USING TEKLEEN FILTERS FOR SEAWATER FILTRATION ON CRUISE SHIPS

1. Using Filtered Water for Ballast Water Exchange

Filtered sea water from a ship's ballast can be released back into the sea, eliminating the potential of unloading non-native and often invasive plants and animals where they don't belong. Many cruise lines are using on-board filtration to clean their bilge water during the ballast water exchange.

By using Tekleen self-cleaning automatic filters, ballast water can be cleaned of debris and solids, thereby preventing animals, vegetation, and floating debris from exiting. Debris can then be collected and disposed of properly.

2. Pre-Filtering for Potable Water Processing from Sea Water, and Keeping Pipes Clean for Maintenance Minimization

When used for other purposes to filter water on board, an automatic self-cleaning Tekleen filter can support cooling systems, can pre-filter water for further cleaning and desalination, and can support the operational reliability of piping, spray heads and any devices that water flows through, by keeping them clean of deposits. Tekleen filters can be used to filter outgoing washwater from laundry, galleys, mess halls, swimming pools and spas, and bathing. It can be used as a pre-filter down to 2 microns, protecting R/O and microfiltration systems that might be used on board for potable water production from sea water.

Using a Tekleen filter increases the potential use of filtered wastewater as re-used water or make-up water throughout a processing operation.

Without a proper filtration system, the debris in source water can cause fouling of pipes and heat exchanging surfaces, which lowers the thermal efficiency of the system. Fouling also increases the friction losses and induces erosion, corrosion, and energy waste by increasing the demand for a higher flow rate. Other problems include the plugging of spray nozzles, blinding of sensors, analyzers, as well as the wearing down of pump gland seals, scrubbers, misters, membranes, and ion exchanger columns. These issues can cause unscheduled shutdowns for maintenance and cleaning and the loss of many man-hours. Filtration is one of the simplest and most convenient ways of solving these problems.

By using Tekleen self-cleaning filters, the debris solids can be captured, removed from the water flow, and disposed of properly before the filtered water reaches its destination. TEKLEEN® self-cleaning water filters provide the ultimate solution where dirty water is a problem. The filters operate on line pressure alone. The self-cleaning process is triggered by a pressure differential that occurs when water is too highly saturated with solids, and is accomplished in seconds without interrupting the main flow.

The filters are compact in size and designed to meet a variety of industrial applications.

The use of Tekleen self-cleaning filtration is also a great benefit to other uses of sea water, sea-based platforms used in extraction and processing, and water reinjection in general. For a description of these benefits, please see the Tekleen application sheet on platforms, oil production and reinjection wells in the OIL PRODUCTION section of our website.

ON-LINE RESOURCES

http://www.tercenter.org/pages/bilgewater.cfm

https://oceanconservancy.org/blog/2017/03/02/3-easy-ways-to-stop-invasive-species/

http://www.stapgef.org/sites/default/files/stap/wp-content/uploads/2015/06/Durr.pdf

MARPOL regulations- https://www.researchgate.net/publication/277708775_Complying_with_MARPOL_7378

Quotation from the Norwegian Cruise Line: "BALLAST WATER:

To operate safely and comfortably, ships perform an operation known as ballasting, which helps to ensure trim, stability, and structural integrity. As water is discharged, or as fuel is consumed, ships take on seawater to assist with stabilization. The practice of ballasting throughout the years has allowed species to "hitch a ride" on ships and transfer to many areas of the world. This introduction of non-native and invasive species can lead to the degradation of many popular cruise destinations. To combat this problem, the International Maritime Organization (IMO) put forth the International Convention for the Control and Management of Ships' Ballast Water and Sediment. This convention, commonly known as the "Ballast Water Convention," requires vessels to install ballast water treatment systems to prevent dispersing non-native organisms to certain areas. Adopted in 2004, this convention was not ratified until September 2016, and [entered] into force in September 2017. We [Norwegian Cruise Line] took a proactive approach and began installing ballast water treatment systems on a majority of [their] vessels before the international compliance date."

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Tekleen industrial self-cleaning water filters are suitable for a wide range of applications: HVAC, petrochemical, pulp & paper, drinking water, golf & turf, sugar processing, metal processing, waste water, sea water filtration, greenhouse & nursery, plastics manufacturing, food industry, power generation, car wash water reuse and recycling, and fruit & vegetable irrigation.

More Information on Preventing the Spread of Invasive Species

"Reducing the Risk of Transporting Invasive Species (Quotation from http://ocean.si.edu/ocean-news/reducing-risk-transporting-invasive-species)

Busy shipping areas, like the Port of Oakland, are especially vulnerable to invading species that can be carried in ballast water.

When people sail the sea, marine organisms tag along. If carried long distances, these hitchhikers can invade and disrupt ecosystems far from their natural homes, pushing out the local species. Some invaders catch a ride by attaching themselves to the sides or bottoms of boats. But many more stow away in ships' "ballast tanks."

When a ship leaves port without cargo, it fills large ballast tanks with water to help keep its balance. At the next port, the ship pumps out the water so that it can load up with cargo. Tiny animals in the water get a free ride from one port to another. And with roughly 50 million gallons being emptied into U.S. waters every day, ballast water is one of the biggest transporters of non-native marine species.

In many cases, the newcomers don't take hold. But some species like the veined rapa whelk (Rapana venosa), wreak havoc on their newfound homes. ... Sometimes small, simple steps can go a long way toward solving big problems. Ship captains can help prevent many stow-away species from invading new areas simply by flushing and refilling ballast tanks with water from the open ocean before they arrive in port. In deep water far from the coast, animals flushed out of the ship's tanks are not likely to survive. Similarly, any deep-water organisms brought on board in the new batch of water, are not likely to make a home in shallow coastal waters at the ship's next port.

Scientists have found that this technique can remove more than 90 percent of the tiny animals in ballast tanks. The U.S. and others countries have begun requiring ships to either keep their ballast water on board or flush it thoroughly in deep waters far from the coast. Meanwhile, scientists at the Smithsonian Environmental Research Center and elsewhere are busy studying other techniques, such filtering or treating ballast water with UV light or heat. They hope that down the line, these techniques will put an end to high-seas hitchhiking altogether."

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