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DESMI Ocean Guard A/S
Attn: Mr. Jorgen Frahm
Lufthavnsvej 12
DK-9400 Norresundby
Denmark

ALTERNATE MANAGEMENT SYSTEM ACCEPTANCE

The Coast Guard has completed its review of the Alternate Management System (AMS) application submitted by DESMI Ocean Guard A/S for the DESMI RayClean ballast water treatment system (BWTS). This letter grants AMS acceptance in accordance with the requirements of 33 CFR 151.2026 for the RayClean BWTS models specified below, as type approved by DNV-GL (Det Norske Veritas - Germanischer Lloyd) on behalf of the Danish Maritime Directorate, and as detailed in DNV-GL type approval (TA) certificate No. P-14955 issued on September 5, 2014 and expiring December 31, 2018.

The following DESMI RayClean models are accepted for use as an AMS in U.S. waters:

- 100 with a treatment rated capacity (TRC) of 100 cubic meters /hour (m³/hr);
- 200 with a TRC of 200 m³/hr;
- 300 with a TRC of 300 m³/hr;
- 400 with a TRC of 400 m³/hr;
- 500 with a TRC of 500 m³/hr;
- 600 with a TRC of 600 m³/hr;
- 700 with a TRC of 700 m³/hr;
- 800 with a TRC of 800 m³/hr;
- 900 with a TRC of 900 m³/hr;
- 1000 with a TRC of 1000 m³/hr;
- 1100 with a TRC of 1100 m³/hr;
- 1200 with a TRC of 1200 m³/hr;
- 1300 with a TRC of 1300 m³/hr;
- 1400 with a TRC of 1400 m³/hr;
- 1500 with a TRC of 1500 m³/hr;
- 1600 with a TRC of 1600 m³/hr;
- 1700 with a TRC of 1700 m³/hr;
- 1800 with a TRC of 1800 m³/hr;
- 1900 with a TRC of 1900 m³/hr;
- 2000 with a TRC of 2000 m³/hr;

- 2100 with a TRC of 2100 m³/hr;
- 2200 with a TRC of 2200 m³/hr;
- 2300 with a TRC of 2300 m³/hr;
- 2400 with a TRC of 2400 m³/hr;
- 2500 with a TRC of 2500 m³/hr;
- 2600 with a TRC of 2600 m³/hr;
- 2700 with a TRC of 2700 m³/hr;
- 2800 with a TRC of 2800 m³/hr;
- 2900 with a TRC of 2900 m³/hr;
- 3000 with a TRC of 3000 m³/hr.

The DESMI RayClean BWTS is assigned the following AMS identification number:

AMS-2015-DESMI RayClean-001

Coast Guard acceptance of the DESMI RayClean BWTS as an AMS does not accord or imply conformance to or compliance with any other Federal, state, or local water discharge effluent limitations that may apply to the vessel on which the AMS operates or the regulatory regimes and locations within which it operates. The owner and operator of the vessel must comply with all applicable laws, regulations, and treaties, including the Clean Water Act and associated provisions of the Vessel General Permit (VGP); the Federal Insecticide, Fungicide, and Rodenticide Act of 1972, as amended (FIFRA); other Coast Guard safety regulations and requirements; and other applicable laws and regulations.

In accordance with 33 CFR 151.2026 (a)(5), the AMS application required the submittal of a type approval application for the BWTS. The type approval information submitted with the AMS application does not have any bearing on the type approval status of the BWTS, nor does Coast Guard acceptance of the DESMI RayClean BWTS as an AMS indicate that the BWTS meets requirements for Coast Guard type approval.

The following conditions apply for the operation of the DESM RayClean AMS in U.S. waters:

1. The AMS manufacturer must comply with all the general conditions of certification stipulated in the type approval certificate issued by DHI-GL under the authority of the government of Denmark, as referenced above. Revocation of type approval by the approving authority will result in revocation of this AMS acceptance. Copies of all reports required under the stated conditions of use must be submitted to the Environmental Standards Division (OES-3) at the following address or email:

COMMANDANT (CG-OES-3)
United States Coast Guard Stop 7509
2703 Martin Luther King Jr. Ave SE
Washington DC 20593-7509
Tel: 202-372-1402
e-mail: environmental_standards@uscg.mil

January 30, 2015

2. Installation and repairs of the AMS must be performed in accordance with the manufacturer's instructions and approved by the flag administration or its representative.
3. Operation and maintenance must be conducted in accordance with all specifications and limiting conditions stipulated on the type approval certificate and with the manufacturer's instructions, including any limitations posed by the environment (for example, water quality, temperature, salinity, or other parameters) or vessel operations (for example, voyage duration, pumping rates, or other constraints). The following specific conditions apply:
 - a. **Flow rate:** The flow rate of ballast water through this AMS should not exceed the treatment rated capacity (TRC) for the installed DESMI RayClean BWTS. UV reactor units for this system may be installed in parallel to achieve treatment rated capacities up to 3000 m³/hr, as detailed in the system's installation guide. The system will actuate an alarm at the control panel if a low ballast water flow rate of less than 30 m³/hr is detected within a UV reactor. The UV reactor(s) experiencing low flow conditions will automatically shut down if the low flow condition is not corrected. A historical record of flow rate is available via readouts from the control panel.
 - b. **Differential pressure across the filter:** This BWTS removes organisms via UV disinfection and filtration during both ballasting and de-ballasting operations. The system employs a 30 um mesh filter. The appropriate filter size for each installation is determined by the treatment rated capacity of the installed system. Filter size specifications for different flow rates (treatment rated capacities) are provided in the TA certificate. This filter is self-cleaning and it has the capability to automatically initiate back-flushing to remove debris from the filter mesh. The maximum allowed filter differential pressure that may be present prior to the initiation of back-flushing is 0.5 bar. Back-flushing of the filter ceases when differential pressure across the filter decreases to 0.35 bar. A historical record of filter pressure differentials can be obtained from the control panel.
 - c. **UV intensity, transmittance, and dosage:** This BWTS employs one UV reactor unit for every 300 m³/hr of treatment rated capacity for the installed model. The UV intensity for the DESMI RayClean has a type approval certificate specified minimum of 55 Watts/m². A UV intensity sensor within each UV reactor assists in determining the UV dose within the reactor chamber under varying ballast water turbidity levels. In clear to normal turbidity waters, the UV dose is regulated by reducing power input to the UV lamps. In high turbidity waters, the UV dose is regulated by reducing flow rates. When UV intensity is below 55 Watts/m², the system is out of the approved range. When UV intensity measured by the sensor is between 55-165 Watts/m², the flow rate within each UV reactor is reduced to between 100 - 300 m³/hr. This flow reduction process ensures an adequate UV dose by extending the time period in which treated water is in contact with UV light. When UV intensity measured by the sensor is between 165-200 Watts/m², the flow rate within each UV reactor will be 300 m³/hr and lamp power will be 100%. If UV lamp intensity is above 200 W/m², the UV lamps will start to dim as a result of automatic

input power reduction. This lamp dimming continues to occur until UV intensity returns to a sensor reading of 200 Watts/m². UV lamp power can be reduced up to 50%.

This BWTS is equipped with a mechanical cleaning system that automatically removes film buildup from the quartz UV lamp sleeves upon the completion of a ballasting or a de-ballasting operation. This system is designed to actuate an alarm at all control panels if UV intensity below 55 Watts/m² is detected within a UV reactor for a period of more than 2 minutes. The system will also alarm if the ballast water within a UV reactor reaches a high temperature value of 50 degrees Centigrade. The system will shut down if this high temperature alarm is not acknowledged by the operator and the water temperature continues to climb to 55 degrees C. The Type Approval certificate for this UV type BWTS specifies that the system has no ballast water salinity limitations. UV intensity values can be obtained via data readouts from the control panel.

A historical record documenting that the system has been operated within these criteria, including a record of any alarm conditions, shall be made available for review onboard the vessel.

4. If installed on a U.S. flag vessel, it must be shown that the system and installation comply with or provide an equivalent level of safety to the requirements of 46 CFR Subchapter F (Marine Engineering) and Subchapter J (Electrical Engineering). All electrical equipment located within hazardous areas must be explosion proof or intrinsically safe as certified by an independent laboratory recognized by USCG per 46 CFR 111.105-7.
5. Use of the AMS is specified in the ship's ballast water management plan (BW plan), required by 33 CFR 151.2050(g). The BW plan must identify the following: (1) the ballast water management practices to be used in the event the AMS cannot be used, and (2) the personnel responsible for the operation, maintenance, and repair of the BWTS. An up-to-date record of the operation, maintenance, and repair of the BWTS must be maintained onboard the ship.
6. Any change in design, materials, manufacturing, or intended operational conditions of this BWTS without prior notification to, and acceptance by, the U. S. Coast Guard will automatically invalidate this AMS acceptance. Prior to any such change, the manufacturer of an AMS must notify the Commanding Officer, U. S. Coast Guard Marine Safety Center (MSC), at the following address or e-mail:

Commanding Officer (MSC)
Attn: Marine Safety Center
U.S. Coast Guard Stop 7410
4200 Wilson Blvd, Suite 400
Arlington VA 20598-7410
e-mail: msc@uscg.mil

The notification must include the following: (1) a description of the change, the reason it is required, and its intended advantages; (2) an explanation of any effect of the change on installation, operation, maintenance, or repair requirements; and (3) an indication of whether or not the original configuration of the BWTS will be discontinued.

7. If the installed AMS does not operate properly when treating ballast water intended for discharge in U.S. waters, the person directing the movement of the vessel must ensure that the problem is reported to the nearest Coast Guard Captain of the Port (COTP) or District Commander as soon as practicable. The Coast Guard shall be notified of any treatment system or component failures, irreparable damage to components of the AMS, frequent process upsets or out-of-bounds operating conditions, or other situations or process-related conditions that may reduce treatment effectiveness. The vessel may continue to the next U.S. port of call, subject to the directions of the COTP or District Commander, as provided by 33 CFR 160.
8. All transport and handling of chemicals required for proper operation of the AMS must be conducted in accordance with 46 CFR 147 (Hazardous Ships' Stores), 49 CFR 171-180 (Hazardous Materials Regulations), and 46 CFR 98.30 (portable tanks), as appropriate.
9. Use of the AMS must be reported in the ship's ballast water management reports submitted to the National Ballast Information Clearinghouse, as required by 33 CFR 151.2060, as follows:
 - a. In Section 4, report the number of tanks treated by the AMS in the space labeled "Underwent Alternative Management";
 - b. In Section 4, write the AMS identification number (AMS-2015-DESMI RayClean-001) in the space labeled "Please specify alternative method(s) used, if any", and;
 - c. In Section 5, in the middle section titled "BW MANAGEMENT PRACTICES" identify the management method as "ALT" under the heading "Method (ER/FT/ALT)" for each tank for which the AMS was used.

The Coast Guard may suspend, withdraw or terminate the acceptance of this BWTS as an AMS in accordance with 46 CFR 2.75-40, 2.75-50(a) and 2.75-50(b), respectively.

A copy of this letter shall be provided to each vessel with this installed AMS and shall be available for review when the vessel is operating in U.S. waters.

Subj: AMS ACCEPTANCE LETTER – DESMI RAYCLEAN

5760

JAN 30 2015

I thank you for your dedicated efforts to seek out AMS acceptance, and we look forward to working with you throughout the type approval process. If you have any questions concerning this letter, you may contact Mr. John Meehan of my staff at John.A.Meehan@uscg.mil.

Sincerely,



R. E. BAILEY

Captain, U.S. Coast Guard

Office of Operating and Environmental Standards

By direction