Fisheries Transport Systems

AQS325

2. Week

Carrying the fishes by cooled sea water

Weeks	***Topics***
1. Week	Carry fish by iced water
2. Week	Carrying the fishes by cooled sea water
3. Week	Carry fishes with ice
4. Week	Carry by cooled store
5. Week	Carry by freezing
6. Week	Carry by salt
7. Week	Fish transport: rules
8. Week	Carry alive fish
9. Week	Carry alive fish with oxygwn
10. Week	Carry alive crustacean
11. Week	Carry alive larvae
12. Week	Carrying equipment
13. Week	Carry by frigorific track
14. Week	Carry fishes long distance

Fish held in Refrigerated Sea Water, RSF should be stored at about 30° F (-1·1 ° C), for at temperatures below this ice crystals form in the muscle. Even under ideal conditions fish stored in ordinary melting ice will not attain temperatures significantly below 32° F (0° C). Indeed, the conditions employed in icing fish aboard many commercial vessels are such that the fish often exceed 35° F (+ 1 . 7° C).

http://www.fao.org/docrep/006/y5013e/y5013e07.htm

In order to optimize the chilling power of ice, some small-decked fishing vessels operating in warm climates have insulated tubs installed on deck. The tubs are filled with ice and CSW and are used for the rapid cooling of freshly caught fish prior to stowage on ice in the hold. An advantage of this system, even though it uses ice to chill the seawater, is that less ice is required in the hold to chill the fish down to 0 °C so, where hold size is a limiting factor, more fish can be stored. Because fish can be chilled almost immediately on capture, this system is capable of producing better quality fish.

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Block-ice plants are still commonly found in many countries because they are relatively simple to operate and maintain. Often, these plants were built to supply local stores, bars, market places and domestic households as well as the fishing industry.

Block ice is preferred by fishermen in many parts of the world because it will last longer and takes up less space in the fish hold. However, as already mentioned, for block ice to be used effectively for stowage of fish, and to make full use of its cooling power, it first has to be crushed or ground into small pieces.

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Common practice in many countries is for the ice to be transported and stored as blocks, and ground into pieces as required. In order for the broken ice to make good contact with the fish it must be broken into small enough pieces. In many instances the ice is broken into smaller pieces by simply using an ice pick or hammer. Generally this does not break the ice sufficiently for it to make good contact with the fish and thus the fish can still be exposed to high ambient temperatures. A much more effective means of crushing block ice is to use a mechanical grinder or crusher that can reduce block ice to small pieces of 1 cm × 1 cm or smaller.

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For optimal use of ice, the following points should be taken into account:

All ice used must be clean and of small particle size for maximum contact. Block ice must be finely crushed to prevent large particles from damaging the fish.

The proper ratios of fish to ice must be observed. In temperate climates, one part fish to one part ice is common. In tropical conditions, one part fish to three parts ice is not unusual.

Areas of heat penetration into the hold, such as the engine room bulkhead and hull sides, must be given extra layers of ice to compensate for rapid ice loss in these areas, particularly if insulation is poor.

The last layers of fish near the deckhead should have extra layers of ice to fully cover the fish and allow for any extra melting from heat penetration through the deck.

Fish and ice must be carefully and evenly stowed to allow even distribution of both. Shelves and boxes must not be overfilled or crushing damage to the fish will result.

Fish temperatures at the dockside when discharging should be between 0 °C and 2 °C, and there should also be considerable amounts of ice still evenly distributed among the fish.

Ice must be layered under, around and on top of the fish.

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CSW is very efficient in cooling because the fish are completely surrounded by the cooling medium. However, it requires watertight boxes or tanks installed in the hold that can incur extra costs, which cannot always be justified. This type of installation is mostly used for:

fisheries dedicated to capture of high-value species;

the preservation of fish where there is a relatively short time between capture and delivery to the processing plants, such as that for sardine and anchovy;

the preservation of bulk catches of small pelagics (for example) where it is impractical to ice fish individually. In this case, fish can often be loaded directly from the purse seine into the CSW hold thus providing rapid and efficient chilling.

The use of tanks also produces a reduction of available hold space, in some cases by as much as 20 percent.

Typical ratios for mixing ice, water and fish in insulated tanks or tubs will vary depending on the climate. FAO Fisheries Circular No. 773 (FAO, 1984) gives the following figures for temperate and tropical climates:

Temperate climate: 1 kg water: 1 kg ice: 4 kg fish

Tropical climate: 1 kg water: 2 kg ice: 6 kg fish

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According to the Circular, this is the necessary volume of ice to chill fish to 0 °C. If the fish have already been cooled down, the volume of ice can be reduced accordingly. All other factors being equal, it must be remembered that ice will be required for chilling the water in the system as well as the fish, so in theory more ice will be needed with a CSW system than with a plain ice system.

In its simplest form, CSW is made by adding fresh seawater to ice held in tubs or in subdivided waterproof compartments or in tanks in the fish hold. This system works for short periods, but suffers from the problem of temperature stratification. This is caused by the fact that warm water will rise in the tank and ice and fish will tend to float in the water. Unless the CSW and the fish are agitated, the temperature stratification can cause uneven cooling of fish. Conversely, damage can be caused to the fish if agitation is too violent, so methods have been devised that combine the need to circulate the water in the tank and the need to treat the fish with care.

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Two common methods used are:

Compressed air introduced into the bottom of the CSW tank via perforated pipes. The air is usually supplied from an air pump located adjacent to the CSW tanks. The resulting streams of bubbles rising to the surface force colder water from the tank bottom to rise and mix with the upper layers. Due to the large amount of bubbles produced this is commonly known as the "champagne system". This is a relatively simple and economical means of reducing temperature stratification and can be used successfully on small fishing vessels with limited space.

CSW circulated by water pumps. For this system to be efficient, a filtration system is needed to ensure that there is no clogging of return pipes with fish, fish scales and other debris. For more information and details on this system refer to Chapter 2 of this document.

http://www.fao.org/docrep/006/y5013e/y5013e07.htm

References

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