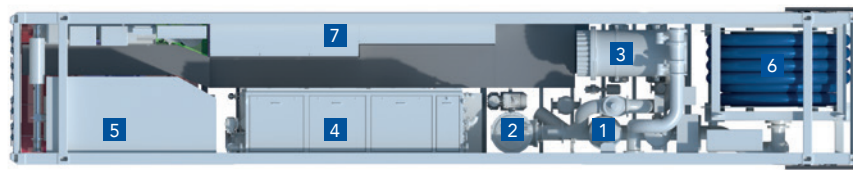


APPENDIX E

EXAMPLE BALLAST WATER TREATMENT – PORT SOLUTION FOR USE AT CRÉMAILLÈRE HARBOUR MARINE PORT IF REQUIRED

INVASAVE 300 OUTLINE SPECIFICATION



CONTACT

Please contact us at green@damen.com
to discuss the solution that suits you best.

FOR MORE INFORMATION
please visit www.damengreen.com

General

Basic functions	Treat raw ballast water from the vessel Supply certified ballast water to the vessel
Description	Mobile ballast water single-pass technology
Classification	Bureau Veritas (product approval) CSC type approval IMO D-2 certified port solution (Dutch flag state) CE Mark
LxWxH	40' x 8' x 9.6' high cube container

Capacities

Capacity	10-300 m³/hr
Power consumption	60-110 kW
Design pressure	10 bar

Treatment system

1	Booster pump	300 m³/h , self priming
2	1st stage treatment	Fine filtration
3	2nd stage treatment	Low Pressure UV system
4	Secondary filter	Fine filtration + separator
5	Generator	US / EPA Tier 3 / EU Stage 3A 149 kW (optional)
6	Hose reel (optional)	6"

Control equipment

7	17" TFT color graphic screen
	Complete, remote monitoring and operation
	Designed to operate in parallel with other InvaSave systems



PORT SOLUTION – INVASAVE 300

SINGLE PASS – COMPLIANCE MADE SIMPLE – D2 CERTIFIED

INVASAVE 300

RECEPTION OR SUPPLY OF BALLAST WATER



DAMEN GREEN SOLUTIONS

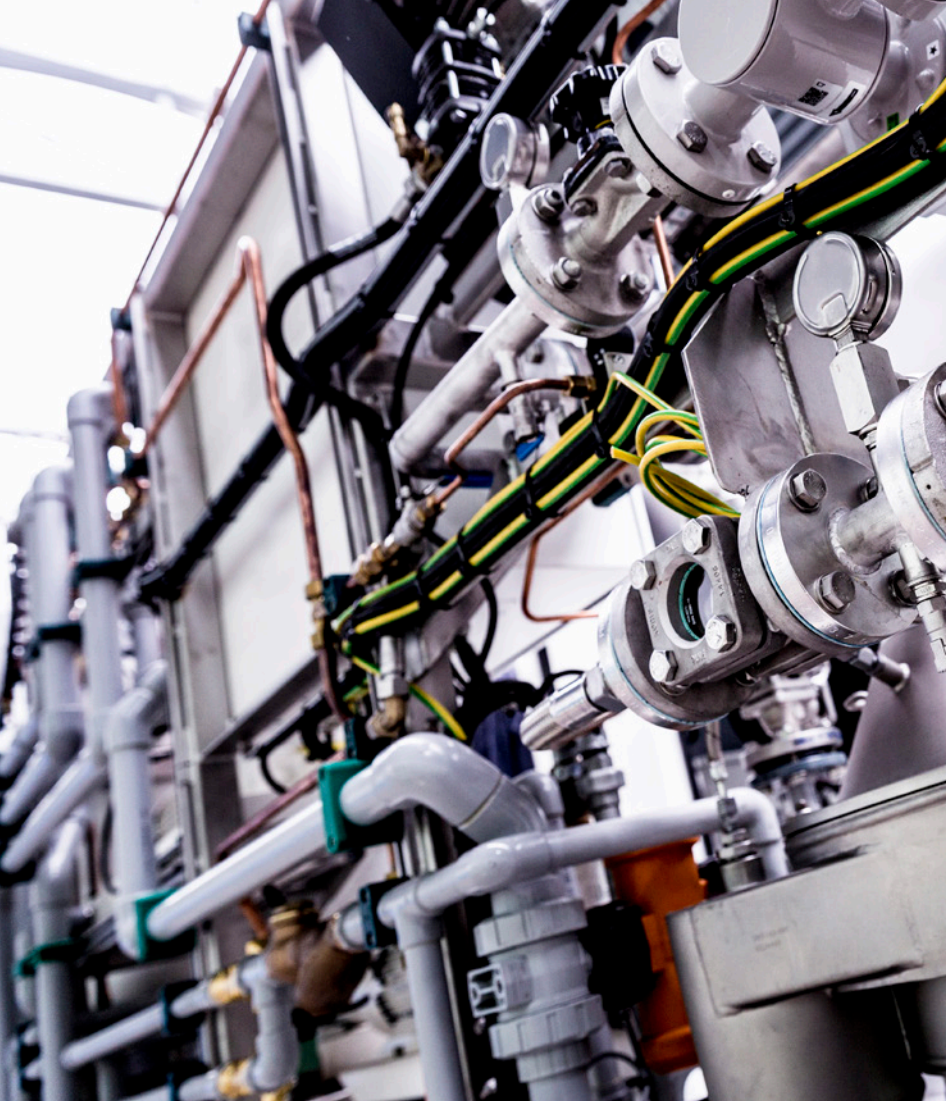
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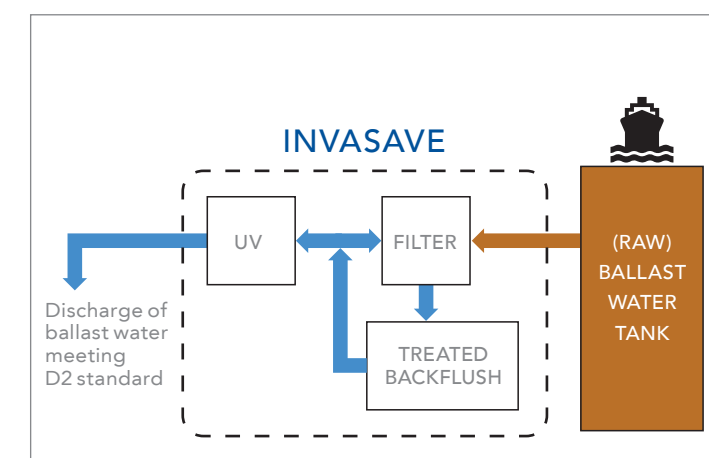


TYPE APPROVED AND PATENTED

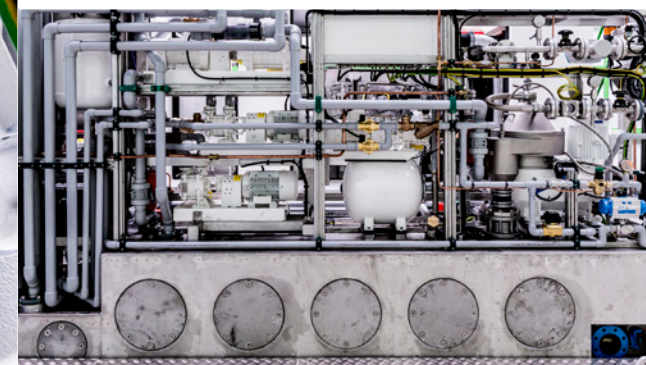
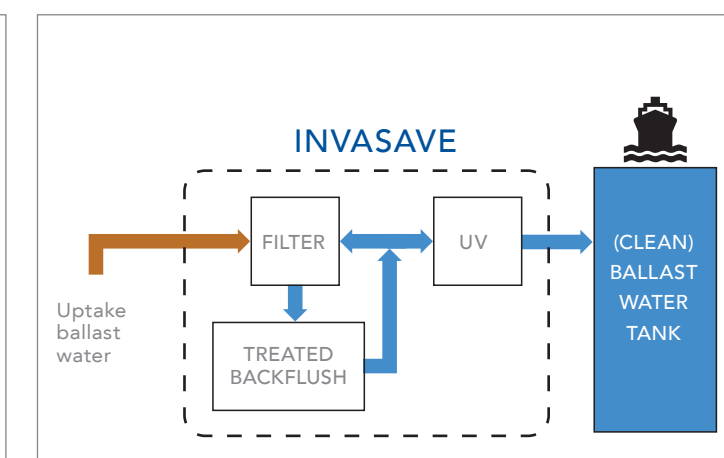
Following extensive land and sea-based testing by a certified ballast water laboratory, the InvaSave, in its capacity as an external treatment system, was certified by the Dutch flag state to achieve IMO D2 compliance in a single pass. As such, its suitability as a port-based ballast water reception facility is confirmed. The process works without any chemicals or required holding times, making the system currently unique in the world.



OPTION 1 TREATING RAW BALLAST WATER FROM THE VESSEL WITH INVASIVE SPECIES



OPTION 2 SUPPLY BALLAST WATER TO THE VESSEL CERTIFIED D2 WATER



PIONEERING TECHNOLOGY

The InvaSave technology is based on continuous fine filtration combined with Ultraviolet treatment. The backwash of the filter is dewatered and compacted in a secondary treatment stage. Treated water exceeds the IMO specifications of the ballast water performance standard as specified in Regulation D2 of the IMO Ballast Water Management Convention. InvaSave is the only certified technology on the market to treat raw ballast water in one step from the vessel, or to supply certified ballast water to the vessel.

ALTERNATIVE FOR ON BOARD TREATMENT

Damen has developed a unique mobile discharge technology – InvaSave – which enables port based treatment of ballast water. With InvaSave technology, raw ballast water from the vessel can be treated during ballast water discharge, or used to supply certified ballast water to the vessel.

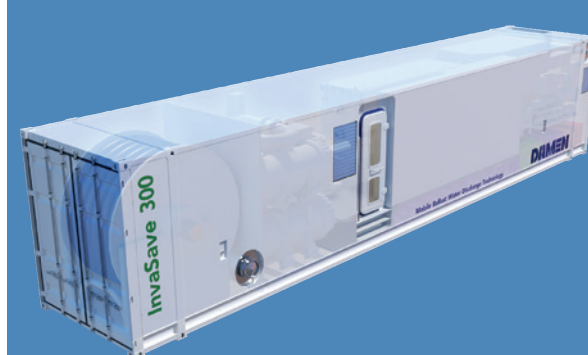
SELF-SUPPORTING MOBILE CONTAINER

The InvaSave 300 technology is located inside a self-supporting mobile container. This can be placed on board a barge or moved around the port on a trailer, a pontoon or other types of vessel. Each Damen InvaSave container unit handles 300 m³/h – and it is easy to scale up if required, using multiple InvaSave container units or a buffer for storage as a simple barge. For those situations where mobility is not required, InvaSave can also be utilised to create a land-based reception facility.



INVASAVE ADVANTAGES

- IMO D2 certified for use in ports
- Single pass treatment
- No holding time
- No back-flush of the filters
- Suitable for all water types, extremely low UV transmittance down to 20%
- Can be used to supply IMO certified ballast water to the vessel
- Can be used to treat raw ballast water out of the vessel
- Self supporting unit
- BV approved treatment technology
- CSC approved container
- High quality equipment installed
- Contributes to sustainable port water
- A business opportunity for service providers in ports



SINGLE PASS BALLAST WATER MANAGEMENT SYSTEM

INVASAVE 300

BALLAST WATER TREATMENT – PORT SOLUTIONS

To comply with the new ballast water regulations, vessels must first carry out ballast water exchange. Soon after, they have to treat ballast water to the stringent IMO D2 standard. Not all ships will be able to meet these new regulations. In such cases, ballast water discharge will be stopped by (port) authorities, preventing vessels from loading their full cargo. In particular, vessels with a failing on board system, coastal vessel with short sailing times, barges and old vessels are at risk. The solution is InvaSave – an IMO certified system to treat raw ballast water from, as well as supply certified ballast water to, a vessel.

