

fish processing plants

Guideline for Live Retail Fish Holding Systems

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Introduction

Fish can be held in holding tanks if they are going to be sold within 2-3 days. The design and operation of a live fish holding system plays an important role in maintaining fish health, preventing worker illness, and in the prevention of foodborne illness.

Proper design will facilitate cleaning and sanitizing of the equipment. In addition, the hydraulic design of the unit is important to assure an adequate quantity and quality of water for the intended purpose. Inadequate flow or “dead spots” can lead to bacteriological growth and/or oxygen deficiency and can lead to fish mortality. Minimum turbulence will permit feces and other organic matter generated by active fish to settle out without being suspended and ingested. Use of food grade materials for all construction materials and additives will prevent possible adulteration by chemicals.

Holding tanks also have the potential to pose a serious health concern for employees. Fish are known to carry organisms that may cause infection and disease in humans. These pathogenic organisms are transmitted to humans either by direct handling of the fish or indirectly through contacting tank water.

Common microbes, that have the potential to cause serious infections and even death, include *Vibrio* spp. such as *Vibrio vulnificus*, *Salmonella* spp., and *Streptococcus iniae*. Although all individuals are susceptible to these pathogens, workers that are immunocompromised or elderly are at higher risk. However, with properly functioning equipment, such as filters and pumps, the risk of workers or the public becoming infected with these disease decreases. Proper use of materials for construction and appropriate installation of equipment is therefore essential for public safety.

Definitions

Ammonia: Toxic byproduct of fish metabolism and dead and dead/decaying organic matter.

Defoamer: Chemicals used to reduce or eliminate foam in holding tanks

Filter Feeders: Animals that feed by straining suspended matter in water

Fish: In this guideline, fish refers to any of the following:

- **Bivalves:** Molluscs are invertebrates that have symmetrical two part shells. Examples include scallops, oysters, clams, mussels
- **Crustaceans:** Crustaceans are invertebrates with an external skeleton. Examples include: lobsters, crabs, shrimp, and crayfish.
- **Finfish:** free swimming aquatic vertebrates that are typically ectothermic and have scales with two paired fins. Examples include: catfish, salmon, trout.

Nitrifying Bacteria: Responsible for converting ammonia into nitrites and nitrites into nitrates. Nitrites are also toxic but less than ammonia, nitrates are relatively non-toxic.

pH: Measure of the acidity or alkalinity of a solution using a scale from 0 to 14

Salinity: The concentration of salt in a solution

Turbidity: Measure of the cloudiness of a solution due to suspended solids

Ultra Violet (UV) Light: a white tubular appliance, which is connected to the water hose lines. The unit contains a UV bulb, which kills bacteria as they pass by.

Tank Specific Terms:

Backwashing: water is run through the filter in the opposite direction from normal flow

Biofilter: Detoxifies soluble waste products

Display Tank: Reservoir containing water

Filtration System: Removes particulate waste from organisms

Primed: Pump is immersed in water

Pumping System: Maintains water circulation to keep the water continually aerated

Temperature Control System: Heating or Refrigeration Unit

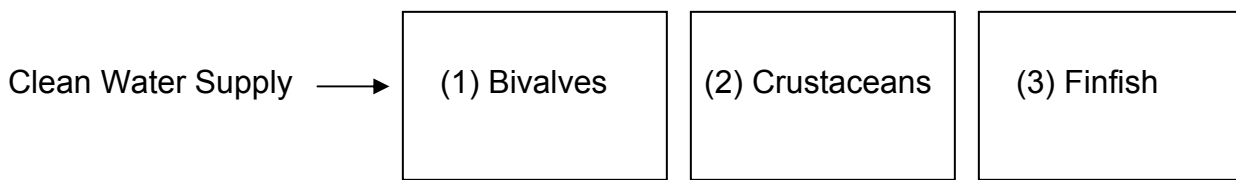
Fish Holding System Design

Each fish holding system should have the following requirements:

1. Equipment and utensils should be constructed with materials that are durable, non-absorbent, non-toxic and easily cleanable.
2. A recirculation system should include a filtration system which includes both mechanical filters and biofiltration (Appendix I).
3. Refrigeration units that can cool water temperature to 10°C (50 °F) or lower. Low temperatures reduce the metabolic activity of organisms resulting in a smaller waste load and allows for more dissolved oxygen to be held in the system (Appendix II).
4. An adequately designed aeration system that provides a minimum of 5 milligrams/litre (mg/l) dissolved oxygen
5. Units that store bivalves require a UV disinfection unit (or similar water treatment device) capable of maintaining the water quality at a bacteriological count of 2 coliform/100 ml or less (Appendix III).
6. Dead-ended pipes or hoses that could fill with stagnant water should be avoided.
7. Systems should be equipped with backflow prevention devices to protect potable water supplies.

Fish Holding System Operation

1. The manual and a working set of maintenance instructions should be readily available for each retail live fish holding system.
2. Marine water used in a retail live fish holding system should not be taken from an area closed to bivalve harvesting or an area subject to contamination (i.e. sewer/storm drain outfalls, industrial areas) or within a 125 metre radius of any docks or wharves.
3. Artificial sea water should be prepared from food grade ingredients with potable water from an approved source.
4. Defoamers, if used should be of food grade quality.
5. Product loading should not exceed the manufacturer's recommended limits. The number of pounds of bivalves and crustaceans should be less than the number of gallons of water in the system. Finfish require 50 pounds of fish for 100 gallons of water, and a flow rate of 8 to 10 gallons per minute per 100 gallons.
6. The order of fish in the holding tanks is important if the tanks are all connected and receiving water from the same source. Otherwise, metabolic waste products from finfish and crustaceans may be filtered in by bivalves. This creates a potential health hazard for consumers. As a result, the bivalves should be placed in the tanks receiving the cleanest water, closest to the water supply source



Bivalves – Special Requirements

In the case of bivalves, the following requirements should also be met (Appendix IV):

1. Prior to placement in tanks, all bivalves should be washed and culled to remove dead, broken or weak animals and culled on a daily basis, thereafter.
2. Bivalves should not be mixed with other fish species. Bivalves are filter feeders that can filter in wastes from other products in the tank.
3. Bivalves that share the water system with other fish species should be placed in tanks closest to the water supply source.
4. Bivalves from different suppliers, harvest areas or harvest dates should not be commingled. Vertical plastic dividers, mesh bags, etc., may be used to maintain lot identity.

Domestic Aquaculture Products – Special Requirements

(Appendix IV)

1. Only artificial water should be used for aquaculture products.
2. Aquacultured species (such as tilapia and white legged shrimp) must be placed in holding tanks separate from other products due to their different salinity and temperature requirements.

Fish Holding System Maintenance

Maintenance procedures (Appendix V) should include regular water testing of holding tanks every 2 days when a system is being set up and weekly when the biofilter is mature (ammonia concentration is low). The parameters that need to be tested and their appropriate ranges are included in the table below:

Tank Water Requirements

Parameter	Range Cold Water Tanks	Range Warm Water Tanks ¹		How often to check?
Water Type (fish species)	Salt-water	Salt-water (white-leg shrimp)	Fresh-water (tilapia)	
Specific Gravity (Salinity)	1.024-1.029 (24 to 29 ppt)	1.003-1.005 (3 to 5ppt)	1.000 (no salt, 0 ppt)	Daily
Temperature	<10 °C	>20 °C		Daily
pH	7.0-8.5	7.0-8.5		Weekly
Ammonia	<10ppm	<10ppm		Weekly
Nitrite	<2 ppm	<2ppm		Weekly
Nitrate	<100ppm	<100ppm		Weekly
Dissolved Oxygen	5mg/L	5mg/L		Weekly
Coliform Count	<2 Coliforms/100mL	<2 Coliforms/100mL		Weekly
Turbidity	20 NTU	20 NTU		Weekly

¹Domestic aquaculture tilapia and white legged shrimp

Most of these tests can be done onsite with a simple test kit for immediate results. Samples can also be sent to an accredited lab where accurate results will be obtained within 24-48 hours. Samples that will be sent to a lab for analysis should be collected in approved containers (contact lab) and should not be stored in direct sunlight or hot areas. Designated employees should be responsible for maintenance.

Maintenance instructions, operating manuals and checklists should be made available (example checklists, Appendix VI).

Weekly cleaning and servicing of the holding unit.

1. replace water every 4-7 days in the absence of a biofilter
2. check spray nozzles for clogging
3. backwash filters for 2-5 minutes to dislodge waste particles
4. remove rubber bands, paper, claws, legs and other foreign objects from intake area of pump
5. ensure the pump's impeller is primed to prevent overheating
6. refrigerator condenser should be free of dirt and debris
7. liquid refrigerant is clear without bubbles (bubbles indicate a gas leak and will result in the warming of water)
8. servicing and testing the UV disinfection system every 6-8 weeks, plus replacement of the UV bulbs every 9-10 months (spare bulbs should be readily available)

Record-Keeping

1. Maintenance and operational logs (water quality, temperature, etc.) are filled out daily, complete and should be kept for a minimum of one year, and
2. Invoices and shellfish tags for each lot of should be kept on site for a minimum of 1 year for fresh product and 2 years for frozen product. These should be made available for review upon request. The shellfish tags describe the processor, harvest location, harvest date and verify the shellfish has been inspected in a federally registered plant.

Workplace Safety

Injuries from Holding Tanks/Fish

Employees must work diligently and carefully when dealing with fish to ensure they don't get cuts, scratches, or puncture wounds. Furthermore, proper precautions need to be taken to ensure infectious organisms from the fish or their tank don't enter skin wounds of handlers and cause infection. Finally, although rare, humans may also experience sensitivity to fish allergens through skin contact or inhalation.

Precautionary Measures for Employees

To ensure worker safety and prevent bacterial infections, the following precautionary measures should be applied when dealing with holding tanks:

1. Do not place hands/arms directly into the holding tank if you have an open wound. Make use of protective gloves that effectively cover the wound.
2. Perform thorough hand washing both before and after handling fish and contaminated water. Avoid touching your face, nose, eyes, or mouth with contaminated gloves or unwashed hands.
3. If you are injured while handling fish or contaminated tank water immediately clean all abrasions and cuts with soap and water (avoid the use of antimicrobial soap).
4. Report accidents to the supervisor.

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Appendix I. Mechanical Filters and Biofilters

Mechanical filters: used to physically trap waste particles in holding tanks for removal. There are 4 types of mechanical filters:

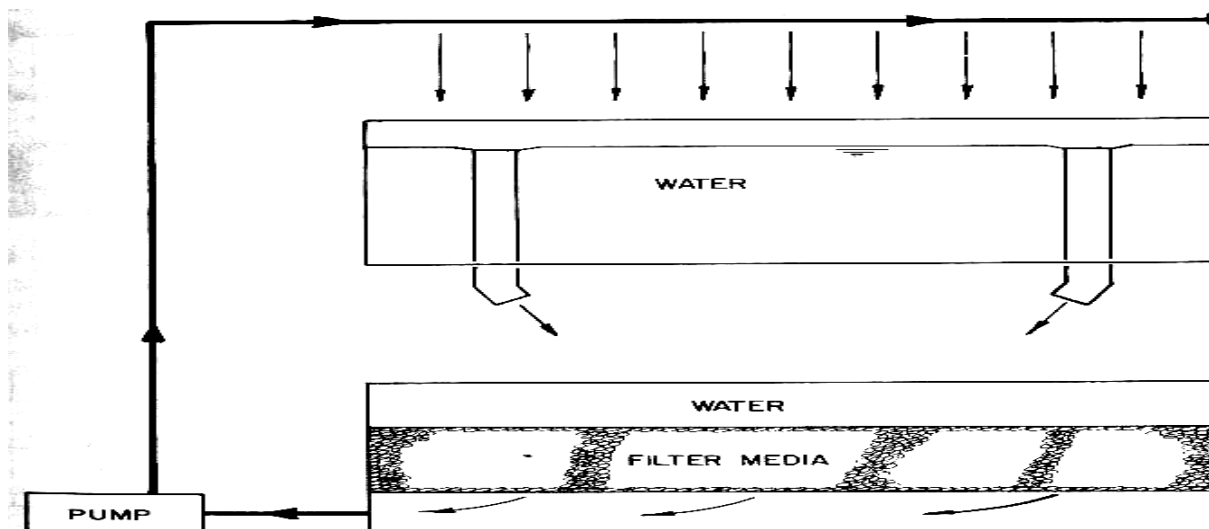
1. carbon filters
2. sand filters
3. diatomaceous earth filters
4. pre-filter pads

Biofilters: Biofilters are an essential component of all holding tanks that are used to detoxify soluble metabolic wastes.

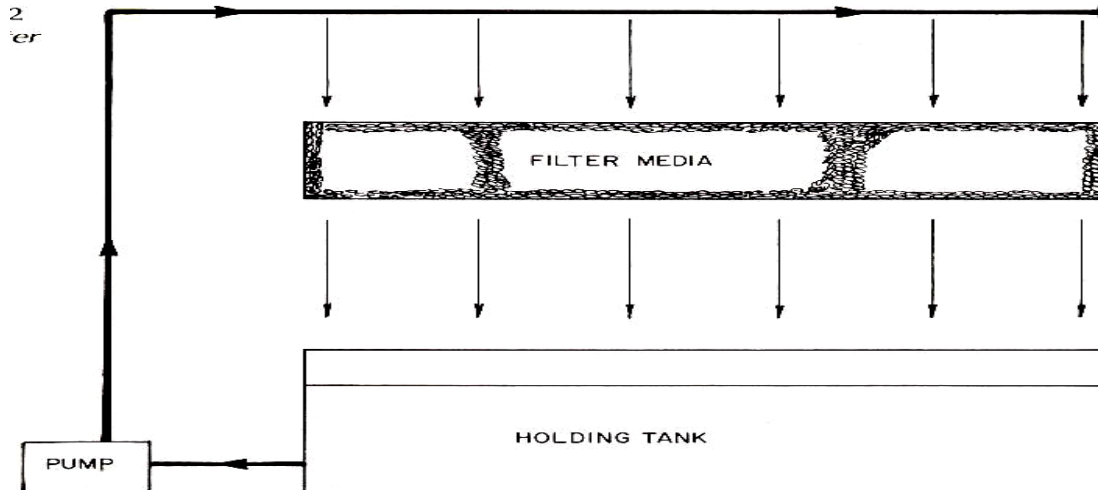
The active element of biofilters is nitrifying bacteria which break down toxic ammonia into less toxic nitrites and nitrates. Nitrifying bacteria are present on the body surfaces of organisms and therefore are automatically introduced into a holding tank when products are placed into the system. The bacteria will then grow on surfaces where nutrients (ammonia/nitrites) are present. It will take 4-6 weeks for a biological filter to become fully established and reach a balance in the system. This system balance can be observed with a low ammonia concentration in the tank.

There are 3 common types of biofilters:

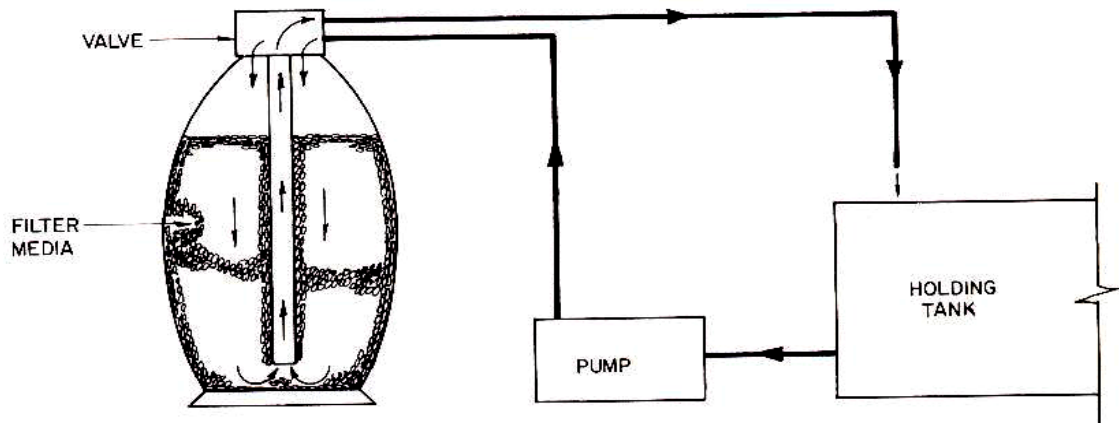
1. Submerged Filter: this filter is completely underwater and a constant flow of water is forced to pass through the filter. This filter type is most effective at removing ammonia.



2. Trickle Filter: this filter uses gravity to move the water through the filter. Water is sprayed on top of the boxed filter and gravity moves the water through the filter and out the perforated bottom of the box.



3. Pressurized filter: pressurized water is forced into a filter-filled vessel and then returned to the holding tank.



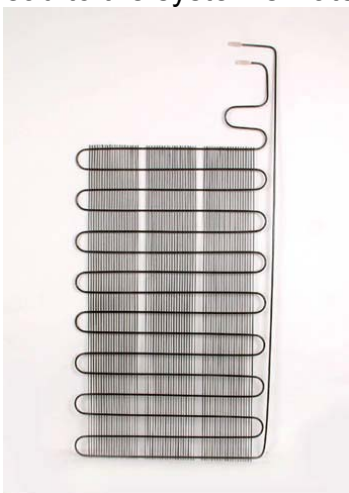
Diagrams copied from:

Lappin, Peter. J. (1986). Live Holding Systems: A Guide and Reference Manual.

Appendix II. Temperature Control

All products have an optimal temperature range in which they will remain alive and healthy. The temperature control system is responsible for maintaining that temperature range. In particular a refrigeration system is used to keep the temperature of the holding tank. Although most fish will survive in a cold holding tank (<10°C/ 50 °F) some fish including tilapia and white legged shrimp require warm holding tanks (>20°C/68 °F).

The refrigeration unit of the system should be monitored weekly. When servicing the unit, the condenser and sight glass need to be checked. The condenser converts the refrigerant gas into liquid. A sight glass is a transparent tube through which the level of liquid can be noted. The condenser should be free of dirt and dust. The sight glass should be checked to see if the liquid refrigerant is clear and contains no bubbles. The presence of bubbles is indicative of a gas leak in the system. Without proper corrective action, the gas leak will lead to the system's water becoming warmer.



<http://www.zjshiner.com/showimage.asp?id=241>

http://wpcontent.answers.com/wikipedia/en/thumb/4/4d/Water_gauge_Chatfield.jpg/250px-Water_gaugeChatfield.jpg

Appendix III. Ultraviolet (UV) Light Water Disinfection System

What a UV Light System Does

A UV-Light system functions as a disinfection unit that uses UV light, at a specific wavelength, to destroy micro-organisms. UV light is a known mutagen that targets nuclear DNA and disrupts the normal cellular processes of bacteria, viruses, and other micro-organisms. Ultimately, micro-organisms are unable to reproduce and die. The micro-organism destroying property of a UV light system is dependent on several properties:

1. length of exposure to UV
2. micro-organisms ability to withstand UV exposure
3. presence of particles that can protect microorganisms from UV

As a result, constant water circulation in the holding tank is important to ensure microorganisms are being targeted. Good water clarity improves disinfection; holding tanks should not be turbid as solid particles can shield microorganisms from the UV light. The UV system must be fully emerged in the water for correct disinfection.

Ultraviolet (UV) Light Maintenance

The UV system needs to be regularly maintained to ensure proper disinfection is taking place. Maintenance involves both changing the UV light unit and cleaning the UV bulb.

Changing U.V. Bulb

1. Unplug unit.
2. Remove protective end caps from chamber.
3. Disconnect bulb-pin plugs from both end of bulb.
4. Remove "O" rings from each end and save for new bulb.
5. Remove old bulb and replace with new one.
6. Replace "O" rings and reconnect plugs and end caps.
7. Plug in unit.
8. Replace bulb every 9-10 months.

Cleaning U.V. Light Unit

1. drain tank. Do not remove bio-mix.
2. mix ½ cup bleach with 1 gallon fresh water.
3. remove spray tops from riser tubes.
4. pour ½ of bleach solution (from #2) down each riser tube using a funnel or container with a pour spout.
5. leave tank drain closed and allow solution to stand in tubes for 30 minutes.
6. open tank drain and flush out solution by running water from hose down each riser tube.
7. flush system completely.
8. clean UV light unit every 6-8 weeks.

Appendix IV. Bivalve and Aquaculture Operator Maintenance Guidelines

Bivalves – Regulatory Requirements

Oysters, clams and mussels in a living state should be adequately protected to remain safe, wholesome and attractive to the consumer. Federal, provincial and local health regulations usually have specific sanitary controls and record keeping requirements that are to be applied to the shellfish by all wholesalers and retailers.

In brief, these requirements usually specify that:

1. Shellfish are to be stored and handled so as not to become contaminated.
2. Storage equipment is to be properly designed, constructed, and cleaned.
3. Different lots should be stored separately.
4. Health officials should be able to trace a lot of shellfish to the original shipper and harvest area of origin.

Therefore, the maintenance guidelines should be followed to conform to federal and provincial requirements.

British Columbia Programs that Monitor Shellfish Quality and Safety

The Canadian Shellfish Sanitation Program (CSSP) classifies harvesting areas and controls the commercial and recreational harvesting and processing of shellfish for the consumer market. The CSSP is run by three (3) federal government agencies:

- Environment Canada (EC)
 - Monitors water quality in shellfish areas
- Canadian Food Inspection Agency (CFIA)
 - Monitors for marine toxins in shellfish areas
 - Registers and inspects shellfish processing plants
- Fisheries and Oceans Canada (DFO)
 - Opens and closed harvest areas
 - Prohibits shellfish harvesting when bacteriological or toxin levels are unsafe

Section 54 of the BC Fish Inspection Regulations requires that all commercially harvested bivalves are processed at a federally registered fish plant prior to their sale. All companies and individuals throughout the distribution system, including retailers and restaurateurs, have a responsibility to ensure that only legally processed shellfish are used in their operation. Shellfish are processed and inspected to check for toxins and check that shellfish are harvested from approved areas. Bivalve shellfish tags are required to be kept for one year by all businesses purchasing bivalve shellfish.

Bivalves shucked in BC are sold in containers that are identified with the product name, plant name, registration number, positively sealed, and date of packaging. It is also a requirement under the *BC Fish Inspection Regulations* that these containers are sold intact and are not displayed for bulk sales.

Bivalves sold in the shell require an identification tag (area and date of harvest and name of harvester) as they leave the beach. This information must remain with the product as it is distributed throughout the wholesale and retail system. Tag identification is the most

evident safety verification available to the retailer or restaurant operator. If a sack of shellfish is broken into smaller quantities the accompanying invoice must make reference to the original tag.

Commercial harvesting of bivalve shellfish from closed areas is a serious contravention of Federal and Provincial regulations, and could pose a serious health risk, including death, to consumers. The potential liabilities for those selling illegally harvested bivalves, far overrides the immediate financial gains that may be had.

Bivalves –Tank Maintenance and Cleaning Requirements

1. Cull out dead, cracked and weak bivalves daily.
2. Before adding new bivalves to the retail live holding system, make sure they are cleaned thoroughly and that you cull out dead, cracked and weak bivalves.
3. If the tank is ever used for crab, lobster, etc., then it should be sanitized before bivalves can be added. To sanitize the tank, follow the instructions for cleaning the U.V. light (Appendix II.). At the end of the 30 minute soaking period, do not open the drain. Fill tank to normal operating level with fresh water and turn system on for 30 minutes. After 30 minutes, turn system off and thoroughly flush out tubes, bio-mix, and tank sides. Make sure all bleach smell is gone before adding the bivalves.
4. Never mix lots of bivalves, which come from different shipping containers and are marked with different shipping tags. If bivalves are added to a tank which already has the same species, then the two lots should be kept separated with a non-absorbent, easily cleaned divider or by the use of non-toxic, single use mesh bags (these requirements are designed to facilitate trace back on a food poisoning and/or food recall).

Bivalve Recommendations

- Shellfish should only be purchased from reputable distributors who are established in the seafood business. Shellstock must never be received unless accompanied with a fully completed tag or other reliable evidence that they have been processed at a federal plant. Tag information must be retained for a minimum of 1 year.
- During transportation, storage, and display, bivalves must be protected from contamination and maintained at refrigerated temperatures. Product must be checked for identification and obvious abuses when received. Suspect product must not be accepted
- Purchase BC shucked bivalves only in fully labelled containers
- When *Live Holding Tanks* are used to store or display bivalves, they should be designed, constructed, and maintained such that the water quality will not cause product contamination. Use of refrigerated water, effective filters, water disinfection devices, and avoid mixing with other species of fish are all important safety controls.

Aquacultured Tilapia and White Legged Shrimp

Aquaculture products, such as tilapia and white legged shrimp, will need to be placed in tanks separate from other organisms. Both tilapia and white legged shrimp have

Guideline for Live Fish Holding Systems

temperature and salinity requirements that differ from other products. Specifically, tilapia has an optimal temperature range of 25-30 °C (77-86 °F) (and temperatures below 10 °C (50 °F) can be lethal. Furthermore, most species of tilapia can be grown in brackish waters, with salinity close to seawater levels. White legged shrimp also grow best in brackish high temperature waters, >20 °C (68 °F).

Land-grown aquaculture products are grown in filtered sterilized water in a disease free environment. For this reason, only use artificially prepared sea water. Do not dilute or substitute ocean water. Aquaculture products may not have resistance to any normally occurring fish diseases, so mixing them with other species or ocean water may cause disease in the fish.

Appendix V. General Maintenance Guidelines

Maintenance Log

One of the melded panels on the system's base should contain a summary of maintenance instructions as well as a maintenance log. The log allows you to keep track of the frequency of critical maintenance procedures. The log should be filled out regularly.

Dividers

Removable dividers used in the tank to keep different lots of bivalves or different fish species separated should be smooth, non-absorbent, and easily cleaned and sanitized. Dividers, left in the system should be washed, rinsed, and sanitized every time the system is cleaned.

Cleaning Tank Interior

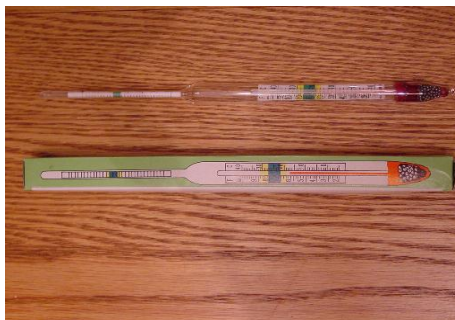
It is important that the tank interior be kept free of algae and slime build-up. To prevent this build-up, the tank interior should be wiped down with a clean rag or towel every time you clean the filter bed (at least once a week).

Instrumentation

It is important that the water in holding tanks mimic the natural habitat of products to prevent organism death and stress. Both simple and complex instruments are used to measure certain parameters of water to ensure it is within acceptable range.

Hydrometer: used to indirectly measure salinity. The basic principal behind a hydrometer is that that a higher concentration of dissolved salts in water results in denser water causing an object floating on top to displace less water and rise higher. A hydrometer is usually a glass tube with gradient markings. The device is then floated in the water and the level of water is measured off the gradations.

The level of salinity can be adjusted by changing the amount of salt in the solution. To lower the salinity, some of the saltwater can be replaced by freshwater. To increase the salinity, salt can be pre-dissolved and added to the holding tank.



<http://www.kwaree.com/blog/wp-content/uploads/2008/02/hydrometer.JPG>

<http://www.reefcorner.com/images/GlassHydrometer.jpg>

Thermometer: used to measure temperature. The thermometer should have a range of 0°C to 30°C (32 °F-86 °F). Mercury thermometers should be avoided as they may contaminate the system. Electronic digital thermometers are very accurate and robust.

pH Test Paper/ pH Liquid Kits: used to measure pH. These techniques depend on either a paper or liquid mix change in color. The color change is compared then compared to a standard chart. It is ideal to keep the pH near 7 to neutralize the toxic effects of ammonia.

Ammonia Test Kits: used to measure the ammonia levels. Tablets are added to a sample of water and the color change is matched to a standardized chart. Note: Water samples can also be sent to an accredited lab for analysis.

Tank Maintenance Troubleshooting Tips

Problem	Potential Cause	Corrective Action
Foam	Build-up of organic products and other material in the tank water Bleeding of an aquatic animal into the water	Remove foam by scraping off surface with fine mesh screen or siphon and vacuum Look for cause Remove injured animals and check for missing body parts (i.e., fins, legs, cracked or broken shells)
Ammonia Smell - Foul Odour	Organics have built up to a level that anaerobic bacteria have started to digest the matter	Clean tank Clean filters Remove organic solvents Change the water Check the U.V. light
Algae	Normal when tanks are in areas of natural light	Clean algae off with a clean soft cloth Rinsing shellfish thoroughly with cold running water will remove the algae spores from their bodies Do not use chemicals to remove the algae from tanks when animals are in the tanks.
Cloudy/Yellow Hazy Water	Build-up of organic proteins (will lead to foaming)	Change the filter's activated carbon unit Check for damaged, or sick animals Check for clogged filter units or clogged air stores Install a properly designed filter system, if one is not in place
High Mortality	Animals damaged or suffering from shock during transportation or transfer to tanks Toxic substance added to tank (e.g., cleaning chemicals, insect spray, non-food grade glues, non-approved algicides)	Remove animals Clean tank if necessary

Appendix VI. Live Fish Holding Tanks Checklist

Week of _____ to _____

Daily Checks

Temperature for Warm Holding Tanks: should be greater than 20°C (68 °F)

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26.0 °C							
25.0 °C							
24.0 °C							
23.0 °C							
22.0 °C							
21.0 °C							
20.0 °C							
19.0 °C							

Temperature for Cold Holding Tanks: should be less than 10°C (50 °F)

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
13.0 °C							
12.0 °C							
11.0 °C							
10.0 °C							
9.0 °C							
8.0 °C							

Specific Gravity for Cold Holding Tanks: should be between 1.024-1.029

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1.030							
1.029							
1.028							
1.027							
1.026							
1.025							
1.024							
1.023							

Specific Gravity for Warm Holding Tanks: should be at 1.003 to 1.005

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1.006							
1.005							
1.004							
1.003							
1.002							

Weekly Checks

Turbidity Level _____
 Ammonia Level _____
 pH Level _____

Yes → No
 Foam
 Algae

Appendix VII. Cross-Contamination and Safe Handling of Retail Seafood

Cross-Contamination

Cross-contamination is the transfer of illness-causing bacteria and viruses to cooked "ready-to-eat" seafoods. These seafoods include cooked crabmeat, cooked shrimp, smoked seafoods, and surimi-based simulated seafood products. Cross-contamination can occur from:

- raw seafood to cooked seafood
- equipment or utensils to cooked seafood
- seafood handlers to cooked seafood
- the environment to cooked seafood.

The following tips will help avoid cross-contamination:

Safe Handling of Raw Seafood and Equipment

1. Proper display or storage of seafood's is done in such a manner that raw and cooked seafood's are physically separated. This can be accomplished by separate refrigerated units and the use of barriers.
2. Place seafood in washable, non-insulated containers rather than directly on the ice. Display containers should allow liquids to drain.
3. Store cooked seafood's in sanitary containers marked only for that use.
4. Clean and sanitize knives and cutting boards between processing raw and cooked products. Ideally, separate equipment and working areas would be used for raw and cooked product.
5. Empty seafood display cases daily and remove old ice. Clean and sanitize display cases and drains before adding fresh ice and restocking.
6. Handle seafood in the display case with individual utensils or single-use sanitary materials. Store utensils in a sanitizing solution or inside the refrigerated display case.
7. Place spiked price tags in garnish or ice, but not in seafood.
8. Keep the surface of the weigh scale sanitary. Protect the scale by placing seafood on single-use paper or plastic material. Clean and sanitize scale if any food comes in contact with the surface.
9. Clean up spills with single-service towels. Do not use cleaning cloths or sponges which may contain unwanted bacteria

Seafood Handlers

1. Wear separate outerwear when handling raw and ready-to-eat fish products. Clothing can spread unwanted bacteria to seafood's. Wear clean outer garments and avoid use of aprons.
2. Wear a hair net or hat to keep hair from falling onto and contaminating seafood's. Hair contains millions of bacteria.
3. Always work with clean hands. Avoid touching your face, nose or clothing. Wash and sanitize hands between handling raw and cooked seafood's, between handling money and food, and whenever they touch anything other than seafood. Dry your hands with single-use paper towels.
4. Do not handle seafood if you have unprotected cuts and sores. Infected cuts and sores often contain illness-causing bacteria.
5. Use sanitary gloves when handling raw and cooked seafood's. Separate gloves are used for each. Wash and sanitize your gloves every time they touch anything other than seafood.
6. Sneeze and cough into a tissue and away from seafood. Never smoke, eat or drink while handling seafood.
7. Remove watches, rings, and jewellery, which may carry unwanted bacteria.
8. Inform your supervisor if you are ill.

The Environment

1. Insects and rodents carry illness-causing bacteria and must be eradicated if found in a seafood establishment.
2. Store garbage and processing wastes in sealed containers away from display areas.
3. Purchase seafoods from reputable wholesalers. Confirm bivalve molluscs have been processed through a federally registered facility.