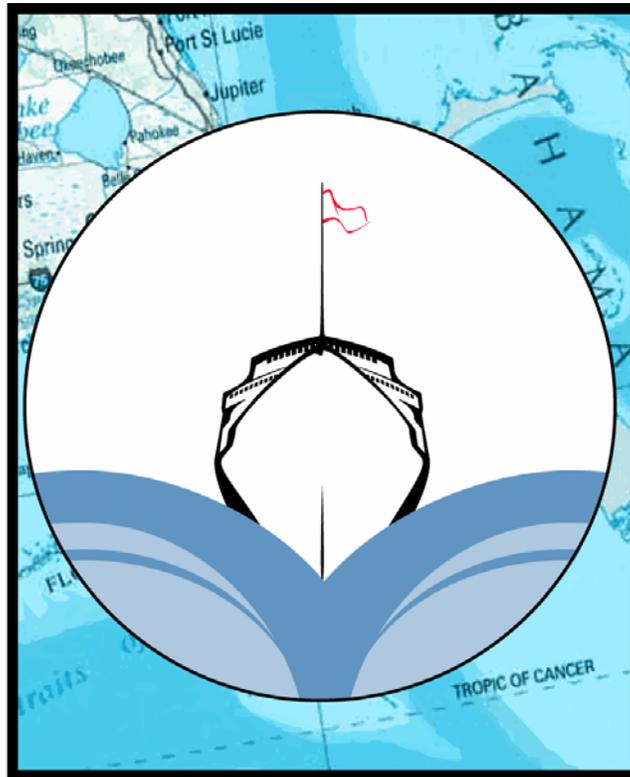


# Vessel Sanitation Program Construction Guidelines



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The *VSP Construction Guidelines* and updates are available at [www.cdc.gov/nceh/vsp](http://www.cdc.gov/nceh/vsp).

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## 1.0 Background and Purpose

The Centers for Disease Control and Prevention (CDC) established the Vessel Sanitation Program (VSP) in 1975 as a cooperative endeavor with the cruise vessel industry. VSP's goal is to assist the industry to develop and implement comprehensive sanitation programs to protect the health of passengers and crew aboard cruise vessels.

Every cruise vessel that has a foreign itinerary, carries 13 or more passengers, and calls on a U.S. port is subject to biannual operational inspections and when necessary, re-inspection by VSP. The vessel owner pays a fee, based on gross registered tonnage (GRT) of the vessel, for all operational inspections. The *Vessel Sanitation Program Operations Manual (VSP Operations Manual)*, which is available on the VSP Web site ([www.cdc.gov/nceh/vsp](http://www.cdc.gov/nceh/vsp)), covers details of these inspections.

Additionally, cruise vessel owners or shipyards that build or renovate cruise vessels may voluntarily request plan reviews, on-site shipyard construction inspections and/or final construction inspections of new or remodeled vessels before their first or next operational inspection. The vessel owner or shipyard pays a fee, based on GRT of the vessel, for on-site and final construction inspections. VSP does not charge a fee for plan reviews or consultations. Section 3.0, Procedures for Making Requests for Plan Reviews and Construction-Related Inspections covers details pertaining to plan reviews, consultations, or construction inspections.

The *Recommended Shipbuilding Construction Guidelines for Cruise Vessels Destined to Call on U.S. Ports*, has been renamed as the *Vessel Sanitation Program Construction Manual* (referred to in this documents as "these guidelines"). The main purpose of these guidelines is to provide a framework of consistent construction and design guidelines that protect passenger and crew health. CDC is committed to promoting high construction standards to protect the public's health. Compliance with these guidelines will help to ensure a healthy environment on cruise vessels.

CDC reviewed many references from a variety of sources to develop this document. These references are indicated in Section 32.2, Standards, Codes and Other References Reviewed for Guidance.

These guidelines cover various components of the vessel's facilities related to public health, including food storage, preparation, and service; 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, and VSP's routine operational inspection requirements.

These guidelines are not meant to limit the introduction of new designs, materials or technology for shipbuilding. A shipbuilder, owner, manufacturer, or other interested party may request VSP to periodically review or revise these guidelines in relation to new information or technology. VSP reviews such requests in accordance with the criteria described in Section 2.0, "Revisions and Recommended Changes."

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

These guidelines went into effect on June 1, 2005. They apply to vessels that lay keel or perform any major renovation (e.g., any changes to the structural elements of the vessel covered by these guidelines) after this date. The guidelines do not apply to minor renovations such as the installation or removal of single pieces of equipment, (refrigerator units, bains-marie units, etc.) or single pipe runs. These guidelines will apply to all areas of the vessel affected by a renovation. VSP will inspect the entire vessel in accordance with the *VSP Operations Manual* during routine vessel sanitation inspections and re-inspections.

## **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. A shipbuilder, owner, manufacturer, or other interested parties may ask VSP to review a construction guideline on the basics of new technologies, concepts, or methods. Recommendations for changes or additions to these guidelines must be submitted in writing, to the Chief, VSP (see Section 33.2 for contact information). The recommendation should:

- identify the section to be revised,
- describe the proposed change or addition,
- state the reason for recommending the change or addition, and
- include research or test results and any other pertinent information that support 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 guidelines. This helps limit any burden placed on the shipyards and owners to make excessive changes to previously agreed upon plans.

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

### **3.0 Procedures for requesting Plan Reviews, Consultations, and Construction-Related Inspections**

To coordinate or schedule a plan review or construction-related inspection submit an official written request to the VSP Chief as early as possible in the planning, construction, or renovation process. Requests that require foreign travel must be received in writing at least 60 days before the intended visit. The request will be honored, depending on VSP staff availability. A complete listing of contact addresses and telephone numbers can be found in Section 33.2.

After the initial contact, VSP assigns primary and secondary officers to coordinate with the vessel owner and shipyard. Normally two officers will be assigned. These officers are the points of contact for the vessel from the time the plan review and subsequent consultations take place through the final construction inspection.

The vessel representatives should provide points of contact to represent the owners, the shipyard, and key subcontractors. All parties will use these points of contact during consultations between any of the parties and VSP to ensure awareness of all consultative activities after conducting the plan review.

#### **3.1 Plan Reviews and Consultations**

VSP normally conducts plan reviews for new construction a minimum of 18-24 months before the vessel is scheduled for delivery. The time required for major renovations varies. To allow time for any necessary changes, VSP coordinates the plan reviews for such projects well before the work begins. Plan reviews normally take two working days. They are conducted in Atlanta, Georgia; Fort Lauderdale, Florida; or other agreed upon sites. Normally, two VSP officers will be assigned to the project. Representatives from the shipyard, the vessel owner,

and the subcontractor(s) who will be doing most of the work should attend the review. They should bring all pertinent plans or drawings and equipment specifications for the areas covered in these guidelines. That includes but is not limited to the following:

- general arrangement plans;
- all food-related storage, preparation, and service area plans;
- potable and non-potable water system plans with details on water inlets, (e.g., sea chests, overboard discharge points, and backflow protection devices);
- ventilation system plans; and, if applicable;
- swimming pool and whirlpool spa plans.

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

Following the plan review, the shipyard will provide:

- 1) a complete set of plans or drawings and specifications for the vessel;
- 2) any redrawn plans and;
- 3) a statement of corrective action outlining how each of the items identified in the Plan Review Report will be corrected, and
- 4) copies of any major change orders in the areas covered by these guidelines that are made after the plan review.

While the vessel is being built, shipyard representatives, the owner or other vessel representatives may direct questions or requests for consultative services to the VSP project officers. Direct these questions or requests in writing to the officer(s) assigned to the project. Include fax number(s) and an e-mail address(es) for appropriate contacts. VSP officer(s) will coordinate the request with the owner and shipyard points of contact designated during the plan review.

### **3.2 On-Site Construction Inspections**

VSP conducts most on-site or shipyard construction inspections in shipyards outside the United States. A formal written request must be submitted to the VSP Chief 60 days before the inspection date so that VSP can process the required foreign travel orders for VSP officers (see Section 3.0). A sample of a request is shown in Section 33.1. VSP encourages shipyards to contact the Chief, VSP to and coordinate on-site construction inspections well before the 60 day minimum to better plan the actual inspection dates. If a shipyard requests an on-site construction inspection, VSP will advise the vessel owner of the inspection dates so that the owner's representatives are present. An on-site construction inspection normally requires the expertise of one to three officers, 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. The inspection, including travel, generally takes 5 working days. The on-site inspection should be conducted approximately 4 to 5 weeks before delivery of the vessel when 90% of the areas of the vessel to be inspected are completed. VSP will provide 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 will submit 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. To schedule the inspection, the vessel owner or shipyard will submit a formal, written request the Chief, VSP as soon as possible after the vessel is completed, or a minimum of 10 days before its arrival in the United States. At the request of a vessel owner or shipyard and provided the vessel is not entering the United States market immediately, VSP may conduct final construction inspections outside the United States (see requirements for foreign travel in section 3.2 On-Site Construction Inspections). If a final construction inspection is not requested, VSP generally will conduct an unannounced operational inspection within 4 weeks following the vessel's arrival in the United States. VSP conducts operational inspections in accordance with the *VSP Operations Manual*.

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 will outline how they will address each item cited in the inspection report, including the projected date of completion. VSP generally schedules vessels that undergo final construction inspection in the United States for an unannounced operational inspection within 6 weeks of the vessel's final construction inspection. VSP conducts operational inspections in accordance with the *VSP Operations Manual*.

## **4.0 Equipment Standards, Testing, and Certification**

Although these guidelines establish certain standards for equipment and materials installed on cruise vessels, VSP does not test, certify, or otherwise endorse 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), or other accredited institutions.

In most cases, independent testing laboratories test equipment and materials to certain minimum standards which generally, but not always meet the

recommended standards established by these guidelines. Equipment built to questionable standards will be reviewed by a committee of VSP, the cruise ship industry and independent testing organization participants. The committee will determine if the equipment meets the recommended standards established in these guidelines. Copies of test or certification standards are available from the independent testing laboratories. Equipment manufacturers and suppliers will not refer to VSP to approve their products.

## 5.0 General Definitions

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

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

**Air-gap** — The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood-level rim of the receptacle or receiving fixture. The air-gap must be at least twice the diameter of the supply pipe or faucet or at least 25 mm (1 inch). (Figure 2)

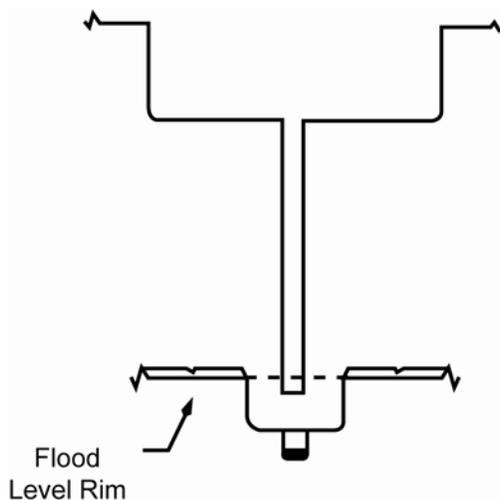


Figure 1 - Air-Break

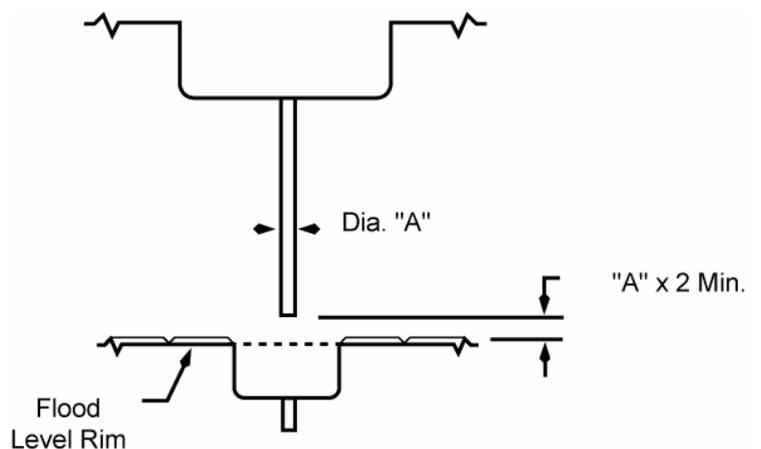


Figure 2 - Air-Gap

**Backflow** — The flow of water or other liquids, mixtures, or substances into the distribution pipes of a potable supply of water from any source or sources other than the potable water supply. Back-siphonage and back-pressure are forms of backflow.

**Backflow, check, or non-return valve** — A mechanical device installed in a waste line to prevent the reversal of flow under conditions of back-pressure. In check-valves, the flap should swing into a recess when the line is flowing full so that it does not obstruct the flow.

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

- **Atmospheric vacuum breaker** — An approved backflow prevention plumbing device used on potable water lines where shut-off valves do not exist downstream from the device. The device is not approved for use under continuous water pressure. An atmospheric vacuum breaker must be installed at least 152 mm (6 inches) above the flood level rim of the fixture or container to which it is supplying water.
- **Continuous pressure backflow preventer** — An approved backflow prevention plumbing device with two check valves and an intermediate atmospheric vent. It is designed and approved for use under continuous water pressure (e.g., when shut-off valves are located downstream from the device).
- **Hose bib connection vacuum breaker** — An approved backflow prevention plumbing device that attaches directly to a hose bib by way of a threaded head. This device uses a single check valve and vacuum breaker vent. It is not approved for use under continuous pressure (e.g., when a shut-off valve is located downstream from the device).
- **Reduced Pressure Principle Backflow Prevention Assembly (RP assembly)** — An assembly containing two independently acting approved 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.

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

**Black water** — Waste from toilets, urinals, medical sinks, and similar facilities.

**Blast chiller** — A unit specifically designed for rapid intermediate chilling of food products to 21°C (70°F) within 2 hours and 5°C (41°F) within an additional 4 hours.

**Child activity facility** — A designated area for use by children who do not require assistance using toilet rooms and who may be old enough to come and go on their own.

**Child care facility** — A designated area for use by children who are not yet out of diapers or require supervision when using the toilet rooms, and who are cared for by vessel staff.

**Child-size toilet** — Toilets whose toilet seat height is between 280–380 mm (11–15 inches) and the water closet center line is between 305–380 mm (12–15 inches). This can be achieved by installing a smaller water closet or by providing a deck platform at the front of the water closet and variably sized, fold-down toilet seats.

**Cleaning room** — A room specifically designed for storage of cleaning equipment such as mops, brooms, floor scrubbing machines, and cleaning chemicals. The room may or may not include a sink for filling buckets and washing mops.

**Corrosion-resistant** — 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.

**Coved** — A curved or concave surface, molding, or other design that eliminates the usual joint angles of 90° or less. (Figures 3 and 4)

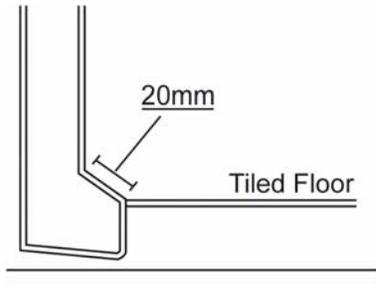


Figure 3 - Coving

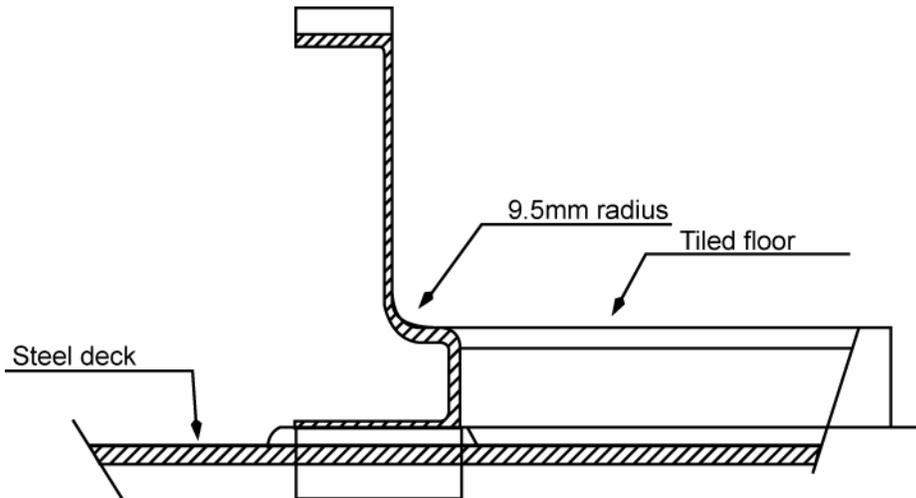


Figure 4 - Coving

**Crew toilet room** — Those toilets located near food preparation areas and intended for use by food service personnel.

**Cross-connection** — Any unprotected, actual or potential connection or structural arrangement between a public or a consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied. Bypass arrangements, jumper connection, removable section, swivel or change-over

devices and other temporary or permanent devices which or because of which backflow can occur are considered to be cross-connections.

**Deck drain** — The physical connection between decks, scuppers, or deck sinks to the gray or black water systems.

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

**Drip tray** — Readily removable tray to collect dripping food from a food dispensing mechanism.

**Easily cleanable** — Fabricated with a material, finish, and design that allows for cleaning by normal methods.

**Food contact surfaces** — 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 onto surfaces normally in contact with food. This includes those areas of ice-making machines where the ice is produced and above the connecting chute between the maker and the storage bin. It does not include the technical compartment where the compressor is located. (figure 5)

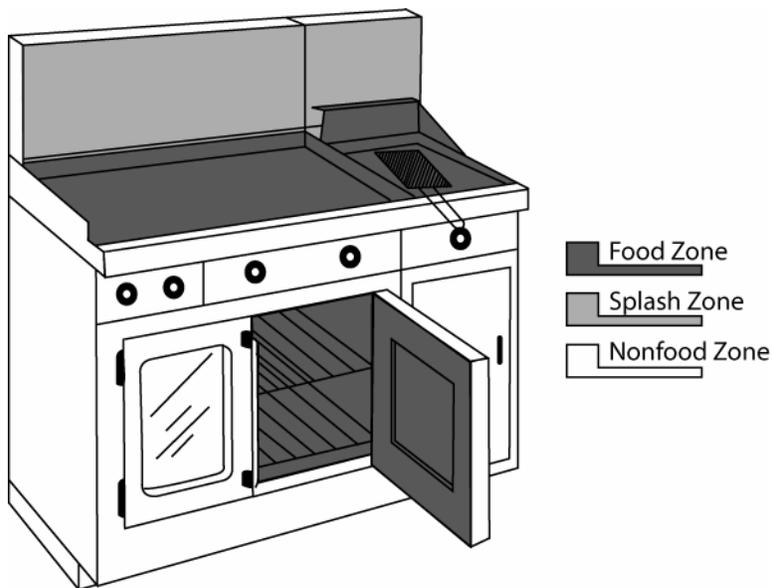


Figure 5 - Food Contact Surfaces

**Food display areas** — Any area where food is displayed for consumption by passengers and/or crew.

**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 service areas** — Any area where food is presented to passengers or crew members (excluding individual cabin service).

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

**Food transport areas** — Any area through which unprepared or prepared food is transported during food storage, preparation, and service operations (excluding public areas and individual cabin service).

**Food waste system** — Food waste transport system (e.g., pulper, vacuum system).

**Gray water** — All wastewater including drainage from galleys, dishwashers, showers, laundries, bath, washbasin, deck drains, and swimming pool and whirlpool spas. It does not include black water or bilge water from the machinery spaces.

**Gutterway** — See scupper

**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.

**Non-food contact surfaces (non-food zone)** — All exposed surfaces, other than food contact or splash contact surfaces, of equipment located in food storage, preparation and service areas. (figure 5) nonabsorbent nontoxic

**Non-potable water (Technical Water)** — Fresh water that may not be halogenated and is intended for use in technical and other areas where potable water is not required (e.g., laundries, engine room, toilets, waste-treatment areas, and for washing decks in areas other than the vessel's hospital, food service, preparation, or storage areas).

**Potable water** — Fresh water that is intended for drinking, washing, bathing, or showering; for use in fresh water swimming pools and whirlpool spas; for use in the vessel's hospital; for handling, preparing, or cooking food; and for cleaning food storage and preparation areas, utensils, and equipment.

**Potable water tanks** — All tanks in which potable water is stored from bunkering and production for distribution and use as potable water.

**Portable** — A description of equipment that is readily 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.

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

**Readily removable** — Capable of being detached from the main unit without the use of tools.

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

**Safe material** — An article or material that would not be expected to become a component of any food or otherwise affect the characteristics of any food. Also, an additive or other materials used as specified in Section 409 or 706 of the Federal Food, Drug, and Cosmetic Act or in conformity with applicable regulations of the U.S. Food and Drug Administration (FDA).

**Scupper** — A conduit or collection basin that channels liquid runoff to a deck drain.

**Sealant** — Material used to fill seams to prevent the entry or leakage of liquid or moisture.

**Sealed** — Having no openings present that will permit the entry of soiled material or seepage of liquids.

**Sealed seam** — A seam that has no openings that would permit the entry of soil or liquid seepage.

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

**Sewage (black water)** — Any liquid waste that contains animal or vegetable matter in suspension or solution, including liquids that contain chemicals in solution.

**Smooth** — means:

- a) A food contact surface that is free of pits and inclusions with a cleanability equal to or exceeding that of a No. 3 finish (100 grit) on stainless steel;
- b) A non-food contact surface of equipment that is equal to commercial grade hot-rolled steel and is free of visible scale; and
- c) A deck, bulkhead, or deckhead that has an even or level surface with no roughness or projections that renders it difficult to clean.

**Spa pool** — A fresh or saltwater supplied pool with temperatures and turbulence comparable to a whirlpool spa, but with a water depth and volume more comparable to a swimming pool. General characteristics are

- water temperature of 30°C–40°C or 86°F–104°F,
- bubbling or jetted water effects that physically break at the water surface,
- depth of more than 1 m (3 feet),
- shape is normally non-circular, and
- volume exceeds 6 tons of water.

**Splash contact surfaces (non-food zone)** — Surfaces that are subject to routine splash, spillage or other soiling during normal use.

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

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

**Technical water** — Fresh water NOT intended for:

- 1) drinking, washing, bathing, or showering;
- 2) use in the vessel's hospital;
- 3) handling, preparing, or cooking food; or
- 4) cleaning food storage and preparation areas, utensils, and equipment.

**Temperature measuring devices (TMDs)** — Thermometers or other instruments that measure relative heat and cold according to an established scale. TMDs that are scaled in Celsius, Fahrenheit, or both must be designed to be easily readable and accurate to  $\pm 1.5^{\circ}\text{C}$  or  $3^{\circ}\text{F}$ .

**Transportation corridors** — Areas primarily intended to move unprepared or prepared food during food preparation, storage, and service operations (e.g., service lift (elevator) vestibules to food preparation service and storage areas,

and corridors connecting preparation areas and service areas). Marshalling, provisions areas, passenger/corridors, public areas, and dining rooms connected to galleys are excluded.

**TMD** — See temperature measuring device.

**Utility sink** — Any sink located in a food service area not intended for handwashing and/or warewashing.

**Whirlpool spa** — A freshwater pool designed to operate at a minimum temperature of 30°C (86°F) and equipped with either water or air jets.

## 6.0 General Facilities 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 can include the size of the vessel, number of passengers and crew, types of foods or menus, number of meals or mealtimes, service or presentation of meals, itinerary, and the vessel owner's experience. In general, food storage, preparation, and service 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 (e.g., frozen stores, refrigerated stores, and dry stores) must be sized to prevent bulk foods from being stored in provisions passageways unless specifically designed to meet provision room standards (Section 15.0). Refrigeration and hot-food holding facilities, including temporary storage facilities, must be available for all food preparation and service areas and for foods being transported to remote areas.

Arrange the flow of food through a vessel in a logical sequence that eliminates or minimizes cross-traffic or backtracking and that allows clear separation of clean and soiled operations. Provide an orderly, functional flow of food from the purveyor at dockside through the storage, preparation, and finishing areas to the service areas and finally, to the waste management area. The goal is to prepare and serve food smoothly and rapidly in accordance with strict time and temperature-control requirements and to minimize time and handling.

VSP evaluates the size of a particular room or area and the flow of food through the vessel to those rooms or areas initially and primarily during the plan review process.

## 6.2 Equipment Requirements

**6.2.1** The following is a list of equipment required in galleys, depending on the level, and type of service, with recommendation for other areas:

**6.2.1.1 Blast chillers** incorporated into the design of passenger and crew galleys. More than one unit may be necessary depending on the size of the vessel, the unit's intended application, and the distances between the chillers and the storage and service areas.

**6.2.1.2 Food preparation sinks** in as many areas as necessary (e.g., in all meat, fish, and vegetable preparation rooms; 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 sinks in vegetable preparation rooms;

**6.2.1.3 Storage of cabinets, shelves, or racks** for food products, condiments, and equipment in food storage, preparation, and service areas, including bars and pantries;

**6.2.1.4 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. Provide a storage cabinet or rack for large items such as ladles, paddles, whisks, spatulas, and to allow the vertical storage of cutting boards;

**6.2.1.5 Knife lockers, or other designated knife storage facilities** (e.g., drawers) that are easily cleanable and meet food contact standards;

**6.2.1.6 Storage areas, cabinets, or shelves** for waiter trays;

**6.2.1.7 Dishware lowerators or similar dish storage and dispensing cabinets;**

**6.2.1.8 Glass rack storage shelving;**

**6.2.1.9 Work counters or food preparation counters** that provide sufficient work space;

**6.2.1.10 Drinking fountains** without filling spout;

**6.2.1.11 Cleaning lockers** (See Section 26.0 for specific cleaning locker construction requirements).

**6.2.2** Equip the main pot washing area that serves the full galley operation with a minimum of a three-compartment sink with a prewash station or a four-

compartment sink with an insert pan and an overhead spray. Install a sink that is large enough to accommodate the largest piece of equipment (pots, tableware, etc.) used in its designated serving area. If desired, use an automatic warewashing machine with separate prewash stations in addition to the three-compartment sinks, if the machines are sized to accommodate the equipment being washed. A front-loading, pass-through, or conveyor type warewashing machine is preferable to an under counter model.

**6.2.3** Provide additional three-compartment sinks with prewash stations or four-compartment sinks with insert pans and overhead spray in heavy-use areas. Those may include bakeries, butcher shops, and other preparation areas where the size of the facility or distance makes use of a central pot washing area impractical.

**6.2.4** Equip all food preparation areas with easy access to a three-compartment sink, or a warewashing machine with an adjacent dump sink and pre-wash hose.

**6.2.5** Furnish beverage dispensing equipment with readily removable drip trays or built-in drains in the tabletop. Furnish bulk milk dispensers with readily removable drip trays.

**6.2.6** Provide readily removable drip trays for condiment dispensing equipment.

**6.2.7** Design storage areas to accommodate all equipment and utensils used in food preparation areas such as ladles and cutting blades.

**6.2.8** Ensure that the design of installed equipment directs food and wash water drainage into a deck drain, scupper, or deck sink, and not directly or indirectly onto a deck.

**6.2.9** Provide a utility sink in areas such as beverage stations where it is necessary to refill pitchers or dispensers or discard liquids such as coffee.

**6.2.10** Provide ice cream, sherbet, or a similar product dipper wells with running water and proper drainage.

**6.2.11** Provide tight-fitting doors or protective closures to ice bins, food display cases, and other food and ice holding units to prevent contamination of stored products.

**6.2.12** 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 or rim of at least 5 mm (3/16 inch) above the counter level around the opening.

## **6.3 Equipment Surfaces**

**6.3.1** Ensure that material used for food contact, splash contact and exposed non-food contact surfaces are smooth, durable, and non-corroding. They should be easily cleanable and designed without unnecessary edges, projections, or crevices.

**6.3.2** Use only materials approved for contact with food on food contact surfaces. Make all food contact surfaces smooth, durable, non-corroding, easily cleanable, readily accessible, and maintainable. Provide coved preferable seamless corners in accordance with current sanitary standards for food service equipment. Form external corners and angles with a sufficient radius to permit proper drainage and without sharp edges. Use only sealants approved for food contact surfaces (certified to ANSI/NSF Standard 51, or equivalent criteria) on food contact and food splash surfaces. Use approved sealants in limited application when practical function or design requires, such as the joining surfaces between ice makers and bins. Avoid excessive use of sealant.

**6.3.3** Use materials approved for food contact surfaces for splash contact surfaces. Design surfaces so they are smooth with no sharp edges, durable, non-corroding, readily accessible, and easily cleanable.

**6.3.4** Use durable and non-corroding material for non-food contact surfaces. Design surfaces so that they are smooth, easily cleanable, and accessible material.

## **6.4 Bulkheads, Deckheads and Decks**

**6.4.1** Do not use exposed fasteners in bulkhead and deckhead construction. Seal all seams between adjoining bulkhead panels, deckhead panels, and between bulkhead and deckhead panels. Seal seams greater than 0.8 mm (1/32 inch), but less than 3 mm (1/8 inch), with an appropriate sealant or appropriate profile strips. Cover all seams greater than 3 mm (1/8 inch) with appropriate profile strips. Seal all bulkhead, deckhead, and deck penetrations through which pipes or other conduits pass, including those located inside technical compartments. Use durable and corrosion-resistant collars where gaps are greater than 3 mm (1/8 inch).

**6.4.2** Reinforce all bulkheads sufficiently to prevent panels from buckling or becoming detached under normal operating conditions.

**6.4.3** Weld door penetration indentations completely so that there are no open voids. Ensure that locking and latch pins insert into inverted nipple recesses. This also applies to the penetrations around fire doors, in thresholds, and bulkhead openings.

**6.4.4** Install durable coving of at least a 9.5 mm (3/8 inch) radius or open design (> 90 degrees [see definition]) as an integral part of the deck and bulkhead interface and at the juncture between decks and equipment foundations. Provide coving that is durable, of sufficient thickness, and securely fastened.

**6.4.5** Use material for decks that is hard, durable, easily cleanable, non-skid, and non-absorbent.

**6.4.5.1** Install durable vinyl or linoleum deck coverings in staff, crew or officer dining areas only.

**6.4.5.2** Seal all pipe and conduit deck penetrations.

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

## **6.5 Deck Drains, Deck Sinks and Scuppers**

**6.5.1** Construct deck drains, scuppers, and deck sinks from stainless steel with smooth finished surfaces that are accessible for cleaning, designed to drain completely, and large enough to prevent overflow to adjacent deck surfaces.

**6.5.2** Construct scupper, and deck sink cover grates from stainless steel or other materials that:

- 1) meet the requirements for a smooth, easily cleanable surface;
- 2) are strong enough to maintain the original shape; and
- 3) exhibit no sharp edges.

Install scupper and deck sink cover grates that are tight-fitting, readily removable for cleaning, and uniform in length where practical (e.g., 1,000 mm or 40 inches), so that they are interchangeable.

**6.5.3** Place deck drains, and deck sinks in low-traffic areas such as in front of soup kettles, boilers, tilting pans, or braising pans. Size the deck drains, scuppers, and sinks in order to eliminate spillage and overflow to adjacent deck surfaces.

**6.5.4** Provide sufficient deck drainage in all food service areas to prevent liquids from pooling on the decks.

**6.5.5** Design deck and scupper drain lines to drain at a sufficient rate, relative to nearby water supplies, to avoid pooling. Provide cross-drain connections to prevent ponding and spillage from the scupper when the vessel is listing.

**6.5.6** Do not use deck sinks as substitutes for deck drains. Independent deck drains are required.

## **6.6 Ramps**

**6.6.1** Ensure that ramps over thresholds are easily removable or sealed in place, sloped for easy roll-in and roll-out of trolleys, and 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 cleanable and durable material.

## **6.7 Gray and black water drain lines**

**6.7.1** Limit the installation of drain lines that carry sewage or other liquid waste directly overhead or horizontally through spaces used for food preparation or storage. That includes areas for washing or storage of utensils and equipment, such as bars, 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.

## **7.0 General Hygiene Facilities Requirements**

### **7.1 Handwashing Stations**

**7.1.1** Provide hot and cold potable water to all handwashing sinks.

**7.1.1.a** Equip handwashing sinks to provide water at a temperature between 43°C (110°F) and 52°C (125°F) through a mixing valve or combination faucet.

**7.1.2** Construct handwashing sinks of stainless steel in food handling, preparation and storage areas. Construct handwashing sinks in food service areas of stainless steel or similar, durable materials.

**7.1.3** Provide handwashing stations that include a suitable soap dispenser, paper towel dispenser, corrosion-resistant waste receptacle, and where necessary, splash panels to protect adjoining equipment. If attached to the bulkhead, permanently seal or make readily removable for cleaning paper towel dispensers and waste towel receptacles.

**7.1.4** Provide at least one bucket filling station in each area of the galleys (e.g., cold galley, hot galley, bakery, etc.), food storage, and food preparation areas,

below the handwashing sinks. Supply hot and cold potable water through a mixing valve to a faucet with the appropriate backflow protection at each bucket filling station. Provide appropriate deck drainage (e.g., 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.

**7.1.5** Locate handwashing stations throughout food handling, preparation, and warewash areas, so that no employee must walk more than 8000 mm (25 feet) to reach a station or pass through a normally closed door.

**7.1.5.a** Install handwash sinks approximately 750 mm (30 inches) above the deck.

**7.1.5.b** Position the handwash sink so employees do not have to squat or reach excessively to wash their hands.

**7.1.5.c** Provide a handwashing station at food dispensing waiter stations (e.g., soups, ice, etc.), where the staff does not routinely return to an area with a handwashing station.

**7.1.5.d** Provide a handwashing station in provision areas where bulk raw foods are handled by provisioning staff.

**7.1.5.e** Provide at least one handwashing station for every 100 seats, (e.g., 1–100 seats = one handwashing station, 101–200 seats = two handwashing stations, etc.) at the entrance of all officer/staff/crew mess areas where food service lines are “self-service.”

**7.1.6** Install a sufficient number of handwashing sinks at the soiled dish drop-off area(s) in the main galley to allow quick turn-around time for employees bringing soiled dishware from the dining rooms or other food service areas and to prevent long waiting lines at handwashing stations.

**7.1.7** Provide at least one handwashing station at soiled linen handling areas of the main laundry.

**7.1.8** Install easy-to-operate, sanitary faucet handles, (e.g., elephant ear handles, foot pedals, knee pedals, or electronic sensors) on handwashing sinks in food service 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** Install permanent signs in English, and in other languages where appropriate, stating at a minimum, “WASH HANDS OFTEN.”

## **7.2 Crew Toilet Rooms**

**7.2.1** Install employee toilet rooms in proximity to the work area of all food preparation areas.

**7.2.2** Supply toilet rooms with exhaust ventilation and equip them with handwashing facilities. Install permanent signs in English, and other languages where appropriate, stating at a minimum “WASH HANDS AFTER USING TOILET.”

**7.2.3** Install tight-fitting, self-closing doors to control insects/vermin and odors in toilet rooms or water closets inside toilet rooms.

**7.2.4** Construct decks of hard, durable materials and cove the bulkhead-deck juncture.

**7.2.5** Install easily cleanable deckheads and bulkheads.

## **8.0 Equipment Placement and Mounting**

**8.1** Seal fixed, non-portable equipment to the bulkhead, table-top, countertop, or adjacent equipment. Provide access for cleaning under and around fixed equipment listed in Section 8.1.1-8.1.4. The access provided is dependent upon the distance from either end to the farthest point requiring cleaning. These requirements do not apply to open racks or other equipment of open design or easily movable equipment mounted on wheels or slides.

**8.1.1** Provide at least 150 mm (6 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads, when the distance to be cleaned is less than 600 mm (24 inches).

**8.1.2** Provide at least 200 mm (8 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads when the distance to be cleaned is greater than 600 mm (24 inches) but less than 1200 mm (48 inches) long.

**8.1.3** Provide at least 300 mm (12 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads when the distance to be cleaned is greater than 1200 mm (48 inches) but less than 1800 mm (72 inches) long.

**8.1.4** Provide at least 460 mm (18 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads when the distance to be cleaned is greater than 1800 mm (72 inches).

**8.2** Continuous weld all equipment that is not classified as portable to stainless steel pads or plates on the deck. Make sure the welds have smooth edges, rounded corners, and no gaps. Attach equipment as an integral part of the deck surface with glue, epoxy, or other durable adhesive product. Ensure that the arrangement is smooth and easily cleanable.

**8.3** Seal deck-mounted equipment that is not easily movable to the deck or elevate it on legs that provide at least a 150 mm (6 inch) clearance between the deck and the equipment. If no part of the deck under the deck-mounted equipment is more than 150 mm (6 inches) from the point of cleaning access, the clearance space may be only 100 mm (4 inches). Exceptions also may be granted if there are no barriers to cleanability, (e.g., equipment, such as waste handling systems and warewashing machines with pipelines, motors, and cables below which 150 mm [6 inches] clearance from the deck may not be practical).

**8.4** Provide a minimum of at least 150 mm (6 inches) between equipment and the deckheads. If proper clearance cannot be achieved, extend the equipment through the deckhead panels and seal appropriately.

**8.5** Mount equipment that is on a foundation or coaming at least 100 mm (4 inches) above the finished deck. Use cement or a continuous weld to seal equipment to the 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 inches). Completely seal any overhang(ing) equipment along the bottom (Figure 6).

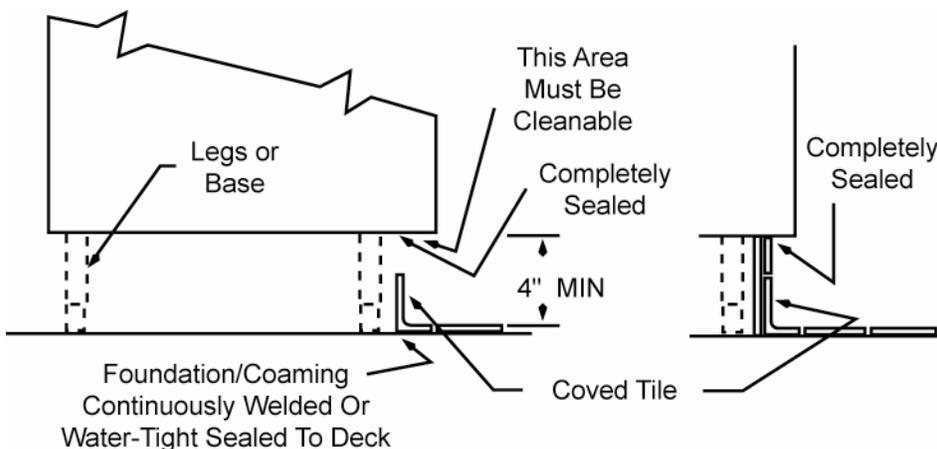


Figure 6 - Foundation Detail

**8.6** Seal table-mounted equipment, unless portable, to the tabletop or mount on legs.

**8.6.1** The length of the legs is dependent upon the horizontal distance of the table top under the equipment from either end to the farthest point requiring cleaning.

**8.6.1.a** Mount the equipment on legs at least 100 mm (4 inches) above the tabletop if the horizontal distance of the table top under the equipment is 500 mm (20 inches) or greater from the point of access for cleaning.

**8.6.1.b** Mount the equipment on legs at least 75 mm (3 inches) above the tabletop if the horizontal distance of the table top under the equipment is less than 500 mm (20 inches) or greater than 75 mm (3 inches) from the point of access for cleaning.

**8.6.1.c** Mount the equipment on legs at least 50 mm (2 inches) above the tabletop if the horizontal distance of the table top under the equipment less than 75 mm (3 inches) from the point of access for cleaning.

**8.6.2** Provide access behind tabletop mounted equipment, including beverage line equipment, for cleaning.

## **9.0 Fasteners and Requirements for Securing and Sealing Equipment**

### **9.1 Food Contact Surfaces**

**9.1.1** 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** Use low profile, non-slotted, non-corroding, and easy to clean fasteners on food contact surfaces and in food splash zones. The use of exposed slotted screws, Phillips head screws or pot rivets in these areas is prohibited.

## **9.2 Non-Food Contact Surfaces**

**9.2.1** Seal non-food contact surfaces of equipment, gaps, and seams less than 3 mm ( $\frac{1}{8}$  inch) with an appropriate sealant. Use only stainless steel profile strips on surfaces exposed to extreme temperatures (e.g., freezers, and above cook tops, grills, and fryers) or for gaps greater than 3 mm ( $\frac{1}{8}$  inch). Avoid excessive use of sealant.

**9.2.2** Construct slotted or Phillips head screws, pop rivets, and other fasteners used in non-food contact areas of corrosion-resistant materials.

## **9.3 Use of Sealants**

**9.3.1** Use approved food grade sealants in food contact and food splash zones.

## **10.0 Latches, Hinges, and Handles**

**10.1** Use durable, non-corroding, and easily cleanable built-in equipment latches, hinges, and handles. Do not use piano hinges in food contact or splash zones.

## **11.0 Gaskets**

**11.1** Use smooth, non-absorbent, non-porous materials for equipment gaskets in reach-in refrigerators, steamers, ice bins, ice cream freezers, and similar equipment.

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

**11.3** Use refrigerator door gaskets that are designed to be removable.

**11.4** Follow the requirements in Section 9.0 when using fasteners to install gaskets.

## **12.0 Equipment Drain Lines:**

**12.1** Connect drain lines from the following to appropriate waste systems by means of an or air-break all fixtures, sinks, appliances, compartments, refrigeration units, or devices that are used, designed for, or intended to be used in the preparation, processing, storage, or handling of food, ice, or drinks.

**12.1.1** Use stainless steel or other easily cleanable rigid or flexible material in the construction of drain lines. Size drain lines appropriately, with a minimum interior diameter of 25 mm (1 inch) for custom-built equipment.

**12.1.2** Slope walk-in refrigerators and freezer evaporator drain lines, and extend them through the bulkheads or decks. Direct drain lines through an accessible air-break to a deck scupper or drain below the deck level or to a scupper outside.

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

**12.1.4** Install horizontal drain lines at least 100 mm (4 inches) above the deck and slope to drain.

**12.2** All drain lines (except condensate drain lines) from hood washing systems, cold top tables, bains-marie, dipper wells, food preparation sinks and warewashing sinks or machines must:

**12.2.1** be less than 1000 mm (40 inches) and free of sharp angles or corners, if designed to be cleaned in place by a brush.

**12.2.2** be readily removable for cleaning, if greater than 1000 mm (40 inches).

**12.2.3** drain through an air-break to a drain or scupper.

**12.3** Extend all installed equipment drain lines in a vertical line to a scupper, or deck drain, when possible. If not possible, keep the horizontal distance of the line to a minimum.

**12.4** Handwashing sinks, mop sinks and drinking fountains are not required to drain through an air-break.

## **13.0 Electrical Connections, Pipelines, and other Attached Equipment**

**13.1** Encase electrical wiring from permanently installed equipment in durable and easily cleanable material. Do not use braided or woven stainless steel electrical conduit outside of technical spaces or where it is subject to splash or soiling, unless encased in easily cleanable plastic or similar easily cleanable material. For equipment that is not permanently mounted, adjust the length of electrical cords or fasten them in a manner that prevents the cords from lying on countertops.

**13.2** 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.

**13.3** 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.

**13.4** 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. Cover any exposed, insulated pipelines with stainless steel or other durable, easily cleanable material.

## **14.0 Hood Systems**

**14.1** Install hood systems or direct duct exhaust over warewashing equipment (except undercounter warewashing machines) and over three-compartment sinks in pot wash areas where hot water is used for sanitizing.

**14.1.1** Directly connect warewashing machines that have a direct duct exhaust, to the hood exhaust trunk.

**14.1.2** Design exhaust hoods over warewashing equipment or three-compartment sinks to have a minimum 150 mm (6 inches) overhang from the edge of equipment to capture excess steam and heat.

**14.1.3** Install a clean-out port 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** Provide accessible and removable flat condensate drip trays in the ducts from the warewashing machines.

**14.2** Install hood or canopy systems above cooking equipment in accordance with SOLAS requirements to ensure that they adequately remove excess steam and grease-laden vapors.

**14.2.1** Install hood systems or dedicated local exhaust ventilation to control excess heat and steam from bains-marie or steam tables.

**14.3** Select proper sized exhaust and supply vents. Position and balance them appropriately for expected operating conditions to ensure proper air conditioning, and capture and exhaust of heat and steam.

**14.4** Where used, provide readily removable, and cleanable filters.

**14.5** Provide access for cleaning vents and ductwork (Automatic clean-in-place systems are recommended for removal of grease generated from cooking equipment).

**14.6** Locate the automatic clean-in-place hood wash control panels that have detergent reservoirs so they are not over food preparation equipment or counters.

**14.7** Construct hoods systems of stainless steel with coved corners of at least 9.5 mm (3/8 inch) radius. Use continuous welds or profile strips on adjoining pieces of stainless steel.

**14.7.1** A drainage system is not required for normal grease and condensate hoods, or if cleaning solutions are applied manually to hood assemblies.

**14.7.2** Install drainage for automatic clean-in-place hood washing systems.

**14.8** Install ventilation systems in accordance with the manufacturer's recommendations. Test the system by utilizing a method that determines if the system is properly balanced for normal operating conditions.

## **15.0 Provision Rooms, Walk-in Refrigerators and Freezers, and Transportation Corridors**

### **15.1 Bulkheads and Deckheads**

**15.1.1** Provide tight-fitting, stainless steel bulkheads in walk-in refrigerators and freezers. Line doors with stainless steel.

**15.1.2.a** Light colored painted steel is acceptable for provision passageways and transportation corridors.

**15.1.2.b** Stainless steel panels are preferable but not required in dry storage areas.

**15.1.3** Provide protection to prevent damage to bulkheads from pallet handling equipment (e.g., forklifts, pallet jacks, etc.) in areas through which food is stored or transferred.

**15.1.4** 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).

### **15.2 Decks**

**15.2.1** Use hard, durable, non-absorbent decking, (e.g., tiles, or diamond plate corrugated stainless steel deck panels) in refrigerated provision rooms. Install durable covings, and provision rooms s, and provision rooms as an integral part of the deck and bulkhead interface and at the juncture between decks and equipment foundations. If installed, use a sufficient thickness on stainless steel or other coving to make durable and secure. Sufficiently reinforce stainless steel decking to prevent buckling if pallet handling equipment will be used in these areas.

**15.2.2** Steel decking is acceptable in provisions passageways, transportation corridors, and dry-stores areas.

## **15.3 Cold Room Evaporators, Drip Pan, and Drain Lines**

**15.3.1** Enclose piping, wiring, coils, and other difficult-to-clean components of evaporators in walk-in refrigerators, freezers, and dry storerooms with stainless steel panels.

**15.3.2** Use stainless steel evaporator drip pan that have coved corners, are sloped to drain and strong enough to maintain slope, and are readily accessible for cleaning.

**15.3.3** Place non-corroding spacers between the drip pan brackets and the interior edges of the pans.

**15.3.4** Follow all fastener guidelines in Section 9.0.

**15.3.5** Provide a heater coil for freezer drip pan. 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 that heating coils provided for drain lines are installed inside of the lines.

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

**15.3.7** Encase thermometer probes in a stainless steel conduit. Position probes in the warmest part of the room where food is normally stored.

## **16.0 Galleys, Food Preparation Rooms, and Pantries**

### **16.1 Bulkheads and Deckheads**

**16.1.1** Construct bulkheads and deckheads (including doors, door frames, and columns) with a high quality, corrosion-resistant stainless steel. Use a thick enough gauge so that the panels do not warp, flex, or separate under normal conditions. Use an appropriate sealant for seams greater than 1 mm (1/32 inch), but less than 3 mm (1/8 inch). Use only stainless steel profile strips for bulkhead and deckhead seams greater than 3 mm (1/8 inch).

**16.1.1.a** Minimize gaps around fire shutters, sliding doors, and pass-through-windows.

**16.1.1.b** Provide cleaning access to void spaces of sliding doors and sliding pass-through windows.

**16.1.2** Construct bulkheads of sufficient thickness or reinforce the areas where equipment is installed to allow the use of fasteners or welding without compromising the quality and construction of the panels.

**16.1.3** Install utility line connections through a stainless steel or other easily cleanable, food service approved conduit that is mounted away from bulkheads for ease in cleaning.

**16.1.4** Attach backsplashes to the bulkhead with low profile, non-slotted fasteners or continuous- or tack-welds, polished smooth. Use an appropriate sealant to make the backsplash attachment watertight.

**16.1.5** Seal all openings where piping and other items penetrate the bulkheads and deckheads, including inside technical compartments.

## **16.2 Decks**

**16.2.1** Construct decks from hard, durable, non-absorbent, non-skid material. Install durable coving as an integral part of the deck and bulkhead interface and at the juncture between decks and equipment foundations.

**16.2.2** Seal all deck tiling with a durable, water-tight grouting material. Seal stainless steel deck plate panels with a continuous, non-corroding weld.

**16.2.3** Use durable, non-absorbent, 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** Seal all openings where piping and other items penetrate through the deck.

## **17.0 Buffet Lines, Waiter Stations, Bars, Bar Pantries and Other Food Service Areas**

### **17.1 Bulkheads and Deckheads**

**17.1.1** Construct bulkheads and deckheads of hard, durable, and non-corroding materials. Decorative tiles, pressed metal panels, and etc. are acceptable provide they are easily cleanable.

Follow bar and bar pantry construction guidelines referenced in Sections 6.0 - 16.2.4.

### **17.2 Decks**

**17.2.1** Install hard, durable, non-absorbent decks at all buffet lines that are at least 1000 mm (40 inches) in width measured from the edge of the service counter or from the outside edge of the tray rail (if such a rail is present).

**17.2.2** Install hard, durable, non-absorbent decks (e.g., tile, sealed granite, or marble) that extends at least 600 mm (24 inches) from the edge of the working side of the dining room service stations.

**17.2.3** Construct and cove decks behind service counters, under equipment, and in technical spaces of hard, durable, non-absorbent materials (e.g., tiles, epoxy resin, or stainless steel). Do not use painted steel or concrete decking.

**17.2.4** Durable linoleum, vinyl tile, or deck covering may be used only in staff, crew, or officers dining areas.

**17.2.5** Cove and tightly seal all bulkhead and deck junctures (including deck/buffet, deck/bar, deck/waiter station).

### **17.3 Food Display Protection**

**17.3.1** Provide effective means to protect food (e.g., sneeze shields or display cases) in all areas where food is on display for self-service.

**17.3.2** Following these criteria for sneeze guards:

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

**17.3.2.2** Sneeze guard panels must be durable plastic or glass that is smooth and easily cleanable. Use sections of manageable lengths that are removable for cleaning.

**17.3.2.3** Position sneeze guards so that the panels intercept the line between the consumer's mouth and the displayed foods, in accordance with ANSI/NSF Standard 2 for food equipment. Take into account 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 7).

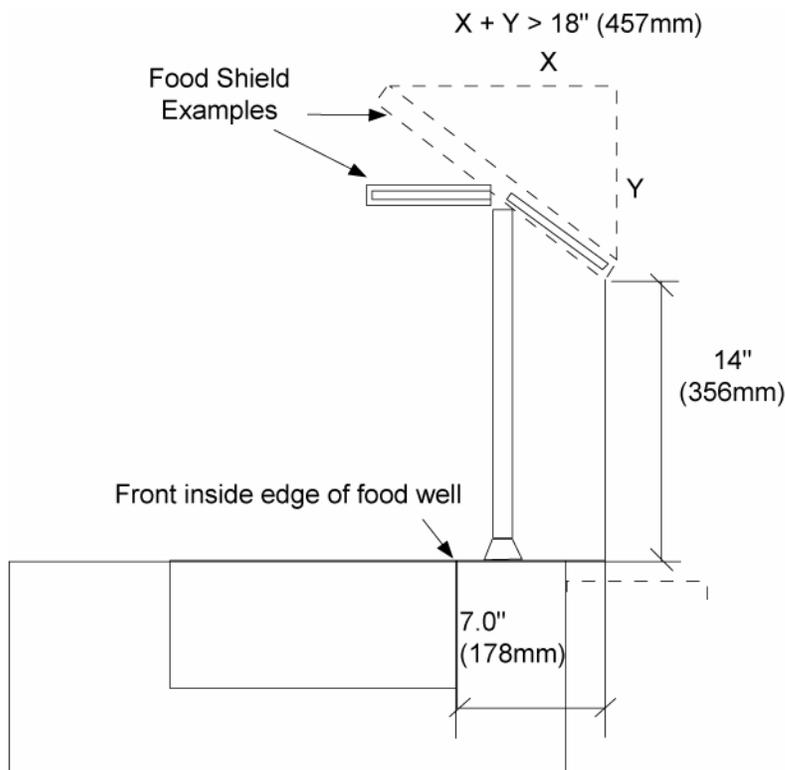


Figure 7 Sneeze Guard Detail

**17.3.2.3.a** Install side protection for sneeze guards if the distance between exposed food and where people are expected to stand is less than 1000 mm (40 inches).

**17.3.3** Use tray rail surfaces that are sealed, coved, or have an open design and easily cleanable in accordance with guidelines for food splash zones.

## **17.4 Beverage Delivery System**

**17.4.1** Install a stainless steel, vented, double-check valve backflow prevention device on carbonation systems with brass or copper fittings (e.g., multi-flow beverage dispensing systems). Install the device before the carbonator and downstream from any copper or copper-alloy (e.g., brass) in the potable water-supply line.

**17.4.2** Encase supply lines to the dispensing guns in a single tube. If the tube penetrates through any bulkhead or countertop, seal the penetration with a grommet.

**17.4.3** Incorporate, into the design of bulk dispensers of beverage delivery systems, a clean-in-place system that provides a means of flushing, and sanitizing the entire interior of the dispensing lines in accordance with manufacturers' instructions.

## **18.0 Warewashing**

**18.1** Provide rinse hoses for prewashing (not required but recommended in bar and deck pantries). If a sink is to be used for prerinsing, provide a removable strainer.

**18.2** Provide space for trash cans, garbage grinder, or food waste handling systems. Grinders are optional in pantries and bars.

**18.3** Provide a food waste trough that extends the full length of soiled landing tables with food waste handling systems.

**18.4** Seal the back edge of the soiled landing table to the bulkhead or provide a minimum of 460 mm (18.4 inches) clearance between the table and the bulkhead.

**18.5** Design soiled landing tables to drain waste liquids and to prevent contamination of adjacent clean surfaces.

**18.6** Provide across-the-counter gutters with drains, and slope the clean landing tables to the gutters at the exit from the warewashing machines to prevent water from pooling. If the first gutter does not effectively remove the 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** Provide sufficient space for cleaning around and behind equipment (e.g., food waste systems and warewashing machines). Refer to section 8.0 for spacing requirements.

**18.8** Encase food waste system wiring in a durable and easy to clean stainless steel or non-metallic watertight conduit and raise it at least 150 mm (6 inches) above the deck. Elevate all warewashing machine components at least 150 mm (6 inches) above the deck, except as noted in Section 8.3.

**18.9** Construct removable splash panels of stainless steel to protect the food waste system and technical areas.

**18.10** 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** Design and size warewashing machines for their intended use and install them according to the manufacturer's recommendations.

**18.11.1** Equip warewashing machines with a device that audibly or visually indicates that the sanitizing temperature or the chemical sanitizer level has dropped below the levels stated on the machine data plate.

**18.12** Display the data plate affixed to warewashing machines by the manufacturer so that the information is easily accessible and readable. The data plate provides the following information:

**18.12 a)** temperatures required for washing, rinsing, and sanitizing;

**18.12 b)** pressure required for the fresh water sanitizing rinse unless the machine is designed to use only a pumped sanitizing rinse;

**18.12 c)** conveyor speed for conveyor machines or cycle time for stationary rack machines; and

**18.12 d)** chemical concentration (if chemical sanitizers are used).

**18.13** 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 internal corners that are integral to the interior surfaces.

**18.14** Install one of the following arrangements to prevent excessive contamination of rinse water with wash water splash:

**18.14 a)** an across-the-counter gutter with a drain that divides the wash compartment from the rinse compartment

**18.14 b)** a splash shield at least 100 mm (4 inches) above the flood level rim of the sink between the wash and rinse compartments

**18.14 c)** an overflow drain in the wash compartment 100 mm (4 inches) below the flood level.

**18.15** Equip hot water sanitizing sinks with accessible and easily readable thermometers, a utensil retrieval system (e.g., long-handled stainless steel wire basket, or other retrieval system), a jacketed or coiled steam supply with a temperature control valve to control water temperature, or electric heating system. (Three-compartment sinks that utilize chemical sanitizers for the sanitization step do not require those items).

**18.15.a** Provide pot and utensil washing facilities as listed in Section 6.2.2 and 6.2.3

**18.16** Provide sufficient shelving for storage of soiled and clean ware. Use either solid or open round tubular shelving or racks. Design solid overhead shelves to drain away from clean surfaces.

**18.17** Provide adequate ventilation to prevent condensation on the deckhead or adjacent bulkheads. Ensure that any filters installed over warewashing equipment are easily removable, and fans are accessible for cleaning.

## **19.0 Lighting**

**19.1** Provide a minimum of 220 lux (20 foot candles) of light at the work surface level in all food preparation, food service, and warewashing areas when all equipment is installed. Provide 220 lux (20 foot candles) of lighting for equipment storage, garbage and food lifts, garbage rooms, and toilet rooms, measured at 760 mm (30 inches) above the deck.

**19.1.1** Provide a minimum light level of 110 lux (10 foot-candles) behind and around equipment measured at a distance of 760 mm (30 inches) above the deck (e.g., ice machines, combi-ovens, etc.).

**19.1.2** Provide a minimum light level of 220 lux (20 foot-candles) at counter tops (e.g., beverage lines, etc.).

**19.2** For effective illumination, place the deckhead mounted light fixtures above the work surfaces and positioned them in an "L" pattern rather than a straight line pattern.

**19.3** Install light fixtures tightly against the bulkhead and deckhead panels. Completely seal electrical penetrations to permit easy cleaning around the fixtures.

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

**19.5** Provide lighting levels of at least of 220 lux (20 foot candles) in provision rooms, measured at 760 mm (30 inches) above the deck while the rooms are empty. During normal operations when foods are stored in the rooms, provide lighting levels of at least 110 lux (10 foot candles), measured at a distance of 760 mm (30 inches) above the deck.

**19.6** In bars and over dining room waiters' stations designed for lowered lighting during normal operations, provide lighting that can be raised to 220 lux (20 foot candles) during cleaning operations, as measured at 760 mm (30 inches) above the deck.

**19.7** Use shielded, coated, or otherwise shatter-resistant light bulbs in areas where there is exposed food; clean equipment, utensils, and linens; or unwrapped single-service, and single-use articles.

**19.8** 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.

**19.9** 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. However, install specially-coated, shatter-resistant bulbs in the light fixtures in this area.

## **20.0 Waste Management**

### **20.1 Food and Garbage Lifts**

**20.1.1** Provide food and garbage lifts whose interiors are constructed of stainless steel and meet the same standards as Section 16.0.

**20.1.2** Construct decks of a durable, non-absorbent, non-corroding material and with an integral cove.

**20.1.3** Position bulkhead-mounted air vents in the upper portion of the panels or in the deckhead.

**20.1.4** Install a drain at the bottom of all lift shafts including provision platform lifts, and dumbwaiters.

**20.1.5** Construct the interiors of dumbwaiters of stainless steel with covered bulkhead and deck junctures and meets the standards of Section 16.0.

**20.1.6** Provide light fixtures that are recessed or fitted with stainless steel guards to prevent breakage.

**20.1.7** If installed, construct garbage chutes of stainless steel, with an automatic washing system, and in accordance with SOLAS and classification society requirements.

### **20.2 Trolley, Waste Container, and Cleaning Equipment Wash Rooms**

**20.2.1** Construct bulkheads, deckheads, and decks to the same standards as Section 16.0.

**20.2.2** 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).

**20.2.3** Provide an easily accessible handwashing station with potable hot and cold water, a hose connection, and a deck drain.

**20.2.4** Provide ventilation for the extraction of steam and heat.

## **20.3 Garbage Holding Facilities**

**20.3.1** Construct garbage and refuse storage or holding rooms sized to hold unprocessed waste for the longest expected period when off-loading of waste is not possible. Separate the refuse-storage room from all food preparation and storage areas.

**20.3.2** Provide supply and exhaust ventilation to control odors, temperature, and humidity.

**20.3.3** Provide a sealed, refrigerated space for storing wet garbage that meets the standards of 15.0.

**20.3.4** Provide an easily accessible handwashing station with potable hot and cold water, a hose connection, and a deck drain.

**20.3.5** Provide sufficient deck drainage to prevent pooling of any water.

**20.3.6** Ensure that all bulkheads and decks are durable and easily cleanable.

## **20.4 Garbage Processing Areas**

**20.4.1** Appropriately size the garbage processing area for the operation and supply a sufficient number of sorting tables.

**20.4.2** Provide stainless steel sorting tables with coved corners. If provided, use deck coaming that is at least 80 mm (3 inches) and coved. If the tables have drains, direct the table drains to a deck drain and install a strainer in the deck drain.

**20.4.3** Provide an easily accessible handwashing station with potable hot and cold water, a hose connection, and a deck drain.

**20.4.4** Provide a storage locker for cleaning materials. Follow storage locker guidelines in Section 26.1.

**20.4.5** Ensure that bulkheads and decks are durable and easily cleanable. Provide deck drains to prevent liquids from pooling on the decks. Provide berm/coaming around all waste-processing equipment and ensure there is proper deck drainage inside the berms.

**20.4.6** Provide light levels of at least 220 lux (20 foot candles) at work surface levels.

**20.4.7** Equip a sink with a pressure washer or an automatic washing machine for washing equipment, storage containers, and garbage barrels.

## **20.5 Sewage Systems**

**20.5.1** Limit the installation of drain lines that carry sewage or other liquid waste directly overhead or horizontally through spaces used for food preparation or storage. That includes areas for washing or storage of utensils and equipment, such as bars, 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.

**20.5.2** Design black and gray water drain systems from cabins, food areas, and public spaces to prevent the back-up of waste and the emission of odors or gases into these areas.

**20.5.3** Vent sewage-holding tanks to the outside of the vessel so that they are independent of all other tanks and are away from any air intakes.

## **21.0 Potable Water System**

### **21.1 Bunker Stations**

**21.1.1** Position the filling lines at least 450 mm (18 inches) above the deck; paint or stripe them auxiliary blue or in accordance with ISO 14726.

**21.1.2** Equip filling lines with tight-fitting caps that are fastened by a non-corroding chain so that the cap does not touch the deck when hanging.

**21.1.3** Use unique screw connections for the hose attachments that only fit potable water hoses.

**21.1.4** Label the filling lines "POTABLE WATER FILLING" with at least 13 mm (½ inch) high lettering stamped, stenciled, or painted on the bulkhead in the area of the bunker line.

**21.1.5** If used, locate filters in the bunkering line before the halogenation injection point, accessible for inspection and removable for cleaning.

## **21.2 Filling Hoses**

**21.2.1** Provide hoses designed for potable water use that are durable with smooth, impervious linings, caps on each end, and fittings unique to the potable water connections.

**21.2.2** Provide at least two 15 m (50 feet) hoses per bunker station.

**21.2.3** Label potable water hoses "POTABLE WATER ONLY."

## **21.3 Filling Hose Storage**

**21.3.1** Construct potable water hose lockers from smooth, non-toxic, corrosion-resistant, and easily cleanable material.

**21.3.2** Mount potable water hose lockers at least 450 mm (18 inches) above the deck. Design hose lockers to be self-draining.

**21.3.3** Label potable water hose lockers "POTABLE WATER HOSE AND FITTING STORAGE" in letters at least 13 mm (½ inch) high.

**21.3.4** Provide storage space for at least four 15 m (50 feet) potable water bunker hoses per bunker station.

## **21.4 International Fire Shore Connections and Fire Sprinkler Shore Connections**

**21.4.1** Install an RP assembly on all connections where hoses from potable water supplies on shore will be connected to non-potable systems onboard the vessel.

## **21.5 Storage and Production Capacity for Potable Water**

**21.5.1.a** Provide a minimum of 2 days storage capacity that assumes 120 liters (30 gallons) of water per day per person, and provide potable water production capacity of 120 liters (30 gallons) per day per person for the maximum capacity of crew and passengers on the vessel.

## **21.6 Potable Water Storage Tanks**

### **21.6.1 General Requirements**

**21.6.1.1** Ensure that the tanks are independent of the shell of the vessel and do not share a common wall with tanks containing non-potable water or other liquids. Provide a 450 mm (18 inch) cofferdam above and between tanks that are not for storage of potable water and also between the tanks and the hull. Skin or double-bottom tanks are not allowed for potable water storage.

**21.6.1.2** Use an approved potable water tank coating. Follow all of the manufacturers' recommendations for applying and drying or curing the coating. Provide written documentation for these.

**21.6.1.3** Coat all items that penetrate the tank (e.g., bolts, pipes, pipe flanges) with the same product used for the tank's interior.

**21.6.1.4** Design tanks to be super-chlorinated one tank at a time.

**21.6.1.5** Ensure that lines for non-potable liquids do not pass through potable water tanks. Minimize the use of non-potable lines above potable water tanks. Do not use mechanical couplings on lines above tanks. If coaming is present along the edges of the tank, provide slots along the top of the tank to allow leaking liquid to run off and be detected.

**21.6.1.6** Treat welded pipes over the tanks in order to make them corrosion-resistant.

**21.6.1.7** Treat all potable water lines inside potable water tanks so as to make them jointless and corrosion-resistant.

**21.6.1.8** Label each potable water tank on its side and where clearly visible, with a number and the words "POTABLE WATER" in letters a minimum of 13 mm (½ inch) high.

**21.6.1.9** Install at least one sample cock located above the deck plating on each tank.

**21.6.1.9.a** Point sample cocks down; identify and number them for each tank.

## **21.6.2 Storage Tank Access Holes**

**21.6.2.1** Install access holes on the sides of potable water tanks.

## **21.6.3 Storage Tank Water Level**

**21.6.3.1** Provide an automatic method for determining the water level of potable water tanks.

**21.6.3.1.a** Visual site glasses are acceptable.

## **21.6.4 Storage Tank Vents**

**21.6.4.1** Ensure that air-relief vents end at least 1000 mm (40 inches) above the maximum load level of the vessel.

**21.6.4.1.a** Make the cross-sectional area of the vent equal to or greater than that of the filling line to the tank.

**21.6.4.1.b** Position the end of the vent so that its opening faces down or is otherwise protected, and install a 16-mesh corrosion-resistant screen.

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

**21.6.4.3** Do not connect the vent of a potable water tank to the vent of a non-potable water tank.

## **21.6.5 Storage Tank Drains**

**21.6.5.1** Design tanks to drain completely.

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

**21.6.5.3** If drained by suction pumps provide a sump and install the pump suction port in the sump.

**21.6.5.3.a** Use separate pumps to drain the tanks.

**21.6.5.3.b** Locate the drain in the pump discharge line ahead of any branch take-offs to the distribution system. Provide a valve on the distribution main immediately beyond the drain line take-off. (Figure 8).

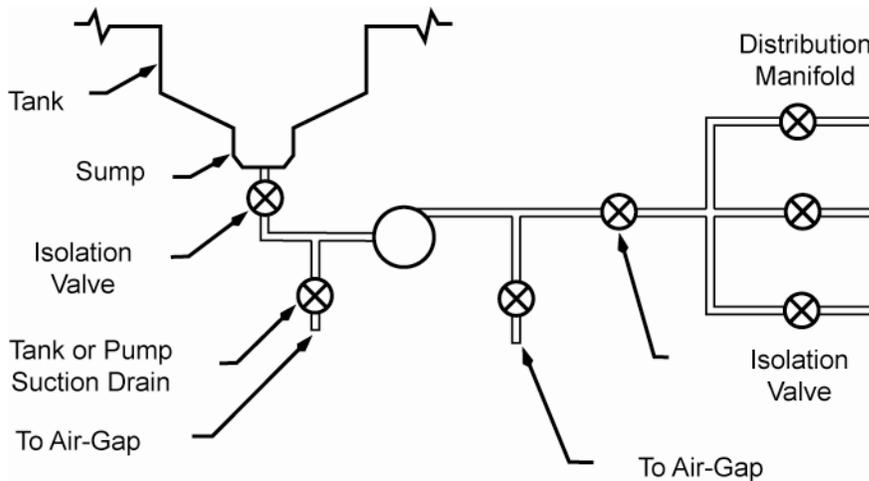


Figure 8 - Potable Storage Tanks Drains

## 21.7 Suction Lines

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

## 21.8 Potable Water Distribution System

**21.8.1** Locate distribution lines at least 450 mm (18 inches) above the deck plating or the normal bilge water level.

**21.8.2** Do not cross connect potable water distribution lines with the piping of any non-potable water system lines.

**21.8.3** Do not use lead or cadmium pipes, fittings, or solder.

**21.8.4** Install only potable water taps in food areas, the hospital, and the cabin showers and sinks.

**21.8.5** Paint or stripe potable water piping and fittings in auxiliary blue, or in accordance with ISO 14726 at 5000 mm (15 feet) intervals and on each side of

partitions, decks, and bulkheads except where decor would be marred by such markings.

**21.8.6** Use only potable water for steam that is applied directly to food and food contact surfaces. Generate the steam locally from food service equipment designed for this purpose (e.g., vegetable steamers, combi-ovens, etc.). Only apply non-potable water steam indirectly to food or food equipment. Route that steam through coils, tubes, or separate chambers.

**21.8.7** Ensure that an air-gap or approved backflow prevention device is present if potable water is supplied to a bilge, waste, ballast, or laundry tank.

**21.8.8** Clean, disinfect, and flush potable water tanks and any parts of the potable water distribution system with potable water before the system is placed in service.

## **21.9 Potable Water Pressure Tanks**

**21.9.1** Do not cross-connect potable water hydrophore tanks to non-potable water tanks through the main air compressor.

**21.9.2** Provide a filtered air supply from a non-permanent, quick disconnect, or independent compressor. The compressor shall not emit oil into the final air product.

## **21.10 Potable Water Pumps**

**21.10.1** Size the potable water pumps to meet the service demands; do not use them for any other purpose.

**21.10.2** Use pumps that prime automatically and not manually. Use a direct connection, not an air-gap, when supplying water to a potable water pump.

**21.10.3** Properly size potable water pumps and distribution lines so that pressure is maintained at all times and at levels adequate levels to operate all equipment.

## **21.11 Evaporators and Reverse Osmosis Plants**

**21.11.1** Locate the seawater inlets (sea chests) forward of all overboard waste water, swimming pool and whirlpool spa, and ballast tank discharge outlets.

**21.11.2** Use only direct connections to the potable water system. Do not use swing lines.

**21.11.3** Provide an air-gap or RP assembly between the potable water system and the non-potable water system. (Fresh water produced by an evaporator, or reverse osmosis plant is not considered potable until after it has been pH adjusted to the proper level.)

**21.11.4** Post operating instructions for the evaporators, or reverse osmosis plants near the units.

**21.11.5** Ensure that high and low-pressure units connected directly to the potable water lines have the ability to discharge to the waste system if the distillate is not fit for use.

**21.11.6** Install units that have a low-range salinity indicator, an operation temperature indicator, an automatic discharge to waste, and an alarm with trip setting.

**21.11.7** Route the high-saline discharge to the bilge or overboard through an air-gap or RP assembly.

## **21.12 Halogenation**

### **21.12.1 Bunkering and Production**

**21.12.1.1** Provide labeled potable water taps with appropriate backflow preventers at the halogen supply tanks.

**21.12.1.2** Provide a labeled sample cock at least 3000 mm (120 inches) downstream of the halogen injection point.

**21.12.1.3** Control halogen injection by a flow meter or analyzer.

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

### **21.12.2 Distribution**

**21.12.2.1** Provide a completely automatic halogenation system that is analyzer controlled.

**21.12.2.2** Use halogenation probes that measure free halogen; link them to an analyzer/controller and dosing pump.

**21.12.2.3** Provide a back-up halogenation system with an automatic switchover that begins pumping halogen when the primary (in-use) pump fails or cannot meet the preset halogenation level.

**21.12.2.4** Locate analyzer probes at a distant point in the system where significant water flow exists.

**21.12.2.5** Provide an audible alarm in a continually occupied watch station, (e.g., the engine-control room), to indicate low free-halogen readings at the distant-point analyzer.

**21.12.2.6** Provide labeled potable water taps with appropriate backflow preventers at halogen supply tanks.

**21.12.2.7** Locate a labeled sample cock at least 3000 mm (120 inches) downstream of the halogen injection point.

**21.12.2.8** Provide free-halogen analyzer-chart recorders with ranges of 0.0 to 5.0 ppm and continuous recording periods indicating the level of free-halogen for 24 hour time periods, (e.g., circular 24 hour charts).

**21.12.8.a** Electronic data loggers with certified data security features may be installed in lieu 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 <15 minutes.

## **21.13 Disinfection of the Potable Water System**

**21.13.1** Disinfect the entire distribution system with a free halogen concentration of at least 50 mg/L (ppm) for at least 4 hours. Prior VSP agreement is required if alternative approved disinfection practices are used.

**21.13.2** Provide written documentation of the distribution system disinfection.

## **22.0 Backflow Prevention**

**22.1** Use appropriate backflow prevention (e.g., air-gaps, RP assemblies, pressure vacuum breakers, atmospheric vacuum breakers, pressure-type backflow preventers, or double-check valves with intermediate atmospheric vent) for all non-potable connections in the potable water system.

**22.2** Use air-gaps that are at least twice the diameter of the supply pipe measured vertically above the flood level rim of the receiving vessel. The air-gap must at least 25 mm (1 inch).

**22.3** Install RP assemblies in high-hazard situations where air-gaps are not practical.

**22.4** If RP backflow prevention assemblies are used, provide a test kit for testing the devices.

**22.4.a** Test all RP's after installation.

**22.5** Use mechanical backflow prevention devices when water must be supplied under pressure.

**22.6** Install atmospheric vacuum breakers 150 mm (6 inches) above the fixture flood level rim with no valves downstream from the device.

**22.7** Connect potable water through an air-gap when it is directed to a black water tank for rinse down or other such uses. RP assemblies are inadequate in this high hazard condition.

**22.8** Protect the following connections to the potable water system against backflow or back-siphonage by air-gaps or mechanical backflow prevention devices:

**22.8.1** Potable water supply lines to swimming pools, whirlpool spas, hot tubs, bathtubs, showers, and similar facilities.

**22.8.2** Photographic laboratory developing machines and utility sinks.

**22.8.3** Beauty and barber shop spray-rinse hoses.

**22.8.4** Potable water faucets where hoses maybe connected.

**22.8.5** Garbage grinders and food waste systems.

**22.8.6** Mechanical warewashing machines.

**22.8.7** Hospital and laundry equipment.

**22.8.8** Air conditioning expansion tanks.

**22.8.9** Boiler feed water tanks.

**22.8.10** Fire system.

**22.8.11** Toilets.

**22.8.12** Potable water, bilge, and sanitary pumps that require priming.

**22.8.13** Freshwater or saltwater ballast systems.

**22.8.14** International fire and fire sprinkler water connections.

**22.8.15** The potable water supply to automatic window washing systems which utilize chemicals or chemical mix tanks.

**22.8.16** Water softeners for non-potable fresh water if located before an air-gap.

**22.8.17** Water softener and mineralizer drain lines must be protected by an air-gap or RP assembly.

**22.8.18** Any other connection between potable and non-potable water systems.

## **22.9 Heat Exchangers used for cooling potable water**

**22.9.1** Fabricate heat exchangers, using, or for cooling potable water so a single failure of any barrier will not cause a cross-connection or permit back-siphonage of contaminants into the potable water system.

**22.9.2** Design heat exchangers where both potable water and any non-potable liquid are used to protect the potable water from contamination by one of the following designs;

**22.9.2.a** Double-wall construction between the potable and non-potable liquids, with a void space to allow any leaking liquid to drain away; and

**22.9.2.a.1** An alarm system to indicate a leak in the double wall.

**22.9.2.b** Single-wall construction with the following safety features:

**22.9.2.b.1** Higher pressure of at least 1 bar on the potable water side of the heat exchanger;

**22.9.2.b.2** An automatic diverter valve that directs potable water from the heat exchanger when the pressure difference is less than 1 bar; and

**22.9.2.b.3** An alarm system that sounds when the diverter valve directs potable water from the heat exchanger.

## **23.0 Swimming Pools**

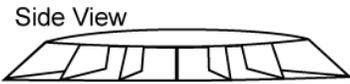
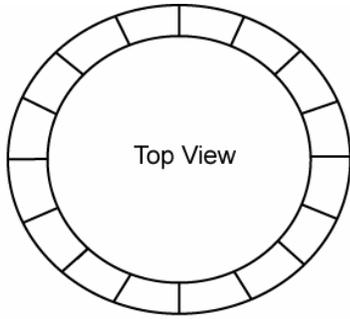
**23.1** Use seawater, or a potable water supply passing through an air-gap or backflow preventer to fill swimming pools.

**23.2** Provide an independent pool drainage system. If swimming pool drains are connected to another drainage system, provide a double-check valve between the two.

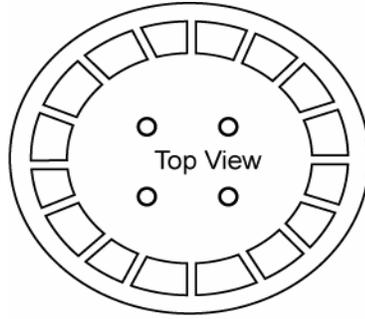
**23.2.a** Install a drain at the lowest point in the pool.

**23.3** Slope the bottom of the pool towards the drains to achieve complete drainage.

**23.4** Provide anti-entrapment type drain covers that are constructed of durable easily visible, easily cleanable material and that meet ASME/ANSI A112.19.8M voluntary standard for suction fittings (figure 9a-9c), or other drains that prevent entrapment hazards as specified in U.S. Consumer Product Safety Publication 363-009801 (figure 9-10b). Dual drains meet the anti-entrapment requirements.



*Note: the top of the cover is domed.*



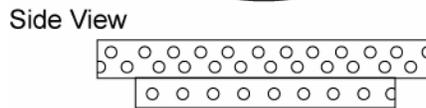
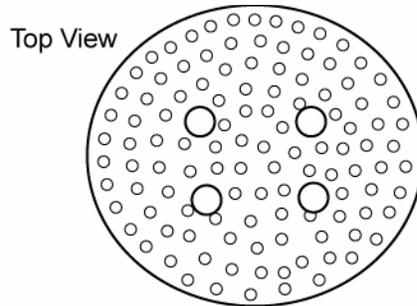
*Note: this top cover is also domed*

**Figure 9a**

One type of Anti-Vortex Drain Cover.

**Figure 9b**

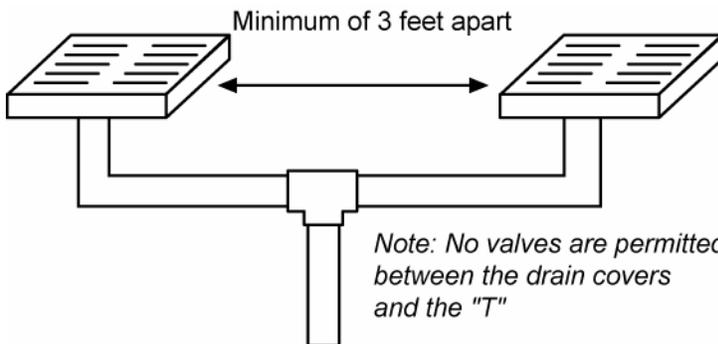
Another type of Anti-Vortex Cover.



*Note: the top of the cover may or may not be domed.*

**FIGURE 9c**

Top and side view of Suction Drain Cover.



**FIGURE 10a - Dual Drain System**

Grate type cover would be attached to the channel

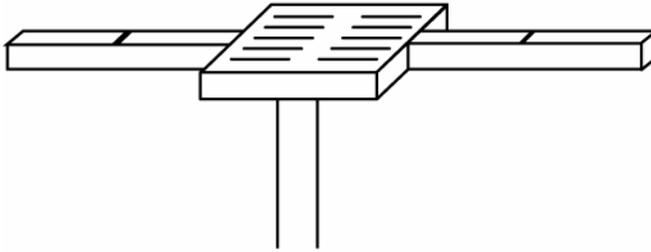


FIGURE 10b - Channel System

- 23.5** Ensure that the fill level of the pool is at the skim gutter level.
- 23.6** Ensure that pool overflows are either directed by gravity to the make-up tank for recirculation through the filter system or disposed of as waste.
- 23.7** Install recirculation, filtration, and disinfection equipment.
- 23.8** Use pool equipment (e.g., pumps and filters) that has the capacity to turnover the pool water at least four times every 24 hours (i.e., once every 6 hours or less).
- 23.9** Use self-priming, centrifugal pumps to re-circulate pool water.
- 23.10** Install pumps large enough to re-circulate the entire volume of the pool in 6 hours.
- 23.11** Install surface skimmers or gutters that are capable of handling approximately 80% of the filter flow of the recirculation system.
- 23.12** If skimmers are used instead of gutters, install is at least one skimmer for each 47 m<sup>2</sup> (500 square feet) of pool surface area.
- 23.13** Provide a hair strainer between the pool outlet and the suction side of the pumps to remove foreign debris such as hair, lint, pins, etc.
- 23.14** Ensure that the removable portion of the strainer is corrosion-resistant and has holes no greater than 6 mm (¼ inch) in diameter.

- 23.15** Use filters that are designed to remove all particles greater than 20 micrometers from the entire volume of the pool in 6 hours or less.
- 23.16** Use cartridge or media-type filters (e.g., rapid-pressure sand filters, high rate sand filters, diatomaceous earth filters, or gravity sand filters). Make filter sizing consistent with ANSI standards for public pools.
- 23.17** Use media-type filters that are capable of being back-washed.
- 23.18** Provide filter accessories, such as pressure gauges, air-relief valves, and rate-of-flow indicators.
- 23.19** Provide automatic dosing of chemicals for disinfection and pH adjustment.
- 23.20** If desired, use a make-up tank to replace water lost by splashing and evaporation. If the tank is supplied with potable water, ensure that the supply enters through an air-gap or backflow preventer. An overflow line at least twice the diameter of the supply line and located below the tank supply line as backflow prevention is acceptable provided it drains through a visible air-break.
- 23.21** Provide easy access to the media filters so that they can be inspected at least on a weekly basis and the media can be changed periodically.
- 23.22** Provide water sample points on the system for halogen level testing and routinely calibrating the analyzer.
- 23.23** Provide analyzer controlled halogen-based disinfection equipment.
- 23.24** Ensure that pH adjustment is accomplished by using appropriate acids and bases and that a buffering agent is used to stabilize the pH. Control the injection of acids and bases by an analyzer.
- 23.25** Make pool mechanical rooms accessible, well-ventilated, and provide a potable water tap with appropriate backflow protection.
- 23.26** Mark all piping with directional-flow arrows and maintain a flow diagram and operational instructions in a readily available location.
- 23.27** Design the pool mechanical room and recirculation system for easy and safe chemical storage and re-filling of chemical feed tanks.
- 23.28** Install drains in the pool mechanical room that allow rapid draining of the entire pump and filter system; install a minimum 80 mm (3 inch) drain on the lowest point of the system.
- 23.29** Provide a drain in the make-up tanks to allow complete draining.

**23.30** Prominently display the depth of the pool so that it can be seen from the deck and in the pool. Label depth markers either in feet or meters, or both. Install additional depth markers for every 1 m (3 feet) change of depth and prominently display them so that they can be seen from the deck and in the pool.

## **24.0 Children's Pools**

**24.1** Follow all requirements in Section 23.0.

**24.2** Provide an independent recirculation, filtration and halogenation system in children's pools.

**24.3** Use a water turn-over rate of is at least once every 30 minutes.

## **25.0 Whirlpool Spas**

**25.1** Supply potable water whirlpool systems through an air-gap or approved backflow preventer.

**25.2** Use water filtration equipment (e.g., pumps, filters, etc.) that ensures a turn-over rate of at least once every 30 minutes and halogenation equipment that is capable of maintaining the appropriate levels of free-halogen throughout the use period.

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

**25.4** Design the overflow system so that water level is maintained.

**25.5** If skimmers are used instead of gutters, use one skimmer for every 14 m<sup>2</sup> (150 square feet) or fraction thereof of water surface area.

**25.6** Provide an independent whirlpool drainage system. If the whirlpool drainage system is connected to another drainage system, provide a double-check valve between the two.

**25.7** Provide drains and ensure the bottom of the whirlpool slopes toward the drains to affect complete drainage.

**25.7.a** Use whirlpools seating areas that drain completely.

**25.8** Provide anti-entrapment type drain covers constructed of durable easily visible, easily cleanable material and that meet ASME/ANSI A112.19.8M voluntary standard for suction fittings (figure 9a-9c), or other drains that prevent entrapment hazards as specified in U.S. Consumer Product Safety Publication 363-009801 (figures 9a-10b) dual drains meet the anti-entrapment requirements.

**25.9** Design the system to permit daily shock treatment or super-halogenation in accordance with the *VSP Operations Manual*.

**25.10** Install systems in a manner that permits routine visual inspection of the granular media filters in accordance with the *VSP Operations Manual*.

**25.11** Ensure that the fill level of the whirlpool is at the skim gutter level.

**25.12** Ensure that whirlpool overflows are either directed by gravity to the make-up tank for recirculation through the filter system or disposed of as waste.

**25.13** Use self-priming, centrifugal pumps to re-circulate whirlpool water.

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

**25.15** Ensure that the removable portion of the strainer is corrosion-resistant and has no holes greater than 6 mm ( $\frac{1}{4}$  inch) in diameter.

**25.16** Use filters that are designed to remove all particles greater than 20 micrometers from the entire volume of the whirlpool in 30 minutes or less.

**25.17** Use filters that are cartridge, or media type (e.g., rapid-pressure sand filters, high-rate sand filters, diatomaceous earth filters, or gravity sand filters). Make filter sizing consistent with ANSI standards for public pools.

**25.17.1** Provide a clear sight glass on the backwash side of the filters.

**25.18** Design and install filters in a manner that allows for easy access for inspection and maintenance.

**25.19** Make all media-type filters capable of being back-washed.

**25.20** Provide filter accessories, such as pressure gauges, air-relief valves, and rate-of-flow indicators.

**25.21** A make-up tank may be used to replace water lost by splashing and evaporation. If the tank is supplied with potable water, ensure that the supply enters through an air-gap or backflow preventer. An overflow line at least twice

the diameter of the supply line and located below the tank supply line may be used as backflow prevention.

**25.22** Provide analyzer controlled chemical dosing for both pH and disinfection.

**25.23** Accomplish disinfection by chlorination or bromination.

**25.24** Provide water sample points on the system for the testing of halogen levels and routine calibration of the analyzer.

**25.25** Accomplish pH adjustment by using appropriate acids and bases and that a buffering agent is used to stabilize the pH. Control acid and bases injections by an analyzer.

**25.26** Make the whirlpool mechanical room accessible and well-ventilated and provide a potable water tap.

**25.27** Mark all piping with directional-flow arrows and maintain a flow diagram and operational instructions in a readily available location.

**25.28** Design the pool mechanical room and recirculation system for easy and safe chemical storage and re-filling of chemical feed tanks.

**25.29** Install drains in the whirlpool mechanical room to allow for rapid draining of the entire pump and filter system; install them so that a minimum 80 mm (3 inch) drain is on the lowest point of the system.

**25.30** Provide a drain in the make-up tanks to allow complete draining.

**25.31** Make sure that all decorative features of whirlpool spas are completely draining, non-porous and easy to clean.

## **26.0 Miscellaneous**

### **26.1 Facilities and Lockers for Cleaning Materials**

**26.1.1** Provide bulkhead-mounted racks on which hang wet brooms and mops, or provide sufficient space and hanging brackets within a cleaning locker. Locate bulkhead-mounted racks outside of food storage, preparation, or service areas.

**26.1.2** Provide stainless steel vented lockers, with coved deck and wall junctures, for storing buckets, detergents, sanitizers, cloths, etc.

**26.1.3** The number of lockers and the location and size of lockers is determined by the needs of the vessel. Make access to lockers containing cleaning materials convenient.

**26.1.3.a** Provide a single cleaning room for each deck of multiple level galleys, if cleaning lockers are not provided in each of the preparation areas.

**26.1.4** Provide accessible facilities for cleaning mops and buckets separate from food facilities.

**26.1.5** Label all cleaning lockers “Cleaning Materials Only.”

## **26.2 Filters**

**26.2.1** If used, install only point-of-use potable water filters on ice machines, combi-ovens, beverage machine, etc. A single point-of-use filter can be installed on the potable water supply line to a beverage counter.

## **26.3 Drinking Fountains**

**26.3.1** Ensure that the water jet orifices from drinking fountains are slanted and that the orifice is protected by a cover to prevent contamination. Do not allow lead in the water storage tanks and plumbing serving water fountains.

**26.3.2** Provide drinking fountains with stainless steel cabinets and without filling spouts in food preparation areas.

**26.3.3** Provide drinking fountains that will allow the user to control the water stream.

**26.3.4** Install drinking fountains that are accessible to galley personnel.

## **26.4 Facility for Cleaning of Maintenance Equipment**

**26.4.1** Provide facilities (e.g., deep utility sinks) with hot and cold water or a pressure-washing system with a deck sink and drain for cleaning of maintenance equipment such as brooms and mops. Provide bulkhead-mounted racks or hooks for hanging the equipment for drying. Separate room(s) designated for this purpose from food preparation and warewashing areas.

## **27.0 Ventilation Systems**

### **27.1 Air Supply Systems**

**27.1.1** Design fan rooms so that they are accessible for periodic inspections and air intake filter changing.

**27.1.2** Design air condition condensation collection pans to drain completely.

**27.1.2.a** Use air conditioner condensation collection pans that are designed to drain through closed piping to prevent condensate from pooling on the decks.

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

**27.1.4** Provide a sufficient air supply in all food preparation, warewashing, cleaning rooms, and toilet rooms.

**27.1.5** Design all cabin air vent diffusers for easy removal and cleaning.

**27.1.6** Make air handling unit condensate drain pans easily accessible for inspection and cleaning, and accessible for maintenance. Make sure that all major air supply trunks have access panels to allow for periodic inspection and cleaning.

**27.1.7** Provide a separate, independent air supply system for the engine room and other mechanical compartments, (e.g., fuel separation, purifying, and black water treatment rooms) which are located in and around the engine room.

### **27.2 Air Exhaust Systems**

**27.2.1** Air handling devices in the following areas must exhaust air through independent systems that are completely separated from systems using re-circulated air:

**27.2.1.1** Engine rooms and other mechanical spaces;

**27.2.1.2** Hospitals, infirmaries, and any rooms used for patient care or isolation;

**27.2.1.3** Indoor swimming pools swimming pool: , dome type swimming pools when closed; whirlpool spa facilities, and supporting mechanical rooms.

**27.2.1.4** Galleys and other food preparation areas;

**27.2.1.5** Cabin and public toilet rooms; or

**27.2.1.6** Waste processing areas.

**27.2.2** Maintain negative air pressure, in relation to the surrounding areas, in the areas listed under Section 27.2.1.

**27.2.3** Provide a sufficient exhaust system in all food preparation, warewashing, cleaning rooms, and toilet rooms to keep them free of excessive heat, humidity, steam, condensation, vapors, obnoxious odors, and smoke.

**27.2.4** Provide all major air exhaust trunks with access panels to allow for periodic inspection and cleaning.

**27.2.5** Provide a written ventilation balancing report for those areas listed in Section 28.2.1.

## **28.0 Child Care and Child Activity Facilities**

**28.1** Include the following in child care and child activity facilities:

**28.1.1** Handwashing facilities that are accessible without barriers such as doors to each child activity and child care area. Teen areas are exempt from the handwashing facilities requirement.

**28.1.2** Toilet rooms in child care and child activity centers including:

**28.1.2.1** Child-size toilets;

**28.1.2.2** Handwashing facilities;

**28.1.2.3** A covered waste receptacle; and

**28.1.2.4** A sign advising users to wash their hands after using the toilet.

**28.2** Provide a diaper-changing station and disposal facilities in child care facilities. Include the following in each diaper changing station:

**28.2.1** A changing table designed for diaper changing that is impervious, non-absorbent, non-toxic, smooth, durable, and cleanable;

**28.2.2** An airtight, soiled-diaper receptacle;

**28.2.3** An adjacent handwashing station; and

**28.2.4** A sign advising child care facility staff to wash their hands after each diaper change.

**28.3** Provide separate toilet and handwashing facilities for child care providers.

## **29.0 Housekeeping**

**29.1** Provide handwashing stations for housekeeping staff. VSP will evaluate the number and location for these handwashing stations during the plan review process.

## **30.0 Public Toilet Rooms**

**30.1** Provide either of the following in the public toilet rooms:

**30.1.2** Hands-free exits from toilet rooms; or

**30.1.1** Paper towel dispensers with a waste receptacle near the exit door to allow towel disposal after opening the exit door(s).

## **31.0 Decorative Fountains**

**31.1** Provide potable water to all decorative fountains.

**31.2** Ensure that fountains are designed to be maintained free of algae and mold.

## **32.0 Acknowledgements**

### **32.1 Individuals**

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

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**32.2.16** International Organization for Standardization. 2002. Ships and marine technology – identification colours for the content of piping systems, ISO 14726-2. Geneva, Switzerland. For information, see URL: <http://www.iso.org/iso/en/ISOOnline.frontpage>.

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## 33.0 Appendices

### 33.1 Sample Letter of Request for Construction Inspection

Chief, Vessel Sanitation Program  
National Center for Environmental Health  
Centers for Disease Control and Prevention (CDC)  
4770 Buford Highway, NE, F-23  
Atlanta, GA 30341-3724  
Facsimile (770) 488-4127

We request the presence of USPHS representatives to conduct a construction inspection on the cruise vessel (NAME). We tentatively expect to deliver the vessel on (DATE). We would like to schedule the inspection for (DATE). We expect the inspection to take approximately (NUMBER OF DAYS). We will pay CDC in accordance with the inspection fees published in the Federal Register. For inspections occurring outside of the United States, we will reimburse the Vessel Sanitation Program for all expenses in connection with the on-site Vessel Sanitation inspection and will make all necessary arrangements for lodging and transportation, which includes airfare and ground transportation in (CITY, STATE, COUNTRY). We will provide in-kind lodging, airfare, and local transportation expenses. We will reimburse the CDC for en-route per diem, meals and miscellaneous expenses, and ground transportation to and from the airport nearest the representative's work site or residence. No honorarium will be given. No U.S. federal funds will be used. Send an invoice to:

Company  
Attention:  
Street Address  
City, State, Country  
Zip Code  
Office Telephone Number  
Office Fax Number

If you have any questions concerning this request, please contact:

(Signed)  
Name and Title

Hotel  
Address  
Telephone Number

## **33.2 VSP Contact Information**

### **33.2.1 Atlanta Office**

Vessel Sanitation Program  
Centers for Disease Control and Prevention  
4770 Buford Highway, NE F-23  
Atlanta, GA 30341-3724  
Phone: (770) 488-7070  
Fax: (770) 488-4127  
E-mail: [vsp@cdc.gov](mailto:vsp@cdc.gov)

### **33.2.2 Fort Lauderdale Office**

Vessel Sanitation Program  
Centers for Disease Control and Prevention  
1850 Eller Drive, Suite 101  
Ft Lauderdale, FL 33316-4201  
Phone: 1-800-323-2132 or (954) 356-6650  
Fax: (954) 356-6671

### **33.2.3 VSP Website**

For updates to these guidelines and information about the Vessel Sanitation Program, visit <http://www.cdc.gov/nceh/vsp>.

## **33.3 VSP Construction Checklists and Vessel Profile Sheets**

**33.3.1** VSP developed checklists from these guidelines, which may be helpful to shipyard and cruise industry personnel in achieving compliance with these guidelines. You may obtain copies of these checklists from the VSP Website.

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