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August 9, 2017

Wärtsilä Water Systems, Ltd.
Attn: Joe Thomas
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England

ALTERNATE MANAGEMENT SYSTEM ACCEPTANCE

The Coast Guard has completed its review of the Alternate Management System (AMS) application submitted by Wärtsilä Water Systems, Ltd. for the AQUARIUS EC and ECX ballast water treatment system (BWTS). This letter grants AMS acceptance in accordance with the requirements of Title 33 of the Code of Federal Regulations (CFR), Section 151.2026 for the AQUARIUS EC and ECX models that have been type approved by the Netherlands Ministry of Infrastructure and the Environment as described in type approval certificate No. 6997/2017 issued 9 June 2017. Accordingly, the following Aquarius models, using mechanical filtration and side stream electro-chlorination, with the following treatment rated capacity (TRC) expressed in cubic meters per hour (m^3/hr), are accepted for use as an AMS in U.S. waters:

- AQ-250-EC and AQ-250-ECX with a TRC of 250 m^3/h ;
- AQ-300-EC and AQ-300-ECX with a TRC of 300 m^3/h ;
- AQ-375-EC and AQ-375-ECX with a TRC of 375 m^3/h ;
- AQ-430-EC and AQ-430-ECX with a TRC of 430 m^3/h ;
- AQ-500-EC and AQ-500-ECX with a TRC of 500 m^3/h ;
- AQ-550-EC and AQ-550-ECX with a TRC of 550 m^3/h ;
- AQ-750-EC and AQ-750-ECX with a TRC of 750 m^3/h ;
- AQ-850-EC and AQ-850-ECX with a TRC of 850 m^3/h ;
- AQ-1000-EC and AQ-1000-ECX with a TRC of 1,000 m^3/h ;
- AQ-1200-EC and AQ-1200-ECX with a TRC of 1,200 m^3/h ;
- AQ-1500-EC and AQ-1500-ECX with a TRC of 1,500 m^3/h ;
- AQ-1650-EC and AQ-1650-ECX with a TRC of 1,650 m^3/h ;
- AQ-2000-EC and AQ-2000-ECX with a TRC of 2,000 m^3/h ;
- AQ-2250-EC and AQ-2250-ECX with a TRC of 2,250 m^3/h ;
- AQ-2500-EC and AQ-2500-ECX with a TRC of 2,500 m^3/h ;
- AQ-3000-EC and AQ-3000-ECX with a TRC of 3,000 m^3/h ;
- AQ-3300-EC and AQ-3300-ECX with a TRC of 3,300 m^3/h ; and
- AQ-4000-EC and AQ-4000-ECX with a TRC of 4,000 m^3/h .

The AQUARIUS EC and ECX models may be combined to achieve a TRC of up to 16,000 m³/h by using multiple units in parallel.

The AQUARIUS EC and ECX BWTSs are assigned the following AMS identification number:

AMS-2017-Wartsila AQUARIUS EC/ECX-001

Coast Guard acceptance of the AQUARIUS EC and ECX 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 AQUARIUS EC and ECX BWTS as an AMS indicate that the BWTS meets requirements for Coast Guard type approval.

The following conditions apply for the operation of the AQUARIUS EC and ECX BWTS AMS in U.S. waters:

1. The AMS manufacturer must comply with all the general conditions of certification stipulated in the TA certificate issued by the Ministry of Infrastructure and the Environment under the authority of the government of the Netherlands, 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 Office of Environmental Standards (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

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 TA 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. **Design dose of oxidants:** The active substance disinfecting oxidant (sodium hypochlorite) employed by this BWTS is generated in situ by electrolyzer units that are controlled by the Programmable Logic Controller (PLC). Per the type approval certificate, the maximum allowable dosage of active substance is 10.0 mg/L or 10 ppm (measured as Chlorine) in the treated ballast water. The active substance dosage level for this BWTS is automatically monitored and adjusted by the control circuitry using input from in-line total residual oxidant (TRO) sensors. These sensors continuously monitor the total residual oxidant level in the treated ballast water, which is a direct indicator of the active substance concentration. This BWTS is designed to start hypochlorite dosing at a concentration that is preset at the control panel by the operator and then adjust this dosing level, as necessary, based on input from the in-line TRO sensors. The amount of active substance sodium hypochlorite generated is determined by the PLC through a DC current control that powers the electrolyzer / rectifier units. At the maximum allowable dosage level of 10 mg/L sodium hypochlorite, this DC current is at the maximum permitted level. The system has the capability to actuate an alarm and then shutdown if the electrolyzer module experiences a failure that prohibits the production of the sodium hypochlorite active substance in concentrations sufficient to meet the disinfecting oxidant demand of the intake ballast water (as determined by the in-line TRO sensors).
 - b. **Differential pressure across the filter:** This BWTS is equipped with a 40 um mesh self-cleaning filter. The Wärtsilä Aquarius EC ballast water treatment system is designed to automatically back flush the filter unit if the differential pressure across the filter meets or exceeds 0.5 bar. A differential pressure high level alarm is activated at the control panel if the differential pressure across the filter meets or exceeds 0.8 bar. This BWTS shall initiate shutdown if this high differential pressure across the filter condition persists after a predetermined number of automatic back flush cleaning operations. A historical record of pressure differential alarms can be accessed on the human / machine interface monitor (HMI).
 - c. **Maximum allowable discharge concentration (MADC):** Prior to the discharge of treated ballast water, the total residual oxidant concentration of this BWTS must be measured to ensure compliance with all applicable federal, state, and local water quality limits for all discharged chemicals, including disinfectant by-products (DBPs). The oxidant residual is measured by two TRO sensors located upstream from the point of ballast discharge. These sensors monitor measure TRO in the treated ballast water to be discharged at locations before and after the neutralizer static mixer injection point. Their data input is used to automatically control the

sodium bisulfite neutralizer module's output to achieve a TRO level below the MADC. TRO discharge concentrations can be observed on the HMI.

- d. **Ballast water salinity considerations:** The type approval certificate for this BWTS stipulates that the electrolyzer module requires intake feed water with a salinity concentration value of 10 PSU or greater in order to effectively produce sufficient quantities of sodium hypochlorite active substance. When operated in waters with salinity concentrations of less than 10 PSU, this BWTS is designed to switch from the intake ballast water as the side stream feed water for the electrolyzer module to a dedicated high salinity seawater tank onboard the vessel. In situations where an in-line conductivity sensor detects that the intake ballast water has a salinity of less than 10 PSU, an alert appears at the control panel notifying the operator. At that point, the system shall be switched to the dedicated seawater tank as the source for electrolyzer feed water. This BWTS is designed to shutdown if the feed water supplied to the electrolyzer module does not have a salinity of 10 PSU or greater.

- e. **Ballast water temperature considerations:** The type approval certificate for this BWTS specifies that the temperature of the ballast water to be treated shall be between -2 degrees C and 45 degrees C. The system's operations manual states that the optimum temperature for the ballast water side stream that feeds the electrolyzer module is 15 degrees C or greater. This optimum water temperature for electro-chlorination is maintained by a heat exchanger that raises the temperature of incoming feed water to a value above 15 degrees C during ballasting operations.

A historical record documenting that the system has been operated within these criteria, including a record of any alarm conditions, any deviations from the manufacturer's operating instructions, or any conditions and requirements noted above, shall be available for review onboard the vessel.

- 4. Because the Wärtsilä Aquarius EC BWTS has not been adequately tested in freshwater, its use as an AMS is limited to the treatment of marine and brackish water with a practical salinity unit (PSU) concentration greater than 1.

- 5. 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.

- 6. 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

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maintained onboard the ship.

7. 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 Headquarters
2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509
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.

8. 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, any irreparable or recurring 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.
9. 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.
10. 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. Report the number of tanks treated by the AMS in the space labeled "Underwent Alternative Management";

- b. Report the AMS identification number, located toward the beginning of this letter and in bolded text, in the space labeled “Please specify alternative method(s) used, if any,” and;
- c. 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.

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 Ms. Debbie Duckworth of my staff at (202) 372-1429 or Debbie.Duckworth@uscg.mil.

Sincerely,



S.J. KELLY
Captain, U.S. Coast Guard
Office of Operating and Environmental Standards