

AUGUST 2001

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

**VESSEL SANITATION PROGRAM
NATIONAL CENTER FOR ENVIRONMENTAL HEALTH
CENTERS FOR DISEASE CONTROL AND PREVENTION
UNITED STATES PUBLIC HEALTH SERVICE**

AUGUST 2001



Table of Contents		Page ¹
1.0	Background and Purpose	5
2.0	Revisions and Recommended Changes	7
3.0	Procedures for Making Requests for Plan Reviews, Consultations and Construction-Related Inspections	7
3.1	Plan Reviews and Consultations	8
3.2	On-Site Construction Inspections	9
3.3	Final Construction Inspections	9
4.0	Equipment Standards, Testing and Certification	10
5.0	General Definitions	10
6.0	General Facilities Requirements	16
6.1	Size and Flow	16
6.2	Equipment Requirements	16
6.3	Equipment Surfaces	18
6.4	Bulkheads, Deckheads, and Decks	19
6.5	Deck Drains and Scuppers	20
7.0	General Hygiene Facilities Requirements	20
7.1	Handwashing Facilities	20
7.2	Crew Toilet Facilities	21
8.0	Equipment Placement and Mounting	22
9.0	Fasteners and Requirements for Securing and Sealing Equipment	24
9.1	Food Contact Surfaces	24
9.2	Non-Food Contact Surfaces	24
9.3	Use of Sealants	25
10.0	Latches and Hinges, and Handles	25
11.0	Gaskets	25
12.0	Equipment Drain Lines	25
13.0	Electrical Connections, Pipelines, and Other Attached Equipment	26
14.0	Hood Systems	27
15.0	Provision Rooms and Walk-In Refrigerators and Freezers	28
15.1	Bulkheads and Deckheads	28
15.2	Decks	28
15.3	Provision Evaporators, Drip Pans, and Drain Lines	29
16.0	Galleys, Food Preparation Rooms, and Pantries	29
16.1	Bulkheads and Deckheads	29
16.2	Decks	30

¹ The original document was printed with a HP Laserjet 5Si printer. Actual page numbers may vary with different printers and their formatting. Blue = hypertext link.

Table of Contents	Page
17.0 Buffet Lines, Waiter Stations, Bars, Bar Pantries, and Other Food Service Areas	30
17.1 Bulkheads and Deckheads	30
17.2 Decks	31
17.3 Food Display Protection	31
17.4 Beverage Delivery System	32
18.0 Warewashing	33
19.0 Lighting	35
20.0 Waste Management	36
20.1 Food and Garbage Lifts	36
20.2 Trolley, Waste Container, and Cleaning Equipment Wash Rooms	37
20.3 Garbage Holding Facilities	37
20.4 Garbage Processing Areas	37
20.5 Sewage Systems	38
21.0 Potable Water System	39
21.1 Bunker Stations	39
21.2 Filling Hoses	39
21.3 Filling Hose Storage	39
21.4 Fire/International Shore Connections and Technical Water Connections	40
21.5 Storage Capacity for Potable Water	40
21.6 Potable Water Storage Tanks	40
21.6.1 General Requirements	40
21.6.2 Storage Tank Manholes	41
21.6.3 Storage Tank Water Level	41
21.6.4 Storage Tank Vents	41
21.6.5 Storage Tank Drains	41
21.7 Suction Lines	42
21.8 Potable Water Distribution System	42
21.9 Potable Water Pressure Tanks	43
21.10 Potable Water Pumps	43
21.11 Evaporators, and Reverse Osmosis Plants	44
21.12 Halogenation	44
21.12.1 Bunkering and Production	44
21.12.2 Distribution	45
21.13 Disinfection of the Potable Water System	46
22.0 Backflow Prevention	46
23.0 Swimming Pools	48
24.0 Whirlpool Spas	52

Table of Contents	Page
25.0 Miscellaneous	54
25.1 Facilities and Lockers for Cleaning Materials	54
25.2 Filters	54
25.3 Drinking Fountains	54
25.4 Facility for Cleaning of Maintenance Equipment	55
26.0 Ventilation Systems	55
26.1 Air Supply Systems	55
26.2 Air Exhaust Systems	56
27.0 Child Care and Child Activity Centers	57
28.0 Acknowledgments	58
28.1 Individuals	58
28.2 Standards, Codes, and Other References Reviewed for Guidance	58
29.0 Appendices	60
29.1 Sample Letter of Request for Construction Inspection	60
29.2 VSP Contact Numbers	61
29.3 VSP Construction Checklists and Vessel Profile Sheets	61

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

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

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 in fulfilling its responsibility for developing and implementing comprehensive sanitation programs to protect the health of passengers and crew members aboard cruise vessels.

Every cruise vessel that has a foreign itinerary, carries 13 or more passengers, and calls on a United States port is subject to biannual operational inspections and when necessary, to reinspection by the VSP. The vessel owner pays a fee, based on gross registered tonnage (GRT) of the vessel, for all operational inspections. The *VSP Operations Manual*, which is available on the VSP web site at www.cdc.gov/nceh/vsp, covers details of these inspections.

Additionally, on a voluntary basis, cruise vessel owners or shipyards that build or renovate cruise vessels may 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, as the case may be. 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 primary purpose of ***Recommended Shipbuilding Construction Guidelines for Cruise Vessels Destined To Call on U.S. Ports (hereinafter referred to as the guidelines)*** is to provide a framework of consistency for the sanitary design and construction of cruise vessels in order to protect the health of passengers and crew aboard ship. CDC is committed to promoting high construction standards to protect the public's health and believes compliance with these recommended construction guidelines will help ensure a healthful environment on cruise vessels.

For general guidance in developing this document, CDC reviewed many references from a variety of sources. These references are in Section 28.2, Standards, Codes and Other References Reviewed for Guidance.

CDC provides construction guidelines for various components of the vessel's facilities related to public health, such as food storage, preparation, and service; water bunkering, storage, disinfection, and distribution. CDC's position is that vessel owners and operators may select the equipment that best meets their needs. However, the equipment selected must be maintained over time to meet VSP's routine operational inspection requirements.

CDC's intention or purpose is not to limit the introduction of new designs, materials or technology for shipbuilding. A shipbuilder, owner, manufacturer, or other interested party may request that VSP periodically review or revise these construction guidelines on the basis of 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 will comply with all international code requirements (e.g., International Maritime Organization (IMO) Conventions, including the Safety of Life-at-Sea Convention (SOLAS), the International Convention for the Prevention of Pollution from Ships (MARPOL), the Tonnage and Load Line Convention, International Electric Code (IEC), International 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 will apply to all newbuildings for which the keel is laid after August 1, 2001. The guidelines will apply also to major renovations performed after August 1, 2001. A major renovation is any change in the structural elements of the vessel covered by these guidelines. The guidelines do not apply to minor renovations. Minor renovations are small changes, such as the installation or removal of single pieces of equipment (e.g., refrigerator units, bain marie units) 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 Vessel Sanitation Program Operations Manual during routine vessel sanitation inspections and reinspections.

2.0 REVISIONS AND RECOMMENDED CHANGES

In cooperation with the industry, VSP will periodically review and revise the guidelines. VSP will give special consideration to shipyards and owners for ships that have had plan reviews conducted prior to an effective date of a revision of these guidelines. This will ensure that an unfair burden is not placed on the shipyards and owners to make excessive changes to newbuildings previously agreed upon.

A shipbuilder, owner, manufacturer, or other interested party may ask VSP to review a construction guideline based on new technologies, concepts, or methods. Recommendations for changes or additions to these guidelines must be submitted in writing, to the Chief, VSP. Section 29.2.1 includes the address. The recommendation should identify the section, describe the proposed change or addition and the reason for recommending the change or addition, and include research or test results and any other pertinent information that support change or addition. The VSP will coordinate a professional evaluation and consult with industry to determine whether to include the recommendation in the next revision.

VSP recognizes that the shipbuilding and cruise industries are constantly evolving and that these guidelines may require periodic revision. 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 MAKING REQUESTS FOR PLAN REVIEWS, CONSULTATIONS, AND CONSTRUCTION-RELATED INSPECTIONS

In order to coordinate or schedule a plan review or construction-related inspection the shipyard, vessel owner, or other vessel representative may contact VSP and submit an official, written request as early as possible in the planning, construction, or renovation process. ***All official, written letters of requests for plan reviews, consultations, and construction-related inspections shall be directed to the Chief, VSP.*** The availability of VSP staff determines VSP's ability to schedule and honor these requests. Section 29.2, VSP Contact Numbers, contains a complete listing of contact addresses and telephone numbers.

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

representatives will provide points of contact to represent the owners, the shipyard, and key subcontractors. All parties will utilize 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 newbuildings a minimum of 18-24 months before the vessel is scheduled for delivery. Because of the variable time lines associated with major renovations and to allow time for any necessary changes, VSP coordinates the plan reviews for such projects well before the work begins. Normally, VSP assigns two officers conduct the review. Most plan reviews will take 2 working days and will be conducted in Atlanta or Fort Lauderdale. Representatives from the shipyard, the vessel owner, and the subcontractor(s) who will be doing most of the work will attend the review. These representatives shall bring all pertinent plans or drawings and equipment specifications for the areas covered in these guidelines, including but not limited to general arrangement plans; all food-related storage, preparation, and service area plans; potable and non-potable water system plans with details on water inlets, i.e., sea chests, outlets, 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. Additionally, the shipyard will send VSP 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 representative may direct questions or requests for consultative services to the VSP project officers. Questions or requests will be directed in writing to the officer(s) assigned to the project. The VSP officer(s) will coordinate the request with the owner and shipyard points of contact designated during the plan review. The person sending the request shall include the fax numbers of the contact person or project manager for the vessel owner, shipyard or subcontractor so that they may receive a copy of the VSP's response. A sample request form is included in Section 29.1.

3.2 On-Site Construction Inspections

VSP conducts most on-site or shipyard construction inspections in shipyards outside the United States. **So that VSP can process the required foreign travel orders for VSP officers, the shipyard must submit a formal, written letter of request to Chief, VSP, a minimum of 45 days before the inspection date.** Section 29.1 includes a Sample Letter of Request. VSP encourages shipyards to contact the Chief, VSP and coordinate on-site construction inspections well before the 45-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 the 90% of the areas of the vessel to be inspected are completed.** 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. 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. 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 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 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, the VSP does not test, certify, or otherwise endorse equipment or materials used by the cruise industry. Instead, the VSP accepts 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 in some cases may not, meet the recommended standards established by these guidelines. In these instances questionable equipment will be referred to a committee with participants from VSP, various members of the cruise ship industry and an independent testing organization. The committee will be responsible for determining if the equipment meets the recommended standards established in these guidelines.

Copies of test or certification standards are available from the previously mentioned independent testing laboratories. ***Equipment manufacturers and suppliers will not refer to VSP to approve their products.***

5.0 GENERAL DEFINITIONS

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

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

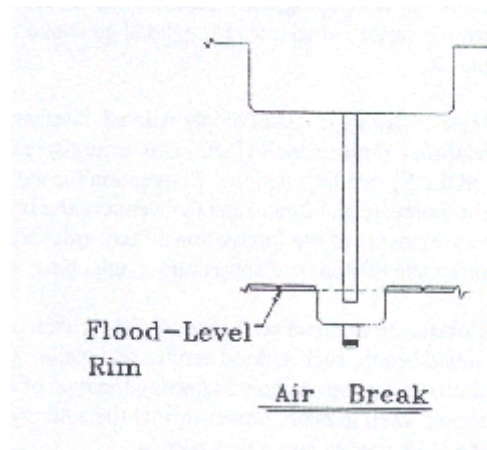


Figure 1 - Air Break

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)

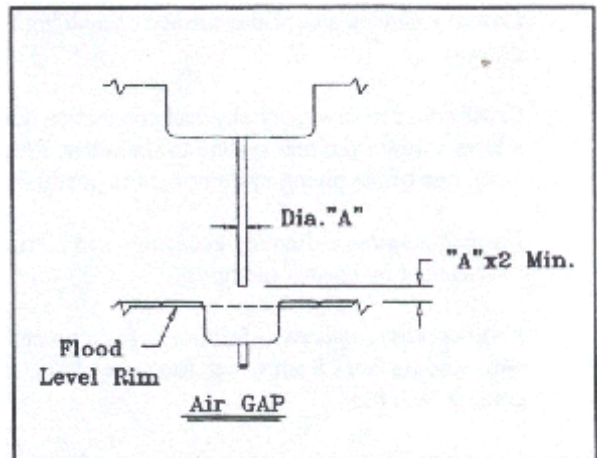


Figure 2 - Air Gap

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 is one form 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 the check-valve type, the flap should swing into a recess when the line is flowing full in order to preclude obstructing the flow.

Backflow preventer - An approved backflow prevention plumbing device that must be used on potable water distribution lines where there is a direct connection or a potential connection between the potable water distribution system and other liquids, mixtures, or substances from any source other than the potable water supply. Some devices are designed for use under continuous water pressure, whereas others are non-pressure types. To ensure proper protection of the water supply, a thorough review of the water system shall be made 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 utilized on potable water lines where shut-off valves do not exist downstream from the device. The device is not approved for use when it is installed in a manner that will cause it to be 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 that 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 shall 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 other similar facilities.

Blast Chiller - A unit specifically designed for rapid intermediate chilling of food products to 21⁰ C (70⁰) within 2 hours and 5⁰ C (41⁰ F) within an additional 4 hours.

Child Activity Facility - Facility for child-related activities where children do not require assistance using toilet facilities and may be old enough to come and go on their own.

Child Care Facility - Facility for child-related activities where children are not yet out of diapers or require supervision using the toilet facilities, and are cared for by vessel staff.

Child Size Toilet - Toilet of appropriate height and having a seat size appropriate for the age and average size of the children that will use the toilet.

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

Coved - A concave surface or molding that eliminates the usual angles of ninety degrees or less.

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.

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

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

Food 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 preparation, storage, and service operations (excluding individual cabin service).

Grey water - All water including drainage from galleys, dishwashers, showers, laundries, and bath and washbasin drains. It does not include black water or bilge water from the machinery spaces.

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 one per cent of the estimated mass of all structural material, whichever is less.

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

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

Potable water (PW) - 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 manufactured from or composed of materials that may not reasonably be expected to result, directly or indirectly, in their becoming a component of any food or otherwise affecting the characteristics of any food; an additive that is used as specified in Section 409 or 706 of the Federal Food, Drug, and Cosmetic Act; or other materials that are not additives but are used in conformity with applicable regulations of the Food and Drug Administration (FDA).

Scupper - A conduit or collection basin that channels water runoff to a 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 soil 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 - 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 render it difficult to clean.

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

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

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

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; and 4) cleaning food storage and preparation areas, utensils, and equipment.

Temperature Measuring Devices (TMDs) - Ambient air, and water temperature measuring devices that are scaled in Celsius or dually scaled in Celsius and Fahrenheit shall be designed to be easily readable and accurate to $\pm 1.5^{\circ}$ C or $\pm 3^{\circ}$ F.

Utility Sink - Any sink located in a food service area not used for handwashing and/or warewashing.

6.0 GENERAL FACILITIES REQUIREMENTS

6.1 Size and Flow

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, and itinerary as well as the vessel owner's experience are many, but not all, of the factors to determine and influence the size of rooms or areas and the flow of food through a vessel. In general, food storage, preparation, and service areas; warewashing areas; and waste management areas shall be of adequate size to accommodate the vessel's passengers and crew on the vessel. Bulk food storage areas or provision rooms (frozen stores, refrigerated stores, and dry stores) shall be adequate for the vessel's itinerary. Adequate refrigeration and hot holding facilities, including temporary storage facilities, shall be available for all food preparation and service areas and for foods being transported to remote areas.

The flow of food through a vessel shall be arranged in a logical sequence that minimizes cross-traffic or backtracking and that allows for adequate separation of clean and soiled operations. 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, shall be provided. The goal is to conduct production and service smoothly and rapidly in accordance with strict temperature-control requirements and to minimizing time and handling.

VSP will evaluate the adequacy of the size of a particular room or area and the flow of food through the vessel to those rooms or areas shall be evaluated primarily during the plan review process.

6.2 Equipment Requirements

6.2.1 The following is a list of equipment required, depending on the level of service, in galleys and recommended 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 (i.e., in all meat, fish, and vegetable preparation rooms; cold pantries or garde mangers; and in any other areas

CDC Construction Guidelines - AUGUST 2001 - page 17

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 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 skillets, or ice storage bins. Provide a storage cabinet or rack for large items such as ladles, paddles, whisks, and spatulas.

6.2.1.5 *Knife lockers* 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 An adequate number of *work counters or food preparation counters* that provide sufficient work space.

6.2.1.9 *Drinking fountains.*

6.2.1.10 *Cleaning lockers.*

6.2.2 The main pot washing area(s) serving a full galley operation, shall have at a minimum, a three compartment sink with a pre-wash station or a four-compartment sink with an insert pan and an overhead spray. The sink design shall allow for handling the largest piece of equipment used in the areas being served. Automatic warewashing machines with separate pre-wash stations may be used in addition to the three-compartment sinks, provided the machines are sized to the equipment being washed. A single-door, pass-through type warewashing machine is preferable to an undercounter model.

6.2.3 Depending on the size of facilities and distance to central pot washing facilities and other factors, heavy-use areas such as bakeries, butcher shops, and other preparation areas may require a pre-wash station

(including overhead spray) or a four-compartment sink with an insert pan and an overhead spray.

- 6.2.4 All food preparation areas shall have easy access to a three-compartment utensil washing sink or a warewashing machine equipped with a dump sink and a pre-wash hose.
- 6.2.5 Beverage dispensing equipment shall have readily removable drain pans, or built-in drains in the tabletop.
- 6.2.6. Condiment dispensing equipment shall have readily removable drain pans
- 6.2.7 Provide storage areas for all equipment and utensils used in food preparation areas such as ladles and cutting blades
- 6.2.8 Ensure that the design of all installed equipment directs food and wash water drainage into a container, 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. Provide ice cream, sherbert, or similar product dipper wells with running water and proper drainage.
- 6.2.10 For openings to ice bins, food display cases, and other such food and ice holding facilities, provide tight fitting doors or similar protective closures that prevent contamination of stored products.
- 6.2.11 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 In general, all food contact, splash contact and exposed non-food contact surfaces shall be smooth, durable, noncorroding and designed to preclude unnecessary edges, projections, or crevices and easily cleanable.
- 6.3.2 Ensure that all food contact surfaces consist of materials approved for food contact. Food contact surfaces shall be smooth, durable, noncorroding, easily cleanable, readily accessible, and maintainable;

provided with coved corners, and preferably seamless in accordance with current ANSI/NSF standard for food service equipment. Form external corners and angles with no sharp edges and with a sufficient radius to permit proper drainage. Use only sealants certified to ANSI/NSF, (i.e., NSF Standard 51) criteria on food contact and food splash surfaces. Use approved sealants in limited application when practical function or design requires. Avoid excessive use of sealant.

6.3.3 Splash contact surfaces shall consist of materials that are approved for food contact. Splash contact surfaces shall be smooth with no sharp edges, durable, non-corroding, readily accessible, and easily cleanable.

6.3.4 Non-food contact surfaces shall be durable and noncorroding. Exposed surfaces shall be smooth, easily cleanable, and accessible.

6.4. Bulkheads, Deckheads and Decks

6.4.1 Do not use exposed fasteners in bulkhead and deckhead construction. Seal all seams between adjoining deckhead or bulkhead panels that are more than 0.8 mm (1/32 inch) but less than 3 mm (1/8 inch) with an approved sealant. Cover all seams greater than 3 mm (1/8 inch) with appropriate profile strips. Properly seal all bulkhead and deckhead penetrations through which pipes or other conduits pass. Use stainless steel 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 Door penetrations shall be completely welded indentations with no open voids. Locking pins shall be inserted into inverted nipples. This also applies to the penetrations around fire doors, in the thresholds and in bulkhead openings.

6.4.4 Install durable coving of at least a 10 mm (3/8 inch) radius as an integral part of the deck and bulkhead interface and at the juncture between decks and equipment foundations. Stainless steel or other coving, if installed, shall be of sufficient thickness so as to be durable and securely installed.

6.4.5 Decks shall be hard, durable, easily cleanable, non-skid and non-absorbent. Completely seal all deck penetrations through which pipes or other conduits pass.

6.5 Deck Drains 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 material that 1) meets the requirements for a smooth, easily cleanable surface; 2) is strong enough to maintain its original shape; and 3) exhibits no sharp edges. Ensure that scupper and deck sink cover grates are tight-fitting, readily removable for cleaning, and uniform in length where practical (e.g., 1 meter or 3 feet), so that they are interchangeable.
- 6.5.3 Place deck drains, scuppers, and deck sinks in low-traffic spaces 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 be a minimum of 65 mm (2 ½ inches) in diameter and to drain completely.. Provide cross-drain connections in order to prevent ponding and spillage from the scupper when the vessel is listing.
- 6.5.6 Ramps over thresholds shall be easily removable or sealed in place, sloped for easy roll-in and roll-out of trolleys, and be strong enough to maintain their shape. Ramps over scupper covers may be constructed as an integral part of the scupper system, provided that they are cleanable and durable.
- 6.5.7 Deck sinks may not be used as substitutes for deck drains. Independent deck drains are required.

7.0 GENERAL HYGIENE FACILITIES REQUIREMENTS

7.1 Handwashing Stations

- 7.1.1 Construct handwashing sinks of stainless steel or other similar durable materials. Provide hot and cold running water from a single mixing faucet.

CDC Construction Guidelines - AUGUST 2001 - page 21

- 7.1.2 Ensure that handwashing stations include a suitable soap dispenser, a paper towel dispenser, a corrosion-resistant waste receptacle and, where necessary, splash panels to protect adjoining equipment. Paper towel dispensers and waste towel receptacles shall be either permanently sealed or readily removable for cleaning if attached to the bulkhead.
 - 7.1.3 Provide an adequate number of bucket filling stations, below the handwashing sinks. Each bucket filling station shall be provide hot and cold water supplied through a mixing valve to a faucet with the appropriate backflow protection. Provide appropriate deck drainage (e.g., scupper) under all bucket filling stations.
 - 7.1.4 Install handwashing stations throughout the food handling, preparation, and warewashing areas so that no employee must walk more than 8 m (25 feet) to reach a station. (Waiter stations and provision areas are excluded) Handwashing sinks shall be approximately 750 mm (30 inches) above the deck. Travel through a normally closed door to reach a handwashing station shall be avoided. Employees shall not be required to squat or reach excessively to wash their hands at a handwashing sink.
 - 7.1.5 Install a sufficient number of handwashing sinks at the soiled dish drop-off area 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.
 - 7.1.6 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. A self-closing, slow-closing, or metering faucet shall provide a flow of water for at least 15 seconds without the need to reactivate the faucet.
 - 7.1.7 Install permanent signs in English and in other languages where appropriate, stating that frequent handwashing is required.
- 7.2 Crew Toilet Facilities located in proximity to food preparation areas.
- 7.2.1 Install toilet rooms for use by employees in proximity to the work area of all food preparation areas.
 - 7.2.2 Ensure that toilet rooms are well-ventilated and equipped with handwashing facilities. Install permanent signs in English and other languages where appropriate, stating that frequent handwashing is required.

- 7.2.3 Ensure that toilet rooms are completely enclosed and have tight-fitting, self-closing doors.
- 7.2.4 Ensure that the decks are constructed of hard, durable materials and are covered at the bulkhead-deck juncture to provide at least a 10 mm (3/8 inch) radius.
- 7.2.5 Ensure that deckheads and bulkheads are easily cleanable.

8.0 EQUIPMENT PLACEMENT AND MOUNTING

- 8.1 Seal permanently installed equipment to the bulkhead, table-tops, counter-tops, and/or to adjacent equipment. For permanently installed equipment that is not sealed to bulkheads and adjacent equipment, spacing shall be based on accessibility for cleaning. (These guidelines do not apply to open racks or other equipment of open design or easily movable equipment mounted on wheels or slides.)

When a piece of equipment is installed adjacent to another piece of equipment or a bulkhead, it should be located to permit cleaning under, between and behind the equipment. The width of the space to be provided is dependent upon the distance from either end to the farthest point requiring cleaning.

- 8.1.1 When the distance to be cleaned is less than 0.6 m (2 feet) long, provide at least 150 mm (6 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads.
- 8.1.2 When the distance to be cleaned is greater than 0.6 m (2 feet) long but less than 1.2 m (4 feet) long, provide at least 200 mm (8 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads.
- 8.1.3 When the distance to be cleaned is greater than 1.20 m (4 feet) long but less than 1.8 m (6 feet) long, provide at least 300 mm (12 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads.
- 8.1.4 When the distance to be cleaned is greater than 1.8 m (6 feet) long, provide at least 460 mm (18 inches) of clear, unobstructed space between adjacent equipment and between the equipment and bulkheads.

- 8.2 Continuous weld all equipment that is not classified as portable to stainless steel pads or plates on the deck. The stainless steel welding shall 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. Construct equipment that locks in place so that it is free of gaps and crevices and easily cleanable.
- 8.3 Deck-mounted equipment that is not easily movable shall be sealed to the deck or elevated 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 may also be granted if there are no barriers to cleanability, i.e., equipment, such as pulpers and warewashing machines with pipelines, motors and cables below where 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 When mounting equipment on a foundation or coaming, ensure that the foundation or coaming is 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. Ensure that the overhang of the equipment from the foundation or coaming does not exceed 100 mm (4 inches). Completely seal any overhang of equipment along the bottom (Figure 8.5).

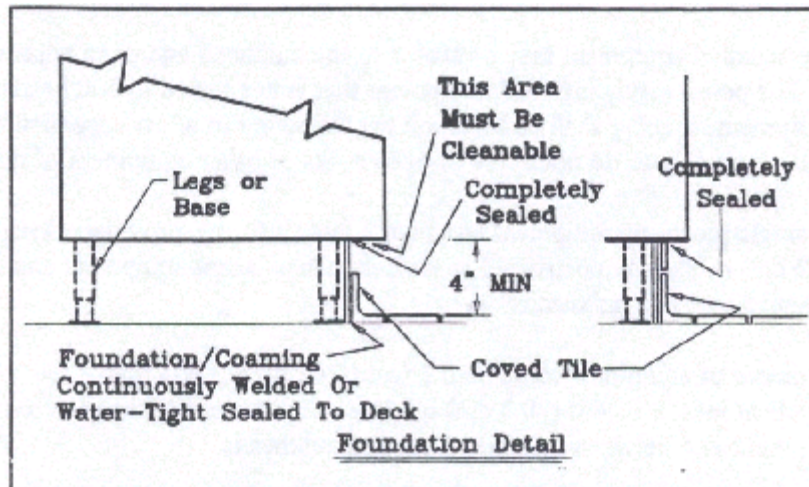


Figure 8.5 - Foundation Detail

- 8.6 Ensure that table-mounted equipment, unless portable, is either sealed to the tabletop or mounted on legs.

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. 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, mount the equipment on legs at least 100 mm (4 inches) above the tabletop.
- 8.6.2. 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, mount the equipment on legs at least 75 mm (3 inches) above the tabletop.
- 8.6.2. If the horizontal distance of the table top under the equipment less than 75 mm (3 inches) from the point of access for cleaning, mount the equipment on legs at least 50 mm (2 inches) above the tabletop.

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 Do not use non-easily cleanable fasteners, (e.g., exposed slotted screws, Phillips head screws, or pop rivets) in food splash zones or on food contact surfaces. Fasteners, when used, must be low profile, non-slotted, non-corroding, and easily cleanable.

9.2 Non-Food Contact Surfaces

- 9.2.1 Seal non-food contact surfaces of equipment, gaps and seams less than 3 mm (1/8 inch) with an approved sealant. For surfaces exposed to extreme temperatures or for gaps greater than 3 mm (1/8 inch), use only stainless steel profile strips. Avoid the excessive use of sealant.

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

9.3 Use of Sealants

9.3.1. Ensure that sealants are approved and appropriate for each application.

10.0 LATCHES, HINGES, AND HANDLES

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

11.0 GASKETS

11.1 Ensure that equipment gaskets for reach-in refrigerators, steamers, ice bins, ice cream freezers, and similar equipment are constructed of smooth, non-absorbent, non-porous materials.

11.2 Close and seal gaskets at their ends and corners and seal hollow sections.

11.3 Ensure that refrigerator gaskets are designed to be removable.

11.4 Ensure that fasteners used to install gaskets conform with the requirements specified for Section 9.0.

12.0 EQUIPMENT DRAIN LINES

12.1 Connect drain lines from 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 to appropriate waste systems by means of an air-gap or air-brake.

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

- 12.1.2 Slope drain lines from the evaporators, and extend them through the bulkheads or decks. Direct drain lines through an accessible air gap or 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 Installed horizontal drain lines at least 100mm (4 inches) above the deck and slope to drain.
 - 12.1.5 Ensure that drain lines drain through an air break or air gap to a drain or scupper.
- 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 shall conform to the following requirements:
- 12.2.1 Shall be less than 1m (3 feet) and free of sharp angles or corners, if designed to be cleaned in place by a brush.
 - 12.2.2 Shall be readily removable for cleaning, if greater than 1.0 m (3 feet).
 - 12.2.3 Shall drain through an air break or air gap to a drain or scupper.
 - 12.2.4 Handwashing sinks, mop sinks and drinking fountains are not required to drain through an air break or air gap.
- 12.3 When possible, all installed equipment drain lines shall extend in a vertical line to a deck scupper drain. When this is not possible, the horizontal distance of the line shall be kept to a minimum.

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. Adjust the length of electrical cords to equipment that is not permanently mounted or fasten them in a manner that prevents the cords from lying on countertops.

- 13.2 Ensure that other bulkhead- or deckhead-mounted equipment such as phones, speakers, electrical control panels, or outlet boxes are sealed tight with the bulkhead or deckhead panels. Do not place in areas exposed to food splash.
- 13.3 Tightly seal any areas where electrical lines, steam, or water pipelines penetrate the panels or tiles of the deck, bulkhead or deckhead. In addition, seal any openings or void spaces 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 For warewashing machines with direct duct exhaust, such exhaust shall be directly connected to the hood exhaust trunk where hot water is used for sanitization.
 - 14.1.2 Design all exhaust hoods over warewashing equipment or three-compartment sinks with a minimum 150 mm (6 inches) overhang from the edge of equipment so as to capture excess steam and heat.
 - 14.1.3 Warewashing machines with direct duct exhaust to the ventilation system shall have a clean-out port in each duct that is located between the top of the warewashing machine and the hood system or deckhead.
 - 14.1.4 The flat condensate drip pans located in the ducts from the warewashing machines shall be removable for cleaning.
- 14.2 Install hood systems above cooking equipment to ensure that they adequately remove excess steam and grease-laden vapors. Install hood systems or dedicated local 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 filters are used, ensure that they are readily removable.
- 14.5 Ensure that vents and duct work are accessible for cleaning. (Hood washing systems are recommended for removal of grease generated from cooking equipment).
- 14.6 Use stainless steel with coved corners that provide at least a 10 mm (3/8 inch) radius to construct hood systems. Use continuous welds or profile strips on adjoining pieces of stainless steel. A drainage system is not required for normal grease condensate or cleaning solutions applied manually to hood assemblies. Drainage systems are required for hood assemblies using automatic clean-in-place systems.
- 14.7 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 AND WALK-IN REFRIGERATORS AND FREEZERS

15.1 Bulkheads and Deckheads

- 15.1.1 Provide tight-fitting stainless steel bulkheads in walk-in refrigerators and freezers and line doors with stainless steel.
- 15.1.2 Painted steel is acceptable for provision passageways and in drystores areas. Light colors are recommended. Stainless steel panels are preferable for dry storage areas.
- 15.1.3 Provide bumper guards to protect bulkheads from forklift damage in passageways through which food is transferred.

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. Cove all bulkhead and deck junctures with a 10 mm (3/8 inch) radius and seal tight. If a forklift will be used in this area, reinforce stainless steel panels sufficiently to prevent buckling.
- 15.2.2 Painted steel decking is acceptable in provisions passageways and drystores areas.

15.3 Provision Evaporators, Drip Pans, and Drain Lines

- 15.3.1 Ensure that the evaporators located in the walk-in refrigerators, freezers, and dry stores are constructed with stainless steel panels that cover piping, wiring, coils, and other difficult-to-clean components.
- 15.3.2 Ensure that the evaporator drip-pans are constructed of stainless steel, have coved corners, are sloped to drain, are of sufficient strength to maintain slope, and are readily accessible for cleaning.
- 15.3.3 Place non-metal spacers between the drip pan brackets and the interior edges of the pans.
- 15.3.4 Ensure that all fasteners comply with the guidelines in Section 9.0.
- 15.3.5 Provide a heater coil for freezer drip pans, and attach it to a stainless steel insert panel or to the underside of the drip pan. The panel shall be easily removable for cleaning of the drip pan. Ensure that heating coils provided for drain lines are installed inside of the lines.
- 15.3.6 Position and size refrigeration condensate drip pans to ensure catchment of drippage from the entire surface area of the evaporator unit.
- 15.3.7 Encase thermometer probes in a stainless steel conduit and place 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. Ensure that the gauge is thick enough so that the panels do not warp, flex, or separate under normal conditions. For seams greater than 1 mm (1/32 inch) but less than 3 mm (1/8 inch), use an approved sealant. For bulkhead and deckhead seams greater than 3 mm (1/8 inch), use only stainless steel profile strips.
- 16.1.2 Ensure that all bulkheads to which equipment is attached shall be of sufficient thickness or reinforcement to allow for the reception 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 Seal back splash attachments to the bulkhead with a continuous- or tack-weld and polish. Use an approved sealant to make back splash attachment watertight.
- 16.1.5 Seal all openings where piping and other items penetrate the bulkheads and deckheads.

16.2 Decks

- 16.2.1 Construct decks from hard, durable, non-absorbent, non-skid material. Cove and sealed tight all bulkhead and deck junctures.
- 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 In technical spaces below undercounter cabinets, counters or refrigerators, the deck shall be a durable, non-absorbent, easily cleanable surface such as tile or stainless steel. 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

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

Bar and bar pantry construction shall follow the same guidelines referenced in Sections 6.0 - 14.7 and 17.0 - 21.5.4.

17.2 Decks

- 17.2.1 Ensure that all buffet lines have hard, durable, non-absorbent decks that are at least 1 m (3 feet) 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 Ensure that the dining room service stations have a hard, durable, non-absorbent deck, e.g., sealed granite or marble, at least 600 mm (2 feet) from the edge of the working sides of the service station.
- 17.2.3 Ensure that the decks behind service counters, under equipment, and in technical spaces are constructed of hard, durable, non-absorbent materials, e.g., tiles, epoxy resin, or stainless steel. Do not use painted steel and concrete decking.
- 17.2.4 Use durable linoleum tile or durable vinyl deck covering may be used only in staff, crew or officers' dining areas.
- 17.2.5 Ensure that all bulkhead and deck junctures (including deck/buffett, deck/bar, deck/waiter station) have a 10 mm radius coving and are sealed tight.

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 consumption.
- 17.3.2 Ensure that sneeze guards meet the following criteria:
 - 17.3.2.1 Sneeze guards may be temporary (portable), built-in, permanent, and integral parts of display tables, bains-marie, or cold-top tables.
 - 17.3.2.2 Sneeze guard panels shall be durable plastic or glass that is smooth and easily cleanable. Sections of manageable lengths shall be removable for cleaning.

- 17.3.2.3 Sneeze guards shall be positioned in such a way that the sneeze guard panels intercept the line between the consumer's mouth and the displayed foods in accordance with NSF Standard 2. 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 shall be taken into account (Figure 17.3).

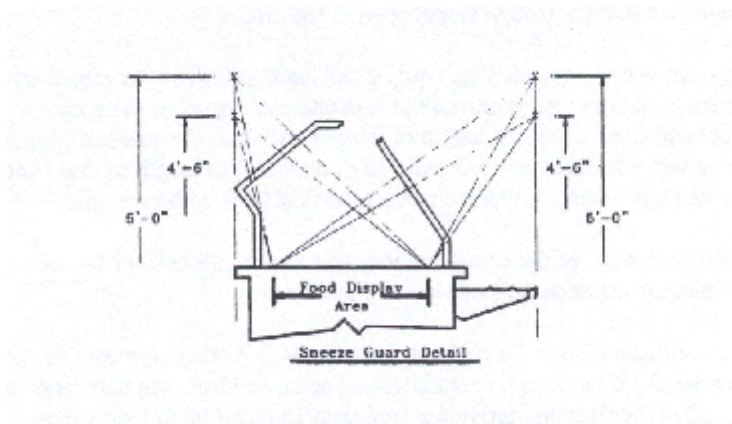


Figure 17.3 - Sneeze Guard Detail

- 17.3.3 Tray rail surfaces shall be sealed 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 in all bars that have carbonation systems, 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 Bulk dispensers of beverage delivery systems shall incorporate in their design a clean-in-place system that provides a means of flushing the entire interior of the dispensing lines in accordance with manufacturers' instructions.

18.0 WAREWASHING

- 18.1 Provide rinse hoses for pre-washing. In all food preparation areas, provide adequate table space for waste barrels, garbage grinder, or pulper system. Grinders are optional in pantries and bars. If a sink is to be used for pre-rinsing, provide a removable strainer.
- 18.2 For soiled landing tables with pulper systems, ensure that the pulper trough extends the full length of the table and that the trough slopes toward the pulper.
- 18.3 Seal the back edge of the soiled landing table to the bulkhead or provide a minimum of 460 mm (18 inch) clearance between the table and the bulkhead.
- 18.4 Design soiled landing tables to drain waste liquids and to prevent contamination of adjacent clean surfaces.
- 18.5 To prevent water from pooling, equip clean landing tables with across-the-counter gutters with drains at the exit from the machine and sloped to the scupper. Install a second gutter and drain line if the length of table is such that the first gutter at the exit from the machine does not effectively remove pooled water. Minimize the length of drain lines and when possible, place them in straight vertical lines with no angles.
- 18.6 Provide sufficient space for cleaning around and behind equipment (e.g., pulpers and warewashing machines). Section 8.0 covers spacing requirements. For pieces of equipment greater than 1.8 m (6 feet), provide a minimum of 460 mm (18 inches) of clearance.
- 18.7 Encase pulper 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 from stainless steel to protect the pulper and technical areas.
- 18.10 Construct grinder cones, pulper tables, and dish-landing tables from stainless steel with continuous welding. Construct platforms for supporting warewashing equipment from stainless steel. Avoid the use of painted steel.
- 18.11 Ensure that warewashing machines are designed and sized for their intended use and that they are installed according to the manufacturer's recommendations.

- 18.12 Ensure that warewashing machines have an easily accessible and readable data plate. The plate, affixed to the machine by the manufacture, includes the machine's design and operating specifications and the following:
- a) temperatures required for washing, rinsing, and sanitizing;
 - b) pressure required for the fresh water sanitizing rinse unless the machine is designed to use only a pumped sanitizing rinse;
 - c) conveyor speed for conveyor machines or cycle time for stationary rack machines; and
 - d) chemical concentration (if chemical sanitizers are used).
- 18.13 Ensure that three-compartment warewashing sinks are sized correctly for their intended use. Ensure that the sinks are large enough to submerge the largest piece of equipment used in the area that is served. Ensure that the sinks 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:
- a) an across-the-counter gutter with a drain dividing the wash compartment from the rinse compartment
 - b) a splash shield at least 100 mm (4 inches) above the flood level rim of the sink between the wash and rinse compartments, or
 - 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 long-handled stainless steel wire basket, and a jacketed or coiled steam supply with a temperature control valve to control water temperature. Three-compartment sinks that utilize halogen for the sanitization step do not require the aforementioned items necessary for hot water sanitizing sinks.
- 18.15.1 Provide, at a minimum, three-compartment warewashing sinks with a separate pre-wash station for the main galley, crew galley, lido galley and other full-service galleys with pot-washing areas.

- 18.15.2 For meat, fish and vegetable preparation areas, provide at least one three-compartment sink or an automatic warewashing machine with a pre-wash station.
- 18.15.3 Provide warewashing facilities that are accessible to all food preparation areas, such as the bakery and pantries.
- 18.16 Provide sufficient shelving for storage of soiled and clean ware. Minimum storage available for soiled ware should be approximately 1/3 the volume provided for clean ware. Use either solid or open tubular shelving or racks. Design solid overhead shelves so that they drain at each end to the landing table below.
- 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.

19.0 LIGHTING

- 19.1 Ensure that a minimum of 220 lux (20 foot candles) of light is available at the work surface level in all food preparation, food service, and warewashing areas. For equipment storage, garbage and food lifts, garbage rooms, and toilet rooms, provide 220 lux (20 foot candles) of lighting at a distance of 760 mm (30 inches) above the deck.
- 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 Ensure that light fixtures are installed tightly against the bulkhead and deckhead panels and electrical penetrations are sealed completely to allow easy cleaning around the fixtures.
- 19.4 Ensure that light shields on light fixtures are shatter-resistant, and removable, and that they completely enclose the entire light bulb or fluorescent light tube(s).
- 19.5 Lighting levels shall be at least of 220 lux (20 foot candles) in provision rooms when measurements are taken while the rooms are empty. Lighting levels shall be of at least 110 lux (10 foot candles) during normal operations when foods are stored in the rooms.
- 19.6 In bars and dining room waiters' stations designed for lowered lighting during normal operations, provide 220 lux (20 foot candles) during cleaning operations.

- 19.7 Ensure that light bulbs are shielded, coated, or otherwise shatter-resistant in areas where there is exposed food; clean equipment, utensils, and linens; or unwrapped single-service, and single-use articles.
- 19.8 Ensure that an infrared or other heat lamp shall be protected against breakage by a shield surrounding and extending beyond the bulb so that only the face of the bulb is 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, the bulbs installed in these light fixtures shall be the specially-coated, shatter-resistant type.

20.0 WASTE MANAGEMENT

- 20.1 Food and Garbage Lifts
 - 20.1.1 Ensure that the interiors of food and garbage lifts are constructed of stainless steel and meet the same standards as Section 16.0.
 - 20.1.2 Ensure that the decks are constructed of a durable, non-absorbent, non-corroding material and are coved at least 10 mm (3/8 inch) all along the sides.
 - 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 the lift shaft.
 - 20.1.5 Ensure that the interiors of dumbwaiters are constructed of stainless steel and meet the same standards that other food service areas must meet. Ensure that the bottom of the dumbwaiter is constructed of stainless steel and is coved to provide a 10 mm (3/8 inch) radius.
 - 20.1.6 Ensure that light fixtures are recessed or fitted with stainless steel guards to prevent breakage.
 - 20.1.7 Do not install trash or garbage chutes for transfer of waste material to storage or processing areas.

20.2 Trolley, Waste Container, and Cleaning Equipment Wash Rooms

20.2.1 Construct bulkheads, deckheads, and decks to meet the same standards described in Section 16.0 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).

20.2.2 Provide an easily accessible handwashing station for employees working in the area.

20.2.3 Provide adequate ventilation and extraction of steam and heat.

20.3 Garbage Holding Facilities

20.3.1 Construct a garbage- and refuse-storage or holding room of adequate size 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 Ensure that the storage room is well-ventilated, and that temperature and humidity controlled. Provide a sealed, refrigerated space for storing wet garbage. Ensure that the space meets the same criteria utilized for cold storage facilities for food.

20.3.3 Provide an easily accessible handwashing station with a potable hot and cold water tap for a hose connection and a deck drain.

20.3.4 Provide deck drainage to prevent pooling of any water.

20.3.5 Ensure that bulkheads, deckheads and decks are easily cleanable. See 20.4.5

20.4 Garbage Processing Areas

20.4.1 Ensure that the garbage processing area is of adequate size for the operation and has a sufficient number of tables for sorting.

20.4.2 Ensure that the sorting tables are constructed from stainless steel and have coved corners and rounded edges. Deck coaming, if provided, shall be 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.

CDC Construction Guidelines - AUGUST 2001 - page 38

- 20.4.3 Ensure that the processing area includes a handwashing station, a potable hot and cold water tap for a hose, and an adequate number of deck drains.
 - 20.4.4 Provide a storage locker for cleaning materials.
 - 20.4.5 Ensure that all bulkheads and decks are easily cleanable. Provide an adequate number of deck drains. Provide berm/coaming around all waste-processing equipment and insure there is proper deck drainage.
 - 20.4.6 Ensure that adequate lighting of at least 220 lux (20 foot candles) is provided at work surface levels.
 - 20.4.7 Provide a sink equipped with a pressure washer or an automatic washing machine to be used for washing equipment, storage containers, and garbage barrels.
- 20.5 Sewage Systems
- 20.5.1 Drain lines carrying sewage or other liquid waste shall not pass directly overhead or horizontally through spaces used for the preparation, serving, or storage of food or the washing or storage of utensils and equipment. Drain lines that are unavoidable in these food areas shall be sleeve-welded, or butt welded and shall not have mechanical couplings. Press fitted piping shall not be used over these areas.
 - 20.5.2 Black and grey water drain systems from cabins, food areas, and public spaces shall be designed 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 Ensure that the filling line is positioned at least 460 mm (18 inches) above the deck and is painted or striped auxiliary blue.
- 21.1.2 Ensure that the filling line has a tight-fitting cap fastened by a non-corroding chain so that the cap does not touch the deck when hanging.
- 21.1.3 Ensure that the screw connections for the hose attachments are unique and fit only potable water hoses.
- 21.1.4 Label the filling line "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 Filters may be used in the bunkering line before the halogenation injection point. Filters must be 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 for use with the "potable water only".

21.3 Filling Hose Storage

- 21.3.1 Construct potable water hose lockers from smooth, nontoxic, corrosion resistant, 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.
- 21.3.3 Provide storage space for at least four 15 m (50 feet) potable water bunker hoses per bunker station.

21.4 Fire/International Shore Connections and Technical Water Connections

- 21.4.1 Install a reduced pressure principle (RP) backflow prevention assembly on all connections where hoses from potable water supplies on shore will be connected.

21.5 Storage Capacity for Potable Water

- 21.5.1 Provide a minimum of 2 days' storage capacity that assumes 120 liters (30 gallons) of water per day per person for the maximum capacity of crew and passengers on the ship.

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 460 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 Ensure that 1) the coating of the tanks is approved for use in potable water tanks, 2) all manufacturer's recommendations for application and drying or curing are followed, and 3) provide written documentation for 1 & 2.
- 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 Ensure that the system is designed to be super-chlorinated one tank at a time through the filling line.
- 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. Lines above tanks shall not have any mechanical couplings. 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.

CDC Construction Guidelines - AUGUST 2001 - page 41

- 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 sample cocks above the deck plating on each tank. Ensure that sample cocks point down and that they are identified and numbered for each tank.
- 21.6.2 Storage Tank Manholes
 - 21.6.2.1 Install manholes 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. Visual site glasses are acceptable.
- 21.6.4 Storage Tank Vents
 - 21.6.4.1 Ensure that air-relief vents end well above the water line of the vessel. The cross-sectional area of the vent shall be equal to or greater than that of the filling line to the tank. The vent shall terminate with the open end turned down, or otherwise protected, and shall be screened with 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 Ensure that the drain opening is at least 100 mm (4 inches) in diameter, ideally the same diameter as that of the inlet pipe.

21.6.5.3 When drainage is by suction pump, the water shall drain from a sump. Use separate pumps to drain tanks. In addition, locate the drain in the pump-discharge line ahead of any branch take-off to the distribution system. Install a valve on the main immediately beyond the drain line take-off (Figure 21.6).

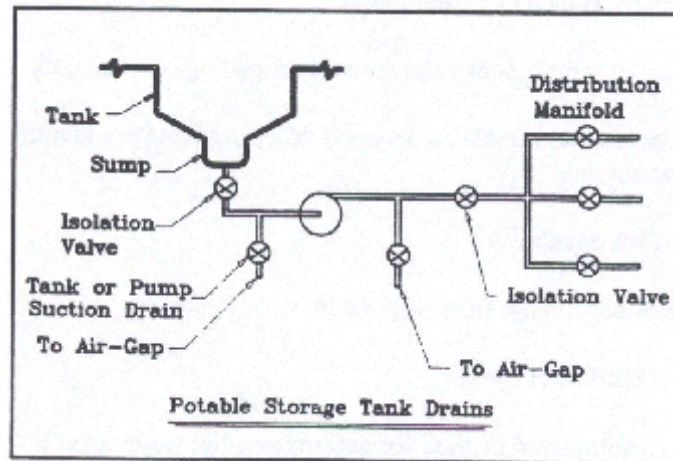


Figure 21.6 - Potable Storage Tank Drains

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 460 mm (18 inches) above the deck plating or the normal bilge water level.

21.8.2 Ensure that the potable water distribution lines are not cross-connected with the piping of any non-potable water system lines.

21.8.3 Ensure that no lead or cadmium pipes, fittings, or solder are used.

- 21.8.4 Ensure that only potable water taps are installed 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 at 5 m (15 feet) intervals and on each side of partitions, decks, and bulkheads except where decor would be marred by such markings.
 - 21.8.6 Ensure steam that is not produced from potable water is only applied indirectly to food or food equipment and provided through coils, tubes or separate chambers. Steam applied directly to food and food contact surfaces shall only be produced from potable water and shall be generated locally by the food service equipment designed for this purpose (e.g., vegetable steamers, combi-ovens, etc).
 - 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 Potable water tanks and any parts of the potable water distribution system shall be cleaned, disinfected, and flushed with potable water before the system is placed in service.
- 21.9 Potable Water Pressure Tanks
- 21.9.1 Ensure that potable water hydrophore tanks are not cross-connected 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 Ensure that the potable water pumps have adequate capacity for service demands and are not used for any other purpose.
 - 21.10.2 Ensure that pumps prime automatically and not manually. Use a direct connection, not an airgap, when supplying water to a potable water pump.
 - 21.10.3 Ensure that pumps and distribution lines are the proper size so that pressure will be maintained at all times and at levels adequate 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 and ballast tanks 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 reduced pressure principle (RP) backflow 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 near the evaporator, or reverse osmosis plant.
- 21.11.5 Ensure that high- and low-pressure units connected directly to the potable water lines have the ability to go to the waste system if the distillate is not fit for use.
- 21.11.6 Ensure that units have a low-range salinity indicator, an operation temperature indicator, an automatic discharge to waste, and an alarm with trip setting.
- 21.11.7 Ensure that the high-saline discharge goes to bilge or overboard through an airgap or reduced pressure principle backflow prevention assembly.

21.12 Halogenation

21.12.1 Bunkering and Production

- 21.12.1.1 Provide labeled potable water taps with appropriate backflow preventers at each halogen supply tank.
- 21.12.1.2 Provide a labeled sample cock at least 3 m (10 feet) downstream of the halogen injection point.
- 21.12.1.3 Ensure that halogen injection is controlled by a flow meter or analyzer.
- 21.12.1.4 Provide pH adjustment equipment for water bunkering and production. The analyzer, controller, and dosing pump shall be designed to accommodate changes in flow rates.

21.12.2 Distribution

- 21.12.2.1 Provide a completely automatic halogenation system that is controlled by an analyzer.
- 21.12.2.2 Ensure that the halogenation probe measures free halogen and is linked to an analyzer/controller and dosing pump.
- 21.12.2.3 Provide a back-up halogenation system with a switch-over that automatically begins pumping halogen when the primary (in-use) pump fails to provide adequate halogenation.
- 21.12.2.4 Ensure that all analyzer-chart recorders are located at a distant point in the system where significant water flow exists. The analyzer shall measure and indicate free-halogen.
- 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 injection points.
- 21.12.2.7 Locate a labeled sample cock at least 3 m (10 feet) downstream of the halogen injection point.
- 21.12.2.8 Provide free-halogen analyzer-chart recorders with ranges of 0 to 5.0 ppm and continuous recording periods indicating the level of free-halogen for 24 hours time periods, e.g., circular 24 hour charts. Test kits provided to calibrate analyzer-chart recorders shall be capable of reading in 0.2 ppm increments over a 0.0 to 5.0 ppm range. Electronic data loggers with certified data security features used in lieu of chart recorders shall produce records that conform to the principles of operation and data display required of the analog charts, including printing the records. Electronic data logging shall be 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.
- 21.13.2 Provide written documentation (letter) of the disinfection.

22.0 BACKFLOW PREVENTION

- 22.1 All non-potable connections to the potable water system shall use appropriate backflow prevention (e.g., air gaps, reduced pressure principal backflow prevention assemblies, pressure vacuum breakers, atmospheric vacuum breakers, pressure-type backflow preventers, or double-check valves with intermediate atmospheric vent).
- 22.2 Ensure that air gaps, the most reliable method of backflow protection, are at least double the diameter of the supply pipe measured vertically above the overflow of the rim of the vessel. The airgap must not be less than 25 mm (1 inch).
- 22.3 In high-hazard situations where air gaps are impractical or cannot be installed, use a reduced pressure principle backflow prevention assembly.
- 22.4 If reduced pressure principle backflow prevention assemblies are used, provide a test kit for testing the devices annually. All RP's shall be tested after installation.
- 22.5 Use air gaps or 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 Pressure-type backflow preventers (e.g., carbonator backflow preventer) or double-check valves with intermediate atmospheric vents prevent both back-siphonage and backflow caused by back pressure and shall be used in continuous pressure-type applications.
- 22.8 Where potable water is directed to a black water tank for rinse down or other such us, it shall only be connected through an air gap. Reduced pressure principle backflow prevention assemblies are inadequate in this high hazard condition.

- 22.9 Ensure that the following connections to the potable water system are protected against backflow or back-siphonage by air gaps or mechanical backflow prevention devices:
- 22.9.1 Potable water supply lines to swimming pools, whirlpool spas, hot tubs, bathtubs, showers, and similar facilities.
 - 22.9.2 Photographic laboratory developing machines and utility sinks.
 - 22.9.3 Beauty and barber shop spray-rinse hoses.
 - 22.9.4 Potable water faucets where hoses maybe connected.
 - 22.9.5 Garbage grinders and pulpers.
 - 22.9.6 Mechanical warewashing machines.
 - 22.9.7 Hospital and laundry equipment.
 - 22.9.8 Air conditioning expansion tanks.
 - 22.9.9 Boiler feed water tanks.
 - 22.9.10 Fire system.
 - 22.9.11 Toilets.
 - 22.9.12 Potable water, bilge, and sanitary pumps that require priming.
 - 22.9.13 Freshwater or saltwater ballast systems.
 - 22.9.14 International fire and technical water connections.
 - 22.9.15 The potable water supply to automatic window washing systems which utilize chemicals or chemical mix tanks .
 - 22.9.16 Water softeners for non-potable fresh water if located before an air gap.
 - 22.9.17 Water softener and mineralizer drain lines shall be protected by an air gap or reduced pressure principle backflow prevention assembly.
 - 22.9.18 Any other connection between potable and non-potable water systems.

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. Install a drain at the lowest point in the pool.
- 23.3 Ensure that the bottom of the pool slopes toward the drains to effect complete drainage.
- 23.4 Provide anti-vortex 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 3a-3c), or other drains that prevent entrapment hazards as specified in U.S. Consumer Product Safety Publication 363-009801 (figure 4a-4b).

FIGURE 3a. One type of Anti-Vortex Drain Cover. Notice the top of the cover is domed.

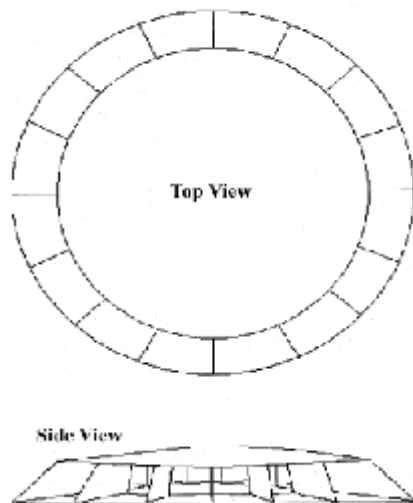
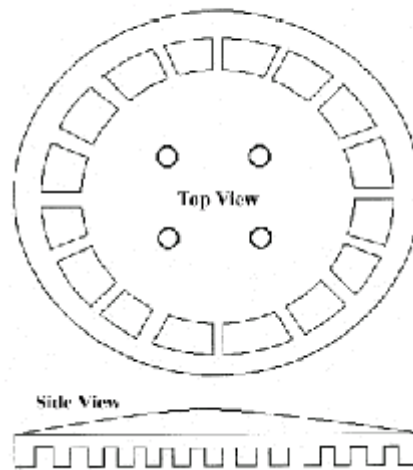


FIGURE 3b. Another type of design for Anti-Vortex Cover. Note again the domed top of the cover.



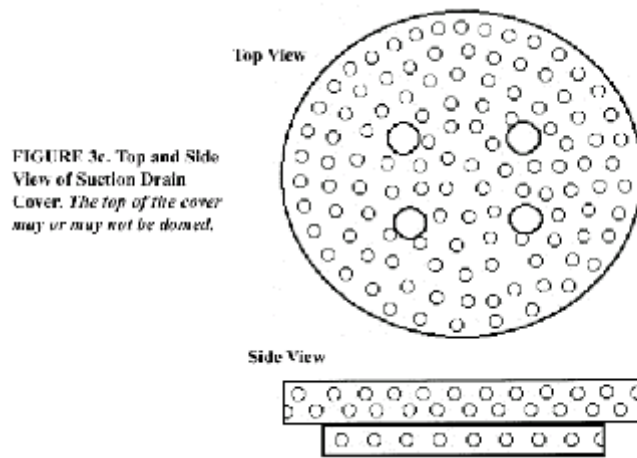


FIGURE 4a. Dual Drain System

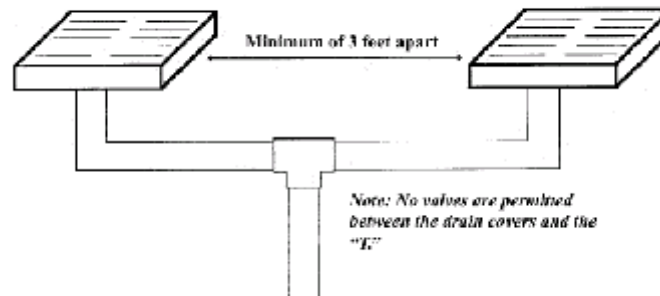
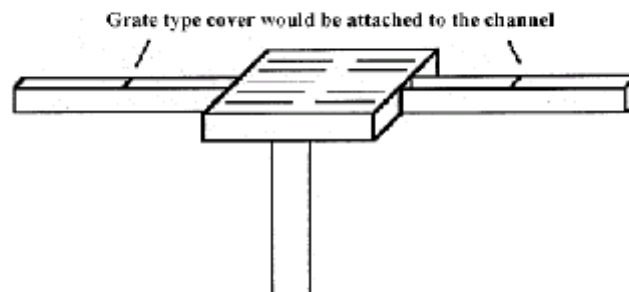


FIGURE 4b. Channel System



- 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 Ensure that pool equipment (i.e.; pumps and filters) has the capacity to turn-over 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 recirculate pool water.
- 23.10 Install pumps large enough to recirculate the entire volume of the pool in 6 hours.
- 23.11 Ensure that surface skimmers are capable of handling approximately 80 percent of the filter flow of the recirculation system.
- 23.12 Provide at least one skimmer for each 47 m² (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, and pins, etc.
- 23.14 Ensure that the removable portion of the strainer is corrosion-resistant and has holes no greater than 6 mm (1/4 inch) in diameter.
- 23.15 Ensure that filters are designed to remove all particles greater than 10 micrometers from the entire volume of the pool in 6 hours or less.
- 23.16 Filters shall be cartridge or media-type (e.g.; rapid-pressure sand filters, high-rate sand filters, diatomaceous earth filters, or gravity sand filters). Filter sizing shall be made consistent with ANSI standards for public pools.
- 23.17 All media-type filters shall be 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 The make-up tank may be used to replace water lost by splashing and evaporation. If the tank is supplied with potable water, ensure that the supply enters through an 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.

- 23.21 Provide easy access to the sand filters so that they can be inspected at least on a weekly basis and the media can be changed periodically.
- 23.22 Water sample points shall be provided on the system for the testing of halogen levels and routine calibration of 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 Ensure that the pool mechanical room is accessible and well-ventilated and that a potable water tap is provided in this room.
- 23.26 Mark all piping with directional-flow arrows and maintain a flow diagram and operational instructions in a readily available location.
- 23.27 Ensure that the pool mechanical room and re-circulation system are designed for easy and safe storage of chemicals and re-filling of chemical feed tanks.
- 23.28 Ensure that drains are installed in the pool mechanical room in order to allow for rapid draining of the entire pump and filter system and that a minimum 80 mm (3 inch) drain is installed on the lowest point of the system.
- 23.29 Wading pools shall have their own independent recirculation, filtration and halogenation system.
 - 23.29.1 Ensure that the turn-over rate of water is at least once every 30 minutes.
 - 23.29.2 Provide anti-vortex 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 3a-3c), or other drains that prevent entrapment hazards as specified in U.S. Consumer Product Safety Publication 363-009801 (figure 4a-4b).
- 23.30 The depth of the pool shall be displayed prominently so that it can be seen from the deck and in the pool. Depth markers should be labeled either in feet or meters, or both. Additional depth markers shall be installed for every 1 m (3 feet) in change of depth and shall be displayed prominently so they can be seen from the deck and in the pool.

24.0 WHIRLPOOL SPAS

- 24.1 Potable water supplied whirlpool systems shall be supplied through an air gap or approved backflow preventer.
- 24.2 Provide water filtration equipment 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.
- 24.3 Provide a temperature control mechanism to prevent the temperature from exceeding 40⁰ C (104⁰ F).
- 24.4 Design the overflow system so that water level is maintained.
- 24.5 Provide one skimmer for every 14 m² (150 square feet) or fraction thereof of water surface area.
- 24.6 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.
- 24.7 Provide drains and ensure the bottom of the whirlpool slopes toward the drains to effect complete drainage.
- 24.8 Provide anti-vortex 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 3a-3c), or other drains that prevent entrapment hazards as specified in U.S. Consumer Product Safety Publication 363-009801 (figure 4a-4b).
- 24.9 Design the system to permit daily shock treatment or superhalogenation in accordance with the *VSP Operations Manual*.
- 24.10 Install systems in a manner that permits routine visual inspection of the granular media filters in accordance with the *VSP Operations Manual*.
- 24.11 Ensure that the fill level of the whirlpool is at the skim gutter level.
- 24.12 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.
- 24.13 Use self-priming, centrifugal pumps to recirculate whirlpool water.
- 24.14 Ensure that whirlpool equipment (e.g.; pumps and filters) has the capacity to turn-over the spa water every in 30 minutes.

CDC Construction Guidelines - AUGUST 2001 - page 53

- 24.15 Provide a hair strainer between the whirlpool outlet and the suction side of the pumps to remove foreign debris such as hair, lint, and pins, etc.
- 24.16 Ensure that the removable portion of the strainer is corrosion-resistant and has no holes greater than 6 mm (1/4 inch) in diameter.
- 24.17 Ensure that filters are designed to remove all particles greater than 10 micrometers from the entire volume of the whirlpool in 30 minutes or less.
- 24.18 Filters shall be cartridge, rapid-pressure sand filters, high-rate sand filters, diatomaceous earth filters, or gravity sand filters. Filter sizing shall be made consistent with ANSI standards for public pools.
- 24.19 Design and install filters in a manner that allows for easy access for inspection and maintenance.
- 24.20 All media-type filters shall be capable of being back-washed.
- 24.21 Ensure that filter accessories, such as pressure gauges, air-relief valves, and rate-of-flow indicators are provided.
- 24.22 The make-up tank may be used to replace water lost by splashing and evaporation. If the tank is supplied with potable water, ensure that the supply enters through an 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.
- 24.23 Provide analyzer controlled chemical dosing for both pH and disinfection.
- 24.24 Ensure that disinfection is accomplished by chlorination or bromination.
- 24.25 Water sample points shall be provided on the system for the testing of halogen levels and routine calibration of the analyzer.
- 24.26 Ensure that pH adjustment is accomplished by using appropriate acids and bases and that a buffering agent is used to stabilize the pH. Injection of acids and bases shall be controlled by an analyzer.
- 24.27 Ensure that the whirlpool mechanical room is accessible and well-ventilated and that a potable water tap is provided in this room.
- 24.28 Mark all piping with directional-flow arrows and maintain a flow diagram and operational instructions in a readily available location.

- 24.29 Ensure that the whirlpool mechanical room and recirculation system are designed for easy and safe storage of chemicals and refilling of chemical feed tanks.
- 24.30 Ensure that drains are installed in the whirlpool mechanical room so as to allow for rapid draining of the entire pump and filter system and that a minimum 80 mm (3 inch) drain is installed on the lowest point of the system.

25.0 MISCELLANEOUS

- 25.1 Facilities and Lockers for Cleaning Materials
 - 25.1.1 Provide storage lockers for cleaning material and equipment. If wet brooms, mops, or other wet equipment are to be stored in the cleaning lockers, vent the lockers.
 - 25.1.2 Provide bulkhead-mounted racks on which to hang wet brooms and mops, or provide sufficient space and hanging brackets within a cleaning locker. Bulkhead-mounted racks shall be located outside food storage, preparation, or service areas.
 - 25.1.3 Provide stainless steel lockers with coved deck and wall junctures for storing buckets, detergents, sanitizers, and cloths.
 - 25.1.4 The number of lockers and the location and size of lockers is determined by the needs of the vessel. Each area shall have convenient access to lockers containing cleaning materials.
 - 25.1.5 Provide accessible facilities for cleaning mops and buckets separated from food facilities.
 - 25.1.6 Label all cleaning lockers "Cleaning Materials Only".
- 25.2 Filters
 - 25.2.1 Water filters may only be installed at point-of-use e.g. beverage machines, ice machines, combi-ovens, etc.
- 25.3 Drinking Fountains
 - 25.3.1 Ensure that the water jet orifices from drinking fountains are slanted and that the orifice is protected by a cover to prevent contamination. The water storage tanks and plumbing in water fountains shall be lead free.

- 25.3.2 Provide drinking fountains with stainless steel cabinets in food preparation areas.
- 25.3.3 Ensure that the flow of the water stream from drinking fountains can be controlled by the user.
- 25.3.4 Ensure that drinking fountains are accessible to galley personnel.
- 25.4 Facility for Cleaning of Maintenance Equipment
 - 25.4.1 Provide facilities (e.g., deep utility sinks) with hot and cold water or a pressure-washing system with a deck sink and drain shall be provided 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.

26.0 VENTILATION SYSTEMS

- 26.1 Air Supply Systems
 - 26.1.1 Design fan rooms so that they are accessible for periodic inspections and air intake filter changing.
 - 26.1.2 Design air condition condensation collection pans to drain completely. Air condition condensate drainage from air chiller units shall be through closed piping to prevent pooling of wastewater on the decks.
 - 26.1.3 Locate air intakes for fan rooms so that any ventilation or processed exhaust air is not drawn back into the vessel.
 - 26.1.4 Ensure that all food preparation, warewashing, and toilet rooms shall have a sufficient air supply.
 - 26.1.5 Design all cabin air vent diffusers for easy removal and cleaning.
 - 26.1.6 Air handling unit condensate drain pans shall be accessible for inspection, maintenance, and cleaning. All major air supply trunks shall have access panels to allow for periodic inspection and cleaning.

- 26.1.7 Provide a separate, independent air supply system for the engine room and other mechanical compartments, such as fuel separation or purifying rooms, which are located in and around the engine room.

26.2 Air Exhaust Systems

- 26.2.1 Air handling devices in the following areas shall exhaust air through independent systems that are completely separated from systems using recirculated air:
 - 26.2.1.1 Engine rooms and other mechanical spaces.
 - 26.2.1.2 Hospitals, infirmaries, and any rooms used for patient care.
 - 26.2.1.3 Indoor swimming pools, dome type swimming pools when closed, whirlpool spa facilities, and supporting mechanical rooms.
 - 26.2.1.4 Galleys and other food preparation areas.
 - 26.2.1.5 Cabin and public toilet rooms.
 - 26.2.1.6 Waste processing areas.
- 26.2.2 Maintain negative air pressure in the areas listed under Section 26.2.1.
- 26.2.3 Provide a sufficient exhaust system in all food preparation, warewashing and toilet rooms to keep them free of excessive heat, humidity, steam, condensation, vapors, obnoxious odors, and smoke.
- 26.2.4. Provide all major air exhaust trunks with access panels to allow for periodic inspection and cleaning.

27.0 CHILD CARE AND CHILD ACTIVITY FACILITIES

- 27.1 Child care and child activity facilities shall include:
 - 27.1.1 Handwashing facilities that are accessible without barriers such as doors to each child activity and child care area.
 - 27.1.2 Toilet facilities in child care and child activity centers including:
 - 27.1.2.1 Child size toilets;
 - 27.1.2.2 Handwashing facilities;
 - 27.1.2.3 A covered waste receptacle; and
 - 27.1.2.4 A sign advising users to wash their hands after using the toilet.
- 27.2 Child care facilities must provide diaper-changing stations and disposal facilities. Each diaper changing station shall include:
 - 27.2.1 A changing table designed for diaper changing that is impervious, nonabsorbent, nontoxic, smooth, durable, and cleanable;
 - 27.2.2 An airtight, soiled-diaper receptacle;
 - 27.2.3 An adjacent handwashing station; and
 - 27.2.4 A sign advising child-care facility staff to wash their hands after each diaper change.
- 27.3 Provide separate toilet and handwashing facilities for child care providers.

28.0 ACKNOWLEDGMENTS

28.1 Individuals

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

28.2 Standards, Codes and Other References Reviewed For Guidance

28.2.1 NSF International *Certification Policies for Food Equipment* and ANSI/NSF International Standards 2-59, 1995-2001
<http://www.nsf.org/food/>

28.2.2 Underwriters Laboratories (UL), 1996
<http://www.ul.com/customers/index.html>

28.2.3 American National Standards Institute/National Spa & Pool Institute, *Standard for Public Swimming Pools* and *Standard for Public Spas*, Standard 50, 1991 <http://www.nsf.org/pools/>

28.2.4 *National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs*, 1993 <http://nrc.uchsc.edu/national/>

28.2.5 FDA Food Code, 1997 and 1999
<http://vm.cfsan.fda.gov/~dms/fc99-toc.html>

28.2.6 International Electric Code, 1997
http://www.bocai.org/2000_codes.asp

28.2.7 International Mechanical Code, 1997
http://www.bocai.org/2000_codes.asp

28.2.8 International Plumbing Code, 1997 and 1998
http://www.bocai.org/2000_codes.asp

28.2.9 National Standard Plumbing Code-Illustrated, 1993
<http://www.buildingsite.com/bcl1.htm>

28.2.10 Uniform Plumbing Code, 1994
<http://www.buildingsite.com/bcl1.htm>

CDC Construction Guidelines - AUGUST 2001 - page 59

- 28.2.11 *Vessel Sanitation Program Operations Manual*, 1989 and 2000
<http://www.cdc.gov/nceh/vsp/manual/draft/ManCov0900.htm>
- 28.2.12 *Final Recommendations To Minimize Transmission of Legionnaires' Disease From Whirlpool Spas On Cruise Ships*, March 1997 (Available upon request from the VSP)
- 28.2.13 World Health Organization, *Guidelines for Drinking Water Quality*, 1993
[http://www.who.int/dsa/cat98/water8.htm#Drinking-water quality](http://www.who.int/dsa/cat98/water8.htm#Drinking-water%20quality)
Volume 1
- 28.2.14 World Health Organization, *Guide To Ship Sanitation*, 1967
(No longer in print)
- 28.2.15 U.S. Consumer Product Safety Commission, *Guidelines for Entrapment Hazards: Making Pools and Spas Safer*, Publication No. 363-009801. <http://www.cpsc.gov/cpscpub/pubs/chdrown.html>

29.0 APPENDICES

29.1 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, (F16)
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 shipyard 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 for lodging and transportation expenses. An invoice for all remaining expenses, such as en-route per diem and meals and miscellaneous expenses, including ground transportation to and from the airport nearest the representative's work site or residence, shall be sent to the following address:

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

29.2 VSP Contact Numbers

29.2.1 Atlanta Office

Vessel Sanitation Program
Centers for Disease Control and Prevention
4770 Buford Highway, NE (F16)
Atlanta, GA 30341-3724

Phone: (770) 488-7070

Fax: (770) 488-4127

E-mail: vsp@cdc.gov

29.2.2 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

29.2.3 VSP Website

Updated information on this document and other VSP activities
can be found on the VSP Website located at:

<http://www.cdc.gov/nceh/vsp>

29.3 VSP Construction Checklists and Vessel Profile Sheets

29.3.1 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.