Great Lakes Ballast Water Collaborative Meeting

Duluth
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Ballast Water Treatment

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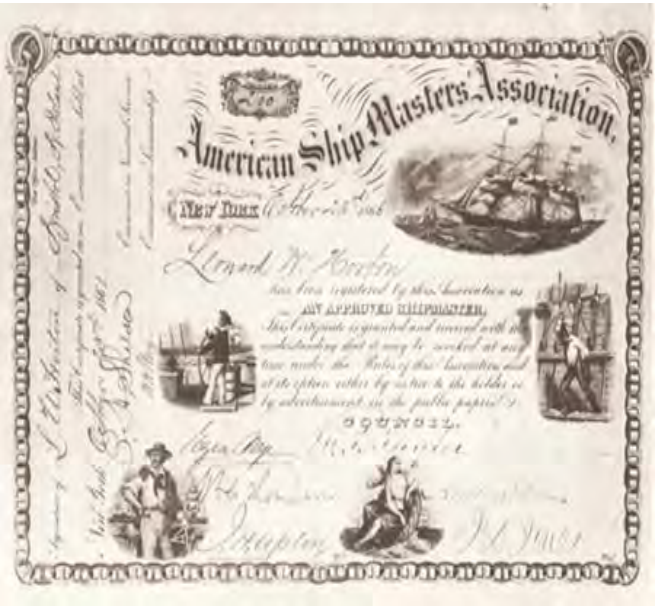
The Origin of Classification

- 1688 Coffee House in London - Edward Lloyd - helped clients collecting and circulating news about maritime business

  - Formed Lloyd's of London in 1771
  - Published list of ships (and their particulars)
  - Assign ship ratings (Lloyds Register)

American Bureau of Shipping (ABS)

- 1860 American Shipmasters Association
- Founded in 1862
- Incorporated in the State of New York as a "Not For Profit" organization



- No outside owners / shareholders
- 3,000 employees, 183 offices, 72 countries
- 11,000 vessels / rigs – commercial (ships, boats, barges), military, offshore, yachts

Mission of ABS

The mission of the American Bureau of Shipping is to serve the public interest as well as the needs of our clients by promoting the security of life, property and the natural environment primarily through the development and verification of standards for the design, construction and operational maintenance of marine-related facilities.

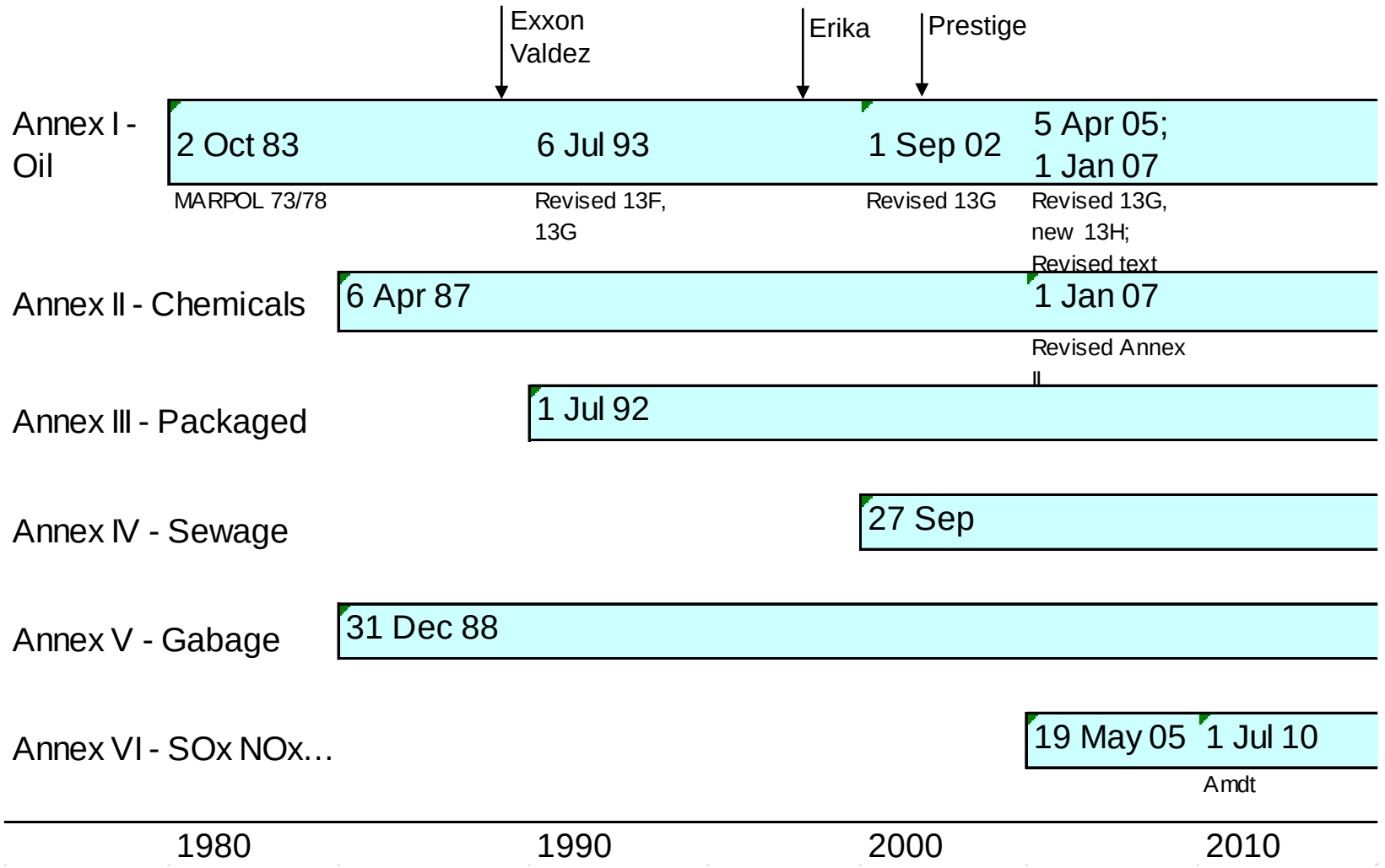
What is Classification?

Classification is third party certification in the marine industry & offshore

Classification is a life cycle process which certifies adherence to a recognized set of technical standards. (Cradle to grave)

Classification covers a ship or marine structure as a whole; **certification** may cover a single piece of equipment

The 6 Annexes of IMO MARPOL



Eco-friendly & Energy Efficient Ships

Engine Room discharges
bilge water; oily water; waste oil, accidental bunker discharge, cooling water, seepage thru machinery seals

Engine and combustion emissions
SOx, NOx, PM, CO_2

Discharges from accommodations
Sewage; gray water; garbage disposal; refrigerant leakages

Cargo-related discharges
oil; chemical; tank washing; accidental discharges; cargo in packaged form; vapor emission

Ballast water discharges
transfer of harmful non-indigenous marine species

Deck discharges
Cargo residue
Deck cleaning/washing
Anchor and chain washing

Hull coating
anti-fouling coating

Ship recycling
safety and pollution to recycling facilities

Bio-fouling
transfer of non-indigenous marine species

Other
Underwater noise
Collision with whales
Emission during fire
Shipbuilding and ship repair facilities

CO_2 emission reduction
Ships' energy efficiency (design and operational)
CO_2 reduction market-based measures

Note: Red categories addressed by **ENVIRO** and **ENVIRO+** notations

Energy Efficiency

Engine

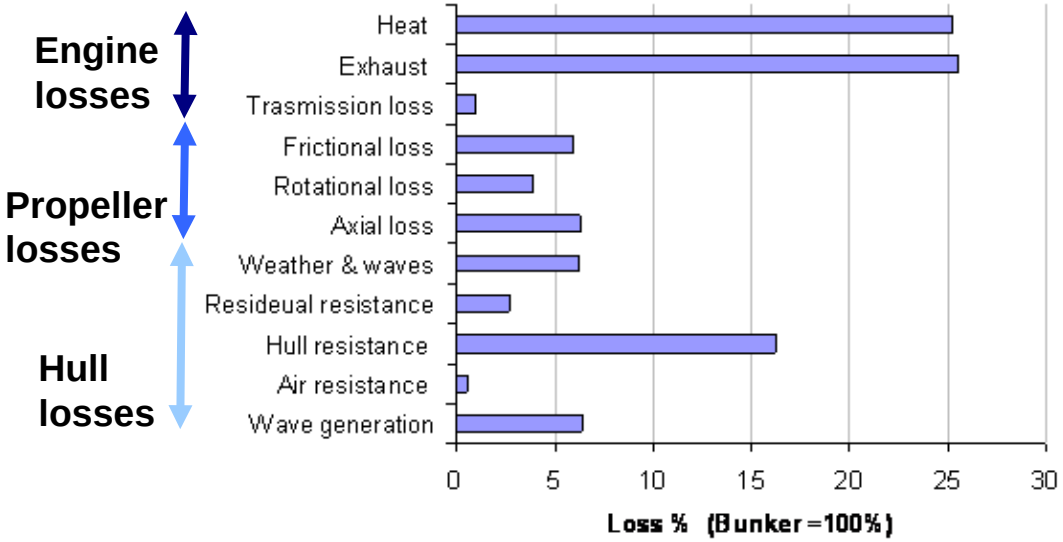
- Improving engine fuel efficiency
- Waste heat recovery
- Low load operations
- Engine de-rating

Propeller

- Propeller optimization
- Cleaning

Hull

- Hull shape optimization
- Anti-fouling coatings
- Air bubble lubrication
- Weather routing/trim optimization

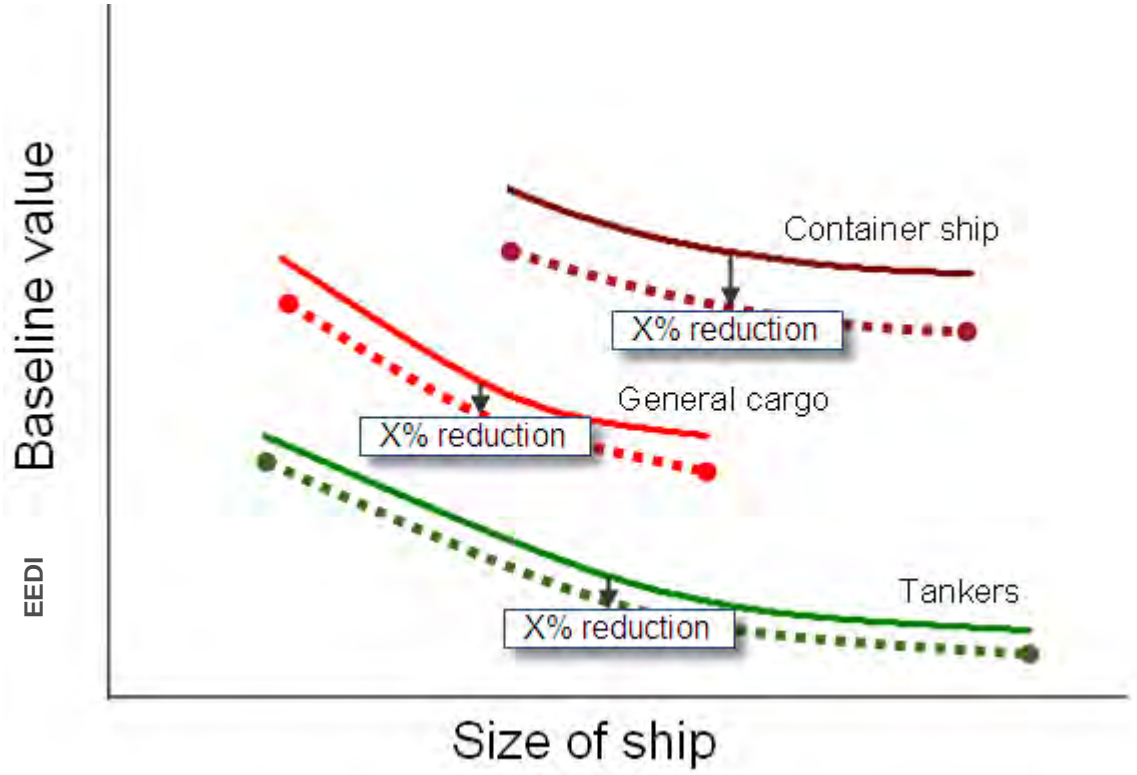


Alternative energy source

- Gas
- Renewable energy
- Shore power

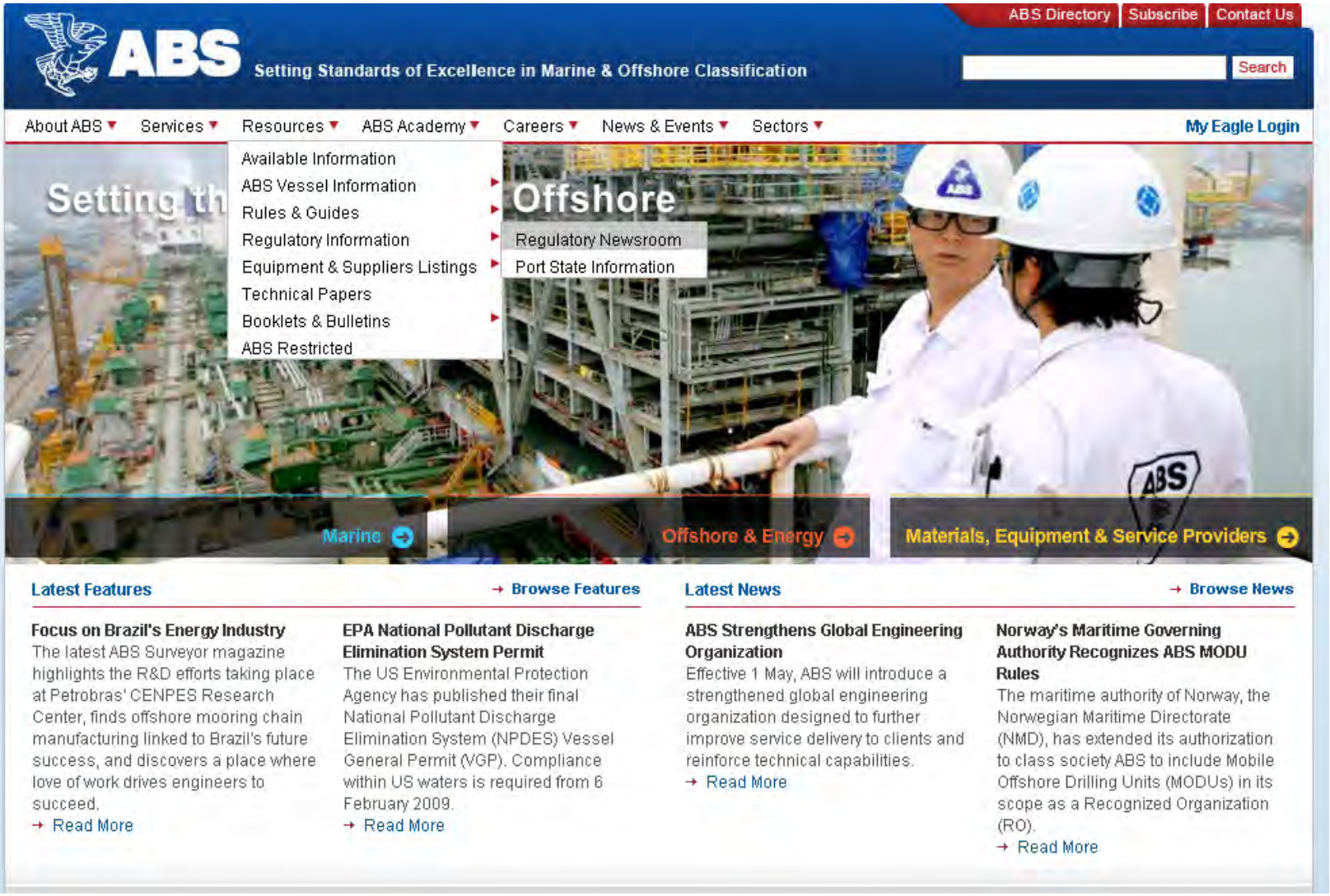
Energy Efficiency Design Index (EEDI)

- Application to new ships
- Required EEDI is obtained as X% reduction from the baseline, equally applied for all ship types
- Baseline is based on a regression analysis of historical data
- Proposed baselines do not represent ships in each size category[1]



[1]ABS/HEC Study: Evaluation of the EEDI Baseline for Tankers Containerships and LNG Carriers

Keep Pace with Regulatory Developments



ABS Ballast Water Treatment Advisory

- Produced to summarize the current state of ballast water treatment regulations and available technologies in order to provide useful guidance to shipowners, operators and builders in their decisions about suitable treatment options.
- This Notice contains five sections:
  - Section 1: Regulatory Developments
  - Section 2: Overview of Treatment Technologies
  - Section 3: Considerations for System Selection, Installation and Operation
  - Section 4: Evaluation Checklists
  - Appendix: Available Systems

Section 1: Regulatory Developments

- International Regulatory Status (IMO)
  - Applicability of the IMO Convention
  - IMO BWM Convention Treatment Standards
  - IMO compliance timeframe
  - Recent IMO activity related to 2004 Convention
  - IMO Guidelines available
- Overview of some regional, national and local regulations
  - United States/USCG
  - California
  - Others

BWM Convention: Implementation

- D-1 = exchange standard D-2 = biological standard
- Implementation: ships of signatory flag States/all ships in jurisdictional waters of signatory States

Ballast Cpty (m^3)	Build Date	*First Intermediate or Renewal Survey, whichever occurs first, after the anniversary date of delivery in the respective year								
		2009	2010	2011	2012	2013	2014	2015	2016	2017
<1,500	< 2009	D-1 or D-2								D-2 *
	in 2009	Note: D-1; D-2 by 2nd Annual but not beyond 31 Dec. 2011 or EIF, whichever is later								
	>2009	D-2 (at delivery or EIF, whichever is later)								
≥1,500 or ≤5,000	< 2009	D-1 or D-2						D-2 *		
	in 2009	Note: D-1; D-2 by 2nd Annual but not beyond 31 Dec. 2011 or EIF, whichever is later								
	>2009	D-2 (at delivery or EIF, whichever is later)								
>5,000	< 2012	D-1 or D-2								D-2 *
	≥ 2012	N/A			D-2 (at delivery or EIF, whichever is later)					

Note: Signatory States may not invoke delayed D-2 enforcement permitted by A.1005(25)
EIF: Entry Into Force date

Ballast Water Capacity & Pump Rates by Vessel Type

Vessel Category	Vessel Type	Representative Ballast Capacity (m^3)	Representative Pump Rate (m^3/hr)
High Ballast Dependent Vessels	**Bulk Carriers**		
	Handy	18,000	1,300
	Panamax	35,000	1,800
	Capesize	65,000	3,000
	Tank ships		
	Handy	6,500	1,100
	Handymax/Aframax	31,000	2,500
	Suezmax	54,000	3,125
	VLCC	90,000	5,000
	ULCC	95,000	5,800
Low Ballast Dependent Vessels	**Containerships**		
	Feeder	3,000	250
	Feedermax	3,500	400
	Handy	8,000	400
	Subpanamax	14,000	500
	Panamax	17,000	500
	Postpanamax	20,000	750
	Other vessels		
	Chemical carriers	11,000	600
	Passenger ships	3,000	250
	General Cargo	4,500	400
	Ro/Ro	8,000	400
	Combination vessels	7,000	400

BWT System Selection: Considerations

- General considerations
  - Space to install, do maintenance and repair: footprint, storage of chemicals. Possible spaces for installation: machinery space, on-deck store, pump room for oil tankers, steering gear room, etc.
  - Easy installation: modules/containerized unit/separate components
  - Safe locations: hazardous areas, toxicity
  - Flow rates and pressure drops
  - Simple operation and maintenance
  - Service network, supply of spare parts and chemicals
  - Training and documentations
  - Life cycle cost: acquisition, installation, power requirements, transfer and handling of chemicals, etc.

BW Treatment System: Considerations

- Additional considerations for oil tankers
  - Separation of hazardous areas (e.g. pump room) and non-hazardous areas (e.g. machinery space).
  - Electrical equipment in hazardous locations: in addition to lighting fixtures, explosion proof type equipment may be acceptable subject to interpretation and risk assessment approach of the approving authority. (cf. Amendment to SOLAS II-1/45.11 applicable for ships constructed $\geq$ 1 January 2007. Res. MSC.170(79)).
  - Check availability of explosion proof electrical equipment: UV lamps, motors of large capacity, control panels, flow meters (electro-magnetic type), etc.

BW Treatment System: Considerations

- Additional considerations for BWTS using active substances or chemicals
  - Additional fire protection, fire fighting measures, ventilation systems, enclosures, etc. may be required in accordance with recognized international or national standards
  - Handling equipment such as a deck crane may be necessary to transfer chemical containers (or drum cans) into the vessel depending on the container size/ weight
  - Cooling (chiller) system may be required depending on the chemicals to be used
  - Qualified or trained personnel may be required to handle AS or chemicals

BW Treatment System: Considerations

- Additional considerations for existing vessels
  - To minimize impact to existing systems/installations: number and capacities of electric generators, piping installations, fire protection and fighting measures, ventilation systems, corrosion protection, etc.
  - Reduction of BW pumping capacity may need to be considered due to additional resistance in piping system and/or high position of BWTS depending on each design
  - Easy installations: containerized system, modular unit or separate components depending on space availability
  - Increased gross tonnage if additional enclosed space is necessary to install BWTS

Making a Treatment System Selection

- Evaluation checklist (1)
  - Owner supplied data
    - Vessel ballast system particulars
      - Arrangement
      - Ballast system equipment
    - Ship and service characteristics that impact BWT selection
      - Ship type and capacity
      - Ballast water handling practices
      - Ballast water characteristics
      - Vessel service characteristics
      - Ballast system characteristics

Making a Treatment System Selection

- Evaluation checklist (2)
  - Vendor supplied data
    - Treatment technology factors
      - Treatment methods
      - Treatment system capacity
      - Treatment system pressure drops
      - Equipment size and space requirements
      - Materials, equipment protection and hazardous spaces
      - Power requirements
      - Impact on ballast tank and pipe corrosion
      - Health and safety (handling, operation, maintenance)

Making a Treatment System Selection

- Evaluation checklist (3)
  - Vendor supplied data
    - General treatment system considerations
      - Proven efficacy and official approvals
      - Vendor qualifications and reputation
      - Maintenance requirements and system reliability
      - Simple operation: control and monitoring
      - Life cycle costs

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