



Centers for Disease Control and Prevention
National Center for Environmental Health
Vessel Sanitation Program

Health Practices on Cruise Ships: Training for Employees Transcript

Equipment and Facilities

The Centers for Disease Control and Prevention's Vessel Sanitation Program is proud to bring to you the following session: Equipment and Facilities Construction and Maintenance. While this session is primarily intended for the cruise vessels under the jurisdiction of the Vessel Sanitation Program, it may be used by anyone interested in this topic. This session should not replace existing interactive training, but should be used as an adjunct to a comprehensive training program.

Equipment and facilities construction and maintenance.

Learning objectives. At the end of this session, you will be able to list the materials that are acceptable in the construction of food contact surfaces, explain the differences between the cleaning frequency for food contact versus non-food contact surfaces, list the time and temperature control for hot sanitizing using manual methods, list the solution strength in PPM and contact times for chemical sanitization, list the proper location and placing for thermometers in cold holding and hot holding units, list the items that must be available at each hand wash station in the galley.

Food contact surfaces. The design and construction of food contact surfaces should be such that these surfaces are smooth, durable, easy to clean, corrosion resistant, free of seams and crevices, and if seams are present, they should be tight. We want to minimize sharp angles and corners. Fasteners should be smooth, low-profile, and non-corroding, and the installation of the equipment should allow for cleaning.

Food contact surfaces, maintenance and cleaning. We want to make sure that our equipment is in working order, that the food contact surfaces are accessible for cleaning, that the piece of equipment can be disassembled to wash, rinse, and sanitize the food contact surfaces. We want to clean as necessary. If these surfaces are in contact with non-potentially hazardous foods, the cleaning frequency would be different than if they were in contact with potentially hazardous foods. For potentially hazardous foods, we want to make sure that we wash, rinse, and sanitize at a minimum every four hours. Additionally, if the food contact surfaces are being used for items such as raw poultry, we want to make sure that we wash, rinse, and sanitize before we handle another food, even if it's another raw meat product.

Acceptable materials. The acceptable materials for food contact surfaces include stainless steel, hard plastic, rubber or rubber-like materials, for example on cutting boards. Cast iron can be used for heated food contact surfaces such as grills, griddles, skillets, and



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other similar equipment, but these materials should not be used to hold or store food: for cooking only. Hard maple or an equivalent hardwood can be used as well, however this use is limited. Specifically, we can find these materials in the construction of cutting boards.

Hard sealant versus soft sealant. Soft sealants are generally used on non-food contact surfaces and are not allowed to be used on food contact surfaces. There is, however, one exception. Inside an ice machine, you'll find a seam between the upper compartment of the ice machine and the ice bin. Here there is an allowance to use soft sealant. If hard sealant were to be used in this area, the vibration of the vessel can cause the sealant to crack. Soft sealant is allowed in this area to close a seam. However, the sealant should be food grade and specifically non-toxic. Hard sealant can be used anywhere and is generally what we would choose to use on a food contact surface. Again, if we use this on a food contact surface, it should be non-toxic and food grade. One caution on soft sealant. This is not acceptable to be used near the deck. It is not considered to be a durable material if it is applied near the deck.

Cutting boards. Cutting boards can either be plastic or hardwood. They should be smooth. They should be replaced or refinished as often as is necessary. Some vessels use color coding for cutting boards, and this is specifically used to prevent cross-contamination. The Vessel Sanitation Program does not require the use of color-coded cutting boards. We simply require wash, rinse, and sanitize and air drying cutting boards as often as is necessary. Again, the cleaning frequency and sanitizing frequency would be dependent on the foods that are cut on the cutting boards. For potentially hazardous foods, cutting boards should be washed, rinsed, and sanitized at a minimum every four hours. If we cut raw poultry on a cutting board, and now we're going to cut raw fish, we would again want to wash, rinse, sanitize, and air dry to prevent cross-contamination.

Facilities to maintain temperatures. We use hot and cold holding units to keep food products out of the temperature danger zone, which is 41 degrees Fahrenheit to 140 degrees Fahrenheit. We want to make sure that these hot and cold holding units have sufficient capacity, meaning that you have enough of these to store the foods that you need to keep out of the danger zone, that we are maintaining proper temperatures, that we have adequate air circulation, and that we have ambient air temperature thermometers in these units. For a hot holding unit, we would place the thermometer in the coldest part of the unit where you normally store food. In a cold holding unit, we would place it in the hottest part of the unit where you normally store food.

Ice machines. Ice machines have technical compartments and have food contact compartments or food contact surfaces. And this means there's an area in the ice machine where we would want materials to be constructed as food contact surfaces need to be constructed, and the cleaning frequency would be like for food contact surfaces. This area is where the ice and the water are-- the upper compartment of the ice bin where the ice



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and the water flow and the ice is formed and the entire surface of the ice bin including the upper portions. These are considered to be food contact or ice water contact surfaces. The technical compartment is considered to be non-food contact.

Filters. There really is no mention of filters in the manual. However, we do have some recommendations. One is that the filters are changed regularly per the manufacturer's recommendations. And two, that the filter is dated, either the date the filter was changed or the date that the filter needs to be changed.

Food thermometers. We want to make sure that we calibrate them regularly, and a suggestion would be at least once a week. However, if a thermometer is dropped or mishandled, you may need to calibrate more frequently. We want to make sure that we clean and sanitize thermometers regularly, at least once a day. However, we want to make sure that we wipe thermometers down in between checking food temperatures. This can be done with alcohol wipes or a sanitizing cloth. We want to make sure that our thermometers are accurate to plus or minus one degree Centigrade or plus or minus two degrees Fahrenheit. As you can see from this photo, thermometers are being calibrated in an ice water mixture. It's important to remember when you do this calibration that you should have much more ice than water. The water is simply allowing you to take the temperature.

Non-food contact surfaces. The requirements for non-food contact surfaces are not as stringent as those for food contact surfaces. We want to make sure that they are constructed and maintained to be durable, they retain their characteristics during normal use, and that they're installed for easy cleaning or that they are easy to move.

Walk-in units. We want to have adequate shelving, and preferably this shelving should be open slotted or tubular shelving to allow for proper air circulation. We want to have thermometers again in these units placed in the warmest part of the unit where you normally store food. Some of these units have evaporators, condensate collection pans, drain lines, and we want to make sure that if we store underneath these units, which is allowed, that they are not dripping and that we don't have condensate forming that can drip down onto food.

Surfaces exposed to splash. These are considered to be non-food contact surfaces. They need to be designed for easy cleaning, non-absorbent, smooth, and corrosion resistant. As we can see from this slide, we have the bottom portion of a kettle. And generally a lot of splashing can occur in this area, and this is why we want these surfaces to be easy to clean. The tube or pipe portion, the inside of this, would be considered to be food contact, because if you were making a big kettle full of stock and you were going to drain it off, it would come out of this pipe. So it's only the outer surfaces of this kettle that is considered to be non-food contact.



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Exhaust hoods. They need to be properly sized. The filters should be removable. And they should be maintained clean. And when we say properly sized, we're specifically trying to ensure that we keep this area free of odors and that any heat or condensate is collected, trapped in the hood, and removed.

Mechanical warewashing equipment. We want to make sure that this warewashing equipment is cleaned, has a manufacturer's data plate, has the proper gauges in working order, has the proper curtains properly placed, and has effective spray patterns. At a minimum, warewashing units should be cleaned after each meal service. You may find that they need to be cleaned more frequently if the dishes and equipment are not properly rinsed or scraped prior to placement in the unit.

Machine gauges. Machine gauges need to have a numerical scale. For temperature measuring devices, they need to be in increments of one degree Centigrade or two degrees Fahrenheit, and the accuracy should be plus or minus 1.5 degrees Centigrade or plus or minus three degrees Fahrenheit. A pressure gauge is required.

Warewashing procedures. We need to make sure that dishes, utensils, and equipment are properly scraped, pre-flushed, soaked as needed. And this would be dependent on the food that was served. We want to wash, rinse, sanitize, and air dry. As we can see from this photo, there is entirely too much soiled equipment stored in this area. And this would require more frequent cleaning to eliminate this excess. This would be a concern with roaches and flies.

From this photo, we can see that the trays, while they're being placed in a machine for cleaning, they've been poorly loaded. And the spray pattern, while it may be effective inside the machine, it's not going to contact much of those trays because of the way they've been loaded.

Machine maintenance. We want to make sure we have trained employees. We have to have routine inspections, routine cleaning, and temperature checks. At a minimum, we want to make sure that we do inspections and cleaning and temperature checks at the end of each meal service, and it is suggested to perhaps take temperature checks every hour during operation, or every half hour.

Manual warewashing. This can either be done in a three-compartment sink, as is shown in the photo here, or it can be done in a three-bucket system, which we will discuss later. For a three-compartment sink, we want to make sure that each compartment is properly sized so that the largest piece of equipment that would be washed in this unit can be fully submerged.

Clean in place equipment. We want to use a three-bucket system anywhere where we cannot move a piece of equipment to either a three-compartment sink or a warewashing



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unit. For example, when you take apart a slicer, there are portions of that slicer that can go through a dishwash unit or the three-compartment sink. There are portions that remain behind that cannot go into a three-compartment sink or a warewash unit. This is where you would use the three-bucket system. Again, we want to wash, rinse, sanitize, and air dry.

Sanitizing temperatures, plate surface. For automatic warewashing units, our final rinse temperature should be 71 degrees Centigrade or 160 degrees Fahrenheit. Manifold temperatures vary depending on the units used. It's important to note that regardless of the unit used, the manifold temperature should not exceed 194 degrees Fahrenheit. Sanitizing temperature. For manual operation, the requirement for your sanitizing temperature is 77 degrees Centigrade or 171 degrees Fahrenheit for a minimum of 30 seconds.

Chemical sanitizers. For whatever sanitizer you are using, you need to have the appropriate test kit or test strips. If you are using a quaternary ammonium compound, the parts per million required would be per the manufacturer's recommendations, so you must read the label. However, the contact time is 30 seconds. If you are going to be using iodine, the parts per million to be used for sanitizing is 12.5 to 25 parts per million for a contact time of 30 seconds. When using chlorine, the residual should be between 50 and 200 parts per million with a contact time of seven seconds.

Wiping cloths and linen. Linen use is very limited in the galley with respect to food contact. A clean, dry cloth is allowed to be used in a basket for items such as bread or pastries. They must, however, be changed in between use. Soiled and clean linen should be stored properly. Dry cloths can be used to wipe the edges of plates for presentation. To wipe up food spills on surfaces, a wet cloth should be used. This cloth should be kept in a sanitizing solution between uses, and again, it is important to have the appropriate test strips for the sanitizer used.

Clean equipment storage. We want to make sure that we store our clean equipment in a self-draining position, protected, covered, or inverted, and at least 15 centimeters or six inches off the deck. And I want to point out why we store these items 15 centimeters or six inches off the deck. We want to make sure that when we're cleaning, sweeping, or mopping, that we don't contaminate clean equipment. We want to be able to do inspections for vermin infestation. And additionally, if this area were to flood, either because of a backup of waste water or because of a burst pipe, the items would not be contaminated, because they would be well off of the deck.

Preset tables. If tables are preset less than four hours prior to service, there is no requirement. However, if tables are preset more than four hours prior to service, this would be considered storage, and as such, the items should be covered, inverted, or otherwise protected.



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Soiled equipment storage. We want to make sure we have sufficient capacity and that items are not stored on the deck. We can see from this photo that there is an excessive amount of soiled equipment stored here. For this vessel, we would need to clean these items more frequently, because we cannot increase the capacity for storing soiled equipment.

Potwash clean storage. We want to make sure we have sufficient capacity to store items. We want to store them in a self-draining position. We want to make sure that the shelves drain so we don't have pooled water. We want to store these items covered or inverted, and at least 15 centimeters or six inches off the deck.

Equipment storage. Knife lockers. We want to make sure that our knife lockers can be secured, that they're accessible for inspections both by the Vessel Sanitation Program and by supervisors in the food area, and we want to make sure that they're only used to store clean items.

Hand washing station. We want to make sure that we have hand washing stations installed within eight meters or 25 feet of all food preparation and warewashing areas. We want them to be accessible at all times. We want to make sure that hot water is a minimum of 43 degrees Centigrade or 110 degrees Fahrenheit. If the hand washing station turns on via a sensor where the user cannot control the temperature, the water should not be any hotter than 52 degrees Centigrade or 125 degrees Fahrenheit. Hand washing stations are to be used for hand washing only. They need to be adequately stocked with paper towels and liquid soap, and we want to make sure we have a proper waste receptacle. Signs should be posted over the handwash sink letting people know that they need to wash their hands frequently. The language used should be appropriate for the employees in that food area.

Solid waste storage. We want to make sure that our solid waste bins are properly located, durable, easy to clean, and leak proof, cleaned when emptied or as often as is necessary, and we want to have proper facilities for cleaning waste receptacles. We want to have tight fitting lids. If the area is in use and food employees are placing waste in these bins, the lid should be off. If the area is closed and no work is occurring in that area, the lid should be on. From this photo, we can see a solid waste receptacle that is not properly located. Right next to this waste receptacle or right behind it you can see clean storage. This waste receptacle could not be put anywhere else because this area was very small. The way to correct this would be to put a splash shield between the clean equipment and the soiled waste bin.

Facilities. Decks need to be constructed to be easy to clean. Deckheads and bulkheads also should be constructed to be easy to clean. We also want to eliminate gaps and crevices where roaches or other vermin may hide. Attached equipment should be



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installed so that the deckhead and bulkhead are easy to clean, and also that the attached equipment is easy to clean. Coved junctures are needed so that we can facilitate cleaning. 90 degree angles or sharp angles do not facilitate cleaning, so we need to properly cove deck bulkhead junctures, deck equipment junctures, deck waiter station junctures, and deck buffet junctures.

Liquid waste and equipment drain lines. We want to make sure that we have indirect connections to the wastewater system from food equipment and food sinks. We also want to have an indirect connection to the wastewater system from warewashing equipment and warewashing sinks. And this is because if we have a backup of waste water, we don't want it to end up in a refrigerator, in a food prep sink, a three-compartment sink, or a warewashing unit, or any similar piece of equipment. We don't want to have waste lines overhead in food areas. If this is unavoidable, that waste line must be sleeve welded. We want to make sure that our waste system is properly sized and it's in good repair.

Lighting. We want to make sure that our lighting is shielded or that the lightbulbs are shatter resistant. We want to make sure that we have adequate levels of lighting. The levels of lighting are dependent on the area where the lights are installed. These differ. For example, the lighting requirement for a walk-in refrigeration unit would be very different than the lighting required for a food prep area in the galley.

Proper storage of cleaning supplies. We want to make sure that we have chemical and cleaning lockers, and that these chemical and cleaning lockers have a sign. If mops are stored in the locker, we need to have adequate ventilation. Pesticide lockers need to be locked and outside of the food area. We want to make sure that our cleansers and chemicals are properly labeled.

Organizing a cleaning program. We want to survey our cleaning needs, compartmentalize the areas to be cleaned, assign these areas to specific staff, devise a cleaning schedule. If we need to, we may have to supervise or demonstrate cleaning procedures. And we want to ensure that the employees have proper tools and cleansers to clean the equipment.

Cleaning program maintenance. We want to conduct routine weekly inspections to ensure that cleaning is properly performed. It may be advisable to use good areas as an example to employees. We want to tie our cleaning program into integrated pest management, again because leaving food behind can provide a source of food for roaches, flies, and other vermin. We want to replace difficult-to-clean equipment with equipment that is not difficult to clean. And we want to monitor our cleaning program for effectiveness. Again, this can be done with routine inspections.

The following slides will show photos that were taken on various cruise vessels. The issues for each slide or photo will be pointed out. From this example, we can see a technical space where an excessive amount of cabling was left behind after equipment



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installation. This cabling should have been cut. We can see a drain line in this technical space, so there may be some moisture, and the excessive cabling is a good place for mold to grow.

From this slide, we can see a filter installed on a potable water line. We can see that the filter has been dated with the next filter change. Additionally, we can see a backflow protection device that's been installed on the water line. With respect to the filter, it's important to note that while filters are allowed, they can only be used on single pieces of equipment such as ice machines, coffee machines, juice machines, or they can be used on a bank of equipment such as on a beverage station. Filters cannot be used to remove all of the chlorine in an area such as a pantry or a galley.

From this photo, we can see a piece of equipment installed in a bakery or pastry area where there is an insufficient amount of space under the equipment for cleaning.

This photo shows a close-up of the previous photo. Again, we can see the area under this piece of equipment where it would be very difficult to clean. Additionally, this is a very heavy piece of equipment which cannot be easily moved for cleaning. This should have been mounted on legs at least four inches high to facilitate cleaning.

From this photo, we can see the inside of a mixer lid. The fasteners on the food contact surface or inside of this mixer lid are slotted fasteners. Slotted fasteners are not allowed on food contact surfaces. These fasteners should be replaced with smooth, low-profile, non-corroding fasteners.

From this photo, we can see a drain in a technical compartment. There is damage around this drain, and water is collecting in the damaged area. This can be a problem, because this is an area where flies would like to breed, in a moist, damp area. This should be repaired.

From this photo, we can see the deck-bulkhead juncture where soft sealant has been applied, and the area has not been coved. As was said previously, soft sealant should not be used near the deck, and deck-bulkhead junctures should be coved to facilitate cleaning. From this photo, we can see that there's an insufficient amount of space between pieces of equipment to allow for cleaning.

From this photo, we can see the seam between the upper compartment of an ice machine and the ice bin. As was previously stated, this is the area where soft sealant would be allowed, but the soft sealant must be food grade and non-toxic.

From this photo, we can see a leak emanating from a piece of equipment. This piece of equipment is a hood cleaning cabinet, and the leak is dripping onto a food contact surface that's adjacent to a fryer.



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From this photo, we can see the inside of the hood cleaning cabinet. Inside a hood cleaning cabinet you will have a potable water line, and you will have a container that holds a cleanser. This cleanser can spill into the cabinet, especially during rough seas. We do not want these hood cleaning cabinets installed over food prep, food storage, or clean equipment areas. If the vessel has already been constructed and these cabinets cannot be moved, the cabinet should be made leak-proof, and the receptacle holding the chemical should be made spill-proof.

From this photo, we can see a piece of equipment that's been installed very close to the deckhead. There is an insufficient amount of space between the top of the equipment and the deckhead. The way to solve this would be to close the space between the deckhead and the top of the equipment, or to raise the deckhead in this area to have more space for cleaning.

From this photo, we can see a fastener on the top of a grill. The top of a grill of course we know is a food contact surface. This food contact surface should be durable, smooth, corrosion-resistant. So these fasteners would not be allowed on a food contact surface because it impedes cleaning. Additionally we have some slight corrosion on the top of this grill. It's important to understand that the Vessel Sanitation Program would allow you after cleaning to put a very thin coating of oil on this grill. This may actually reduce the amount of corrosion that could develop.

From these two photos, we can see that there is an issue with inadequate ventilation in this area. The top left photo shows a heavy amount of condensate. The bottom right photo shows a food employee wiping the condensate off the deckhead. The ventilation in this area needs to be improved. Again, from this photo, we can see inadequate ventilation. This inadequate ventilation is more specific to a single piece of equipment and not an entire space. This is a hot holding unit where we can see condensate has collected on the inside surfaces of the sneeze guard. This is a problem because this condensate can eventually drip down into the food stored beneath. The way to solve this would be perhaps to reduce the temperature of the water so it's not excessive, and wherever there's a space where a food pan is not going to be placed to either put a lid or an empty food pan to prevent the condensate from escaping.

This concludes the session Equipment and Facilities, Construction and Maintenance. Resources and reference. For further information on the Centers for Disease Control and Prevention, please visit www.cdc.gov. For further information on the Vessel Sanitation Program, please visit www.cdc.gov/nceh/vsp. For information on the Food and Drug Administration, please visit www.fda.gov or www.cfsan.fda.gov.