final construction inspections. VSP does not charge a fee for plan reviews or consultations.

Section 3.0 covers details pertaining to plan reviews, equipment reviews, consultations, construction inspections, and operational inspections.

When a plan review or construction inspection is requested, VSP reviews current construction billing invoices of the shipyard or owner requesting the inspection. If this review identifies construction invoices unpaid for more than 90 days, no inspection will be scheduled. An inspection can be scheduled after the outstanding invoices are paid in full.

The *VSP Construction Standards* provide a framework of consistent construction and design standards that protect passenger and crew health. These standards were first published in 1997. Recent versions include the *VSP 2011 Construction Guidelines* and the *VSP 2018 Construction Guidelines*.

The *VSP Construction Standards* cover components of the vessel's facilities related to public health, including FOOD STORAGE AREAS, FOOD PREPARATION AREAS, FOOD SERVICE AREAS, water bunkering, storage, DISINFECTION, and distribution. Vessel owners and operators may select the design and equipment that best meets their needs. However, the design and equipment must also meet the sanitary design criteria of the American National Standards Institute (ANSI) or equivalent organization as well as VSP's routine operational inspection requirements.

These standards are not meant to limit the introduction of new designs, materials, or technology for shipbuilding. A shipbuilder, owner, manufacturer, or other interested party may ask VSP to periodically review or revise these standards in relation to new information or technology. VSP reviews such requests in accordance with the criteria described in section 2.0.

New cruise vessels must comply with all international code requirements (for example, International Maritime Organization Conventions). Those include requirements of the following:

- Safety of Life at Sea Convention.
- International Convention for the Prevention of Pollution from Ships.
- Tonnage and Load Line Convention.
- International Electrical Code.
- International Plumbing Code.
- International Standards Organization.

Once published, requirements in the *VSP Construction Standards* are effective immediately. These standards

- Apply to vessels with a contract signed or KEEL LAYING date, whichever is later, after the effective date.
- Apply to building the ship or performing any major renovation or equipment replacement, such as any changes to the structural elements of the vessel covered by these standards.
- Do not apply to minor renovations such as the installation or removal of single pieces of equipment (for example, refrigerator units, WAREWASHING machines, bain-marie units) or single pipe runs.

VSP will conduct operational inspections per the current *VSP Environmental Public Health Standards*.

2.0 Revisions and Changes

VSP periodically reviews and revises these recommendations in coordination with industry representatives and other interested parties to stay abreast with industry innovations and current science. A shipbuilder, owner, manufacturer, or other interested party may ask VSP to review a construction standard on the basis of new technologies, concepts, or methods.

Significant changes from the *VSP 2018 Construction Guidelines* are noted in yellow highlight with a vertical rule.

Recommendations for changes or additions to the *VSP Construction Standards* must be submitted in writing to the VSP Chief at Construction.VSP@cdc.gov. The recommendation should

- Identify the section to be revised.
- Describe the proposed change or addition.
- State the reason for recommending the change or addition.
- Include research or test results and any other pertinent information that support the change or addition.

VSP will coordinate a professional evaluation and consult with industry to determine whether to include the recommendation in the next revision.

VSP gives special consideration to shipyards and owners of vessels that have had plan reviews conducted before an effective date of a revision of these standards. This helps limit any burden

placed on the shipyards and owners to make excessive changes to previously agreed-upon plans.

VSP asks industry representatives and other knowledgeable parties to meet with VSP representatives periodically to review the standards and determine whether changes are necessary to keep up with the innovations in the industry.

VSP will circulate proposed clarifications to the construction standards along with supporting information on their public health significance in advance of VSP's meetings with industry. These clarifications will be considered during the meeting. Proposed clarifications VSP considers time critical can be circulated to the industry and others for review and coordination through other collaborative means (for example, email, web-based forum, etc.) for more timely dissemination and further review, as needed, during the annual meeting.

3.0 Plan Reviews, Equipment Reviews, Consultations, Construction Inspections, and Operational Inspections

To coordinate or schedule a plan review or construction-related inspection, submit an official written request to the VSP Chief at Construction.VSP@cdc.gov as early as possible in the planning, construction, or renovation process.

Final arrangements for requests that require VSP to travel internationally must be received in writing at least 45 days before the intended visit. Requests will be honored depending on VSP staff availability.

The VSP point of contact for construction activities can be reached at Construction.VSP@cdc.gov for questions about plan reviews, construction inspections, equipment reviews, or other technical assistance.

Vessel representatives should provide points of contact to represent the owners, shipyard, and key subcontractors.

3.1 Plan Reviews and Consultations

VSP normally conducts plan reviews for new construction a minimum of 18 months before the vessel is scheduled for delivery. The time required for major renovations varies. To allow time for any necessary changes, VSP coordinates plan reviews for such projects well before the work begins.

Plan reviews normally take 2 working days. They are conducted in Atlanta, Georgia; Fort Lauderdale, Florida; or other agreed-upon sites. Normally, two VSP staff members will be assigned to the project.

Representatives from the shipyard, vessel owner, and subcontractor(s) who will be doing most of the work should attend the review. They should bring all pertinent materials for areas covered in these standards, including the following:

- Complete plans or drawings (this includes new vessels from a class built under a previous version of the *VSP Construction Standards*).
- Any available menus.

- Equipment specifications.
- General arrangement plans.
- Decorative materials for FOOD AREAS and bars.
- All plans for FOOD AREAS.
- Level and type of FOOD service (for example, concept menus, staffing plans).
- POTABLE and nonpotable water system plans with details on water inlets (for example, sea chests, overboard discharge points, and BACKFLOW PREVENTION DEVICES).
- Ventilation system plans.
- Plans for all RECREATIONAL WATER FACILITIES.
- Size profiles for operational areas.
- Owner-supplied and PORTABLE equipment specifications, including cleaning procedures.
- Cabin attendant work zones.
- Operational schematics for misting systems and decorative fountains.

VSP will prepare a plan review report summarizing recommendations made during the plan review and will submit the report to the shipyard and owner representatives.

After the plan review, the shipyard will provide the following:

- Any redrawn plans.
- Copies of any major change orders made after the plan review in areas covered by these standards.

While the vessel is being built, shipyard representatives, the ship owner, or other vessel representatives may direct questions or requests for consultative services to VSP. Direct these questions or requests in writing to Construction.VSP@cdc.gov. VSP will coordinate the request with the owner and shipyard points of contact designated during the plan review.

3.2 Construction Inspections

VSP conducts most onsite or shipyard construction inspections in shipyards outside the United States. Final travel arrangements and a formal written request must be submitted to the VSP Chief at least 45 days before the inspection date so that VSP can process the required foreign travel orders for VSP staff members (refer to section 3.0). Section 39.1 shows a sample request.

VSP encourages shipyards to contact the VSP Chief and coordinate onsite construction inspections well before the 45-day minimum to better plan the actual inspection dates.

An onsite construction inspection normally requires the expertise of one to three VSP staff members, depending on the size of the vessel and whether it is the first of a hull design class or a subsequent hull in a series of the same class of vessels. International inspections, including travel, generally take 5–7 days depending on the ship's gross tonnage. The onsite inspection should be conducted approximately 4 to 5 weeks before delivery of the vessel when at least 90% of the areas of the vessel to be inspected are completed. VSP provides a written report to the party that requested the inspection. After the inspection and before the ship's arrival in the United States, the shipyard submits to VSP a statement of corrective

action outlining how it will address and correct each item identified in the inspection report.

3.3 Final Construction Inspections

At the request of a vessel owner or shipyard, VSP may conduct a final construction inspection. Final construction inspections are conducted only after construction is 100% complete and the ship is fully operational.

These inspections are conducted to evaluate the findings of the previous yard inspection, assess all areas that were incomplete in the previous yard inspection, and evaluate performance tests on systems that could not be tested in the previous yard inspection. Such systems include the following:

- Ventilation for cooking, holding, and WAREWASHING areas.
- WAREWASHING machines.
- Artificial light levels.
- Temperatures in cold- or hot-holding EQUIPMENT.
- HALOGEN and other chemistry measures for POTABLE WATER or RECREATIONAL WATER systems.

To schedule the inspection, the vessel owner or shipyard submits a formal written request to the VSP Chief at Construction.VSP@cdc.gov as soon as possible after the vessel is completed, or a minimum of 60 days before its arrival in the United States. If a vessel is not immediately entering the U.S. market, a vessel owner or shipyard can request a final construction inspection outside the United States.

As soon as possible after the final construction inspection, the vessel owner or shipyard will submit a statement of corrective action to VSP. The statement outlines how the shipyard will address each item cited in the inspection report and includes the projected date of completion.

3.4 Operational Inspections

VSP conducts unannounced operational inspections in the United States per the current VSP *Environmental Public Health Standards*.

Construction related deficiencies identified during construction activities (such as plan reviews, equipment reviews, consultations, and construction inspections) must be addressed after the initial construction or renovation inspection and before the first operational inspection.

If the deficiencies cannot be quickly corrected, a timeline for correction must be discussed with VSP.

4.0 Equipment Standards, Testing, and Certification

Although these standards establish certain standards for equipment and materials installed on cruise vessels, VSP does not test, certify, or otherwise endorse or approve any equipment or materials used by the cruise industry. Instead, VSP recognizes certification from independent testing laboratories such as NSF International, Underwriter's Laboratories (UL), the American National Standards Institute (ANSI), and other recognized independent international

testing institutions.

In most cases, independent testing laboratories test equipment and materials to certain minimum standards that generally meet the recommended standards established by these standards. Copies of test or certification standards are available from the independent testing laboratories.

Equipment built to questionable standards may be reviewed by a committee from VSP, cruise ship industry, and independent testing organizations. The committee will determine whether the equipment meets VSP's standards.

Equipment manufacturers and suppliers should not contact the VSP to request approval of their products.

5.0 General Definitions and Acronyms

This section defines and clarifies commonly used terminology. Terms defined in section 5.1 are identified in the text of these standards by CAPITAL LETTERS.

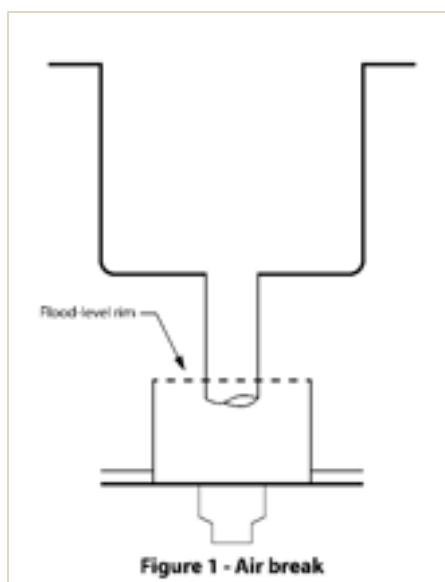
5.1 Definitions

Accessible: Exposed for cleaning and inspection with the use of simple tools including a screwdriver, pliers, or wrench.

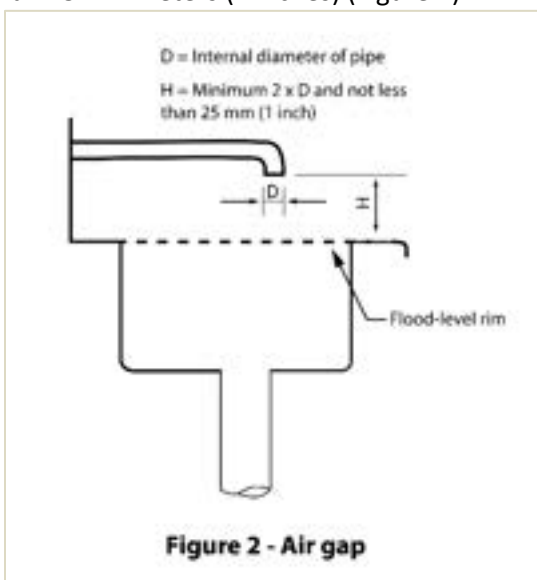
Activity pool: An indoor or outdoor RECREATIONAL WATER FACILITY that provides flowing water without any additional features. This includes wave pools, catch pools, open water slides, lazy rivers, action rivers, vortex pools, continuous surface pools, etc.

Adequate: Sufficient in number, features, or capacity to accomplish the purpose for which something is intended and to such a degree that there is no unreasonable risk to health or safety.

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 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 inside diameter of the supply pipe or faucet (i.e., delivery fixture opening) and not less than 25 millimeters (1 inches) (Figure 2).



Antientrapment cover: A cover for a drain/SUCTION FITTING designed to prevent any portion of the body or hair from becoming lodged or otherwise forced onto a drain cover or SUCTION FITTING in a RECREATIONAL WATER FACILITY.

Approved: Acceptable based on a determination of conformity with principles, practices, and generally recognized standards that protect public health, federal regulations, or equivalent international standards and regulations. Example of these standards include those from the American National Standards Institute (ANSI), NSF International, American

Society of Mechanical Engineers (ASME), American Society of Safety Engineers (ASSE), and Underwriter's Laboratory (UL).

Atmospheric vacuum breaker (AVB): A BACKFLOW PREVENTION DEVICE that consists of an air inlet valve, a check seat or float valve, and air inlet ports. The device is not APPROVED for use under continuous water pressure and must be installed downstream of the last valve.

Automatic pump shut-off (APS): System device that can sense a BLOCKABLE DRAIN blockage and shut off the pumps in a RECREATIONAL WATER FACILITY.

Baby-only water facility: RECREATIONAL WATER FACILITY with zero water depth designed for use by children in diapers or who are not completely toilet trained.

Backflow: The reversal of flow of water or other liquids, mixtures, or substances into the distribution pipes of a potable supply of water from any sources other than the source of POTABLE WATER supply. BACKSIPHONAGE and BACKPRESSURE are forms of backflow.

Backflow prevention device: An APPROVED backflow prevention plumbing device used on POTABLE WATER distribution lines where there is a direct connection or a potential CROSS-CONNECTION between the POTABLE WATER distribution system and other liquids, mixtures, or substances from any source other than the POTABLE WATER supply. Devices are designed for specific applications, such as continuous and non-continuous use, and installation orientation.

See also:

- ATMOSPHERIC VACUUM BREAKER (AVB)
- CONTINUOUS PRESSURE (CP) BACKFLOW PREVENTION DEVICE
- DUAL CHECK VALVE WITH INTERMEDIATE ATMOSPHERIC VENT (DCIV)
- HOSE BIBB CONNECTION VACUUM BREAKER
- PRESSURE VACUUM BREAKER ASSEMBLY
- REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY (RP ASSEMBLY)

Backpressure: An elevation of pressure in the downstream piping system (by pump, elevation of piping, or steam and/or air pressure) above the supply pressure at the point of consideration that would cause a reversal of normal direction of water flow.

Backsiphonage: The reversal or flowing back of used, contaminated, or polluted water from a PLUMBING FIXTURE, vessel, or other source into a water supply pipe as a result of negative pressure in the pipe.

Beverage: A liquid for drinking, including water.

Black water: Wastewater from toilets, urinals, medical sinks, and other similar facilities.

Blast chiller: A unit specifically designed for rapid cooling of FOOD products from 57°C (135°F) to 21°C (70°F) within 2 hours and 21°C (70°F) to 5°C (41°F) within an additional 4 hours.

Blind lines: Pipes closed at one end, so no water passes through.

Blockable drain/suction fitting: A drain or suction fitting in a RECREATIONAL WATER FACILITY that can be completely covered or blocked by a 457 mm x 584 mm (18 in x 23 in) body-blocking element as set forth in ASME A112.19.8M.

Bulkhead: A dividing wall covering an area constructed from several panels, also known as the visible part of the lining.

Certified data security features: Features that ensure the values recorded by the data logger cannot be manipulated by the user.

Child activity center: A facility for child-related activities where children under the age of 6 are placed to be cared for by vessel staff.

Children's pool: A pool that has a depth of 1 meter (3.3 feet) or less and is intended for use by children who are toilet trained.

Child-sized toilet: Toilets whose toilet seat height is no more than 305 millimeters (12 inches), and the toilet seat opening is no greater than 203 millimeters (8 inches).

Cleaning locker: A room or cabinet specifically designed or modified for storage of cleaning equipment such as mops, brooms, floor-scrubbing machines, and cleaning chemicals.

Contamination: The presence of environmental, chemical, biological, or physical hazards in FOOD, in water, or on other inanimate objects (for example, eating UTENSILS, LINENS, surgical instruments) that can lead to potential health risks.

Continuous pressure (CP) backflow prevention device: A device generally consisting of two check valves and an intermediate atmospheric vent that has been specifically designed to be used under conditions of continuous pressure (greater than 12 hours out of a 24-hour period).

Coving (also coved): A concave surface, molding, or other design that eliminates the usual angles of 90° or less (Figures 3, 4, 5, and 6).

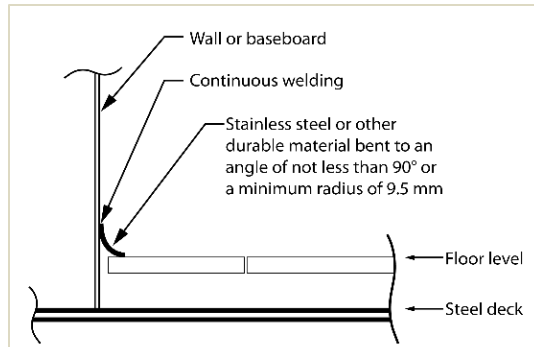


Figure 3 - Nonintegral coving (floor)

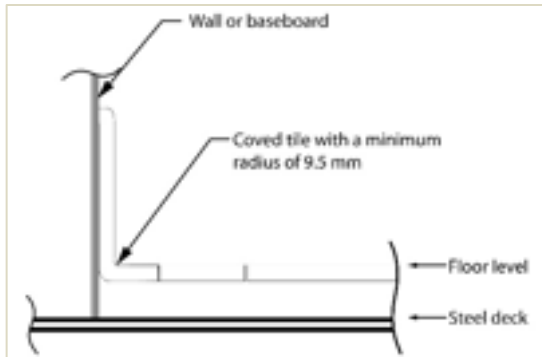


Figure 4 - Integral coving (tiles)

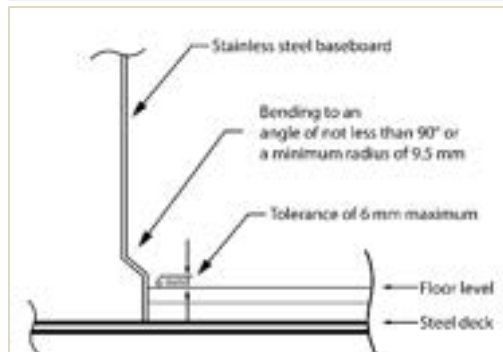


Figure 5 - Integral coving (stainless steel)

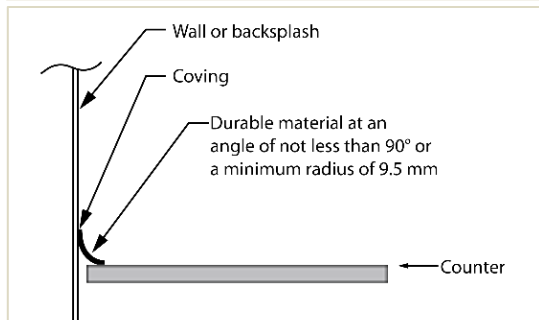


Figure 6 - Nonintegral coving (counter)

Cross-connection: An actual or potential connection or structural arrangement between a POTABLE WATER system and any other source or system through which it is possible to introduce into any part of the POTABLE WATER system any used water, industrial fluid, gas, or substance other than the intended POTABLE WATER with which the system is supplied.

Deck drain: The physical connection between decks, SCUPPERS, or DECK SINKS and the GRAY WATER or BLACK WATER systems.

Deckhead: The deck overhead covering the ceiling area constructed from several panels, also known as the visible part of the ceiling.

Deck sink: A sink recessed into the deck and sized to contain waste liquids from tilting kettles and pans.

Disinfectant: A substance or mixture of substances (for example, chemicals) that destroys or irreversibly inactivates bacteria, fungi, and viruses in the inanimate environment (for example, bathroom surfaces, elevator buttons, stair railings). This substance or mixture of substances does not necessarily destroy or inactivate bacterial spores.

Disinfection: The application of cumulative heat, a substance, or a mixture of substances (for example, chemicals) to destroy or irreversibly inactivate bacteria, fungi, and viruses in the inanimate environment (for example, bathroom surfaces, elevator buttons, stair railings).

RWF equipment, and water). Application does not necessarily destroy or inactivate bacterial spores.

Distillate water lines: Pipes carrying water condensed from the evaporators and that may be directed to the POTABLE WATER system. This is the VSP definition for pipe stripping purposes.

Dual check valve with an intermediate atmospheric vent (DCIV): A BACKFLOW PREVENTION DEVICE with dual check valves and an intermediate atmospheric vent located between the two check valves.

Drip tray: REMOVABLE tray to collect dripping fluids or FOOD from FOOD dispensing EQUIPMENT.

Dry storage area: A room or area designated for the storage of PACKAGED or containerized bulk FOOD that is not a TIME/TEMPERATURE CONTROL FOR SAFETY FOOD and dry goods such as SINGLE-SERVICE ARTICLES or SINGLE-USE ARTICLES.

Easily cleanable: A characteristic of a surface that

- Allows effective removal of soil by normal cleaning methods;
- Is dependent on the material, design, construction, and installation of the surface; and
- Varies with the likelihood of the surface's role in introducing pathogenic or toxigenic agents or other contaminants into FOOD based on the surface's acceptable placement, purpose, and use.

Easily movable: EQUIPMENT that

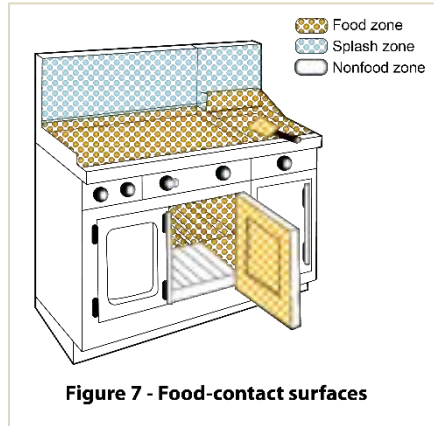
- Is PORTABLE or has a mechanical means to safely tilt it for cleaning; and
- Has no utility connection, a utility connection that disconnects quickly, or a flexible utility connection line of sufficient length that allows it to be moved for cleaning of the EQUIPMENT and adjacent area.

Equipment: An article used in the operation of a FOOD establishment, such as a freezer, grinder, hood, ice maker, MEAT block, mixer, oven, reach-in refrigerator, scale, sink, slicer, stove, table, TEMPERATURE-MEASURING DEVICE for ambient air, vending machine, or WAREWASHING machine. Equipment does not include items used for handling or storing large quantities of PACKAGED FOOD received from a supplier in a cased or overwrapped lot, such as hand trucks, forklifts, dollies, pallets, racks, and skids.

Food: Raw, cooked, or processed edible substance; ice; BEVERAGE; or ingredient used or intended for use or for sale in whole or in part for human consumption. Chewing gum is classified as FOOD.

Food area: Includes FOOD and BEVERAGE display, handling, preparation, service, and storage areas; WAREWASHING areas; clean EQUIPMENT storage areas; and LINEN storage and handling areas.

Food-contact surface: Surfaces (FOOD zone, splash zone) of EQUIPMENT and UTENSILS with which FOOD normally comes in contact and surfaces from which FOOD may drain, drip, or splash back into a FOOD or surfaces normally in contact with FOOD (Figure 7).



Food-handling areas: Any area where FOOD is stored, processed, prepared, or served.

Food preparation areas: Any area where FOOD is processed, cooked, or prepared for service. FOOD PREPARATION AREAS include areas where UTENSILS are used to mix and prepare FOOD (such as breweries and stations for making pizza, salad, sandwiches, and sushi) and the FOOD is prepared and cooked (such as fryers, griddles, grills, ovens, skillets, waffle makers).

Food service areas: Any area where FOOD is displayed or presented to passengers or crew members (excluding individual cabin service). This also applies to CONSUMER self-service areas.

Food storage areas: Any area where FOOD or FOOD products are stored.

Food transportation corridors: Areas primarily intended to move FOOD during FOOD preparation, storage, and service operations (for example, service lift [elevator] vestibules to FOOD PREPARATION AREAS, FOOD SERVICE AREAS, FOOD STORAGE AREAS, provision corridors, and corridors connecting preparation areas and service areas). Corridors primarily intended to move only closed BEVERAGES and packaged FOOD (for example, bottled or canned BEVERAGES, crackers, chips) are not considered FOOD transportation corridors. Excluded:

- Passenger and crew cabin corridors, public areas, individual cabin service, and dining rooms connected to galleys.
- FOOD loading areas used solely for delivery of FOOD to the vessel.

Food waste system: A system used to collect, transport, and process FOOD waste from FOOD AREAS to a waste disposal system (for example, pulper, vacuum system).

Gap: An open juncture greater than or equal to 3 millimeters (1/8 inches).

Gravity drain: A drain fitting used to drain the body of water in a RECREATIONAL WATER FACILITY by gravity and with no pump downstream of the fitting.

Gravity drainage system: A water collection system whereby a collection tank is located between the RECREATIONAL WATER FACILITY and the suction pumps.

Gray water: Wastewater from galley EQUIPMENT and DECK DRAINS, dishwashers, showers and baths, laundries, washbasins, DECK DRAINS, and recirculated RECREATIONAL WATER FACILITIES. Gray water does not include BLACK WATER or bilge water from the machinery spaces.

Gutterway: See SCUPPER.

Halogen: The group of elements including chlorine, bromine, and iodine used for DISINFECTION of water.

Health hazard: An impairment that creates an actual hazard to the public health through poisoning or through the spread of disease. For example, water quality that creates an actual hazard to the public health through the spread of disease by SEWAGE, industrial fluids, waste, etc. (for example, sluice machine connection).

Heated jetted tub: A freshwater or seawater tub equipped with either water or air jets. This type of tub has a heating element designed to maintain a consistent water temperature between 25°–40°C (77°–104°F). This type of tub is not defined by volume or person capacity. HEATED JETTED TUBS can be accessed only by entering a cabin (or nonpublic space like the spa). HEATED JETTED TUBS are not designed to be operated as WHIRLPOOL SPAS.

Hose bibb connection vacuum breaker (HVB): A BACKFLOW PREVENTION DEVICE that attaches directly to a hose bibb by way of a threaded head. This device uses a single check valve and vacuum breaker vent. It is a form of an AVB specifically designed for a hose connection. A hose bibb connection vacuum breaker is not APPROVED for use under continuous pressure (for example, when a shut-off valve is located downstream from the device).

Interactive recreational water facility: An indoor or outdoor recreational water facility that includes misting, jetting, waterfalls, or sprinkling features that involve water recirculation systems that come into contact with bathers. Additional features or facilities, such as decorations or fountains, will designate the facility as an interactive RWF if there is any piping connected through the recirculation system. These facilities may be zero depth. Fully or partially enclosed water slides are considered interactive recreational water facilities.

Jetted tub: A freshwater or seawater tub equipped with either water or air jets. This type of tub has no heating element. This type of tub is not defined by its volume or person capacity. JETTED TUBS can be accessed only by entering a cabin (or nonpublic space like the spa). JETTED TUBS are not designed to be operated as WHIRLPOOL SPAS.

Keel laying: The date at which construction identifiable with a specific ship begins and when assembly of that ship comprises at least 50 tons or 1% of the estimated mass of all structural material, whichever is less.

Linen: Fabric items for FOOD operations, such as cloth napkins, tablecloths, wiping cloths, and work garments, including cloth gloves.

mg/L: Milligrams per liter, the metric equivalent of parts per million (ppm).

Noncorroding: Material that maintains its original surface characteristics through prolonged influence by the use environment, FOOD contact, and normal use of cleaning compounds and sanitizing solutions.

Nonfood-contact surfaces: All exposed surfaces, other than FOOD-CONTACT SURFACES, of EQUIPMENT located in FOOD AREAS (Figure 7).

Permeate water lines: Pipes carrying permeate water from the reverse osmosis unit that are directed to the POTABLE WATER SYSTEM. This is the VSP definition for pipe stripping purposes.

pH: Potential of hydrogen. The symbol for the negative logarithm of the hydrogen ion concentration, which is a measure of the degree of acidity or alkalinity of a solution. Values between 0 and 7 indicate acidity and values between 7 and 14 indicate alkalinity. The value for pure distilled water is 7, which is neutral.

Plumbing fixture: A receptacle or device that

- Is permanently or temporarily connected to the water-distribution system of the vessel and demands a supply of water from the system; or
- Discharges used water, waste materials, or SEWAGE directly or indirectly to the drainage system of the vessel.

Portable: A description of EQUIPMENT that is REMOVABLE or mounted on casters, gliders, or rollers; provided with a mechanical means so that it can be tilted safely for cleaning; or readily movable by one person.

Potable water: Water that is halogenated and PH controlled and is intended for

- Drinking, washing, bathing, or showering;
- Using in fresh water SWIMMING POOLS and WHIRLPOOL SPAS;
- Using in the vessel's hospital;
- Handling, preparing, or cooking FOOD; and
- Cleaning FOOD STORAGE and FOOD PREPARATION AREAS, UTENSILS, and EQUIPMENT.

Potable water is free from impurities in amounts sufficient to cause disease or harmful physiological effects. The water quality must conform to requirements of the World Health Organization DRINKING WATER standards.

Potable water tanks: All tanks in which POTABLE WATER is stored.

Pressure vacuum breaker assembly (PVB): A device consisting of an independently loaded internal check valve and a spring-loaded air inlet valve. This device is also equipped with two

resilient seated gate valves and test cocks.

Recreational water facility (RWF): A water facility that has been modified, improved, constructed, or installed for the purpose of public swimming or recreational bathing. RWFs include, but are not limited to,

- ACTIVITY POOLS.
- BABY-ONLY WATER FACILITIES.
- CHILDREN'S POOLS.
- Diving pools.
- Hydrotherapy pools.
- INTERACTIVE RECREATIONAL WATER FACILITIES.
- Slides.
- SPA POOLS.
- SWIMMING POOLS.
- Therapeutic pools.
- WADING POOL SPAS.
- WHIRLPOOLS.

Recreational water facility (RWF) equipment room or area: A space intended for the operation of pool pumps, filters, heaters, controllers, and chemicals needed for operation.

Reduced pressure principle backflow prevention assembly (RP assembly): An assembly containing two independently acting internally loaded check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The unit must include properly located resilient seated test cocks and tightly closing resilient seated shutoff valves at each end of the assembly.

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.

Safety vacuum release system (SVRS): A system capable of releasing a vacuum at a suction outlet caused by a high vacuum due to a blockage in the outlet flow. These systems shall be designed and certified in accordance with ASTM F2387-04 or ANSI/ASME A 112.19.17-2002.

Sanitary seawater lines: Water lines with seawater intended for use in the POTABLE WATER production systems or in RECREATIONAL WATER FACILITIES.

Sanitizer: A substance or mixture of substances (for example, chemicals) that reduces the microbial population in the inanimate environmental surfaces (for example, FOOD-CONTACT, NONFOOD-CONTACT) by significant numbers but does not destroy or eliminate all microorganisms.

Scupper: A conduit or collection basin that channels liquid runoff to a DECK DRAIN.

Sealant: Material used to fill SEAMS.

Seam: An open juncture greater than 0.8 millimeters (1/32 inch) but less than 3 millimeters (1/8 inch).

Sewage: Liquid waste containing animal or vegetable matter in suspension or solution and may include liquids containing chemicals in solution.

Single-service articles: TABLEWARE, carry-out UTENSILS, and other items such as bags, containers, placemats, stirrers, straws, toothpicks, and wrappers that are designed and constructed for one-time, one-person use.

Single-use articles: UTENSILS and bulk FOOD containers designed and constructed to be used once and discarded. Single-use articles include items such as wax paper, butcher paper, plastic wrap, formed aluminum FOOD containers, jars, plastic tubs or buckets, bread wrappers, pickle barrels, ketchup bottles, and number 10 cans that do not meet materials, durability, strength, and cleanability specifications.

Smooth:

- A FOOD-CONTACT SURFACE having a surface free of pits and inclusions with a cleanability equal to or exceeding that of (100-grit) number 3 stainless steel.
- A NONFOOD-CONTACT SURFACE of EQUIPMENT having a surface equal to that of commercial grade hot-rolled steel free of visible scale.
- Deck, BULKHEAD, or DECKHEAD that has an even or level surface with no roughness or projections to make it difficult to clean.

Spa pool: A POTABLE WATER or saltwater-supplied pool with temperatures and turbulence comparable to a WHIRLPOOL SPA and a tub volume of more than 6 tons of water.

Spray pad: Play and water contact area designed to have no standing water.

Suction fitting: A fitting in a RECREATIONAL WATER FACILITY under direct suction through which water is drawn by a pump.

Swimming pool: A RECREATIONAL WATER FACILITY greater than or equal to 1 meter (3.3 feet) in depth. This does not include SPA POOLS that meet this depth.

Technical water: Water that has not been chlorinated or PH controlled on board the vessel and that originates from a bunkering or condensate collection process, or seawater processed through the evaporators or reverse osmosis plant and is intended for storage and use in the technical water system.

Temperature-measuring device (TMD): A thermometer, thermocouple, thermistor, or other device that indicates the temperature of FOOD, air, or water and is numerically scaled in Celsius and/or Fahrenheit.

Turnover: The circulation, through the recirculation system, of a quantity of water equal to the pool volume.

Unblockable drain/suction fitting: A drain or SUCTION FITTING in a RECREATIONAL WATER

FACILITY that cannot be completely covered or blocked by a 457-millimeter x 584-millimeter (18-inch x 23-inch) body-blocking element and that is rated by the test procedures or by the appropriate calculation in accordance with ASME A112.19.8M.

Utensil: A FOOD-contact implement or container used in storing, preparing, transporting, dispensing, selling, or serving FOOD. Examples: multiuse, SINGLE-SERVICE ARTICLES, or single-use KITCHENWARE or TABLEWARE; gloves used in contact with FOOD; FOOD TEMPERATURE-MEASURING DEVICES; and probe-type price or identification tags used in contact with FOOD.

Utility sink: Any sink located in FOOD SERVICE AREAS not intended for handwashing and/or WAREWASHING.

Wading pool: RECREATIONAL WATER FACILITY with a maximum depth of less than 1 meter (3.3 feet).

Warewashing: The cleaning and sanitizing of TABLEWARE, UTENSILS, and FOOD-CONTACT SURFACES of EQUIPMENT.

Whirlpool spa: A freshwater or seawater pool equipped with either water or air jets and designed to operate at a minimum temperature of 32°C (90°F) and a maximum temperature of 40°C (104°F).

5.2 Abbreviations

FT	Foot
IN	Inch
M	Meter
MM	Millimeter

6.0 General Facility Requirements

6.1 Size and Flow

Many factors determine and influence the size of rooms and work areas and the flow of FOOD through a vessel. Those factors can include the vessel size, number of passengers and crew, types of FOOD and menus, number of meals and mealtimes, service or presentation of meals, itinerary, and vessel owner's experience.

In general FOOD AREAS, WAREWASHING areas, and waste management areas must be sized to accommodate the vessel's full capacity of passengers and crew. Bulk FOOD STORAGE AREAS or provision rooms (for example, frozen stores, refrigerated stores, and DRY STORAGE AREAS) must be sized to prevent the storage of bulk FOOD in provisions corridors unless the corridors are specifically designed to meet provision room standards (refer to section 15.0). Refrigeration and hot FOOD holding facilities, including temporary storage facilities, must be available for all FOOD PREPARATION AREAS and FOOD SERVICE AREAS and for FOOD being transported to remote areas.

6.1.1 Food Flow

Arrange the flow of FOOD through a vessel in a logical sequence that eliminates or minimizes cross-traffic or backtracking.

Provide a clear separation of clean and soiled operations. When a common corridor is used for movement of both clean and soiled operations, the minimum distance from BULKHEAD to BULKHEAD must be considered.

Within a galley, the standard separation between clean and soiled operations must be a minimum of 2 m (6.5 ft). For smaller galleys (for example, specialty, bell box), the minimum distance will be assessed during the plan review. Additionally, common corridors for size and flow of galley operations will be reviewed during the plan review.

Provide an orderly flow of FOOD from the suppliers at dockside through the FOOD STORAGE AREAS, FOOD PREPARATION AREAS, and finishing areas to the service areas and, finally, to the waste management area. The goals are to reduce the risk for cross-CONTAMINATION, prepare and serve FOOD rapidly in accordance with strict time and temperature-control requirements, and minimize handling.

Provide a size profile for each FOOD area, including provisions, preparation rooms, galleys, pantries, WAREWASHING, garbage processing area, and storage. The size profile shows the square meters of space designated for that area. Where possible, VSP will visit the reference vessel(s) to verify the capacity during operational inspections. The size profile must be an established standard for each cruise line based on the line's review of the area size for the same FOOD AREA in its existing vessels. As ship size and passenger and crew totals change, there must be a proportional change in each FOOD AREA size based on the profile to ensure the service needs are met for each area. Size evaluations of FOOD AREAS will incorporate seating capacity and staffing, service, and EQUIPMENT needs.

During the plan review process, VSP evaluates the size of a particular room or area and the flow of FOOD through the vessel to those rooms or areas. VSP also uses the results of operational inspections to review the size profiles submitted by individual cruise lines.

6.2 Equipment Requirements

6.2.1 Galleys

The EQUIPMENT in sections 6.2.1.1 through 6.2.1.12 is required in galleys depending on the level and type of service. This EQUIPMENT may be recommended for other areas.

6.2.1.1 Blast Chillers

Incorporate BLAST CHILLERS into the design of passenger and crew galleys. More than one unit may be necessary depending on the size of the vessel and the distances between the BLAST CHILLERS and the storage and service areas.

The size and type of BLAST CHILLERS installed for each FOOD PREPARATION AREA are based on the concept/menu, operational requirements to satisfy that menu, and volume of FOOD requiring cooling.

6.2.1.2 Utility Sinks

Include FOOD preparation UTILITY SINKS in all meat, fish, and vegetable preparation rooms; in cold pantries or garde mangers; and in any other areas where personnel wash or soak FOOD.

An automatic vegetable washing machine may be used in addition to FOOD preparation UTILITY SINKS in vegetable preparation rooms.

6.2.1.3 Food Storage

Include storage cabinets, shelves, or racks for FOOD products and EQUIPMENT in FOOD STORAGE AREAS, FOOD PREPARATION AREAS, and FOOD SERVICE AREAS, including bars and pantries.

6.2.1.4 Tables, Carts, or Pallets

Locate fixed or PORTABLE tables, carts, or pallets in areas where FOOD or ice is dispensed from cooking EQUIPMENT, such as from soup kettles, steamers, braising pans, tilting pans, or ice storage bins.

6.2.1.5 Storage for Large Utensils

Include a storage cabinet or rack for large UTENSILS such as ladles, paddles, whisks, and spatulas and provide for vertical storage of cutting boards.

6.2.1.6 Knife Storage

Include knife lockers or other designated knife storage facilities (for example, drawers) that are EASILY CLEANABLE and meet food-contact standards.

6.2.1.7 Waiter Trays

Include storage areas, cabinets, or shelves for waiter trays.

6.2.1.8 Dish Storage

Include dishware lowerators or similar dish storage and dispensing cabinets.

6.2.1.9 Glass Rack

Include glass rack storage shelving.

6.2.1.10 Preparation Counters

Include work counters or FOOD preparation counters that provide sufficient workspace.

6.2.1.11 Drinking Fountains

Include drinking fountains that allow for hands-free operation and without a filling spout in FOOD PREPARATION AREAS.

6.2.1.12 Cleaning Lockers

Include CLEANING LOCKERS (refer to section 20.1 for specific CLEANING LOCKER construction requirements).

6.2.2 Warewashing Sinks

Equip the main galley, crew galley, and buffet service area/galley potwashing areas with a three-compartment sink and prewash station or a four-compartment sink with an insert pan and an overhead spray.

Install sinks with compartments large enough to accommodate the largest piece of EQUIPMENT (pots, tableware, etc.) used in their designated serving areas. An automatic WAREWASHING machine may be added but cannot be substituted for a three- or four-compartment sink.

Provide additional three-compartment sinks with prewash stations or four-compartment sinks with insert pans and overhead spray in heavy-use areas. Heavy-use areas may include pastry/bakery, butcher shop, buffet pantry, and other preparation areas where the size of the facility or the location makes the use of a central potwashing area impractical.

Refer to section 18.0 for additional WAREWASHING requirements.

6.2.3 Warewashing Access

Equip all FOOD PREPARATION AREAS with easy access to a three-compartment sink or a WAREWASHING machine with an adjacent dump sink and prewash hose.

Refer to section 18.0 for additional WAREWASHING requirements.

6.2.4 Drip Trays or Drains, Beverages

Furnish BEVERAGE dispensing EQUIPMENT with REMOVABLE DRIP TRAYS or built-in drains in the tabletop. Furnish bulk milk dispensers with REMOVABLE DRIP TRAYS.

6.2.5 Drip Trays, Condiments

Provide REMOVABLE DRIP TRAYS for condiment-dispensing EQUIPMENT.

6.2.6 Equipment Storage Areas

Design storage areas to accommodate all EQUIPMENT and UTENSILS used in FOOD PREPARATION AREAS (for example, ladles and cutting blades).

6.2.7 Deck Drainage

Ensure that the design of installed EQUIPMENT directs FOOD and wash water drainage into a DECK DRAIN, SCUPPER, or DECK SINK, and not onto a deck.

6.2.8 Utility Sink

Provide a UTILITY SINK in areas such as BEVERAGE stations and bars where it is necessary to refill serving pitchers or discard BEVERAGES.

6.2.9 Dipper Wells

For hand-scooped ice cream, sherbet, or similar products, provide dipper wells with running water and proper drainage.

6.2.10 Doors or Closures

Provide tight-fitting doors or other protective closures for ice bins, FOOD display cases, and other FOOD and ice holding units to prevent CONTAMINATION of stored products.

6.2.11 Countertop Openings and Rims

Protect countertop openings and rims of FOOD cold tops, bains-marie, ice wells, and other drop-in type FOOD and ice holding units with a raised integral edge (marine edge) or rim of at least 5 mm (3/16 in) above the counter level around the opening.

6.2.12 Insect-Control Devices

Insect-control devices that electrocute or stun flying insects are not permitted in FOOD AREAS. Do not install insect control devices such as insect light traps over FOOD STORAGE, FOOD PREPARATION AREAS, FOOD SERVICE AREAS, or clean EQUIPMENT.

6.3 Equipment Surfaces**6.3.1 Materials**

Ensure material used for FOOD-CONTACT SURFACES and exposed NONFOOD-CONTACT SURFACES is SMOOTH, durable, and NONCORRODING. These surfaces must be EASILY CLEANABLE and designed without unnecessary ledges, projections, or crevices.

6.3.2 Food-Contact Surfaces

Use only materials APPROVED for contact with FOOD on FOOD-CONTACT SURFACES.

6.3.2.1 Surfaces

Make all FOOD-CONTACT SURFACES SMOOTH (with no sharp edges), durable, NONCORRODING, EASILY CLEANABLE, accessible, and maintainable.

6.3.2.2 Corners

Provide COVED and seamless corners. Form external corners and angles with a sufficient radius to permit proper drainage and without sharp edges.

6.3.2.3 Sealants

Use only SEALANTS APPROVED for FOOD-CONTACT SURFACES (certified to ANSI/NSF Standard 51, or equivalent criteria) on FOOD-CONTACT SURFACES and FOOD splash zone surfaces. Avoid excessive use of SEALANT.

6.3.3 Nonfood-Contact Surfaces

Use durable and NONCORRODING material for NONFOOD-CONTACT SURFACES.

6.3.3.1 Easily Cleanable

Design NONFOOD-CONTACT SURFACES so that they are SMOOTH and EASILY CLEANABLE. Ensure that NONFOOD-CONTACT SURFACES are ACCESSIBLE for cleaning and maintenance.

6.3.3.2 No Sharp Corners

Ensure that NONFOOD-CONTACT SURFACES subject to FOOD or BEVERAGE spills have no sharp internal corners and angles. Examples of these areas are waiter station work surfaces, BEVERAGE stations, technical compartments with drain lines, mess room soiled drop-off stations, and bus stations.

6.3.3.3 Compatible Metals

Use compatible metals to minimize corrosion due to galvanic action or to provide effective insulation between dissimilar metals to protect them from corrosion.

6.4 Bulkheads, Deckheads, and Decks**6.4.1 Exposed Fasteners**

Do not use exposed fasteners in BULKHEAD and DECKHEAD construction.

6.4.2 Seams and Penetrations

Seal all SEAMS between adjoining BULKHEAD panels and adjoining DECKHEAD panels and between BULKHEAD and DECKHEAD panels.

6.4.2.1 Seal Seams

Seal SEAMS greater than 0.8 mm (1/32 in), but less than 3 mm (1/8 in), with an appropriate SEALANT or appropriate profile strips.

6.4.2.2 Cover Gaps

Cover all GAPS greater than or equal to 3 mm (1/8 in) with appropriate profile strips.

6.4.2.3 Seal Penetrations

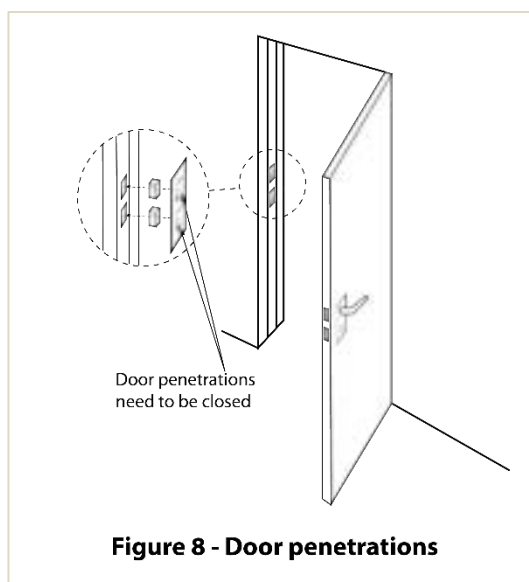
Seal all BULKHEAD, DECKHEAD, and deck penetrations through which pipes or other conduits pass, including those inside technical compartments. Use durable and NONCORRODING collars where GAPS are greater than or equal to 3 mm (1/8 in).

6.4.3 Bulkheads

Reinforce all BULKHEADS sufficiently to prevent buckling or to prevent the BULKHEAD from becoming detached under normal operating conditions.

6.4.4 Penetrations

Weld door penetrations around fire doors, in thresholds, and in BULKHEAD openings so there are no exposed voids. Ensure locking/latch pins insert into closed locking pin recesses. See Figure 8.



6.4.5 Deck Coving

Install durable COVING as part of the deck and BULKHEAD interface and at the juncture between decks and EQUIPMENT foundations.

6.4.5.1 Radius

Ensure COVING has at least a 9.5-mm (3/8-in) radius or open design (greater than 90°). Additionally, a single bent piece of stainless steel can be used as COVING. See COVING definition (Figures 3 and 5).

6.4.5.2 Materials

Provide COVING that is hard, durable, EASILY CLEANABLE, and of sufficient thickness to withstand normal wear.

6.4.5.3 Fasten

Securely fasten COVING.

6.4.6 Deck Material

Use deck material that is hard, durable, EASILY CLEANABLE, nonskid, and nonabsorbent. Vinyl or linoleum deck coverings are not acceptable in FOOD AREAS. However, vinyl or linoleum deck coverings may be used in areas where only table LINENS are stored.

6.4.7 Compatible Metals

Use compatible metals to minimize corrosion due to galvanic action or to provide effective insulation between dissimilar metals to protect them from corrosion.

6.5 Deck Drains, Deck Sinks, and Scuppers

6.5.1 Material

Construct DECK DRAINS, SCUPPERS, and DECK SINKS from stainless steel.

Ensure DECK DRAINS, SCUPPERS, and DECK SINKS have SMOOTH finished surfaces, are ACCESSIBLE for cleaning, and are designed to drain completely.

6.5.2 Cover Grates

Construct SCUPPER and DECK SINK cover grates from stainless steel or other materials that

- Meet the requirements for a SMOOTH, EASILY CLEANABLE surface,
- Are strong enough to maintain the original shape, and
- Have no sharp edges.

Provide SCUPPER and DECK SINK cover grates that are tight-fitting, REMOVABLE for cleaning, and uniform in length where practical (for example, 1 m or 39 in) so that they are interchangeable.

6.5.3 Location

Place DECK DRAINS and DECK SINKS in low-traffic areas such as in front of soup kettles, boilers, tilting pans, or braising pans.

6.5.4 Sizing

Size DECK DRAINS, SCUPPERS, and sinks to eliminate spillage and overflow to adjacent deck surfaces.

6.5.5 Deck Drainage

Provide sufficient deck drainage and design deck and SCUPPER drain lines in all FOOD HANDLING AREAS and WAREWASHING areas to prevent liquids from pooling on the decks. Do not use DECK SINKS as substitutes for DECK DRAINS.

6.5.6 Cross-Drain Connections

Provide cross-drain connections to prevent pooling and spillage from the SCUPPER when the vessel is listing.

6.5.7 Coaming

If a nonremovable coaming is provided around a DECK DRAINS, ensure the juncture with the deck is COVERED. Integral COVING is not required.

6.6 Ramps

Install ramps over thresholds and ensure they are easily REMOVABLE or sealed in place. Slope ramps for easy trolley roll-in and roll-out. Ensure ramps are strong enough to maintain their shape. If ramps over SCUPPER covers are built as an integral part of the SCUPPER system, construct them of SMOOTH, durable, and EASILY CLEANABLE materials.

6.7 Gray and Black Water Drain Lines

Limit the installation of drain lines that carry BLACK WATER or other liquid wastes directly overhead or horizontally through spaces used for FOOD preparation or storage. This limitation includes areas for washing or storing UTENSILS and EQUIPMENT (for example, in bars, in deck pantries, and over buffet counters).

If installation of waste lines is unavoidable in these areas,

- Sleeve weld or butt weld steel piping.
- Heat fuse or chemically weld plastic piping.

For SCUPPER lines, factory assembled transition fittings for steel to plastic pipes are allowed when manufactured per ASTM F1973 or equivalent standard. Do not use push-fit or press-fit piping over these areas.

7.0 General Hygiene Facilities Requirements for Food Areas

7.1 Handwashing Stations

This section also applies to self-service and served candy shops where employees serve candy, refill self-service containers, etc. Refer to Section 19.0 for lighting requirements.

7.1.1 Potable Water

Provide hot and cold POTABLE WATER to all handwashing sinks. Equip handwashing sinks to provide water at a temperature between 29.4°C (85°F) and 49°C (120°F) through a mixing valve or combination faucet. Ensure sufficient flow for all handwashing stations.

7.1.2 Construction

Construct handwashing sinks of stainless steel in FOOD AREAS. Handwashing sinks in FOOD SERVICE AREAS and bars may be constructed of a similar, SMOOTH, durable material.

7.1.3 Supplies

Provide handwashing stations that include a soap dispenser, paper towel dispenser, corrosion-resistant waste receptacle, and, where necessary, splash panels to protect the following:

- Adjoining EQUIPMENT.
- Clean UTENSILS.
- FOOD STORAGE.
- FOOD preparation surfaces.

If attached to the BULKHEAD, permanently seal soap dispensers, paper towel dispensers, and waste towel receptacles or make them REMOVABLE for cleaning. Air hand dryers are not permitted.

7.1.4 Dispenser Locations

Install soap dispensers and paper towel dispensers so that they are not over adjoining EQUIPMENT, clean UTENSIL storage, FOOD STORAGE, FOOD preparation surfaces, bar counters, or water fountains.

For a multiple station sink, ensure that there is a soap dispenser within 380 mm (15 in) of each faucet and a paper towel dispenser within 760 mm (30 in) of each faucet.

7.1.5 Dispenser Installation

Install paper towel dispensers a minimum of 450 mm (18 in) above the deck (as measured from the lower edge of the dispenser).

7.1.6 Installation Specifications

Install handwashing sinks a minimum of 750 mm (30 in) above the deck, as measured at the top edge of the basin, so employees do not have to reach excessively to wash their hands.

Install counter-mounted handwashing sinks a minimum of 600 mm (24 in) above the deck, as measured at the counter level.

The minimum size of the handwashing sink basin must be 300 mm (12 in) in length and 300 mm (12 in) in width. The diameter of round basins must be at least 300 mm (12 in). Additionally, the minimum distance from the bottom of the water tap to the bottom of the basin must be 200 mm (8 in).

7.1.7 Locations

Locate handwashing stations throughout FOOD-HANDLING AREAS, FOOD PREPARATION AREAS, bars, and WAREWASHING areas so that no employee must walk more than 8 m (26 ft) to reach a station or pass through a normally closed door that requires touching a handle to open.

7.1.7.1 Food-Dispensing Waiter Stations

Provide a handwashing station at FOOD-dispensing waiter stations (for example, soups, ice) where the staff do not routinely return to an area with a handwashing station.

7.1.7.2 Food-Handling Areas

Provide a handwashing station in provision areas where bulk raw FOOD are handled by provisioning staff.

7.1.7.3 Crew Buffets

Provide at least one handwashing station for every 100 seats (for example, 1–100 seats = one handwashing station, 101–200 seats = two handwashing stations).

Locate stations near the entrance of all officer/staff/crew mess areas where FOOD service lines are “self-service.”

7.1.7.4 Soiled Dish Drop-Off

Install handwashing stations at the soiled dish drop-off area(s) in the main galley, specialty galleys, and pantries for employees bringing soiled dishware from the dining rooms or other FOOD SERVICE AREAS to prevent long waiting lines at handwashing stations. Provide one sink or one faucet on a multiple station sink for every 10 wait staff who handle clean items and are assigned to a FOOD SERVICE AREA during maximum capacity.

During the plan review, VSP will evaluate work assignments for wait staff to determine the appropriate number of handwashing stations.

7.1.8 Faucet Handles

Install easy-to-operate sanitary faucet handles (for example, large elephant-ear handles, foot pedals, knee pedals, or electronic sensors) on handwashing sinks in FOOD AREAS. If a faucet is self-closing, slow-closing, or metering, provide a water flow of at least 15 seconds without the need to reactivate the faucet.

7.1.9 Signs

Install permanent signs in English and other appropriate languages stating, “wash hands often,” “wash hands frequently,” or similar wording.

7.2 Bucket-Filling Station

7.2.1 Location

Provide at least one bucket-filling station in each area of the galleys (for example, cold galley, hot galley, bakery) and in FOOD STORAGE and FOOD PREPARATION AREAS.

7.2.2 Mixing Valve

Supply hot and cold POTABLE WATER through a mixing valve to a faucet with the appropriate BACKFLOW protection at each bucket-filling station.

7.2.3 Deck Drainage

Provide appropriate deck drainage (for example, SCUPPER or sloping deck to DECK DRAIN) under all bucket-filling stations to eliminate any pooling of water on the decks below the bucket-filling station.

7.3 Crew Public Toilet Rooms for Food Service Employees

7.3.1 Location and Number

Install at least one employee toilet room near the work area of all FOOD PREPARATION AREAS. [BEVERAGE-only service bars are excluded.]

Provide one toilet per 25 employees and provide separate facilities for males and females if more than 25 employees are assigned to a FOOD PREPARATION AREA (excluding wait staff). This refers to the shift with the maximum number of FOOD employees excluding wait staff. Urinals may be installed but do not count toward the toilet/employee ratio.

7.3.1.1 Main Galleys and Crew Galleys

For main galleys and crew galleys, locate toilet rooms inside the FOOD PREPARATION AREA or in a passageway immediately outside the area. If a main galley has multiple levels and there is stairwell access between the galleys, toilet rooms may be located near the stairwell within one deck above or below.

7.3.1.2 Other Food Service Outlets

For other FOOD service outlets (such as buffet galleys, specialty galleys), do not locate toilet rooms more than two decks above or below and within the distance of a fire zone. Do not locate toilet rooms more than one fire zone away if on the same deck (they should be within the same fire zone or an adjacent fire zone). If more than one FOOD service outlet is located on the same deck, the toilet room may be located on the same deck between the outlets and within two fire zones of each outlet.

7.3.1.3 Provision Areas

For preparation rooms in provision areas, use the distance requirement described in section 7.3.1.2 to locate toilet rooms.

7.3.2 Ventilation and Handwashing

Install exhaust ventilation and handwashing facilities in each toilet room. Air hand dryers are not permitted in these toilet rooms. Install a permanent sign in English, and other languages where appropriate, stating the exact wording: "WASH HANDS AFTER USING THE TOILET." Locate this sign on the BULKHEAD adjacent to the main toilet room door or on the main door inside the toilet room.

7.3.3 Hands-Free Exit

Ensure hands-free exit for toilet rooms, as described in section 36.2. Ensure handwashing facilities have sanitary faucet handles as in section 7.1.8.

7.3.4 Doors

Install tight-fitting, self-closing doors.

7.3.5 Decks

Construct decks of hard, durable materials and provide COVING at the BULKHEAD-deck juncture.

7.3.6 Deckheads and Bulkheads

Install EASILY CLEANABLE DECKHEADS and BULKHEADS.

8.0 Equipment Placement and Mounting

8.1 Seal

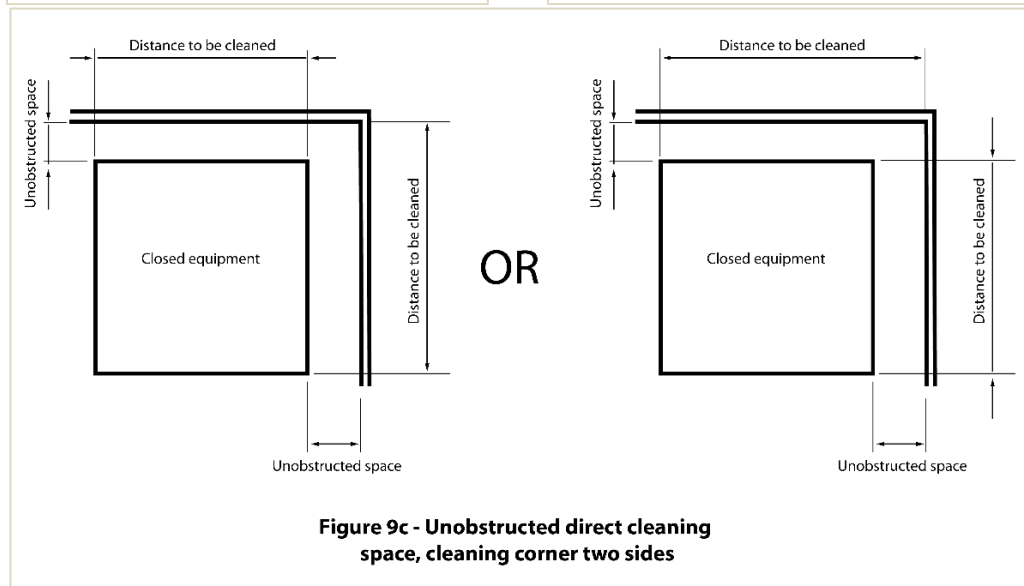
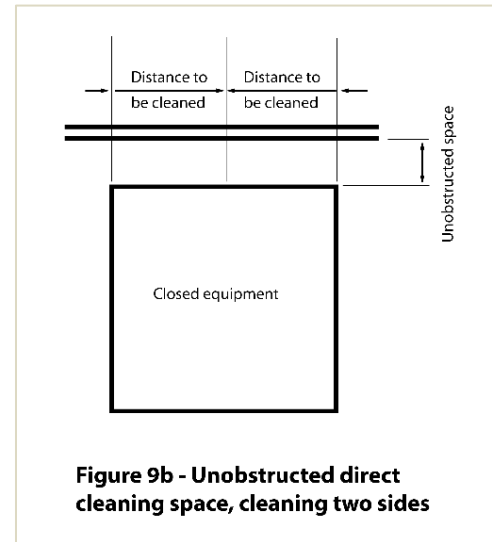
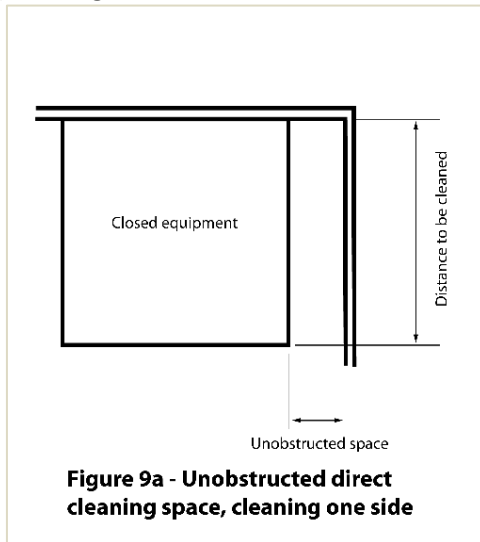
Seal counter-mounted EQUIPMENT that is not PORTABLE to the BULKHEAD, tabletop, countertop, or adjacent EQUIPMENT.

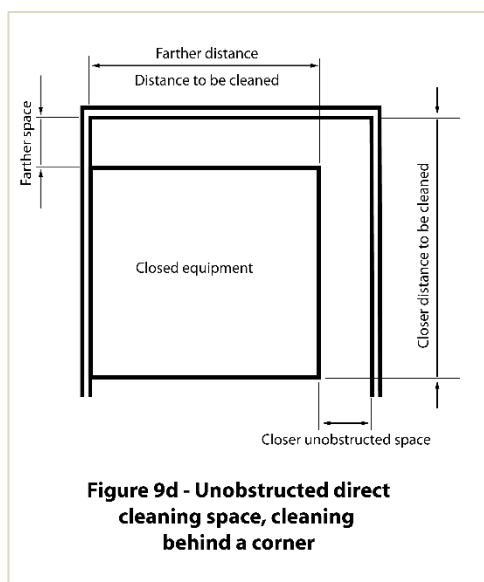
If the EQUIPMENT is not sealed, provide sufficient, unobstructed space for cleaning around, behind, and between fixed EQUIPMENT. The space provided is dependent on the distance from either a position directly in front or from either side of the EQUIPMENT to the farthest point requiring cleaning as described below. These requirements do not apply to open racks, other EQUIPMENT of open design, or PORTABLE EQUIPMENT. See also Figures 9a through 9d.

- A cleaning distance of less than 600 mm (24 in) requires an unobstructed space of 150 mm (6 in).

- A cleaning distance between 600 mm (24 in) and 1,200 mm (47 in) requires an unobstructed space of 200 mm (8 in).
- A cleaning distance between 1,200 mm (47 in) and 1,800 mm (71 in) requires an unobstructed space of 300 mm (12 in).
- A cleaning distance greater than 1,800 mm (71 in) requires an unobstructed space of 460 mm (18 in).

If the unobstructed cleaning space includes a corner, the cleaning distance must be treated separately in two sections. Treat the farther space behind the EQUIPMENT separately according to the above bullet points. The closer space must be a minimum of 300 mm (12 in). See Figure 9d.





Distance To Be Cleaned	Unobstructed Space
Less than 600 mm (24 in)	150 mm (6 in)
Between 600 mm (24 in) and 1,200 mm (47 in)	200 mm (8 in)
Between 1,200 mm (47 in) and 1,800 mm (71 in)	300 mm (12 in)
More than 1,800 mm (71 in)	460 mm (18 in)

8.2 Seal or Elevate

Seal EQUIPMENT that is not PORTABLE to the deck or elevate it on legs that provide at least a 150 mm (6 in) clearance between the deck and the EQUIPMENT. If no part of the EQUIPMENT is more than 150 mm (6 in) from the point of cleaning access, the clearance space may be only 100 mm (4 in). This includes vending and dispensing machines in FOOD AREAS, including mess rooms.

Exceptions to the EQUIPMENT requirements may be granted if there are no barriers to cleaning (for example, EQUIPMENT such as waste handling systems and WAREWASHING machines with pipelines, motors, and cables) and a 150-mm (6-in) clearance from the deck may not be practical.

8.2.1 Deck Mounting

Continuous weld all EQUIPMENT that is not PORTABLE to stainless steel pads or plates on the deck. Ensure the welds have SMOOTH edges, rounded corners, and no GAPS.

8.2.2 Adhesives

Attach deck-mounted EQUIPMENT as an integral part of the deck surface with glue, epoxy, or other durable, APPROVED adhesive product. Ensure that the attached surfaces are SMOOTH and EASILY CLEANABLE.

8.3 Deckhead Clearance

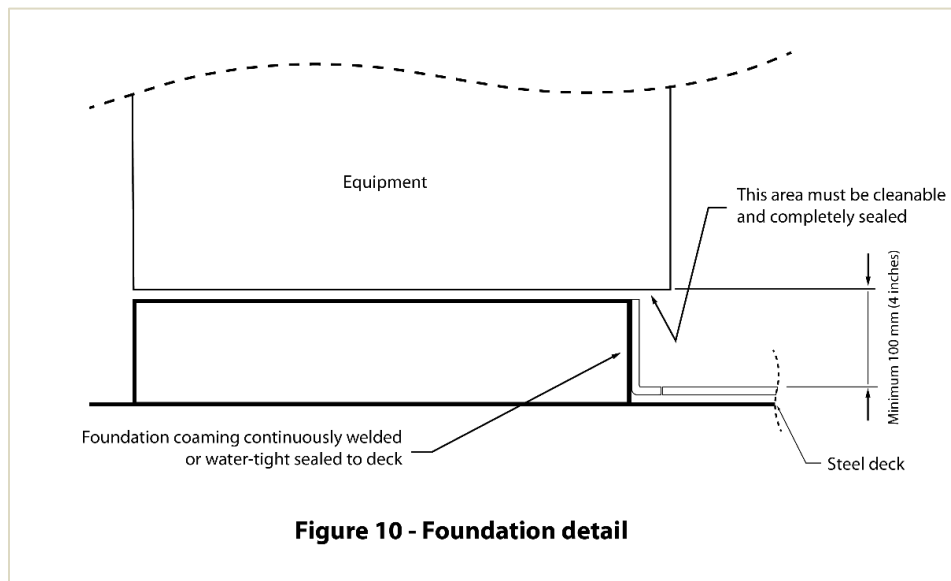
Provide a minimum of at least 150 mm (6 in) between EQUIPMENT and DECKHEADS. If this clearance cannot be achieved, extend the EQUIPMENT to the DECKHEAD panels and

seal appropriately.

8.4 Foundation or Coaming

Provide a sealed-type foundation or coaming for EQUIPMENT not mounted on legs. Do not allow EQUIPMENT to overhang the foundation or coaming by more than 100 mm (4 in). Completely seal any overhanging EQUIPMENT along the bottom (Figure 10).

Mount EQUIPMENT on a foundation or coaming at least 100 mm (4 in) above the finished deck. Use cement, hard SEALANT, or continuous weld to seal EQUIPMENT to the foundation or coaming.



A lower foundation, not less than 75 mm (3 in), is acceptable for self-service counters intended for persons using wheelchairs.

8.5 Counter-Mounted Equipment

Seal counter-mounted EQUIPMENT, unless PORTABLE, to the countertop or mount it on legs.

Leg length depends on the horizontal distance of the tabletop under the EQUIPMENT from either end to the farthest point requiring cleaning (see table below).

Horizontal Distance (Depth)	Equipment Leg Length
More than 750 mm (30 in)	At least 150 mm (6 in)
500 to 750 mm (20 to 30 in)	At least 100 mm (4 in)
75 to 500 mm (3 to 20 in)	At least 75 mm (3 in)
Less than 75 mm (3 in)	50 mm (2 in)

9.0 Fasteners and Requirements for Securing and Sealing Equipment

9.1 Food-Contact Surfaces

9.1.1 Attach

Attach all FOOD-CONTACT SURFACES or connections from FOOD-CONTACT SURFACES to adjacent splash zones to ensure a seamless COVED corner.

Reinforce all BULKHEADs, DECKHEADs, or decks receiving such attachments.

9.1.2 Fasteners

Use low profile, nonslotted, NONCORRODING, and easy-to-clean fasteners on FOOD-CONTACT SURFACES and in splash zones. The use of exposed slotted screws, Phillips head screws, or pop rivets in these areas is prohibited.

9.2 Nonfood-Contact Surfaces

9.2.1 Seal

Seal EQUIPMENT SEAMS with an appropriate SEALANT (refer to SEAM definition). Avoid excessive use of SEALANT.

Use stainless steel profile strips on surfaces exposed to extreme temperatures (for example, freezers, cook tops, grills, and fryers) or for GAPS greater than or equal to 3 mm (1/8 in). Do not use SEALANTS to close GAPS.

9.2.2 Fasteners

Construct slotted or Phillips head screws, pop rivets, and other fasteners used in NONFOOD-CONTACT AREAS of NONCORRODING materials.

9.3 Use of Sealants

9.3.1 Approved

Use APPROVED (certified to ANSI/NSF Standard 51 or equivalent criteria) FOOD grade SEALANTS on FOOD-CONTACT SURFACES. Avoid excessive use of SEALANT.

Once cured, SEALANTS must be SMOOTH, semihard or hard, durable, and easy to clean. [Soft SEALANTS can be used in ice machines.]

Provide product manufacturers' literature and certification listing for SEALANTS used.

10.0 Latches, Hinges, and Handles

Use durable, NONCORRODING, and EASILY CLEANABLE built-in EQUIPMENT latches, hinges, and handles. Do not use piano hinges in FOOD-CONTACT SURFACES.

11.0 Gaskets

11.1 Materials

Use SMOOTH, nonabsorbent, nonporous materials for EQUIPMENT gaskets in reach-in refrigerators, steamers, ice bins, ice cream freezers, and similar EQUIPMENT.

11.2 Exposed Surfaces

Close and seal exposed surfaces of gaskets at their ends and corners.

11.3 Removable

Use REMOVABLE door gaskets in refrigerators, freezers, BLAST CHILLERS, and similar EQUIPMENT.

11.4 Fasteners

Follow the requirements in section 9.0 when using fasteners to install gaskets.

12.0 Equipment Drain Lines

12.1 Connections

Connect drain lines to the appropriate waste system by means of an AIR GAP or AIR BREAK from all fixtures, sinks, appliances, compartments, refrigeration units, or other EQUIPMENT used, designed for, or intended to be used in the preparation, processing, storage, or handling of FOOD, including ice and BEVERAGES. Ensure the AIR GAP or AIR BREAK is easily ACCESSIBLE for inspection and cleaning.

12.2 Construction Materials

Use stainless steel or other durable, NONCORRODING, and EASILY CLEANABLE rigid or flexible material in the construction of drain lines. Do not use ribbed, braided, or woven materials in areas subject to splash or soiling unless coated with a SMOOTH, durable, and EASILY CLEANABLE material.

12.3 Size

Size drain lines appropriately, with a minimum interior diameter of 25 mm (1 in) for custom-built EQUIPMENT.

12.4 Walk-In Refrigerators and Freezers

Slope walk-in refrigerator and freezer evaporator drain lines and extend them through the BULKHEAD or deck.

Direct walk-in refrigerator and freezer evaporator drain lines through an ACCESSIBLE AIR-BREAK to a deck SCUPPER or drain below the deck level or to a SCUPPER outside the unit.

12.5 Deck Drains and Scuppers

Direct drain lines from DECK DRAINS and SCUPPERS through an indirect connection to the wastewater system for any room constructed to store FOOD, clean EQUIPMENT, SINGLE-

USE ARTICLES and SINGLE-SERVICE ARTICLES, and clean FOOD service LINEN.

12.6 Horizontal Distance

Install drain lines to minimize the horizontal distance from the source of the drainage to the discharge.

12.7 Vertical Distance

Install horizontal drain lines at least 100 mm (4 in) above the deck and slope them to drain.

12.8 Food Equipment Drain Lines

All drain lines (except condensate drain lines) from hoodwashing systems, cold-top tables, bains-marie, dipper wells, UTILITY SINKS, and WAREWASHING sinks or machines must meet the criteria in sections 12.8.1 through 12.8.4:

12.8.1 Length

Lines must be less than 1,000 mm (39 in) in length and free of sharp angles or corners if designed to be cleaned in place by a brush.

12.8.2 Cleaning

Lines must be REMOVABLE for cleaning if they are longer than 1,000 mm (39 in).

12.8.3 Extend Vertically

Extend fixed EQUIPMENT drain lines vertically to a SCUPPER or DECK DRAIN when possible. If not possible, keep the horizontal distance of the line to a minimum.

12.8.4 Air Break

Handwashing sinks, mop sinks, and drinking fountains are not required to drain through an AIR BREAK.

13.0 Electrical Connections, Pipelines, Service Lines, and Attached Equipment

13.1 Encase

Encase electrical wiring from permanently installed EQUIPMENT in durable and EASILY CLEANABLE material. Do not use ribbed or woven stainless steel electrical conduit where it is subject to splash or soiling unless it is encased in EASILY CLEANABLE plastic or similar EASILY CLEANABLE material. Do not use ribbed, braided, or woven conduit.

13.2 Install or Fasten

For EQUIPMENT that is permanently mounted, install or fasten service lines in a manner that prevents the lines from contacting decks or countertops.

13.3 Mounted Equipment

Tightly seal BULKHEAD or DECKHEAD-mounted EQUIPMENT (phones, speakers, electrical control panels, outlet boxes, etc.) with the BULKHEAD or DECKHEAD panels. Do not locate such EQUIPMENT in areas exposed to FOOD splash.

13.4 Seal Penetrations

Tightly seal any areas where electrical lines, steam or water pipelines, etc., penetrate the panels or tiles of the deck, BULKHEAD, or DECKHEAD, including inside technical spaces located above or below EQUIPMENT or work surfaces. Seal any openings or voids around the electrical lines or the steam or water pipelines and the surrounding conduit or pipelines.

13.5 Enclose Pipelines

Enclose steam and water pipelines to kettles and boilers in stainless steel cabinets or position the pipelines behind BULKHEAD panels. Minimize the number of exposed pipelines. Do not use ribbed, braided, or woven materials in areas subject to splash or soiling unless coated with a SMOOTH, durable, and EASILY CLEANABLE material, except for steam connections. Cover any exposed insulated pipelines with stainless steel or other durable, EASILY CLEANABLE material.

14.0 Hood Systems

14.1 Warewashing

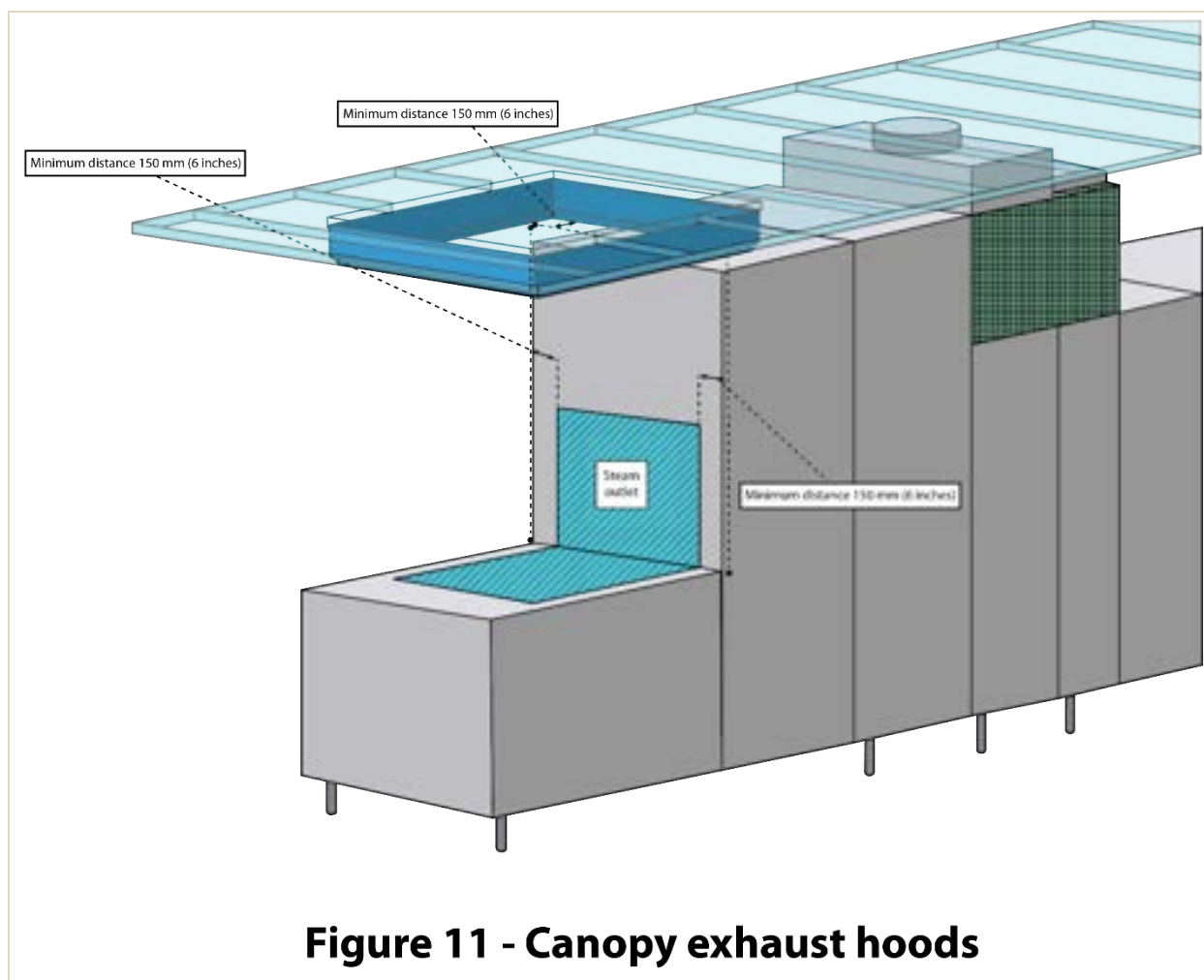
Install canopy exhaust hood or direct duct exhaust systems over WAREWASHING EQUIPMENT (except undercounter WAREWASHING machines) and over three-compartment sinks in potwash areas where hot water is used for sanitizing.

14.1.1 Direct Duct Exhaust

Directly connect WAREWASHING machines that have a direct duct exhaust to the hood exhaust trunk.

14.1.2 Overhang

Provide canopy exhaust hoods over WAREWASHING EQUIPMENT or three-compartment sinks to have a minimum 150 mm (6 in) overhang from the steam outlet to capture excess steam and heat and prevent condensate from collecting on surfaces (Figure 11).



14.1.3 Cleanout Ports

Install cleanout ports in the direct exhaust ducts of the ventilation systems between the top of the WAREWASHING machine and the hood system or DECKHEAD.

14.1.4 Drip Trays

Provide ACCESSIBLE and REMOVABLE condensate DRIP TRAYS in WAREWASHING machine ventilation ducts. A dedicated drainage pipe from the DRIP TRAYS to a GUTTERWAY or a DECK DRAIN is also acceptable.

14.2 Cooking and Hot-Holding Equipment

14.2.1 Cooking Equipment

Install hood or canopy systems above cooking EQUIPMENT in accordance with SOLAS requirements to ensure they remove excess steam and grease-laden vapors and prevent condensate from collecting on surfaces.

14.2.2 Hot-Holding Equipment

In indoor areas, install a hood or canopy system or dedicated local exhaust ventilation above bains-marie, steam tables, or other hot-holding EQUIPMENT that generates

steam to control excess heat and prevent condensate from collecting on surfaces.

14.2.3 Countertop and Portable Equipment

Install a hood or canopy system or dedicated local extraction when SOLAS requirements do not specify an exhaust system for countertop cooking appliances or where PORTABLE appliances are used. The exhaust system must remove excess steam and grease-laden vapors and prevent collection of the cooking by-products or condensate on surfaces.

14.3 Size

Properly size all exhaust and supply vents.

14.3.1 Position and Balance

Position and balance all exhaust and supply vents to ensure proper air conditioning and capture/exhaust of heat and steam.

14.3.2 Prevent Condensate

Limit condensate formation on either the exhaust canopy hood or air supply vents by either

- Locating or directing conditioned air away from exhaust hoods and heat-generating EQUIPMENT or
- Installing a shield to block air from the hood supply vents.

14.4 Filters

Where used, provide REMOVABLE and cleanable filters.

14.5 Access

Provide access for cleaning vents and ductwork. Automatic clean-in-place systems are recommended for removal of grease generated from cooking EQUIPMENT.

14.6 Hood Cleaning Cabinets

Locate automatic cleaned-in-place hoodwashing control panels that have a chemical reservoir, so they are not over FOOD preparation EQUIPMENT or counters, FOOD preparation or WAREWASHING sinks, or FOOD and clean EQUIPMENT storage.

14.7 Construction

Construct hood systems of stainless steel with COVED corners with a radius of at least 9.5 mm (3/8 in).

14.7.1 Continuous Welds

Use continuous welds or profile strips on adjoining pieces of stainless steel.

14.7.2 Drainage System

Install a drainage system for automatic cleaned-in-place hoodwashing systems. A drainage system is not required for normal grease and condensate hoods or for locations where cleaning solutions are applied manually to hood assemblies.

14.8 Manufacturer's Recommendations

Install all ventilation systems in accordance with the manufacturer's recommendations.

Test each system using a method that determines if the system is properly balanced for normal operating conditions. Provide written documentation of the test results.

15.0 Provisions, Walk-In Refrigerators and Freezers, and Food Transportation Corridors

15.1 Bulkheads and Deckheads

Provide protection to prevent damage to BULKHEADS from pallet handling EQUIPMENT (for example, forklifts, pallet jacks) in areas through which FOOD is stored or transferred.

15.1.1 Refrigerators and Freezers

Provide tight-fitting stainless steel BULKHEADS in walk-in refrigerators and freezers. Line doors with stainless steel.

15.1.2 Food Transportation Corridors

Light-colored painted steel is acceptable for provision corridors and FOOD TRANSPORTATION CORRIDORS. However, FOOD TRANSPORTATION CORRIDORS inside galleys must be built to galley standards (refer to section 16.0).

Difficult-to-Clean Equipment

- Close DECKHEAD-mounted cable trays, piping, or other difficult-to-clean DECKHEAD-mounted EQUIPMENT or
- Close the DECKHEAD to prevent FOOD CONTAMINATION from dust and debris falling from DECKHEADS and DECKHEAD-mounted EQUIPMENT and utilities.

Painted sheet metal ceilings are acceptable in these areas.

15.1.3 Dry Storage Areas

Stainless steel panels are preferable but not required in DRY STORAGE AREAS.

15.2 Decks

15.2.1 Refrigerators and Freezers

- Use hard, durable, nonabsorbent, nonskid decking (for example, tiles or diamond-plate corrugated stainless steel deck panels) in refrigerated provision rooms.
- Install durable integral COVING as part of the deck and BULKHEAD interface and at the juncture between decks and EQUIPMENT foundations.
- Sufficiently reinforce stainless steel decking to prevent buckling if pallet handling EQUIPMENT will be used in these areas.

15.2.2 Food Transportation Corridors and Dry Storage Areas

- Use hard, durable, nonabsorbent, nonskid decking. Steel deck material is acceptable.

- Install durable COVING as part of the deck and BULKHEAD interface and at the juncture between decks.
- FOOD TRANSPORTATION CORRIDORS inside galleys must be built to galley standards (refer to section 16.0).

15.3 Refrigerator and Freezer Evaporators, Drip Pan, and Drain Lines

15.3.1 Enclose Components

Enclose piping, wiring, coils, and other difficult-to-clean components of evaporators in walk-in refrigerators, freezers, and DRY STORAGE AREAS with stainless steel panels.

15.3.2 Fasteners

Follow all fastener standards in section 9.0.

15.3.3 Drip Pans

15.3.3.1 Materials

Use stainless steel evaporator drip pans that have COVERED corners, are sloped to drain, are strong enough to maintain slope, and are ACCESSIBLE for cleaning.

15.3.3.2 Spacers

Place NONCORRODING spacers between the drip pan brackets and the interior edges of the pans.

15.3.3.3 Heater Coil

Provide a heater coil for freezer drip pans. Attach the coil to a stainless steel insert panel or to the underside of the drip pan. Use easily REMOVABLE coils so that the drip pan can be cleaned. Make sure heating coils provided for drain lines are installed inside of the lines.

15.3.3.4 Position and Size

Position and size the evaporator drip pan to collect all condensate dripping from the evaporator unit.

15.3.4 Thermometer Probes

Encase thermometer probes in a stainless steel conduit. Position probes in the warmest part of the room where FOOD is normally stored. These probes are for monitoring internal air temperature only.

16.0 Galleys, Food Preparation Rooms, and Pantries

This section also applies to Teppanyaki and areas for FOOD preparation classes (demonstration-style and participant hands-on activities).

For FOOD PREPARATION AREAS (section 16.0) and FOOD SERVICE AREAS (section 17.0), the more protective standards apply to the entire area (section 16.0).

If show galleys (FOOD preparation) are adjacent to buffet stations (FOOD SERVICE AREAS) with no structural separation between the areas, then section 16.0 applies. Structural separations

can include rolling shutters and bulkheads. Examples of areas with a structural separation include the following:

- FOOD preparation niche enclosed behind a rolling shutter.
- A FOOD SERVICE AREA and a FOOD PREPARATION AREA separated by a bulkhead.

16.1 Bulkheads and Deckheads

16.1.1 Construction

Construct BULKHEADS and DECKHEADS (including doors, door frames, and columns) with a high-quality corrosion-resistant stainless steel. Tempered glass windows can be installed in the bulkhead. Use a gauge thick enough so the panels do not warp, flex, or separate under normal conditions. Use an appropriate SEALANT for SEAMS. Use stainless steel or other NONCORRODING but equally durable materials for profile strips on BULKHEAD and DECKHEAD GAPS.

16.1.1.1 Gaps

Minimize GAPS around fire shutters, sliding doors, and pass-through windows.

16.1.1.2 Access Panels

Provide sufficiently sized access panels to void spaces around sliding doors and sliding pass-through windows to allow for cleaning.

16.1.2 Sufficient Thickness

Construct BULKHEADS of sufficient thickness or reinforce areas where EQUIPMENT is installed to allow the use of fasteners or welding without compromising panel quality and construction.

16.1.3 Utility Lines

Install utility line connections through a stainless steel or other EASILY CLEANABLE conduit mounted away from BULKHEADS and DECKHEADS.

16.1.4 Backsplashes

Attach backsplashes to the BULKHEAD with low profile nonslotted fasteners or with continuous welds and tack welds polished SMOOTH. Use an appropriate SEALANT to make the backsplash attachment watertight.

16.1.5 Penetrations

Close all openings where piping and other items penetrate the BULKHEADS and DECKHEADS, including inside technical compartments.

16.2 Decks

16.2.1 Construction

Construct decks from hard, durable, nonabsorbent, nonskid material. Install durable integral COVING

- As part of the deck and BULKHEAD interface,
- At the juncture between decks and EQUIPMENT foundations, and
- Between the deck and EQUIPMENT.

16.2.2 Seal Tiling

Seal all deck tiling with a durable watertight grouting material. Seal stainless steel deck plate panels with a continuous NONCORRODING weld.

16.2.3 Technical Compartments

Use durable, nonabsorbent, EASILY CLEANABLE surfaces such as tile or stainless steel in technical spaces below undercounter cabinets, counters, or refrigerators. Do not use painted steel and concrete decking.

16.2.4 Penetrations

Seal all openings where piping and other items penetrate through the deck.

17.0 Buffet Lines, Waiter Stations, Bars, and Other Similar Food Service Areas

This section also applies to candy shops and other non-packaged FOOD-dispensing areas where consumers serve themselves from displays or dispensers and/or crew members serve non-packaged FOOD to consumers and refill self-service containers.

17.1 Bulkheads and Deckheads**17.1.1 Construction**

Construct BULKHEADS and DECKHEADS of hard, durable, NONCORRODING, nonabsorbent and EASILY CLEANABLE materials. **BULKHEADS and DECKHEADS must have SMOOTH, hard finishes.** DECKHEADS must be provided above all buffet lines, waiter stations, bars, and other similar FOOD SERVICE AREAS.

17.1.2 Ventilation Slots

Slots for ventilation plenum spaces are not allowed directly over FOOD PREPARATION AREAS, FOOD STORAGE AREAS, or clean EQUIPMENT storage.

17.1.3 Perforated Ceilings

Perforated ceilings are not allowed directly over FOOD PREPARATION, FOOD STORAGE, or clean EQUIPMENT storage.

17.1.4 Preparation Areas in View of Consumers

Follow galley standards for FOOD SERVICE AREAS where food preparation occurs, including BULKHEADS and DECKHEADS (refer to section 16.0). **VSP recommends plan reviews for these areas (including Teppanyaki)** and will evaluate proposed decorative stainless steel materials during the plan review.

A one-person carving station and areas that are only for opening, dispensing, or pouring a BEVERAGE are not FOOD PREPARATION AREAS.

Examples of FOOD PREPARATION AREAS include

- **A station specific for quick batter breads (for example, waffles), omelets, salads, sandwiches, pizza, sushi, deli, popcorn, or cotton candy makers.**
- **Teppanyaki, breweries, or distilleries.**
- **Areas built for interactive guest activities that involve guest or crew**

FOOD preparation, such as cooking classes.

17.1.5 Coving for Counter to Bulkhead and Backsplash

Install durable COVING at counter/BULKHEAD/backsplash junctures. Refer to Figure 6.

17.2 Decks

17.2.1 Consumer Side of Buffet Lines and Vending Equipment

Deck Material:

Install hard, durable, nonabsorbent, nonskid decks (such as tile, sealed granite, marble, or resin) for

- All buffet lines at least 1,000 mm (39 in) in width measured from the edge of the service counter, FOOD dispensing equipment (such as an ice cream machine), or, if present, from the outside edge of the tray rail.
- Areas for vending packaged FOOD and BEVERAGE items of at least 600 mm (24 in) in width measured from the edge of the vending EQUIPMENT or display.

Carpet, vinyl, and linoleum deck materials are not acceptable.

Coving:

Install durable COVING at deck/BULKHEAD junctures located within 1,000 mm (39 in) of the buffet lines and FOOD dispensing equipment and within 600 mm (24 in) of vending machines with packaged FOOD and BEVERAGE items. Refer to Figure 12a.

This does not apply to consumer sides of bars or to BEVERAGE storage containing unopened BEVERAGES in guest or crew public spaces.

17.2.2 Waiter Stations, Food Service Islands, and Scrapping Stations

Install hard, durable, nonabsorbent, nonskid decks (for example, tile, sealed granite, or marble) that extend at least 600 mm (24 in) from the outermost edge of the working side(s) of waiter stations, FOOD service islands, and scrapping stations. The sides of stations with a splash shield of 150 mm (6 in) or higher are not considered working sides. Carpet, vinyl, and linoleum deck materials are not acceptable.

Coving:

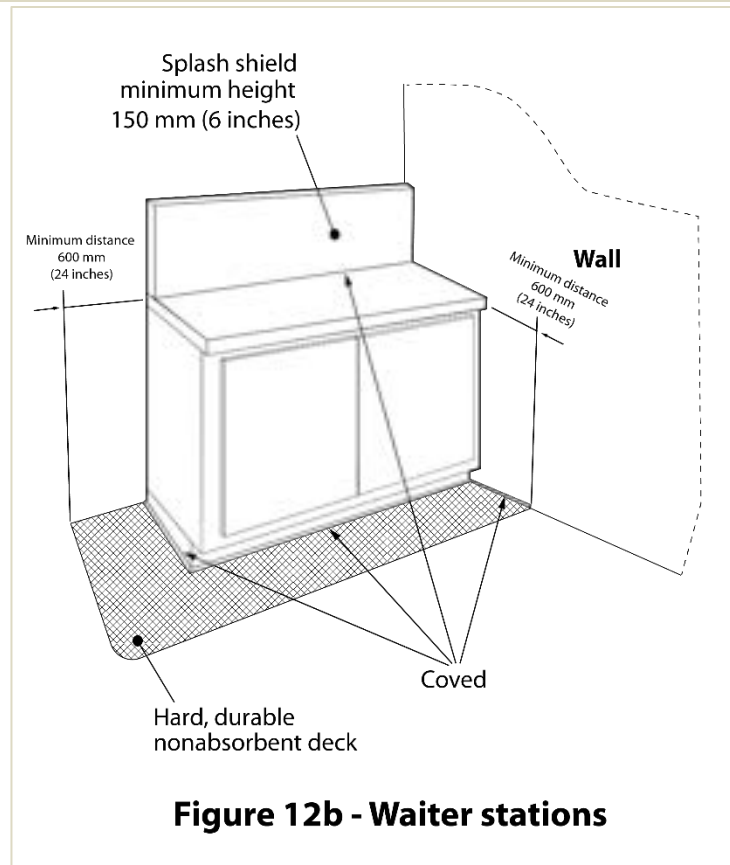
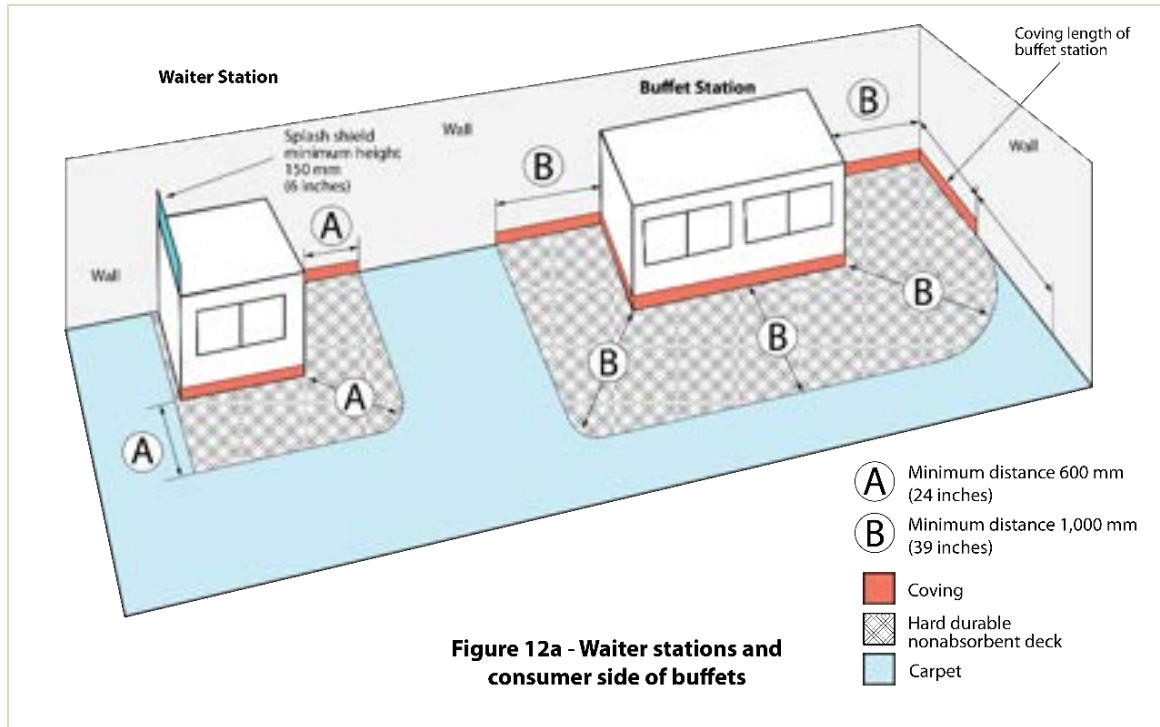
Install durable COVING at deck/BULKHEAD junctures located within 600 mm (24 in) of worker sides of waiter stations, counters shared with worker activities (islands), and scrapping stations. Refer to Figures 12a and 12b.

17.2.3 Technical Spaces

Construct decks in technical spaces of hard, durable, nonabsorbent materials (for example, tiles, epoxy resin, or stainless steel) and provide COVING. Do not use painted steel or concrete decking.

17.2.4 Worker Side of Buffets and Bars

Install durable integral COVING as part of the deck/BULKHEAD and deck/cabinet foundation juncture on the worker-only side of the deck/buffet and deck/bar.



17.2.5 Areas for Buffet Service and Food Preparation

Follow galley standards for construction (refer to section 16.0) for buffet service areas where FOOD preparation occurs.

17.3 Food Display Protection**17.3.1 Effective Means**

Provide effective means to protect FOOD (for example, sneeze guards, display cases, raised shield) in all areas where FOOD is on display,

- including locations where FOOD is being displayed during preparation (for example, carving stations, induction cooking stations, sushi, deli) and
- excluding Teppanyaki-style cooking.

17.3.1.1 Solid Vertical Shield Without Tray Rail

For a solid vertical shield without a tray rail, the minimum height from the deck to the top edge of the shield must be 1,400 mm (55 in).

17.3.1.2 Solid Vertical Shield with Tray Rail

For a solid vertical shield with a tray rail, the height of the shield may be lowered by 10 mm (0.4 in) for every 25 mm (1 in) that the tray rail extends from the buffet, but the minimum height from the deck to the top edge of the shield must be 1,200 mm (47 in).

17.3.1.3 Consumer Seating at Counter

For designs where consumers are seated at the counter and workers are preparing FOOD on the other side of the sneeze guard, consideration must be given to the height of the preparation counter, consumer counter, and consumer seat.

VSP will evaluate these designs and establish the shield height during the plan review.

17.3.2 Sneeze Guard Criteria**17.3.2.1 Portable or Built-In**

Sneeze guards may be temporary (PORTABLE) or built-in and integral parts of display tables, bains-marie, or cold top tables.

17.3.2.2 Panel Material

Sneeze guard panels must be durable plastic or glass that is SMOOTH and EASILY CLEANABLE. Design panels to be cleaned in place or, if REMOVABLE for cleaning, use sections that are manageable in weight and length.

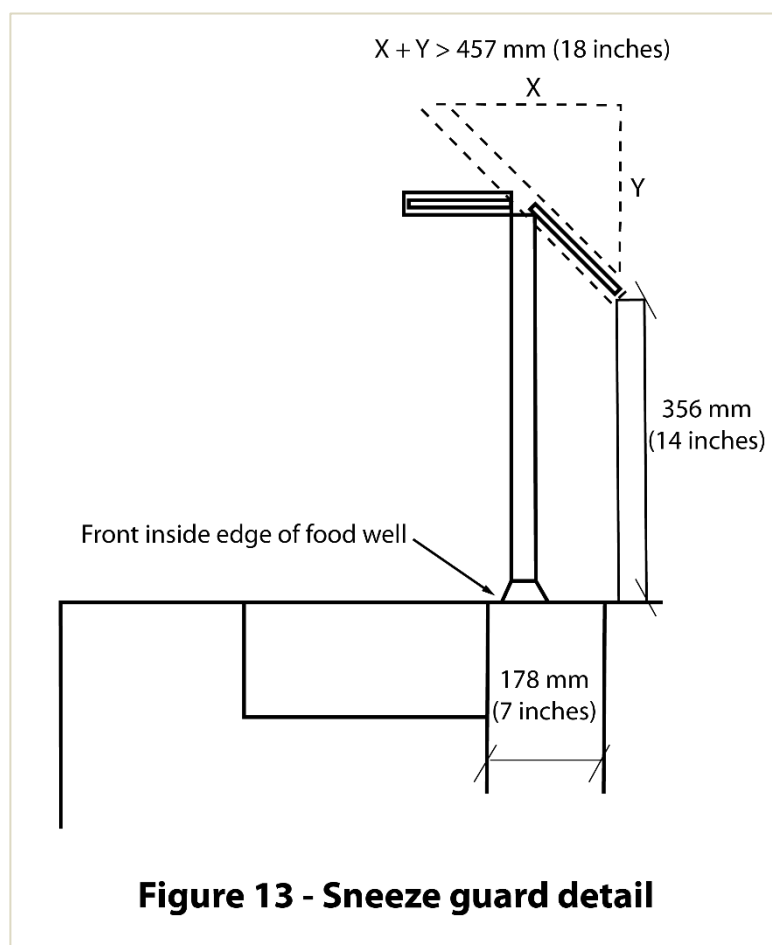
Sneeze guard panels must be transparent and designed to minimize obstruction of the customer's view of the FOOD. To protect against chipping, provide edge guards for glass panels. Sneeze guards for preparation-only protection do not need to be transparent.

17.3.2.3 Spaces or Openings

If there are spaces or openings greater than 25 mm (1 in) along the length of the sneeze guard (such as between two pieces of the sneeze guard), ensure that there are no FOOD wells, bains-marie, etc., under the spaces or openings.

17.3.2.4 Position

Position sneeze guards so that the panels intercept a line between the average consumer's mouth and the displayed FOOD. Consider factors such as the height of the FOOD display counter, the presence or absence of a tray rail, and the distance between the edge of the display counter and the actual placement of the FOOD (Figure 13).

**17.3.2.5 Sneeze Guard Design**

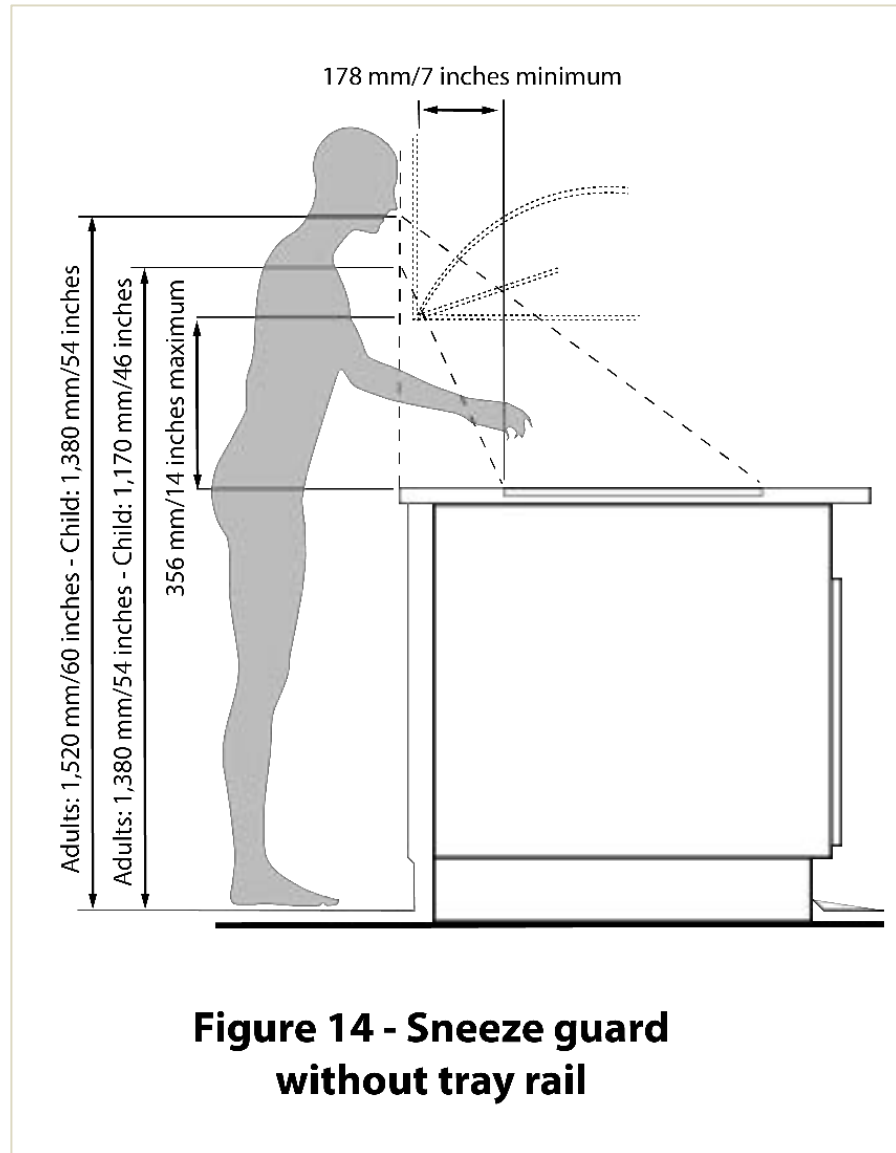
If the buffet is built to the calculations in Figure 13:

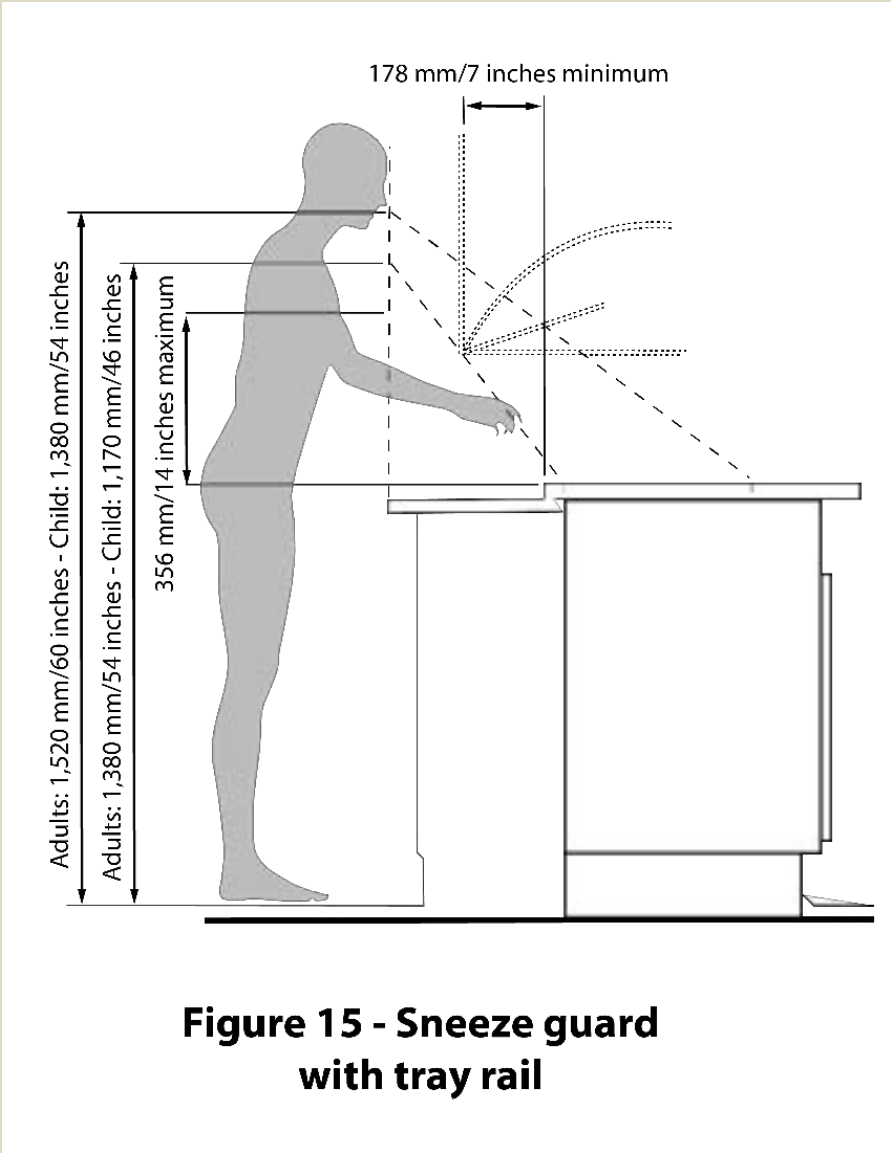
- The maximum vertical distance between a countertop and the bottom leading edge of a sneeze guard must be 356 mm (14 in).
- The bottom leading edge of the sneeze guard must extend a minimum horizontal distance of 178 mm (7 in) beyond the front inside edge of a FOOD well.
- The sum of a sneeze guard's protected horizontal plane (X) and its

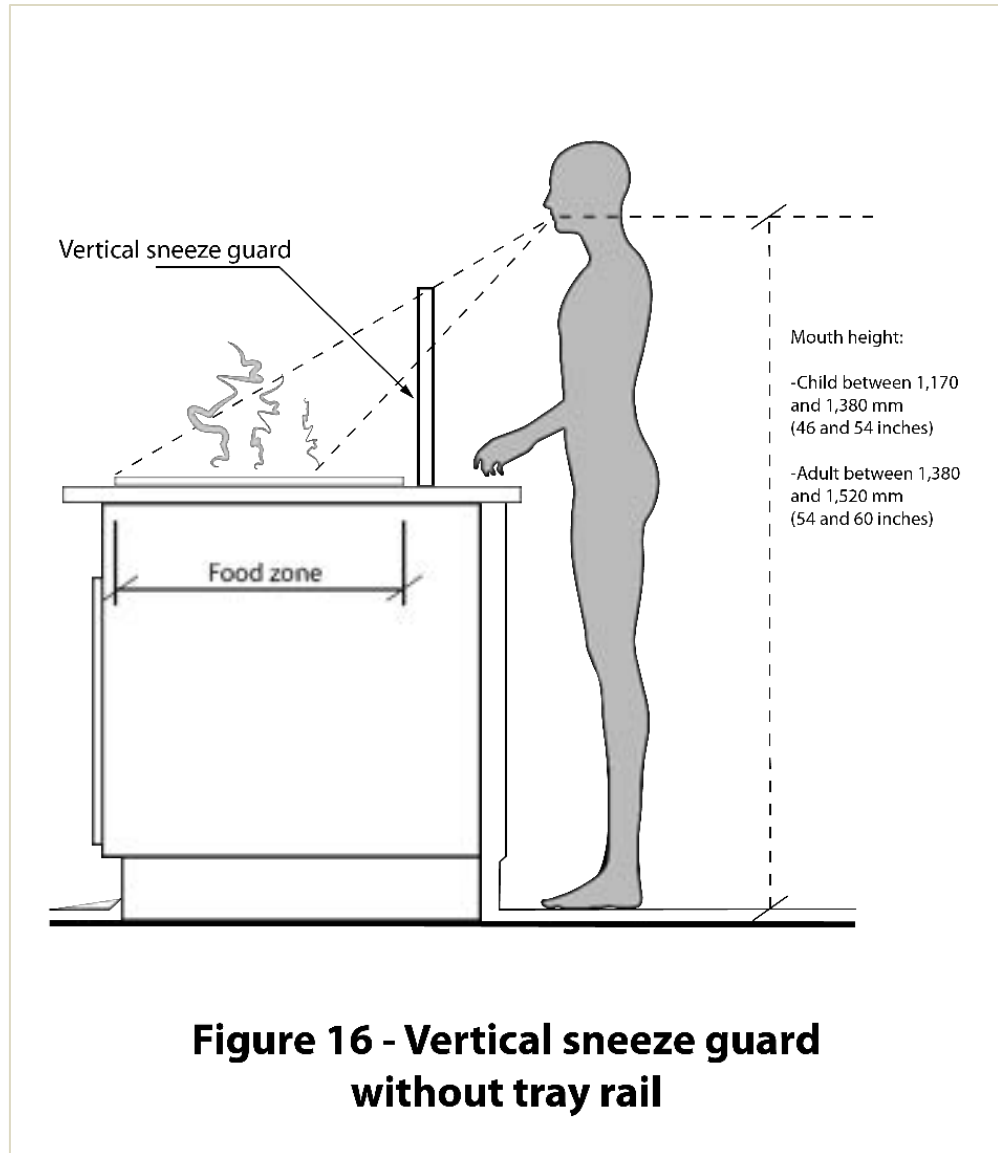
protected vertical plane (Y) must equal a minimum of 457 mm (18 in) (Figure 13). Either X or Y may equal 0.

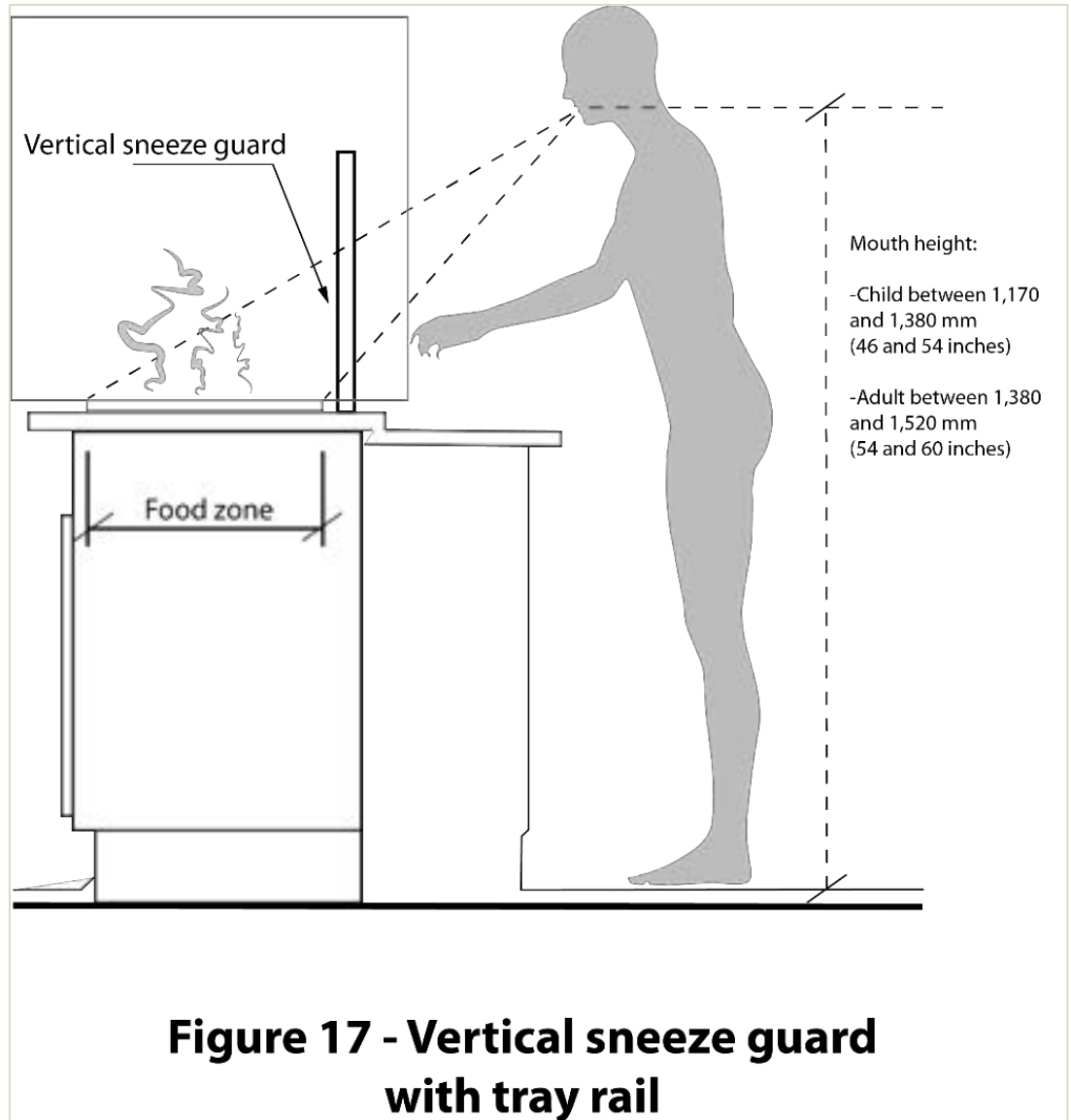
Install side protection for sneeze guards if the distance between exposed FOOD and where people are expected to stand is less than 1 m (39 in).

See Figures 14–17 for additional examples of sneeze guards.









17.3.3 Tray Rail Surfaces

Use tray rail surfaces that are sealed, COVERED, or have an open design. These surfaces must also be EASILY CLEANABLE in accordance with standards for FOOD splash zones.

17.3.4 Food Pan Length

Consideration should be given to the length of the FOOD pans in relation to the distance a consumer must reach to obtain FOOD.

17.3.5 Soup Wells

If soups, oatmeal, and similar FOOD will be self-served, EQUIPMENT must be able to be placed under a sneeze guard.

17.4 Beverage Delivery System

17.4.1 Backflow Prevention Device

Install a BACKFLOW PREVENTION DEVICE that is APPROVED for use on carbonation systems (for example, multiflow BEVERAGE dispensing systems). Install the device before the carbonator and downstream of brass or copper fittings in the POTABLE WATER supply line. A second device may be required if noncarbonated water is supplied to a multiflow hose dispensing unit.

17.4.2 Encase Supply Lines

Encase supply lines to the hose dispensing units in a single tube. If the tube penetrates through any BULKHEAD or countertop, seal the penetration with a grommet.

17.4.3 Clean-in-Place System

For bulk BEVERAGE delivery systems, incorporate fittings and connections for a cleaned-in-place system that can flush and sanitize the entire interior of the dispensing lines in accordance with the manufacturers' instructions.

17.5 Self-Service Buffet Handwashing Stations

Refer to section 19.0 for lighting requirements.

17.5.1 Number

Provide one obvious handwashing station per 100-person seating or fraction thereof. Stations should be equally distributed between the major entry points to the buffet area and must be separate from a toilet room.

17.5.2 Entries

Provide handwashing stations at each passenger entry to the main buffet areas proportional to the capacity, with at least one per entry. These handwashing stations can be counted toward the requirement of one per 100 people.

17.5.3 Self-Service Stations Outside the Main Buffet

Provide at least one handwashing station at the entrance of each self-service station outside of the main buffet. BEVERAGE stations are excluded.

17.5.4 Equipment and Supplies

The handwashing station must include a handwashing sink with hot and cold water, soap dispenser, and single-use paper towel dispenser. Electric hand dryers can be installed in addition to paper towel dispensers. Waste receptacles must be provided near the handwashing sink and sized to accommodate the quantity of paper towel waste generated. The handwashing station may be decorative but must be nonabsorbent, durable, and easy to clean.

17.5.5 Automatic Handwashing System

An automatic handwashing system instead of a handwashing sink is acceptable.

Ensure sufficient flow for all handwashing stations.

17.5.6 Sign

Each handwashing station must have a sign advising everyone to wash their hands before eating. A pictogram can be used instead of words on the sign.

17.5.7 Location

Stations can be installed just outside of the entry. Position the handwashing stations along the flow to the buffets.

17.6 Bar Countertops

Bar countertops are to be constructed to provide access for workers and to prevent workers from stooping or crawling to access the bar area from pantries or service areas.

17.7 Cabinet Interiors

Install COVED stainless steel inserts or seamless stainless steel cabinet interiors where items such as, but not limited to, soiled FOOD EQUIPMENT, dry or wet garbage, or unpackaged FOOD items are stored (Figure 18).

Laminated materials may be used to construct cabinet interiors where items such as, but not limited to, dry packaged FOOD, clean EQUIPMENT, clean LINENS, and single-use items are stored (Figure 18).

VSP will evaluate cabinet interior materials during the plan review process.

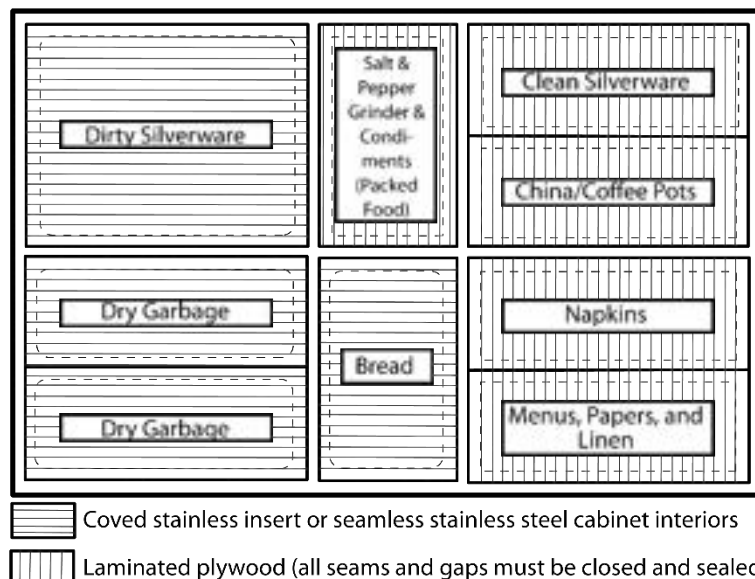


Figure 18 - Materials inside waiter station

18.0 Warewashing

18.1 Prewash Hoses

Provide prewash hoses. (Prewash hoses are recommended but not required in bar and deck pantries.) If a sink will be used for prewashing, provide a REMOVABLE strainer.

Install a splash panel if a clean UTENSIL/glass storage rack or preparation counter is within an unobstructed 2 m (6.5 ft) of a prewash spray hose. This does not include the area behind the worker.

18.2 Food Waste Disposal

Provide space for trash cans, garbage grinder, or FOOD WASTE SYSTEMS. Grinders are optional in pantries and bars.

18.3 Trough

Provide a FOOD waste trough that extends the full length of soiled landing tables with FOOD WASTE SYSTEMS.

18.4 Seal

Seal the back edge of the soiled landing table to the BULKHEAD or provide a minimum clearance between the table and the BULKHEAD according to section 8.0.

18.5 Design

Design soiled landing tables to drain waste liquids and prevent CONTAMINATION of adjacent clean surfaces.

18.6 Drain and Slope

Provide across-the-counter gutters with drains and slope the clean landing tables to the gutters at the exit from the WAREWASHING machines. If the first gutter does not effectively remove pooled water, install additional gutter(s) and drain line(s). Minimize the length of drain lines and, when possible, direct them in a straight line to the deck SCUPPER.

18.7 Space for Cleaning

Provide sufficient space for cleaning around and behind EQUIPMENT (for example, FOOD WASTE SYSTEMS and WAREWASHING machines). Refer to section 8.0 for spacing requirements.

18.8 Enclose Wiring

Enclose FOOD WASTE SYSTEM wiring in a durable and easy-to-clean stainless steel or nonmetallic watertight conduit. Install all WAREWASHING machine components at least 150 mm (6 in) above the deck, except as noted in section 8.4.

18.9 Splash Panels

Construct REMOVABLE splash panels of stainless steel to protect the FOOD WASTE SYSTEM and technical areas.

18.10 Materials

Construct grinder cones, FOOD WASTE SYSTEM tables, and dish-landing tables from stainless steel with continuous welding. Construct platforms for supporting WAREWASHING EQUIPMENT from stainless steel.

18.11 Size

Size WAREWASHING machines for their intended use and install them according to the manufacturer's recommendations.

18.12 Alarm

Equip WAREWASHING machines with an audible or visual alarm that indicates if the sanitizing temperature or chemical SANITIZER drop below the levels stated on the machine data plate.

18.13 Data Plate

Affix data plate so that the information is easy to read by the operator. The data plate must include the following information (as provided by the manufacturer of the WAREWASHING machine):

- Water temperatures required for washing, rinsing (if applicable), and sanitizing.
- Water pressure required for the freshwater sanitizing rinse unless the machine is designed to use only a pumped sanitizing rinse.
- Conveyor speed or cycle time in meters or feet per minute or minimum transit time for belt conveyor machines; minimum transit time for rack conveyor machines; or cycle time for stationary rack machines.
- Chemical concentration (if chemical SANITIZERS are used).

18.14 Manuals and Schematics

Provide WAREWASHING machine operating manuals and schematics of the internal BACKFLOW PREVENTION DEVICES.

18.15 Pot and Utensil Washing

Provide pot and UTENSIL washing facilities as listed in section 6.2.2.

18.16 Three-Compartment Sinks

Correctly size three-compartment WAREWASHING and potwashing sinks for their intended use. Use sinks that are large enough to submerge the largest piece of EQUIPMENT used in the area that is served. Use sinks that have COVED, continuously welded, integral internal corners.

18.16.1 Prevent Excessive Contamination

Install one of the following to prevent excessive CONTAMINATION of rinse water with wash water splash:

- Gutter and drain: An across-the-counter gutter with a drain that divides the compartments. The gutter should extend the entire distance from the front edge of the counter to the backsplash.

- **Splash shield:** A splash shield at least 25 mm (1 in) above the flood level rim of the sink between the compartments. The splash shield should extend the entire distance from the front edge of the counter to the backsplash.
- **Overflow drain:** An overflow drain in the wash compartment 100 mm (4 in) below the flood level.

18.16.2 Hot Water Sanitizing Sinks

Equip hot water sanitizing sinks with an easy-to-read TEMPERATURE-MEASURING DEVICE, a UTENSIL/EQUIPMENT retrieval system (for example, long-handled stainless steel hook or other retrieval system), and a jacketed or coiled steam supply with a temperature control valve or electric heating system.

18.17 Shelving

Provide sufficient shelving for storage of soiled and clean ware. Use open round tubular shelving or racks. Design overhead shelves to drain away from clean surfaces. Sufficient space must be determined by the initial sizing of the WAREWASHING area, as based on the profile or reference size from an existing vessel of the same cruise line per section 6.1.

18.18 Ventilation

For ventilation requirements, refer to section 14.0.

19.0 Lighting

This section also applies to candy shops where consumers serve themselves from candy displays or dispensers or where crew members serve candy to consumers and refill self-service containers.

19.1 Intensity

19.1.1 220 lux (20 foot-candles)

The light intensity must be at least 220 lux (20 foot-candles)

- At work surface level in
 - FOOD PREPARATION AREAS, FOOD SERVICE AREAS, and WAREWASHING areas when all EQUIPMENT is installed.
 - Handwashing stations in all FOOD AREAS.
 - Garbage processing areas and at garbage room handwashing stations
- A distance of 750 mm (30 in) above the deck in
 - EQUIPMENT storage rooms when empty
 - Garbage and FOOD lifts
 - Garbage rooms
 - Toilet rooms
 - Provision rooms when empty
 - Walk-in refrigerators when empty
 - DRY STORAGE AREAS when empty
 - LINEN storage rooms when empty

The light intensity must reach 220 lux (20 foot-candles) during cleaning operations at

- Bars and dining room waiter stations designed for lowered lighting during

normal operations.

- Open shelving (without doors or shutters) where FOOD is stored.
- Scrapping stations outside WAREWASHING areas.
- Dispensing nozzle(s) and the filling surface(s) of water filling stations in nonfood areas during cleaning operations.
 - This applies to bulkhead-recessed, bulkhead-mounted, freestanding POTABLE WATER filling stations and drinking fountains outside of FOOD AREAS for crew and passengers.
 - These areas include passenger and crew corridors, such as in gyms, spas, engine control rooms, jogging tracks, CHILD ACTIVITY CENTERS, and provision corridors.
 - This does not apply to outdoor drinking fountains.

19.1.2 110 lux (10 foot-candles)

The light intensity must be at least 110 lux (10 foot-candles) at

- Self-service buffet handwashing stations.
- Bar handwashing stations.
- A distance of 750 mm (30 in) above the deck when the following areas are in use:
 - EQUIPMENT storage rooms
 - Provision rooms
 - FOOD TRANSPORTATION CORRIDORS
 - Walk-in refrigerators
 - DRY STORAGE AREAS
 - LINEN storage rooms
 - Other FOOD AREAS and rooms

The light intensity must be at least 110 lux (10 foot-candles) measured at the counter surface or at 750 mm (30 in) above the deck behind and around mounted EQUIPMENT. This includes counter-mounted EQUIPMENT (such as ice machines, combination ovens, and BEVERAGE dispensers).

19.2 Installation

For effective illumination, install the DECKHEAD-mounted light fixtures above the work surfaces and position them in an “L” pattern rather than a straight-line pattern.

Install light fixtures tightly against the BULKHEAD and DECKHEAD panels. Completely seal electrical penetrations to permit easy cleaning around the fixtures.

19.3 Light Shields

Use shatter-resistant and REMOVABLE light shields for light fixtures. Completely enclose the entire light bulb or fluorescent light tube(s).

19.4 Light Bulbs

Use shielded, coated, or otherwise shatter-resistant light bulbs in areas with exposed FOOD; clean EQUIPMENT, UTENSILS, and LINENS; or unwrapped SINGLE-SERVICE ARTICLES and SINGLE-USE ARTICLES. This includes lights above waiter stations.

19.5 Heat Lamps

Use shields that surround and extend beyond bulbs on infrared or other heat lamps to protect against breakage. Allow only the face of the bulb to be exposed.

19.6 Track or Recessed Lights

Decorative track or recessed DECKHEAD-mounted lights above bar countertops, buffets, and other similar areas may be mounted on or recessed within the DECKHEAD panels without being shielded. These fixtures must use specially coated, shatter-resistant bulbs.

20.0 Cleaning Materials, Filters, and Drinking Fountains

20.1 Facilities and Lockers for Cleaning Materials

20.1.1 Racks

Provide BULKHEAD-mounted racks for brooms and mops or provide sufficient space and hanging brackets within CLEANING LOCKERS. Locate BULKHEAD-mounted racks outside of FOOD STORAGE AREAS, FOOD PREPARATION AREAS, or FOOD SERVICE AREAS. These racks may be located on the soiled side of WAREWASHING areas.

20.1.2 Stainless Steel

Provide stainless steel vented lockers with COVERED junctures for storing buckets, detergents, SANITIZERS, cloths, and other wet items.

20.1.3 Size and Location

Size and locate CLEANING LOCKERS according to the needs of the vessel and make access convenient.

20.1.3.1 Multiple-Level Galleys

If cabinets dedicated for cleaning supplies are not provided in each of the preparation areas, provide a single cleaning room for each deck of multiple level galleys. Construct rooms used for cleaning materials in accordance with section 16.0.

20.1.4 Mop Cleaning

Provide facilities equipped with a mop sink and ADEQUATE DECK DRAIN or a pressure washing system for cleaning mops and buckets separate from FOOD facilities. The mop sink may be located on the soiled side of WAREWASHING areas.

20.1.5 Labeling

Label all CLEANING LOCKERS, including cleaning rooms, with the exact wording "CLEANING MATERIALS ONLY."

20.2 Filters

If used, install only point-of-use POTABLE WATER filters on ice machines, combination ovens, BEVERAGE machines, etc. Ensure filters are ACCESSIBLE for changing.

20.3 Drinking Fountains

20.3.1 Control

Provide drinking fountains that allow control of the water stream.

20.3.2 Convenient

Install drinking fountains that are convenient to galley personnel.

20.3.3 Outlets Protected

Ensure the water outlets from drinking fountains are slanted and protected by a sanitary guard.

20.3.4 Food Preparation Areas

Provide drinking fountains with stainless steel cabinets and without filling spouts in FOOD PREPARATION AREAS.

21.0 Waste Management

21.1 Food and Garbage Lifts

21.1.1 Interiors

Provide FOOD and garbage lifts with interiors constructed of stainless steel that meet the same standards as section 16.0.

21.1.2 Decks

Construct decks of a durable, nonabsorbent, NONCORRODING material with integral COVING.

21.1.3 Air Vents

Position air vents in the upper portion of the BULKHEAD panels or in the DECKHEAD.

21.1.4 Drain

Install a drain at the bottom of all lift shafts, including provision platform lifts and dumbwaiters. Install the drain flush with the floor of the shaft.

21.1.5 Dumbwaiter Interiors

Construct the interiors of dumbwaiters of stainless steel with COVERED junctures that meet the standards of section 16.0.

21.1.6 Lighting

Provide light fixtures that are recessed or fitted with stainless steel guards.

21.1.7 Garbage Chutes

If installed, construct garbage chutes of stainless steel and with COVERED junctures. Install an automatic washing system for the garbage chute. Ensure the garbage chute meets all SOLAS and classification society requirements.

21.2 Trolley, Waste Container, and Cleaning Equipment Wash Rooms

21.2.1 Construction

Construct BULKHEADS, DECKHEADS, and decks to the same standards as section 16.0.

21.2.2 Pressure Washing System

Provide a BULKHEAD-mounted pressure washing system with a DECK SINK and drain. An enclosed automatic EQUIPMENT washing machine or room may be used in place of the pressure washing system and DECK SINK.

21.2.3 Handwashing Station

Provide an easily accessible handwashing station that meets the requirements of section 7.1.

21.2.4 Ventilation

Provide ADEQUATE ventilation for the extraction of steam and heat.

21.3 Garbage Holding Facilities

21.3.1 Size and Location

Construct the garbage and refuse storage or holding rooms of sufficient size to hold unprocessed waste for the longest expected period between off loadings. Separate the refuse-storage room from all FOOD PREPARATION AREAS and FOOD STORAGE AREAS.

21.3.2 Ventilation

Provide ADEQUATE supply and exhaust ventilation to control odors, temperature, and humidity. Refer to section 33.0 for other requirements related to ventilation.

21.3.3 Refrigerated Storage

Provide a sealed, refrigerated storage space for wet garbage that meets the requirements of section 15.0.

21.3.4 Handwashing Station

Provide an easily accessible handwashing station that meets the requirements of section 7.1.

21.3.5 Drainage

Provide ADEQUATE deck drainage to prevent pooling of any liquids.

21.3.6 Durable and Easily Cleanable

Ensure all BULKHEADS and decks are durable and EASILY CLEANABLE.

21.4 Garbage Processing Areas

Refer to section 19.0 for lighting requirements.

21.4.1 Size

Appropriately size the garbage processing area for the operation and supply sufficient sorting tables.

21.4.2 Sorting Tables

Provide stainless steel sorting tables with COVERED corners. Provide a table drain and direct it to a strainer-protected DECK DRAIN. If deck coaming is provided, ensure it is at least 80 mm (3 in) in height and COVERED on the inside and outside at the deck juncture.

21.4.3 Handwashing Stations

Provide at least one handwashing station in the garbage processing area that meets the requirements of sections 7.1 (excluding sections 7.1.2, 7.1.4, and 7.1.7). The handwashing station must be accessible to both crew members working in the area and to crew members dropping off garbage or any other waste. Ensure the handwashing station is located along the exit route, so crew members can wash hands before leaving the area.

21.4.4 Cleaning Locker

Provide a CLEANING LOCKER for cleaning materials that meets the requirements of section 20.1.

21.4.5 Bulkheads and Decks

Ensure BULKHEADS and decks are durable, NONCORRODING, and EASILY CLEANABLE.

Provide DECK DRAINS to prevent liquids from pooling on the decks. Provide berms or coaming around all waste-processing EQUIPMENT and ensure there is ADEQUATE deck drainage inside the berms.

21.4.6 Washing Containers

Equip a sink with a pressure washer or an automatic washing machine for washing garbage/refuse handling EQUIPMENT, garbage/refuse storage containers, and garbage barrels.

21.5 Black and Gray Water Systems

21.5.1 Drain Lines

Limit installation of drain lines that carry BLACK WATER or other liquid waste directly overhead or horizontally through spaces used for FOOD AREAS. This includes areas for washing or storage of UTENSILS and EQUIPMENT, such as in bars and deck pantries and over buffet counters. Sleeve-weld or butt-weld steel pipe and heat fuse or chemically weld plastic pipe.

Do not use push-fit or press-fit piping over these areas. For SCUPPER lines, factory assembled transition fittings for steel to plastic pipes are allowed when manufactured

per ASTM F1973 or equivalent standard.

21.5.2 Drainage Systems

Ensure BLACK WATER and GRAY WATER drainage systems from cabins, FOOD AREAS, and public spaces are designed and installed to prevent waste back-up and odor or gas emission into these areas.

21.5.3 Venting

Vent BLACK WATER holding tanks to the outside of the vessel and ensure vented gases do not enter the vessel through any air intakes.

21.5.4 Independent

Construct BLACK WATER holding tank vents so they are independent of all other tanks.

Construct all other wastewater holding tank vents so they are independent of all sanitary water tanks. Wastewater tank vents can be combined with each other.

21.5.5 Reuse of Treated Black and Gray Water

VSP will assess water reuse systems during plan reviews.

21.6 General Hygiene

Construct handwashing stations in the following areas according to section 7.1 (excluding sections 7.1.2, 7.1.4, and 7.1.7).

21.6.1 Wastewater Areas

Install at least one handwashing station in each main wastewater treatment, processing, and storage area.

21.6.2 Laundry Areas

Install at least one handwashing station in soiled linen handling areas and at the main exits of the main laundry. Vessel owners will provide locations during the plan review.

21.6.3 Housekeeping Areas

Install handwashing stations in housekeeping areas as described in section 35.1. Provide each handwashing station with a soap dispenser, paper towel dispenser, waste receptacle, and sign that states “wash hands often,” “wash hands frequently,” or similar wording in English and in other languages, where appropriate.

22.0 Potable Water System

22.1 Striping

22.1.1 Potable Water Lines

Stripe or paint POTABLE WATER lines either in accordance with ISO 14726 (blue/green/blue) or in blue only.

Striping is not required in FOOD AREAS of the vessel because only POTABLE WATER is permitted in these areas.

22.1.2 Distillate and Permeate Water Lines

Stripe or paint DISTILLATE WATER LINES and PERMEATE WATER LINES directed to the POTABLE WATER system in accordance with ISO 14726 (blue/gray/blue).

22.1.3 Other Piping

No other lines should have the color designations listed in sections 22.1.1 or 22.1.2.

22.1.4 Intervals

Paint or stripe these lines at 5 m (16 ft) intervals and on each side of partitions, decks, and BULKHEADS except where decor would be marred by such markings. This includes POTABLE WATER supply lines in technical lockers.

22.1.5 Downstream of a Reduced Pressure Principle Backflow Prevention Assembly

Lines downstream of a reduced pressure principle backflow prevention assembly (RP ASSEMBLY) must not be striped as POTABLE WATER.

22.1.6 Refrigerant Brine Lines and Chilled Water Lines

Identify refrigerant brine lines and chilled water lines in all FOOD AREAS with either ISO 14726 (blue/white/blue) or by another uniquely identifiable method to prevent CROSS-CONNECTIONS.

22.2 Bunker Stations

22.2.1 Position Connections

Position the filling line hose connections at least 450 mm (18 in) above the deck; paint or stripe the filling lines either in blue only or in accordance with ISO 14726.

22.2.2 Connection Caps

Equip filling line hose connections with tight-fitting caps fastened by a NONCORRODING chain so the cap does not touch the deck when hanging.

22.2.3 Unique Connections

Use unique connections that only fit POTABLE WATER hoses.

22.2.4 Labeling

Label the filling lines with the exact wording "POTABLE WATER FILLING" with lettering at least 13 mm (1/2 in) high and stamped, stenciled, or painted on the filling lines or on the BULKHEAD at the filling line.

22.2.5 Filter Location

If any filters are used in the bunkering process, locate them **before (upstream)** of the HALOGEN injection point. Ensure any filters used in the bunkering process are easily ACCESSIBLE and can be removed for inspection and cleaning.

22.3 Filling Hoses

22.3.1 Approved

Provide hoses APPROVED for POTABLE WATER. Hoses must be SMOOTH and durable and have an impervious lining, caps on each end, and fittings unique to the POTABLE WATER connections.

22.3.2 At Least Two Hoses

Provide at least two 15-m (49-ft) hoses per bunker station.

22.3.3 Label Hoses

Label POTABLE WATER hoses with the exact wording “POTABLE WATER ONLY” with lettering at least 13 mm (1/2 in) high and stamped, stenciled, or painted at each connection end.

22.4 Potable Water Hose Storage

22.4.1 Construction

Construct POTABLE WATER hose lockers from smooth, nontoxic, NONCORRODING, and easily cleanable materials.

22.4.2 Mounting

Mount POTABLE WATER hose lockers at least 450 mm (18 in) above the deck.

22.4.3 Self-Draining

Design POTABLE WATER hose lockers to be self-draining.

22.4.4 Label Lockers

Label POTABLE WATER hose lockers with the exact wording “POTABLE WATER HOSE AND FITTING STORAGE” in letters at least 13 mm (1/2 in) high.

22.4.5 Size

Provide storage space for at least four 15 m (49 ft) POTABLE WATER bunker hoses per bunker station.

22.5 International Fire Shore Connections and Fire Sprinkler Shore Connections

Install an RP ASSEMBLY at all connections where hoses from shoreside POTABLE WATER supplies will be connected to nonpotable systems on the vessel.

22.6 Storage and Production Capacity for Potable Water

22.6.1 Minimum Storage Capacity

Provide a minimum of 2 days storage capacity that assumes 120 liters (32 gallons) of water per day per person for the maximum capacity of crew and passengers on the vessel.

22.6.2 Production Capacity

Provide POTABLE WATER production capacity of 120 liters (32 gallons) per day per person for the maximum capacity of crew and passengers on the vessel.

22.7 Potable Water Storage Tanks**22.7.1 General Requirements****22.7.1.1 Independent of Vessel Shell**

Ensure POTABLE WATER storage tanks are independent of the shell of the vessel.

22.7.1.2 No Common Wall

Ensure POTABLE WATER storage tanks do not share a common wall with other tanks containing nonpotable water or other liquids.

22.7.1.3 Cofferdam

Provide a 450-mm (18-in) cofferdam above and between POTABLE WATER TANKS and tanks that are not for storage of POTABLE WATER and between POTABLE WATER TANKS and the shell of the vessel. Skin or double-bottom tanks are not allowed for POTABLE WATER storage.

22.7.1.4 Deck Top

If the deck is the top of POTABLE WATER TANKS, these tanks must be identified during the plan review. The shipyard will provide to owners a written declaration of the tanks involved and drawings of the areas that include these tanks.

22.7.1.5 Tanks with Nonpotable Liquid

Do not install tanks containing nonpotable liquid directly over POTABLE WATER TANKS.

22.7.1.6 Coatings

Use APPROVED POTABLE WATER TANK coatings.

Follow all the manufacturer's recommendations for applying, drying, and curing tank coatings.

Provide the following for tank coatings:

- Written documentation of approval from the certification organization (independent of the coating manufacturer).
- Manufacturer's recommendations for applying, drying, and curing.
- Written documentation that the manufacturer's recommendations have been followed for applying, drying, and curing.

22.7.1.7 Items That Penetrate Tank

Coat all items that penetrate the tank (for example, bolts, pipes, pipe flanges) with the same product used for the tank's interior. **Corrosion-resistant items are exempt from this requirement.**

22.7.1.8 Superchlorination

Design tanks to be superchlorinated one tank at a time.

22.7.1.9 Lines for Nonpotable Liquids

Ensure that lines for nonpotable liquids do not pass through POTABLE WATER TANKS.

22.7.1.10 Nonpotable Lines Above Potable Water Tanks

Minimize the use of nonpotable lines above POTABLE WATER TANKS. If nonpotable water lines are installed, do not use mechanical couplings or push-fit or press-fit piping on lines above tanks.

For SCUPPER lines, factory assembled transition fittings for steel to plastic pipes are allowed when manufactured per ASTM F1973 or equivalent standard.

22.7.1.11 Coaming

If coaming is present along the edges or top of the tank, provide slots along the coaming to allow leaking liquids to run off and be detected.

22.7.1.12 Welded Pipes

Treat welded pipes over POTABLE WATER TANKS to make them corrosion resistant.

22.7.1.13 Lines Inside Potable Water Tanks

Treat all POTABLE WATER lines inside POTABLE WATER TANKS to make them jointless and NONCORRODING.

22.7.1.14 Label Tanks

Label each POTABLE WATER TANK on its side and where clearly visible with a number and the exact wording "POTABLE WATER" in letters a minimum of 13 mm (1/2 in) high.

22.7.1.15 Sample Cock

Install a minimum of one sample cock at least 450 mm (18 in) above the deck plating for each tank. The sample cock must be easily ACCESSIBLE.

Point sample cocks down and identify them with the appropriate tank number.

22.7.2 Storage Tank Access Hatch

Install an access hatch for entry on the sides of POTABLE WATER TANKS.

22.7.3 Storage Tank Water Level

Provide an automatic method for determining the water level of POTABLE WATER TANKS. Visual sight glasses are acceptable.

22.7.4 Storage Tank Vents

22.7.4.1 Location

Ensure that air-relief vents end at least 1,000 mm (39 in) above the maximum load level of the vessel.

Make the cross-sectional area of vents equal to or greater than that of the tank filling line.

Position the end of the vents so openings face down or are otherwise protected and install a 16-mesh corrosion-resistant screen.

22.7.4.2 Single Pipe

A single pipe may be used as a combination vent and overflow.

22.7.4.3 Vent Connections

Do not connect the vent of a POTABLE WATER TANK to the vent of a tank that is not a POTABLE WATER TANK.

22.7.5 Storage Tank Drains

22.7.5.1 Design

Design tanks to drain completely.

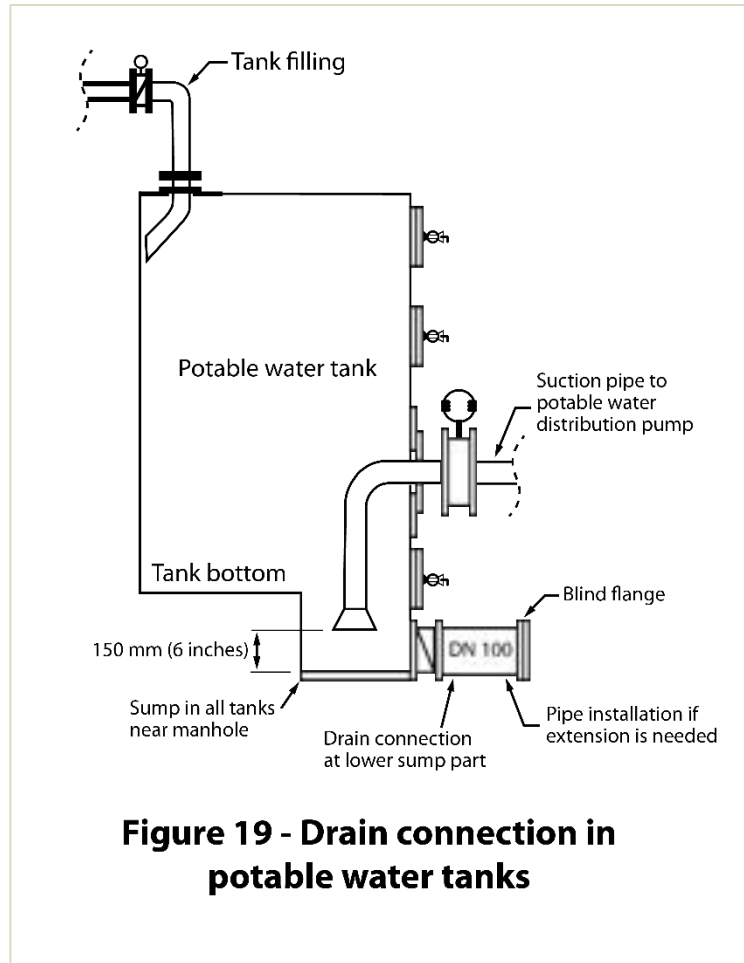
22.7.5.2 Drain Opening

Provide a drain opening at least 100 mm (4 in) in diameter that preferably matches the diameter of the inlet pipe.

22.7.5.3 Suction Pump

If drained by a suction pump, provide a sump and install the pump suction port in the bottom of the sump.

Install separate pumps and piping not connected to the POTABLE WATER distribution system for draining tanks (Figure 19).



22.8 Suction Lines

Place suction lines at least 150 mm (6 in) from the tank bottom or sump bottom.

22.9 Potable Water Distribution System

22.9.1 Location

Locate DISTILLATE WATER LINES, PERMEATE WATER LINES, and distribution lines at least 450 mm (18 in) above the deck plating or the normal bilge water level.

Avoid BLIND LINES in the POTABLE WATER distribution system.

22.9.2 Pipe Materials

Do not use lead, cadmium, or other hazardous materials for pipes, fittings, or solder.

22.9.3 Fixtures That Require Potable Water

Supply only POTABLE WATER to the following areas and plumbing connections, regardless of the locations of these fixtures on the vessel:

- All showers and sinks (not just in cabins).
- Chemical feed tanks for the POTABLE WATER system or RECREATIONAL WATER FACILITIES.

- Drinking fountains.
- Emergency showers.
- Eye wash stations.
- FOOD AREAS.
- Handwashing sinks.
- HVAC rooms.
- Medical facilities.
- Deck and window cleaning facilities.
- Decorative fountains and misting systems.

Utility sinks for engine/mechanical spaces are excluded.

22.9.4 Paint or Stripe

Paint or stripe POTABLE WATER piping and fittings either in blue only or in accordance with ISO 14726 at 5 m (16 ft) intervals and on each side of partitions, decks, and BULKHEADS except where the decor would be marred by such markings. This includes POTABLE WATER supply lines in technical lockers.

22.9.5 Steam Generation for Food Areas

Use POTABLE WATER to generate steam applied directly to FOOD and FOOD-CONTACT SURFACES. Generate the steam locally from FOOD service EQUIPMENT designed for this purpose (for example, vegetable steamers, combination ovens).

Steam generated by nonpotable water may be applied indirectly to FOOD or FOOD EQUIPMENT if routed through coils, tubes, or separate chambers.

22.10 Disinfection of the Potable Water System

22.10.1 Before Placed in Service

Clean, disinfect, and flush POTABLE WATER TANKS and all parts of the POTABLE WATER system before the system is placed in service. BACKFLOW PREVENTION DEVICES are part of the potable piping and must be disinfected before installation.

22.10.2 Free Chlorine Solution

Ensure DISINFECTION is accomplished using a 50-MG/L (ppm) free chlorine solution for a minimum of 4 hours. Use only POTABLE WATER for these procedures. Prior VSP agreement is required for use of alternative APPROVED DISINFECTION practices.

22.10.3 Flush

The disinfected parts of the system must be flushed with POTABLE WATER or otherwise dechlorinated until the free chlorine residual is less than or equal to 5.0 MG/L (ppm).

22.10.4 Documentation

Provide written documentation that shows:

- Representative sampling was conducted at PLUMBING FIXTURES on each deck throughout the vessel (forward, aft, port, and starboard) ensuring 50 MG/L

(ppm) free chlorine residual circulated throughout the distribution system including distant sampling point(s).

- The distant point's (or points') specific free chlorine residual value after flushing the system.

22.11 Potable Water Pressure Tanks

22.11.1 No Connection to Nonpotable Water Tanks

Do not connect POTABLE WATER hydrophore tanks to nonpotable water tanks through the main air compressor.

22.11.2 Filtered Air Supply

Provide a filtered air supply from a dedicated compressor or through a nonpermanent quick disconnect for a movable compressor. The compressor must not emit oil into the final air product.

22.12 Potable Water Pumps

22.12.1 Sizing

Size POTABLE WATER pumps to meet the vessel's maximum capacity service demands. Do not use POTABLE WATER pumps for any other purpose.

22.12.2 Priming

Use nonpriming POTABLE WATER pumps or POTABLE WATER pumps that prime automatically. Use a direct connection when supplying priming water to a POTABLE WATER pump.

22.12.3 Pressure

Properly size POTABLE WATER pumps and distribution lines so pressure is always maintained and at levels to properly operate all equipment.

22.13 Evaporators and Reverse Osmosis Plants

22.13.1 Location of Seawater Inlets

Locate sanitary seawater intakes (sea chests) forward or on the opposite sides of the vessel's overboard waste discharge outlets such as emergency and routine discharge lines from wastewater treatment facilities, the bilge, RWFs, and ballast tanks.

This does not include the following:

- Discharges from DECK DRAINS on open decks.
- Cooling lines with no chemical treatment.
- Alarmed vent/overflow pipes for GRAY WATER, treated GRAY or BLACK WATER, and ballast tanks with an automatic shutoff system for sanitary seawater intake. These alarms must be visual and audible and must sound in a space that is continuously occupied.
- Alarmed emergency bilge discharge lines with an automatic shutoff system for sanitary seawater intake. These alarms must be visual and audible and must sound in a space that is continuously occupied. GRAY WATER and BLACK

WATER cannot be able to be transferred to the bilge with this type of design.

- Alarmed emergency ballast discharge line with an automatic shutoff system for sanitary seawater intake. These alarms must be visual and audible and must sound in a space that is continuously occupied.
- Discharges from the anchor chain locker are allowed forward of the sea chest if the chain is rinsed/cleaned only with seawater.
- Alarmed vent/overflow pipes for heeling tanks and laundry water storage tanks with an automatic shutoff system for sanitary seawater intake are allowed. These alarms must be visual and audible and must sound in a space that is continuously occupied.

22.13.2 Direct Connections

Use only direct connections from the evaporators and reverse osmosis plants to the POTABLE WATER system.

22.13.3 Potable and Nonpotable Water Systems

If an evaporator or reverse osmosis plant makes water for both the POTABLE WATER system and a nonpotable water system, install an AIR GAP or RP ASSEMBLY on the line supplying the nonpotable water system.

Water sources such as TECHNICAL WATER, air conditioning condensate, or wastewater of any kind (treated or untreated) are not allowed for POTABLE WATER production.

22.13.4 Instructions

Post narrative, step-by-step operating instructions for manually operated evaporators and for any reverse osmosis plants near the units.

22.13.5 Discharge to Waste

Ensure water production units connected to the POTABLE WATER system can discharge to waste if the distillate is not fit for use.

22.13.6 Indicator and Alarm

Install a low-range salinity indicator, operating temperature indicator, automatic discharge to waste system, and alarm with trip setting on water production equipment.

22.13.7 High-Saline Discharge

If routed for discharge, direct high-saline discharge from evaporators to the bilge or overboard through an AIR GAP or RP ASSEMBLY.

22.14 Halogenation

Locate storage areas of salt used to generate chlorine for potable water close to the chlorine production plant. Construct storage areas to dry FOOD storage standards.

22.14.1 Bunkering and Production

22.14.1.1 Backflow Prevention

Provide POTABLE WATER taps with appropriate BACKFLOW prevention at the HALOGEN supply tanks.

22.14.1.2 Halogen Injection

Control HALOGEN injection by a flow meter or an analyzer with a sample point located at least 3 m (10 ft) downstream of the HALOGEN injection point. Installed analyzers must have a sample point to calibrate the analyzer.

A static mixer may be used to reduce the distance between the HALOGEN injection point and the sample cock or HALOGEN analyzer sample point. Ensure that the mixer is installed per the manufacturer's recommendation. Provide all manufacturers' literature for installation, operation, and maintenance.

22.14.1.3 pH Adjustment

Provide automatic PH adjustment equipment for water bunkering and production. Install analyzer, controller, and dosing pumps that are designed to accommodate changes in flow rates.

22.14.2 Distribution

22.14.2.1 Sample Point

Provide an analyzer-controlled, automatic halogenation system. Install the analyzer probe sample point at least 3 m (10 ft) downstream of the HALOGEN injection point. The analyzer must have a sample point for calibration.

A static mixer may be used to reduce the distance between the HALOGEN injection point and the HALOGEN analyzer sample point. Ensure the static mixer is installed per the manufacturer's recommendation. Provide all manufacturers' literature for installation, operation, and maintenance.

22.14.2.2 Free Halogen Probes

Use probes to measure free HALOGEN residual and link them to the analyzer/controller and chemical dosing pumps.

22.14.2.3 Backup Halogenation Pump

Provide a back-up halogenation pump with an automatic switchover that begins pumping HALOGEN when the primary (in-use) pump fails or cannot meet the halogenation demand.

22.14.2.4 Chemical Injection Dosing Point

A check valve or nonreturn valve must be installed between the distribution HALOGEN and PH pumps and the injection points. In addition,

- The POTABLE WATER distribution halogenation and PH chemical injection dosing points must be located on the delivery line downstream of the POTABLE WATER pumps, or
- If the injection dosing point is before the POTABLE WATER pumps, it must be located above the chemical dosing tanks.

22.14.2.5 Distant Point Probe/Sample Location

Locate the HALOGEN analyzer probe at a distant point in each distribution system loop where significant water flow exists.

22.14.2.6 Alarm

Provide an audible alarm in a continually occupied watch station (for example, the engine control room or bridge) to indicate low or high free HALOGEN readings at each distant point analyzer.

22.14.2.7 Backflow Prevention

Provide POTABLE WATER taps with appropriate BACKFLOW prevention at HALOGEN supply tanks.

22.14.2.8 Free Halogen Analyzer-Chart Recorder

Provide continuous recording free HALOGEN analyzer-chart recorder(s) that have ranges of 0.0 to 5.0 MG/L (ppm) and indicate the level of free HALOGEN for 24-hour time periods (for example, circular 24-hour charts).

Electronic data loggers with CERTIFIED DATA SECURITY FEATURES may be installed instead of chart recorders. Acceptable data loggers produce records that conform to the principles of operation and data display required of the analog charts, including printing the records. Use electronic data loggers that log times in increments of less than or equal to 15 minutes. Written documentation from the data logger manufacturer, such as a letter or instruction manual, must be provided to verify that the features are secure.

22.14.2.9 Multiple Distribution Loops

When supplying POTABLE WATER throughout the distribution network with more than one ring or loop (lower to upper decks or forward to aft), there must be

- Pipe connections that link those loops and a single distant point monitoring analyzer or
- Individual analyzers on each ring or loop.

A single return line that connects to only one ring or loop of a multiple loop system is not acceptable. One chart recorder may be used to record multiple loop readings.

POTABLE WATER distribution loops/rings supplied by separate HALOGEN dosing equipment must include an analyzer chart recorder at a distant

point for each loop/ring.

23.0 Cross-Connection Control

23.1 Backflow Prevention

Use appropriate BACKFLOW prevention at all CROSS-CONNECTIONS. This may include nonmechanical protection such as an AIR GAP or a mechanical BACKFLOW PREVENTION DEVICE.

Install BACKFLOW PREVENTION DEVICES and AIR GAPS to be ACCESSIBLE for inspection, testing, service, and maintenance. If access panels are required, provide panels large enough for testing, service, and maintenance.

23.2 Air Gaps

AIR GAPS should be used where feasible and when water under pressure is not required.

23.3 Atmospheric Vent

A mechanical BACKFLOW PREVENTION DEVICE must have an atmospheric vent.

Provide an AIR GAP for the atmospheric vent.

23.4 Protect Against Health Hazards

Ensure that connections where there is a potential of a HEALTH HAZARD are protected by AIR GAPS or BACKFLOW PREVENTION DEVICES designed to protect against HEALTH HAZARDS.

23.5 Test Kit

Provide an appropriate test kit for all testable devices.

Test all testable devices after installation and provide pressure differential test results for each device.

23.6 Atmospheric Vacuum Breaker

When used, install an ATMOSPHERIC VACUUM BREAKER (AVB) 150 mm (6 in) above the fixture flood level rim with no valves downstream of the device.

23.7 Atmospheric or Hose Bibb Vacuum Breaker

Ensure an AVB or HOSE BIBB CONNECTED VACUUM BREAKER (HVB) is not installed at a connection where it can be subjected to continuous pressure for more than 12 continuous hours.

23.8 Connections Between Potable and Black Water Systems

Ensure any connection between the POTABLE WATER system and the BLACK WATER system is through an AIR GAP. Where feasible, water required for the BLACK WATER system should not be from the POTABLE WATER system.

23.9 Protection Against Backflow

Protect the following connections to the POTABLE WATER system against BACKFLOW (BACKSIPHONAGE or BACKPRESSURE) with AIR GAPS or mechanical BACKFLOW PREVENTION DEVICES:

- Air conditioning expansion tanks.
- Automatic galley hoodwashing systems.
- Beauty and barber shop spray-rinse hoses.
- BLACK WATER or combined GRAY WATER/BLACK WATER systems. An AIR GAP is the only allowable protection for these connections.
- Boiler feed water tanks.
- Cabin shower hoses, toilets, WHIRLPOOL SPA tubs, and similar facilities.
- Chemical tanks.
- Decorative water features and fountains.
- Detergent and chemical dispensers.
- Fire system.
- EQUIPMENT in FOOD SERVICE AREAS such as coffee machines, ice machines, juice dispensers, combination ovens, and similar EQUIPMENT.
- Freshwater or saltwater ballast systems.
- Garbage grinders and FOOD WASTE SYSTEMS.
- High saline discharge line from evaporators. An AIR GAP or an RP ASSEMBLY is the only allowable protection for these lines.
- Hose bibb connections.
- Hospital and laundry equipment.
- International fire and fire sprinkler water connections. An RP ASSEMBLY is the only allowable device for this connection.
- Mechanical WAREWASHING machines.
- Photographic laboratory developing machines and sinks.
- POTABLE WATER, bilge, and sanitary pumps that require priming.
- POTABLE WATER supply to automatic window washing systems that can be used with chemicals or chemical mix tanks.
- RWFs.
- Spa steam generators where essential oils can be added.
- Toilets, urinals, and shower hoses.
- Water softener and mineralizer drain lines including backwash drain lines. An AG or RP are the only allowable protections for these lines.
- Water softeners for nonpotable fresh water.
- Any other connection between the POTABLE WATER system and a nonpotable water system such as the GRAY WATER, laundry, or TECHNICAL WATER system. An AIR GAP or an RP ASSEMBLY is the only allowable protection for these connections.
- Hi-Fog or similar suppression systems connected to POTABLE WATER TANKS
- Any other connection to the POTABLE WATER system where CONTAMINATION or BACKFLOW can occur.

23.10 Seawater Lines and Potable Water

Do not make any connections to the SANITARY SEAWATER LINES between the POTABLE WATER production plant supply pump and the POTABLE WATER production plant.

23.11 Seawater Lines and RWFs

Do not make any connections to the SANITARY SEAWATER LINES between the RWF supply pump and the RWFs.

23.12 Distillate and Permeate Water Lines

Provide an AIR GAP or BACKFLOW PREVENTION DEVICE at connections to the DISTILLATE WATER LINES and PERMEATE WATER LINES intended for the POTABLE WATER system.

23.13 Sanitary Seawater Lines

Provide an AIR GAP or BACKFLOW PREVENTION DEVICE for connections to the SANITARY SEAWATER LINES.

23.14 List of Connections to Potable Water System

Develop and provide a list of all connections to the POTABLE WATER system where there is a potential for CONTAMINATION with a pollutant or contaminant. At a minimum, this list must include the following:

- Location (of connection and of device, if different).
- Connection description (for examples, hose, chemical tanks, coffee machines, detergent dispensers).
- Protection used (AIR GAP or the device manufacturer name and designation).
- Inspection date for visual inspection of AIR GAPS and nontestable devices.
- Inspection results (passed, replaced, psi results) for testable devices.

Repeat connections such as toilets and showers can be grouped together under a single entry, as appropriate, with the total number of connections listed.

24.0 Heat Exchangers Used for Cooling or Heating Sanitary Seawater and Potable Water

This standard does not apply to heat exchangers downstream of backflow prevention devices.

24.1 Fabrication

Fabricate heat exchangers that use, cool, or heat sanitary seawater or POTABLE WATER so a single failure of any barrier will not cause a CROSS-CONNECTION or permit BACKSIPHONAGE of contaminants into the POTABLE WATER system.

24.2 Design

Where both sanitary seawater or POTABLE WATER and any nonpotable liquid are used, design heat exchangers to protect the sanitary seawater or POTABLE WATER from CONTAMINATION by one of the designs in sections 24.2.1 or 24.2.2.

24.2.1 Double-Wall Construction

Design double-wall construction between the sanitary seawater or POTABLE WATER and nonpotable liquids with both of the following safety features:

- A void space to allow any leaking liquid to drain away.

- An alarm system to indicate a leak in the double wall.

24.2.2 Single-Wall Construction

Design single-wall construction with all the following safety features:

- Higher pressure of at least 1 bar on the sanitary seawater or POTABLE WATER side of the heat exchanger.
- An automatic valve arrangement that closes sanitary seawater or POTABLE WATER circulation in the heat exchanger when the pressure difference is less than 1 bar.
- An alarm system that sounds when the diverter valve directs sanitary seawater or POTABLE WATER from the heat exchanger.

25.0 Recreational Water Facility Water Source

25.1 Filling System

Provide a filling system that allows for the filling of each RECREATIONAL WATER FACILITY (RWF) with sanitary seawater or POTABLE WATER.

For a compensation or make-up tank supplied with POTABLE WATER, an overflow line located below the fill line and at least twice the diameter of the fill line is an acceptable method of BACKFLOW protection if the overflow line discharges to the wastewater system through an indirect connection. If make-up water is introduced into the RWF directly, the water must be at the same level of HALOGENATION and PH as the RWF before entering the RWF.

Avoid BLIND LINES in the water systems of RWFs.

25.2 Compensation or Make-Up Tank

Where make-up water is required to replace water loss due to splashing, carry out, and other volume loss, install an appropriately designed compensation or make-up tank to ensure that ADEQUATE chemical balance can be maintained.

25.3 Combining Recreational Water Facilities

No more than two similar RWFs may be combined.

CHILDREN'S POOLS and BABY-ONLY WATER FACILITIES must not be combined with any other type of RWFs.

An independent slide and an adult SWIMMING POOL may be combined if the water volume added to the slide and the slide pump capacity are sufficient to maintain the TURNOVER rate as shown in section 29.10.

Any other combinations of RECREATIONAL WATER FACILITIES will be decided on a case-by-case basis during the plan review.

25.4 Manual Testing for Combined Facilities

When combining RWFs, provisions must be made for independent manual water testing within the RWF EQUIPMENT ROOM or AREA for each RWF.

26.0 Recreational Water Facility Showers and Toilet Facilities

26.1 Shower Temperature

Equip showers to provide POTABLE WATER at a temperature not to exceed 43°C (110°F) during normal operations.

26.2 Shower Location

Install showers within 10 m (33 ft) and readily accessible at every entry point to each RWF. Pool lifts are considered entry points.

For beach entry RWFs, install a minimum of one showerhead per 10 m (33 ft) of perimeter within 10 m (33 ft) of the beach perimeter.

Install a minimum of one shower at each waterslide staircase entrance. The location and number of showers for facilities with multiple entrances will be determined during the plan review.

26.3 Showers for Children

RWFs designed for use by children under 6 years of age must have appropriately sized shower facilities. Standard height is acceptable, but the mechanism to operate the flow of water must not be more than 1 m (3.3 ft) above the deck.

26.4 Shower Drainage

Shower floors must be sloped to drain. Shower water must discharge to waste, and not into the RWF.

26.5 Toilet Facilities

Locate toilet facilities for each RWF no more than 60 m (197 ft) walking distance of each RWF and on

- the same deck, or
- adjacent decks if there is no obstruction between the RWF and toilet facility entrances, and they are easily visible.

Install a minimum of two separate toilet rooms (either two unisex or one male and one female). Each toilet facility must include a toilet and a handwashing station. The total number of toilets and toilet facilities required will be assessed during the plan review. Urinals may be installed in addition to the required toilet but may not replace the toilet.

26.6 Waterslide Toilets

Toilet facilities for a waterslide may be located no more than 60 m (197 ft) walking distance of each staircase entrance if this is the only access to the waterslide.

26.7 Diaper-Changing Facilities

Provide diaper-changing facilities **no more than 60 m (197 ft) walking distance** and on the same deck of any BABY-ONLY WATER FACILITY. If these facilities are placed within toilet rooms, there must be one facility located within each toilet room (men's, women's, and unisex). Diaper-changing facilities must be equipped in accordance with section 34.2.

27.0 Recreational Water Facility Drainage

27.1 Independent System

Provide an independent drainage system for RWFs from other drainage systems. If RWF drains are connected to another drainage system, provide an AIR GAP between the two **or two in-line swing check valves**. This includes the drainage for compensation or make-up tanks.

27.2 Slope

Slope the bottom of the RWF toward the drains to achieve complete drainage.

27.3 Seating Drains

If seating is provided inside an RWF, ensure drains are installed to allow for complete draining of the seating area (including seats inside WHIRLPOOL SPAS and SPA POOLS).

27.4 Decorative and Working Features

Decorative and working features of an RWF must be designed to drain completely and must be constructed of nonporous, easily cleanable materials. These features must be designed to be shock halogenated.

28.0 Recreational Water Facility Safety

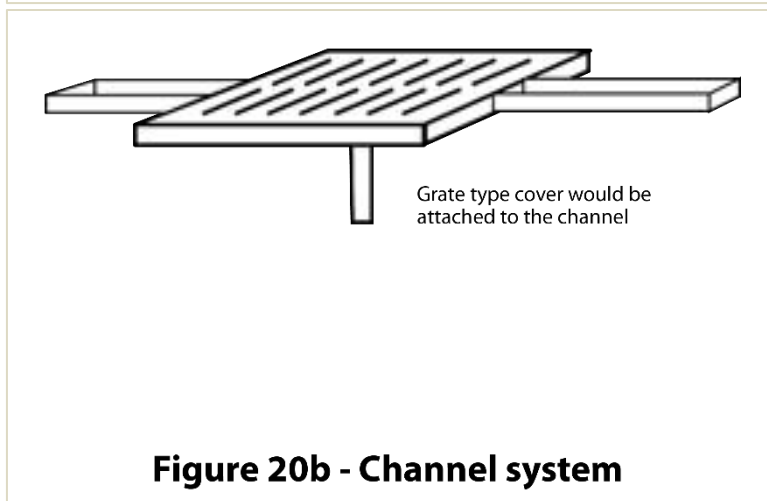
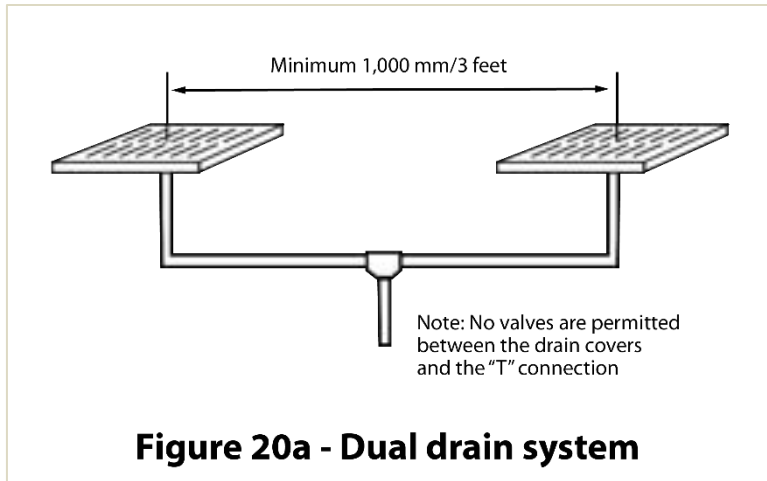
28.1 Antientrapment Drain Covers and Suction Fittings

Where referenced within these standards, drain covers must comply with the requirements in ASME A112.19.8-2007, including addenda. See table below for primary and secondary antientrapment requirements.

VSP is aware that the requirements in Table 28.1.7 may not fully meet the letter of the Virginia Graeme Baker Act, but we also recognize the life-safety concerns for rapid dumping of RWFs in conditions of instability at sea. Therefore, it is the owner's decision to meet or exceed VSP requirements.

28.1.1 Installation

Install dual drains at least 1 m (3.3 ft) apart and at the lowest point in the RWF. Ensure there are no intermediate drain isolation valves on the lines between the drains (Figure 20a). In a channel system (an UNBLOCKABLE DRAIN), a grate-type cover would be attached to the channel (Figure 20b).



28.1.2 Suction Fittings

When fully assembled and installed, SUCTION FITTINGS must prevent the potential for body, digit, or limb entrapment in accordance with ASME A112.19.8M-2007.

28.1.3 Stamped and Certified

Manufactured drain covers and SUCTION FITTINGS must be stamped and certified in accordance with the standards set forth in ASME A112.19.8-2007.

28.1.4 Design of Field Fabricated Drain Covers and Suction Fittings

The design of field fabricated drain covers, and SUCTION FITTINGS must be fully specified by a registered design professional in accordance with ASME A112.19.8-2007. The specifications must fully address cover/grate loadings; durability; hair, finger, and limb entrapment issues; cover/grate secondary layer of protection; related sump design; and features specific to the RWF. This does not apply to field fabricated drain covers that do not conform to ASME A112.19.8-2007.

28.1.4.1 Accompanying Letter

A letter from the shipyard must accompany each field fabricated drain cover and suction fitting. At a minimum, the letter must specify

- Shipyard
- Name of the vessel
- Specifications and dimensions of the drain cover, as noted above
- Exact location of the RWF for which it was designed.
- The registered design professional's name, contact information, and signature must be on the letter.

This does not apply to field fabricated drain covers that do not conform to ASME A112.19.8-2007.

28.1.5 Antientrapment/Antientanglement Requirements

See Table 28.1.7 for antientrapment and antientanglement requirements for drains and SUCTION FITTINGS in RWFs.

Table 28.1.5 Antientrapment Requirements for RWFs

(Does not include facilities designed with zero depth and drains not under direct suction)

Option*	Type	Drainage/Recirculation System	Cover Design	Secondary anti-entrapment Requirement**
1	GRAVITY only	Multiple drains (two or more drains greater than 1 m [3.3 ft] apart)	Not ASME compliant - manufactured or field fabricated	Alarm
2	GRAVITY only	Multiple drains (two or more drains greater than 1 m [3.3 ft] apart)	ASME compliant - manufactured or field fabricated	None
3	GRAVITY only	Single UNBLOCKABLE DRAIN (per ASME A112.19.8)	Not ASME compliant - manufactured or field fabricated	Alarm
4	GRAVITY only	Single UNBLOCKABLE DRAIN (per ASME A112.19.8)	ASME compliant - manufactured or field fabricated	None
5	GRAVITY only	Single BLOCKABLE DRAIN or multiple drains (less than 1 m [3.3 ft] apart)	ASME compliant - manufactured or field fabricated	GDS
6	SUCTION FITTING	Multiple drains (two or more drains per pump with drains greater than 1 m [3.3 ft] apart)	ASME compliant - manufactured or field fabricated	None
7	SUCTION FITTING	Single UNBLOCKABLE DRAIN (per ASME A112.19.8)	ASME compliant - manufactured or field fabricated	SVRS or APS
8	SUCTION FITTING	Single BLOCKABLE DRAIN or multiple drains (less than 1 m [3.3 ft] apart)	ASME compliant - manufactured or field fabricated	SVRS or APS

*Options 1 through 5 are for fittings not under direct suction. These include both fittings to drain the RWF and fittings used to recirculate the water. Options 6 through 8 are for fittings

under direct suction. These include fittings to drain the RWF and fittings used to recirculate the water.

****Notes:**

- Alarm: The audible alarm must sound in a continuously manned space AND at the RWF. This alarm is for all draining: accidental, routine, and emergency.
- APS (automatic pump shut-off system): A manual shut-off near the RWF does not qualify as an APS.
- GDS (GRAVITY DRAINAGE SYSTEM): There is no direct suction at the RWF.
- SVRS (SAFETY VACUUM RELEASE SYSTEM): System must be tested by an independent third party and found to conform with ASTM standard F2387-04 or ANSI/ASME A112.19.17-2012.

28.2 Depth Markers

Install depth markers for each RWF where the maximum water depth is 1 m (3.3 ft) or greater. Install depth markers so they can be seen from the deck and inside the RWF tub. Ensure the markers are in both meters and feet. **Depth markers must have letters and numbers with a minimum height of 100 mm (4 in) of a color contrasting with background.** Additionally, depth markers must be installed for every 1 m (3.3 ft) change in depth.

28.3 Safety Signs

28.3.1 Installation

Install safety signs at each RWF. **Signs must be in a prominent and unobstructed location for all users of the RWF.** At a minimum the signs must include the following words:

- Do not use these facilities if you are experiencing diarrhea, vomiting, or fever.
- No children in diapers or who are not toilet trained.
- Shower before entering the facility.
- Bather load number. (The maximum bather load must be based on the following factor: One person per 19 liters [5 gallons] per minute of recirculation flow.)

Pictograms may replace words, as appropriate or available.

It is advisable to post additional cautions and concerns on signs.

Refer to section 31.3 for safety signs specific to BABY-ONLY WATER FACILITIES and section 32.3 for safety signs specific to WHIRLPOOL SPAS and SPA POOLS.

28.3.1.1 Children's Recreational Water Facilities

For signs in children's RWFs, include the exact wording "TAKE CHILDREN ON FREQUENT BATHROOM BREAKS" or "TAKE CHILDREN ON FREQUENT TOILET BREAKS." This is in addition to the basic RWF safety sign.

28.4 Life-Saving Equipment

28.4.1 Location

A rescue or shepherd's hook and an APPROVED floatation device must be provided at a prominent location (visible from the full perimeter of the pool) at each RWF that has a depth of 1 m (3.3 ft) or greater. These devices must be mounted in a manner that allows for easy access during an emergency.

- The pole of the shepherd's hook must be long enough to reach the center of the deepest portion of the pool from the side plus 600 mm (24 in). It must be light, strong, and nontelelescoping with rounded nonsharp ends.
- The flotation device must have an attached rope that is at least two-thirds of the maximum pool width.

29.0 Recirculation and Filtration Systems

29.1 Skimmers or Gutters

The fill level of RWFs must be to the skim or gutter level to ensure floating debris and surface water is directed to the treatment system.

29.2 Overflows

Ensure that overflows are directed by gravity to the compensation or make-up tank for filtration and DISINFECTION. Alternatively, overflows may be directed to the RWF drainage system. If the overflow is connected to another drainage system, provide an AIR GAP or two in-line swing check valves between the two.

29.3 Return Water

All water returning from an RWF must be directed to the compensation or make-up tank or the filtration and DISINFECTION system.

29.4 Compensation or Make-Up Tanks

Ensure that 100% of the water in the compensation or make-up tanks passes through the filtration and DISINFECTION systems before returning to the RWF. This includes any water directed to water features in RWFs.

29.5 Approved

Install recirculation, filtration, and DISINFECTION equipment that has been APPROVED for use in RWFs based on NSF International or an equivalent standard.

29.6 Centrifugal Pumps

Ensure that pumps used to recirculate RWF water are centrifugal pumps that they are self-priming or prime automatically. Flooded end suction pumps are permitted if suitable for the application.

29.7 Skimmers or Gutters

Install surface skimmers or gutters capable of handling 100% of the filter flow of the

recirculation system.

If skimmers are used instead of gutters, install at least one skimmer for every 37 square meters (398 square feet) of pool surface area.

29.8 Hair and Lint Strainer

Provide a hair and lint strainer between the RWF outlet and the suction side of the pumps to remove foreign debris such as hair, lint, hair pins, bandages, etc.

Ensure the REMOVABLE portion of the hair and lint strainer is corrosion resistant and has holes no greater than 6 mm (1/4 in) in diameter.

29.9 Filters

29.9.1 Particle Size

Use filters designed to remove all particles greater than 20 microns from the entire volume of the RWF within the specified TURNOVER rate.

29.9.2 Cartridge or Media Type

Use cartridge or media-type filters (for example, rapid-pressure sand filters, high-rate sand filters, diatomaceous earth filters, gravity sand filters). Make filter sizing consistent with American National Standards Institute (ANSI) standards for public RWFs. Ensure commercial filtration rates for calculations are used for cartridge filters if multiple rates are provided by the manufacturer.

29.9.3 Backwash

Ensure media-type filters are capable of being backwashed. Provide a clear sight glass on the backwash side of all media filters.

29.9.4 Accessories

Install filter accessories, such as pressure gauges, air-relief valves, and flow meters. Install safety features on delivery lines to control chemical dosing unless the design of the system prevents water flow to analyzers if circulation fails.

29.9.5 Access

Design and install filters and filter housings in a manner that allows access for inspection, cleaning, and maintenance.

29.9.6 Manufacturer's Information

Provide manufacturer's specifications and recommendations for filtration systems.

29.10 Turnover Rates

Install recirculation pumps, filtration, and DISINFECTION equipment that have the capacity to turn over water in the RWF at the appropriate rates as set forth in table the below. Install flow meters to monitor flow rates. Use flow rates from flow meters to calculate TURNOVER rates. Do not use the manufacturer's pump rate to calculate TURNOVER rates.

Ensure that TURNOVER rates can be increased based on bather load. (The maximum bather load must be based on the following factor: One person per 19 liters [5 gallons] per minute of recirculation flow.)

RECREATIONAL WATER FACILITY	TURNOVER Rate
SWIMMING POOL	4 hours
CHILDREN'S POOL	0.5 hours
WADING POOL	1 hour
WHIRLPOOL SPA	0.5 hours
SPA POOL	2 hours
INTERACTIVE RWF or ACTIVITY POOL (≤ 600 mm [24 in] deep)	1 hour
INTERACTIVE RWF or ACTIVITY POOL (> 600 mm [24 in] deep)	2 hours
BABY-ONLY WATER FACILITY	0.5 hours
Custom installations (where the above is not applicable)	To be determined by design engineer with VSP review

For an RWF in sea-to-sea mode, ensure a TURNOVER rate of once per hour.

For facilities that meet the definition of more than one type of RWF, the more protective turnover rate applies. For example, if a CHILDREN'S POOL also has features of an INTERACTIVE RWF or ACTIVITY POOL, the TURNOVER rate must be 0.5 hours.

29.11 Primary Disinfection and pH Control

29.11.1 Installation

Install independent automatic analyzer-controlled HALOGEN-based DISINFECTION and PH dosing systems for each RWF or combined RWFs as allowed in section 25.3. The analyzer must be capable of measuring HALOGEN levels in MG/L (ppm) and PH levels. Analyzers must have digital readouts that indicate measurements from the installed analyzer probes.

29.11.2 Monitoring and Recording

Provide an automatic monitoring and recording system for the free HALOGEN residuals in MG/L (ppm) and PH levels. The recording system must be capable of recording these levels 24 hours/day.

Install chart recorders or electronic data loggers with CERTIFIED DATA SECURITY FEATURES that record PH and HALOGEN measurements.

If POTABLE WATER is introduced into RWFs with recirculated water after filtration and chemistry control and the POTABLE WATER combines with the RWF recirculation system, the POTABLE WATER must be HALOGENATED and PH controlled to the level required for the RWF. The resulting mixture would negatively impact the monitoring analyzer for the RWF.

Electronic data loggers must be capable of recording in increments of less than or equal to 15 minutes. Written documentation from the data logger manufacturer, such

as a letter or instruction manual, must be provided to verify that the features are secure.

The probe for the automated analyzer recorder must be installed before the compensation or make-up tank or from a line taken directly from the RWF.

Install appropriate sample taps for analyzer calibration.

29.11.3 Analyzer Probes

For WHIRLPOOL SPAS and SPA POOLS, analyzer probes for the dosing and recording system must be capable of measuring and recording levels up to 10 MG/L (ppm).

29.11.4 Alarm

Provide an audible alarm in a continuously occupied watch station (for example, the engine control room) to indicate low and high free HALOGEN and PH readings in each RWF.

29.11.5 Water Feature Design

Design water features such that the water cannot be taken directly from the compensation or make-up tank but must be first routed through filtration and DISINFECTION systems.

29.11.6 Water Supply

Water may be taken directly from the RWF to supply other features within the same RWF.

If taken from the RWF, consider taking the water from the lower part of the RWF. This does not apply to a BABY-ONLY WATER FACILITY.

29.12 Secondary Disinfection

29.12.1 Installation

Install a secondary ultraviolet (UV) DISINFECTION system capable of inactivating *Cryptosporidium* for each CHILDREN'S POOL, INTERACTIVE RWF, and BABY-ONLY WATER FACILITY. Ensure these systems are installed in accordance with the manufacturer's specifications. Secondary UV DISINFECTION systems must be designed to operate in accordance with the parameters set forth in NSF International or equivalent standard.

If an ACTIVITY POOL has INTERACTIVE RWF features, such as flowing, misting, sprinkling, jetting, and waterfalls, a secondary ultraviolet (UV) DISINFECTION system must be installed.

29.12.2 Sized

Secondary DISINFECTION systems must be appropriately sized to disinfect 100% of the water at the appropriate TURNOVER rate. Install secondary DISINFECTION systems after filtration but before HALOGEN-based DISINFECTION.

29.12.3 Low- and Medium-Pressure UV Systems

Low- and medium-pressure UV systems can be used and must be designed to treat 100% of the flow through the feature line(s). Multiple units are acceptable. UV systems must be designed to provide 40 mJ/cm² at the end of lamp life. UV systems must be rated at a minimum of 254 nm.

29.12.4 Cleaning Accessibility

Install ultraviolet (UV) systems that allow for cleaning of the UV lamp jacket without disassembling the unit. It is acceptable if the lamp is accessed for cleaning by removing fasteners or covers.

29.12.5 Spare Lamp and Operating Instructions

A spare ultraviolet (UV) lamp and any accessories required by the manufacturer to change the lamp must be provided. Additionally, operational instructions for the UV DISINFECTION system must be provided.

29.13 Recreational Water Facility Equipment Room or Area**29.13.1 Accessible**

Make RWF EQUIPMENT ROOM or AREAs accessible and well-ventilated.

29.13.2 Design

Design RWF EQUIPMENT ROOM or AREAs so operators are not required to stoop, bend, or crawl and so they can easily access and perform routine maintenance and duties.

29.13.3 Clearance

Provide sufficient clearance between the top of components such as compensation or make-up tanks and filter housings and the DECKHEAD for inspection, maintenance, and cleaning. This could be accomplished by providing a hatch in the DECKHEAD above.

29.13.4 Mark Piping

Mark all piping with directional-flow arrows and provide a flow diagram and operational instructions for each RWF in a readily available location.

29.13.5 Chemical Storage and Refill

Design the RWF EQUIPMENT ROOM or AREA for safe chemical storage and refilling of chemical feed tanks.

29.13.6 Deck Drains

Install DECK DRAINS in each RWF EQUIPMENT ROOM or AREA that allow for draining of the entire pump, filter system, compensation or make-up tank, and associated piping. Provide sufficient drainage to prevent pooling on the deck.

29.14 Recreational Water Facility System Drainage

29.14.1 Installation

Install drains in the RWF system to allow for complete drainage of the entire volume of water from the pump, filter system, compensation or make-up tank, and all associated piping.

29.14.2 Compensation Tank Drain

Provide a drain at the bottom of each compensation or make-up tank to allow for complete draining of the tank. Install an access port for cleaning the tank and for the addition of batch HALOGEN- and PH-control chemicals.

29.14.3 Utility Sink

Install a sink and a hose bibb tap supplied with POTABLE WATER in each RWF EQUIPMENT ROOM or AREA. A threaded hose attachment at the sink is acceptable for the tap.

30.0 Additional Requirements for Children's Pools

30.1 Prevent Access

Provide a method to prevent access to pools located in remote areas of the vessel.

30.2 Design

Design the pool such that the maximum water level cannot exceed 1 m (3.3 ft).

30.3 Secondary Disinfection System

Refer to section 29.12.

31.0 Additional Requirements for Baby-Only Water Facility

31.1 Water Source

Fill water must be provided only to the compensation or make-up tank and not directly to the SPRAY PAD.

31.2 Baby-Only Water Facility

31.2.1 Deck Material

Ensure that the decking material inside the BABY-ONLY WATER FACILITY is durable, nonabsorbent, slip-resistant, nontoxic, and free of crevices and sharp surfaces. All deck edges, including small changes in vertical elevation, must be beveled or rounded to eliminate sharp edges. Joints between deck materials and components and any other GAPS or crevices must have fillers (caulk, SEALANT, or other nontoxic material) to provide a smooth and easily cleanable surface. Fasteners and other attachments or surfaces must not have sharp edges. If climbing features are installed, provide impact attenuation surfaces in accordance with ASTM F1292-04.

31.2.2 Limit Access

If located near other RWFs, design the BABY-ONLY WATER FACILITY to limit access to and from surrounding RWFs.

31.2.3 Deck Surface

Design and slope the deck surface of the BABY-ONLY WATER FACILITY to ensure complete drainage and prevent pooling/ponding of water (zero depth).

31.2.4 Gravity Drains

Provide ADEQUATE GRAVITY DRAINS throughout the SPRAY PAD to allow for complete drainage of SPRAY PAD. Suction drains are not permitted.

31.2.5 Filtration and Disinfection

Ensure that 100% of the GRAVITY DRAINS are directed to the BABY-ONLY WATER FACILITY compensation or make-up tank for filtration and DISINFECTION before return to the SPRAY PAD.

31.2.6 Divert Water to Waste

Provide a means to divert water from the SPRAY PAD to waste. If the water from the pad is directed to the wastewater system, ensure there is an indirect connection such as an AIR GAP or AIR-BREAK.

31.2.7 Prevent Water Runoff

Any spray features must be designed and constructed to prevent water run-off from the surrounding deck from entering the BABY-ONLY WATER FACILITY.

31.3 Safety Sign**31.3.1 Content**

Install an easy-to-read permanent sign, with letters on the sign heading at least 25 mm (1 in) high, at each entrance to the BABY-ONLY WATER FACILITY. All other lettering must be at least 13 mm (1/2 in) high. At a minimum, the sign should state the following:

- This facility is only for use by children in diapers or children who are not completely toilet trained.
- Children who have a medical condition that may put them at increased risk for illness should not use these facilities.
- Children who are experiencing symptoms such as vomiting, fever, or diarrhea are prohibited from using these facilities.
- Children must be accompanied by an adult at all times.
- Children must wear a clean swim diaper before using these facilities. Frequent swim diaper changes are recommended.
- Do not change diapers in the area of the BABY-ONLY WATER FACILITY. A diaper changing station has been provided (give exact location) for your convenience.

Pictograms may replace words as appropriate or available. Wording may vary if the message is not changed. This information may be included on multiple signs if they

are posted at the entrances to the facility.

31.4 Recirculation and Filtration System

31.4.1 Compensation or Make-up Tank

Install a compensation or make-up tank with an automatic level control system capable of holding an amount of water sufficient to ensure continuous operation of the filtration and DISINFECTION systems. This capacity must be equal to at least 3 times the total operating volume of the system.

31.4.2 Accessible Drain

Install an ACCESSIBLE drain at the bottom of the tank to allow for complete draining of the tank. Install an access port for cleaning the tank and for the addition of batch HALOGEN and PH control chemicals.

31.4.3 Secondary Disinfection and PH Systems

Design the system so 100% of the water for the BABY-ONLY WATER FACILITY feature passes through filtration, HALOGEN, PH systems, and secondary DISINFECTION, before returning to the BABY-ONLY WATER FACILITY.

31.5 Disinfection and PH Control

31.5.1 Independent Automatic Analyzer

Install independent automatic analyzer-controlled HALOGEN-based DISINFECTION and PH dosing systems. The analyzer must be capable of measuring HALOGEN levels in MG/L (ppm) and PH levels. Analyzers must have digital readouts that indicate measurements from the installed analyzer probes.

31.5.2 Automatic Monitoring and Recording

Provide an automatic monitoring and recording system for the free HALOGEN residuals in MG/L (ppm) and PH levels. The recording system must be capable of recording these levels 24 hours/day.

31.5.3 Secondary Disinfection System

Refer to section 29.12.

31.6 Automatic Shut-Off

Install an automatic control that shuts off the water supply to the BABY-ONLY WATER FACILITY if the free HALOGEN residual or PH range have not been met per the requirements set forth in the current *VSP Environmental Public Health Standards*.

The shut-off control must operate similarly when the UV DISINFECTION system is not operating within acceptable parameters.

31.7 Baby-Only Water Facility Equipment Room or Area

31.7.1 Discharge

All recirculated water discharged to waste must be through a visible indirect connection in the RWF EQUIPMENT ROOM or AREA.

31.7.2 Flow Meter

A flow meter must be installed on the return line before HALOGEN injection. The flow meter must be accurate to within 10% of actual flow.

32.0 Additional Requirements for Whirlpool Spas and Spa Pools

JETTED TUBS and HEATED JETTED TUBS can be accessed only by entering a cabin (or nonpublic space like the spa). JETTED TUBS and HEATED JETTED TUBS are not designed to be operated as WHIRLPOOL SPAS. Refer to section 6.6 Jetted Tub Operations of the current *VSP Environmental Public Health Standards* for a complete list of operational requirements.

32.1 Overflow System

Design the overflow system for WHIRLPOOL SPAS so the water level is maintained.

32.2 Temperature Control

Provide a temperature control mechanism to prevent the temperature from exceeding 40°C (104°F).

32.3 Safety Sign

In addition to the RWF safety sign in section 28.3, install a sign at each WHIRLPOOL SPA and SPA POOL entrance listing precautions and risks associated with the use of these facilities. At a minimum, include cautions against use by the following:

- Individuals who are immunocompromised.
- Individuals on medication or who have underlying medical conditions, such as cardiovascular disease, diabetes, or high or low blood pressure.
- Children, pregnant women, and elderly persons.

Additionally, include caution against exceeding 15 minutes of use.

32.4 Drainage System

For WHIRLPOOL SPAS, provide a line in the drainage system to allow these facilities to be drained to the GRAY WATER, TECHNICAL WATER, or other wastewater holding system through an indirect connection or two in-line swing check valves. This does not include the BLACK WATER system.

33.0 Ventilation Systems

33.1 Air Supply Systems

33.1.1 Accessible

Design and install air handling units to be ACCESSIBLE for periodic inspections and air intake filter changing.

33.1.2 Drain Completely

Install air conditioner condensate collection pans that drain completely.

Connect condensate collection pans to drain piping to prevent condensate from pooling on the decks.

33.1.3 Air Intakes

Locate air intakes for fan rooms so that any ventilation or processed exhaust air is not drawn back into the vessel.

33.1.4 Makeup Air Supply

Provide a sufficient make-up air supply in all FOOD PREPARATION AREAS, WAREWASHING, cleaning, and toilet rooms.

33.1.5 Air Vent Diffusers

Design all cabin air vent diffusers to be REMOVABLE.

33.1.6 Condensate Collection Pans

Make air handling unit condensate collection pans readily ACCESSIBLE for inspection, cleaning, and maintenance. Provide access panels to all major air supply trunks to allow periodic inspection and cleaning.

33.1.7 Engine Room and Mechanical Spaces

Provide a separate independent air supply system for the engine room and other mechanical spaces (for example, fuel separation, purifying, and BLACK WATER treatment rooms).

33.2 Air Exhaust Systems

33.2.1 Independent Systems

The following air handling units must exhaust air through independent systems that are completely separated from systems using recirculated air.

- Engine rooms and other mechanical spaces.
- Medical or isolation spaces (hospitals, infirmaries, and any rooms designed for patient care or isolation)
- RWFs (indoor RWFs, dome-type RWFs when closed, and supporting RWF EQUIPMENT ROOM or AREAS)
- Galleys and other FOOD PREPARATION AREAS.
- Cabin and public toilet rooms.
- Waste processing areas.

33.2.2 Negative Air Pressure

Maintain negative air pressure, in relation to the surrounding areas, in the areas listed in section 33.2.1.

33.2.3 Sufficient Exhaust

Provide a sufficient exhaust system in all FOOD PREPARATION AREAS, WAREWASHING, cleaning, and toilet rooms to keep them free of excessive heat, humidity, steam, condensation, vapors, obnoxious odors, and smoke.

33.2.4 Access Panels

Provide access panels to all major air exhaust trunks to allow periodic inspection and cleaning.

33.2.5 Written Balancing Report

Provide a written ventilation system balancing report for areas listed in section 33.2.1 that demonstrate negative air pressure.

34.0 Child Activity Center

34.1 Facilities

Include items in sections 34.1 through 34.4 in CHILD ACTIVITY CENTERS unless the areas are only for children 6 years of age and older.

34.1.1 Handwashing

Handwashing facilities must be provided in each CHILD ACTIVITY CENTER. They must be convenient to each CHILD ACTIVITY CENTER without barriers such as doors. Locate the handwashing station outside of the toilet room and install handwashing sinks with a maximum height of 560 mm (22 in) above the deck.

- Provide hot and cold POTABLE WATER to all handwashing sinks.
- Equip handwashing sinks to provide water at a temperature not to exceed 43°C (110°F) during use.
- Provide handwashing facilities that include a soap dispenser, paper towel dispenser or air dryer, and a waste receptacle. Install soap and paper towel dispensers close to the sink and near to the height of the sink.
- Ensure sufficient flow for all handwashing stations.

34.1.2 Toilet Rooms

Toilet rooms must be provided in CHILD ACTIVITY CENTERS. Provide one toilet for every 25 children or fraction thereof, based on the maximum capacity of the center. The toilet rooms must include items noted in sections 34.1.2.1 through 34.1.2.6.

34.1.2.1 Child-Sized Toilets

Provide CHILD-SIZED TOILETS with a maximum height of 305 mm (12 in) (including the toilet seat) and toilet seat opening no greater than 203 mm (8 in).

34.1.2.2 Handwashing Stations

Provide hot and cold POTABLE WATER to all handwashing sinks.

Equip handwashing sinks to provide water at a temperature not to exceed 43°C (110°F) during use.

Install handwashing sinks with a maximum height of 560 mm (22 in) above the deck.

Provide handwashing stations that include a soap dispenser, a paper towel dispenser or air dryer, and a waste receptacle.

34.1.2.3 Storage

Provide storage for gloves and wipes.

34.1.2.4 Waste Receptacle

Provide an airtight, washable, waste receptacle.

34.1.2.5 Self-Closing Doors

Provide self-closing toilet room exit doors.

34.1.2.6 Sign

Provide a sign with the exact wording “WASH YOUR HANDS AND ASSIST THE CHILDREN WITH HANDWASHING AFTER HELPING THEM USE THE TOILET.” The sign should be in English and can also be in other languages.

34.2 Diaper-Changing Station

Provide a diaper-changing station in CHILD ACTIVITY CENTERS where children in diapers or children who are not toilet trained will be accepted.

Include the following in each diaper changing station:

- A diaper-changing table that is impervious, nonabsorbent, nontoxic, smooth, durable, easily cleanable, and designed for diaper changing.
- An airtight, washable, soiled-diaper waste receptacle.
- An adjacent handwashing station equipped in accordance with section 34.1.2.2 at a height to be used by an adult.
- A storage area for diapers, gloves, wipes, and DISINFECTANT.
- A sign with the exact wording “WASH YOUR HANDS AFTER EACH DIAPER CHANGE.” The sign should be in English and can also be in other languages.

34.3 Child-Care Providers

Provide separate toilet and handwashing facilities for childcare providers from the children’s toilet rooms. A public toilet outside the center is acceptable.

34.4 Furnishings

Surfaces of tables, chairs, and other furnishings must be constructed of an easily cleanable, nonabsorbent material.

35.0 Housekeeping Handwashing Stations

Provide handwashing stations for housekeeping staff. The farthest distance for handwashing stations is 65 m (213 ft) forward or aft from the center of the work zone (based on 18–20 cabins/work zone). Values will be adjusted by the ship and work zone size. VSP will evaluate the number and location for these handwashing stations during the plan review process.

35.1 Location

Ensure at least one handwashing station is available for each cabin attendant work zone and on the same deck as the work zone. One handwashing station may be located between two cabin attendant work zones, and travel across crew corridors is permitted.

35.2 Ice/Deck Pantries

Handwashing stations for housekeeping staff include those in ice/deck pantries but do not include those located in bars, room service pantries, bell boxes, or other FOOD AREAS.

35.3 Supplies

Handwashing stations not located in ice/deck pantries must have a paper towel dispenser, soap dispenser, and a waste receptacle. These stations must provide water at a temperature between 29.4°C (85°F) and 49°C (120°F) through a mixing valve and be installed to allow for easy access by cabin attendants.

Handwashing stations inside of ice/deck pantries must be installed in accordance with section 7.1.

36.0 Passenger and Crew Public Toilet Rooms

36.1 Handwashing Facilities

Passenger and crew public toilets (not including FOOD-area toilets) must be provided with a handwashing station that includes the following:

- Hot and cold running water. Ensure sufficient flow for all handwashing stations.
- Soap dispenser.
- A method to dry hands (for example, sanitary hand-drying device, paper towel dispenser).
- A sign advising users to wash hands (pictograms are acceptable).

36.2 No-Touch Exits

Provide either of the following in the public toilet rooms.

- Hands-free exits from toilet rooms (such as doorless entry, automatic door openers, latchless doors that open out) **or**
- Paper towel dispensers at or after handwashing stations and a waste receptacle near the last exit door(s) to allow for towel disposal.

Unless the exit is hands-free, a sign or pictogram must be posted advising users of toilet facilities to use a hand towel, paper towel, or tissue to open the door.

36.3 Self-Closing Doors

All public toilet room exit doors must be self-closing.

37.0 Decorative Fountains and Misting Systems

37.1 Potable Water

Provide POTABLE WATER to all decorative fountains, misting systems, and similar facilities.

37.2 Design

Design and install decorative fountains, misting systems, and similar facilities to be maintained free of *Mycobacterium*, *Legionella*, algae, and mold growth.

37.3 Automated Treatment

Install an automated treatment system (halogenation, UV, or other effective DISINFECTANT) to prevent the growth of *Mycobacterium* and *Legionella* in any recirculated decorative fountain, misting system, or similar facility. Ensure these systems can also be manually disinfected.

37.4 Manual Disinfection

Provide a plumbing connection for manual DISINFECTION for all non-recirculated decorative fountains, misting systems, or similar facilities.

37.5 Water Temperature

If heat is used as a DISINFECTANT, ensure the water temperature can be maintained at 65°C (149°F) at the misting nozzle for a minimum of 10 minutes.

37.6 Removable Nozzles

Ensure misting nozzles are REMOVABLE for cleaning and DISINFECTION.

37.7 Schematics

Provide operational schematics for misting systems.

38.0 Acknowledgments

38.1 Individuals

This document is a result of the cooperative effort of many individuals from the government, private industry, and the public. VSP thanks all of those who submitted comments and participated throughout this lengthy process.

38.2 Standards, Codes, and Other References Reviewed for Guidance

CDC. Vessel Sanitation Program 2025 environmental public health standards. Available from URL: www.cdc.gov/vessel-sanitation/php/guidance/index.html.

World Health Organization. Guide to ship sanitation. 3rd edition.

38.2.1 Definitions and Acronyms (for Section 5.0)

FDA. 2022. Food Code, Recommendations of the United States Public Health Service.

CDC. Model Aquatic Health Code (MAHC). 5th ed. 2024.

38.2.2 Food-Related Areas (for Sections 6.0–21.0)

FDA. 2022, Recommendations of the United States Public Health Service.

Conference for Food Protection Plan Review Committee. Food establishment plan review manual.

International Maritime Organization. International Convention for the Safety of Life at Sea (SOLAS).

NFPA 70-2023, National Electric Code.

NSF International Standards. Available from URL: www.nsf.org.

- NSF C2-1983, Special equipment and/or devices.
- NSF/ANSI 2-2022, Food equipment.
- NSF/ANSI 3-2023, Commercial warewashing equipment.
- NSF/ANSI 4-2024, Commercial cooking, rethermalization, and powered hot food holding and transport equipment. Ann Arbor, MI: NSF International.
- NSF/ANSI 5-2024, Water heaters, hot water supply boilers, and heat recovery equipment.
- NSF/ANSI 6-2023, Dispensing freezers.
- NSF ANSI 7-2023, Commercial refrigerators and freezers.
- NSF/ANSI 8-2023, Commercial powered food preparation equipment.
- NSF/ANSI 12-2024, Automatic ice making equipment.
- NSF/ANSI 13-2024, Refuse processors and processing systems.
- NSF/ANSI 18-2023, Manual food and beverage dispensing equipment.
- NSF/ANSI 20-2023, Commercial bulk milk dispensing equipment.
- NSF/ANSI 21-2022, Thermoplastic refuse containers.
- NSF/ANSI 25-2023, Vending machines for food and beverages.
- NSF/ANSI 29-2021, Detergent and chemical feeders for commercial spray-type dishwashing machines.
- NSF/ANSI 35-2024, High pressure decorative laminates for surfacing food service equipment.
- NSF/ANSI 37-2024, Air curtains for entranceways in food and food service establishments.
- NSF/ANSI 51-2023, Food equipment materials.
- NSF/ANSI 52-2024, Supplemental flooring.
- NSF/ANSI 59-2024, Mobile food carts.

38.2.3 Potable Water (for Sections 22.0–24.0)

American Public Health Association. Standard methods for the examination of water and wastewater. 24th ed. 2022.

American Society of Sanitary Engineering (ASSE) International Standards. Available from URL: <https://asse-plumbing.org/>.

- ASSE #1001-2021, Performance requirements for atmospheric type vacuum breakers.
- ASSE #1012-2021, Performance requirements for backflow preventers with an intermediate atmospheric vent.
- ASSE #1013-2021, Performance requirements for reduced pressure principle backflow prevention assemblies.
- ASSE #1015-2021, Performance requirements for double check backflow prevention assemblies.
- ASSE #1022-2021, Performance requirements for backflow preventer for beverage dispensing equipment.
- ASSE #1032-2023, Performance requirements for dual check valve type backflow preventers for carbonated beverage dispensers, post mix type, and non-carbonated beverage dispensers.
- ASSE #1052-2023, Performance requirements for hose connection backflow preventers.
- ASSE #1056-2013 (R2021), Performance requirements for spill resistant vacuum breaker assemblies.

American Water Works Association (AWWA). Available from URL: www.awwa.org.

- ANSI/AWWA C652-19: Disinfection of water-storage facilities.
- ANSI/AWWA C653-20: Disinfection of water treatment plants.
- AWWA Manual M12, Simplified procedures for water examination. 6th ed. 2014.
- AWWA Manual M14, Backflow prevention and cross-connection control. 5th ed. 2024.
- AWWA Manual M19, Emergency planning for water and wastewater utilities. 5th ed. 2018.
- AWWA Manual M38, Electrodialysis and electrodialysis reversal. 2nd ed. 2022.
- AWWA Manual M46, Reverse osmosis and nanofiltration. 2nd ed. 2007.

EPA. Cross-connection control manual. 2003.

Foundation for Cross-Connection Control and Hydraulic Research. Manual of cross-connection control. 10th ed.

IAPMO/ANSI UPC 1-2021. Uniform Plumbing Code.

International Maritime Organization. International Convention for the Safety of Life at Sea (SOLAS).

ISO 14726:2008. Ships and marine technology – identification colours for the content of piping systems.

National Primary Drinking Water Regulations, 40 CFR 141.

National Standard Plumbing Code - illustrated, 2024.

NFPA 70-2023, National Electrical Code.

NSF/ANSI/CAN 61-2024, Drinking water system components—health effects.

38.2.4 Recreational Water Facilities (for Sections 25.0–32.0)

ANSI/APSP/ICC 7-2020. American National Standard for suction entrapment avoidance in swimming pools, wading pools, spas, hot tubs, and catch basins.

CDC. Model Aquatic Health Code (MAHC). 5th ed. 2024.

CDC. Two outbreaks of Legionnaires disease associated with outdoor hot tubs for private use — two cruise ships, November 2022–July 2024. MMWR. 2024;73:950–4.

EPA. Ultraviolet disinfection guidance manual for the final long term 2 enhanced surface water treatment rule. EPA-815-R-06-007. 2006.

NSF/ANSI 14-2023. Plastics piping system components and related materials.

NSF/ANSI/CAN 50-2024, Equipment and chemicals for swimming pools, spas, hot tubs and other recreational water facilities.

Pool and Hot Tub Alliance. Pool and spa operator handbook. 2024.

Rennell DS. Basic pool and spa technology. 2nd ed. Alexandria, VA: National Spa & Pool Institute; 1992.

Underwriters Laboratories.

U.S. Consumer Product Safety Commission. Pool and spa safety.

Virginia Graeme Baker Pool and Spa Safety Act, 16 C.F.R., Sect 1450.

World Health Organization. Guide to ship sanitation. 3rd ed.

38.2.5 Ventilation Systems (for Section 33.0)

ANSI/ASHRAE/ACCA Standard 180-2018, Standard practice for inspection and maintenance of commercial building HVAC systems.

ANSI/ASHRAE Standard 188-2021, Legionellosis: risk management for building water systems.

ASHRAE Guideline 12-2023, Minimizing the risk of legionellosis associated with building water systems.

Bollin GE, Plouffe JF, Para MF, Hackman B. Aerosols containing “Legionella pneumophila” generated by shower heads and hot-water faucets. *Appl Environ Microbiol*. 1985;50(5):1128–31.

Breiman R, Fields B, Volmer L, et al. Definitive association of shower use with Legionnaires’ disease: possible role of amoebae (Abstract). *JAMA*. 1990;263(21):2924–6.

Freije MR. Minimizing the risk of Legionella in cooling towers and other HVAC equipment. Indianapolis, IN: HC Information Resources; 1998.

38.2.6 Child Activity Centers (for Section 34.0)

American Academy of Pediatrics. Caring for our children, national health and safety performance standards. 4th ed. Washington, DC: AAP; 2019.

National Resource Center for Health and Safety in Child Care and Early Education. Available from URL: <https://nrckids.org/>.

38.2.7 Housekeeping and Hygiene (for Sections 35.0–36.0)

CDC. Norovirus prevention and control guidelines for healthcare settings. Available from URL: www.cdc.gov/infection-control/hcp/norovirus-guidelines.

38.2.8 Decorative Fountains and Misting Systems (for Section 37.0)

ASHRAE. Guideline 12-2023, Minimizing the risk of legionellosis associated with building water systems.

ANSI/ASHRAE. Standard 188-2021, Legionellosis: risk management for building water systems.

39.0 Appendices

39.1 Sample Letter of Request for Construction Inspection

(Company or organization letterhead) including the following:

Sponsor (Shipyard) Name

Address

Main telephone:

Sponsor representative:

Direct line:

E-Mail:

Chief, Vessel Sanitation Program (VSP)
Centers for Disease Control and Prevention

We request the presence of USPHS representatives [insert inspector’s names] to conduct a construction inspection on the cruise vessel [insert hull number and vessel name]. We tentatively expect to deliver the vessel on [insert delivery date]. We would like to schedule the construction inspection for [insert inspection dates] in [insert city, country]. We expect the construction inspection to take approximately [insert number] days. We will pay CDC in

accordance with the inspection fees published in the Federal Register.

As stated in section 3.0 of the VSP Construction Standards, the vessel will be 90% complete for onsite construction inspections and 100% complete for final construction inspections.

- If the vessel is not complete, we will arrange travel for the inspectors to return to their airport of origin as soon as possible at no cost to CDC or the VSP inspectors.
- Additionally, if flight itineraries need to be changed because of unforeseen circumstances (for example, missed connections, delayed or canceled flights, weather, or labor strikes), we will provide a revised itinerary at no cost to CDC or the VSP inspectors.
- We understand that failure to comply with these requirements may result in suspension of VSP construction inspections for this shipyard.

For inspections occurring outside of the United States, we will make all necessary arrangements for lodging and transportation of VSP staff conducting the inspection, which includes airfare and ground transportation in [inset city, country].

- We will provide in-kind lodging, airfare, and local transportation expenses from [insert travel dates].
- No cash or honorarium will be given.
- No U.S. federal funds will be used.
- CDC will be responsible for paying all other expenses that cannot be provided in-kind by [insert sponsor name] such as ground transportation (taxis, parking, etc.) and meals outside those provided during the meeting.

Send invoice to:

Sponsor representative:

Billing address:

Phone:

Fax:

If you have any questions concerning this request, please contact: [insert name of sponsor representative].

39.2 VSP Construction Contact Information

Phone: 1-800-323-2132

Email: Construction.VSP@cdc.gov

For updates to these standards and information about VSP visit www.cdc.gov/vessel-sanitation/about/index.html.

39.3 VSP Construction Resources

VSP will develop resources such as job aids that may help shipyard and cruise industry personnel achieve compliance. Contact Construction.VSP@cdc.gov for more information.