CAUTION

修改单号 REVISON NO.	记号 SYMBOL	数量 QTY.	区段位置 GRID REF.	签名 SIGNATURE	日期 DATE	修改单号 REVISON NO.	记号 SYMBOL	数量 QTY.	区段位置 GRID REF.	签名 SIGNATURE	日期 DATE

职别 TITLE	签名 SIGNATURE	日期 DATE	**ORDER SPECIFICATION FOR BALLAST WATER TREATMENT SYSTEM** 压载水处理系统订货说明书	工程名称 PROJECT TITLE **174,000M^3 LNG CARRIER**
编制 COMPILED	董建平	2025/11/19		
校对 CHECKED	崔貌	2025/11/19		**CONTRACT** 设计 DESIGN H1993A-98A
标检				
审核 CONFIRMED				第 **1** 页 共 **9** 页 SHEET **1** OF **9**
审定 APPROVED				
批准 AUTHORIZED	黎翔	2025/11/19	**沪东中华造船(集团)有限公司** HUDONG－ZHONGHUA SHIPBUILDING (GROUP) CO . , LTD .	图 号 **9000540K** 版本 REV. **A**
幅面号 FORMAT A4				

1- General Description:

Ballast water treatment system

The segregated ballast system shall be provided in compliance with the Rules and Regulations concerned.

The WB system shall consist of three (3) ballast pumps (one stand-by), two (2) ballast stripping eductors and ring main line.

The system shall be arranged to permit the ballast pump(s) to take suction from the WBT including aft peak tank and discharge overboard, or vice versa.

Any one of the ballast pumps shall be used as cooling water pump for the inert gas generator.

Ballast pumps capacity: abt. 2,800 m3/h each at 35 mLC. Discharge pressure shall be adjusted to accommodate requirements of ballast treatment system.

Ballast pumps shall be located in the ER.

Ballast pumps motor shall be low voltage VFD type.

Ballast pumps shall be remotely started and stopped from the VDU of the IAS in CCR.

Motor current of the ballast pumps shall be monitored on IAS in CCR.

The suction and discharge pressure gauges with local indication in ER and remote indication on IAS in CCR shall be provided for each ballast pump.

Two (2) ballast eductors each 350 m3/h will be provided for stripping the ballast tanks via the ballast main, and driven fluid will be from the ballast pumps main, without a separate stripping main.

The pressures at suction/discharge/driving sides of each ballast stripping eductor shall be remotely indicated on IAS in CCR and locally in the ER.

Ring ballast main line shall be arranged in pipe duct at double bottom tank area with one trolley on the rail and branched to each WBT.

Each WBT except peak tank shall have two (2) suction branches, one (1) for main suction and the another for stripping. After peak tank and ER ballast tanks shall have one (1) main suction branch only.

Each branch line shall be fitted with a shut-off valve and also fitted with a suction bell mouth except peak tank.

Ballast system suction bell mouth to be flange-type (carbon steel type).

Two (2) ballast overboard discharge lines shall be arranged below the ballast water line.

The valves in pipe duct and major valves in ER shall be fully lined butterfly type, fitted with direct coupled hydraulic actuators and remotely controlled by from IAS in CCR.

Main suction valves in ballast tanks and pump discharge valves shall have position control type and other remotely operated valves shall have open/close control type.

A suitable Ballast Water Treatment System shall be installed based on a side stream electro-chlorination design (Electrolysis indirect type).

The Ballast Water Treatment system (BWTS) shall meet with the requirements of USCG and IMO type approval.

Back flushing function to be applied to the filter unit of BWTS, per manufacturer's guidance, without any disturbance in muddy water. Ballast operation timing shall be designed in accordance with Ballast Loading/Unloading timing (approx. 12hours without top-up and striping).

Water Ballast treatment system monitoring and partial control within the IAS.
Partial：Under normal conditions, the IAS has full information and simple control capabilities of the EUC, but the subsystem and its equipment are stand-alone units (Hardware & Software) capable of fully functioning outside of the IAS environment.

The Aft peak shall be connected to the ballast line in the engine room for holding sea water which shall be supplied to ballast treatment plant when the vessel trading in fresh water areas, but the Aft Peak is not to be used as a ballast tank at any time.

The system design limitations list in the type approval certificate must write in the proposal.

All the components need to be connected with yard pipeline must clearly show in the PID drawing.

The system necessary vacuum breaker must supply by vendor.
For the venting ping of the BWTS: stainless pipes should be applied.

The water ballast system piping in engine room & penetration, suction line and bell in each WBTK material to be carbon steel (Sch80) with polyethylene.

The valve of body to be nodular cast iron centric butterfly valve or bronze globe valve.

SI units of measurement shall be adopted for design and construction of machinery.

All ship’s plans, manuals and other documents shall be marked with the IMO ship identification.

In normal condition, one ballast pump (QAA1A) to service for starboard side ballast water tanks and one ballast pump (QAA1B) to service for port side ballast water tanks in the same time. If one of pumps to be not working, another one can service for all ballast tanks.

The third ballast pump (QAA1C) shall be used as inert gas scrubber cooling water pump. It also can service instead of any one of the QAA1A or QAA1B.

Note: The ballast water should be treated by ballast water treatment plant if the pump QAA1C services as ballast pump. The sea water no necessary treated by ballast water treatment plant if the pump QAA1C services as inert gas scrubber cooling water pump.

The ballast water pumps should design suck sea water from sea chests and discharge sea water to all

ballast sea water tanks. The ballast water pumps also should design suck sea water from all ballast sea water tanks and discharge the sea water to overboard.

Ballast water tanks: Fore W.B.TK (P&S) located at fore part, No.1 W.B.TK (P&S) to No.4 W.B.TK (P&S) located at cargo tanks area. Aft. Peak TK located at after side. The ballast water treatment plant should service for all ballast water in all these tanks.

The ballast water piping system diagram to be for reference (please see diagram No. 9010201F). Maker should arrange the ballast water treatment plant according to this diagram. If necessary, maker can discuss with shipyard to adjust the detail ballast piping.

The necessary operation and alarm should be reflected in ship automation system (IAS). Communication with IAS should be MODBUS protocol with dual series link, and the MODBUS protocol only for information, such alarms and some signals.

Automatic controls, alarms and safety devices shall be fitted to enable the engine room to operate with unattended machinery spaces and control room under all operating modes. i.e. sea voyage, maneuvering, port idle and cargo handling, including ballasting and de-ballasting. Major machineries shall be controlled and monitored from air-conditioned Engine control room.

The BWTS type approval certificate must examined and tested in accordance with new G8 guide (MEPC 279(70) or MEPC 300(72)) and MEPC74, the adequate sampling devices must supply according to Class and vessel's flag required. The sampling commissioning on board for BWMS shall be done by BWTS vendor and approved by class

Operation environment:

If necessary, the heaters (shell/tube type) and necessary steam and condensate valves should be supplied in one unit by maker.

Carbon steel pipe to be applied with Builder's standard H&Z500002-2021
Stainless steel pipe to be applied with Builder's standard H&Z500001-2018

2- Scope of supply:

Based on ballast water treatment system type.
Total 2 sets BWTS, each 2,800 m3/h.

2.1 Electrolysis type with filter

Treatment method: Electrolysis type with filter
Total ballast water treatment capacity: 5,600 m^3/h or more.
Electrolysis unit pressure loss should be supplied.
Power consumption for ballast water treatment plant should be supplied.

The ballast water treatment plant should including electrolysis unit, neutralization unit, flow meter unit, conductivity sensor unit, TRO sensor unit, power rectifier unit, local control panel, and necessary control valves and fittings. The detail can be adjusted according to vender condition.

All equipment of ballast water treatment plant should supply the detail information (including

function description, capacity, detail interface connection, weight, outline dimension, maintains space, etc).

All the pipe material and arrangement required by BWTS should indicated in the document if supplied by shipyard.

Shipyard supply power to be 3-phase AC440V (60Hz).

Filter: 2 pcs for ballast water treatment plant.
Filter pressure lost should be supplied.

3- Description of the supply

3.1 Spare parts, tools, user's instruction manual, users training

The spare part lists should be separated 2 parts, and the spare part list should be included in approval drawing:

- Recommendations of the Makers and the Class rule requirement and additional by owner (on board)
- Depot spare parts (owner warehouse).

As a minimum, on board spare parts (for a twenty four months operational period) and tools shall be provided in accordance with the recommendations of the Makers.

All parts shall be packed individually, or by small groups of similar parts in airtight sealed packing including desiccant for long term protection and with the identification tag attached.

Particular attention is to be given to the packing of spare motor stators, printed circuit boards, separate electric and electronic components etc., and all other parts subject to deterioration, to ensure that they will be preserved in good condition.

Mandatory on board spare parts for regulations to be delivered without additional cost.

These spare parts lists will specify:

- Description of the part
- Manufacture's (or supplier's) reference
- Quantity installed
- Quantity proposed
- Delivery delay in Weeks

The other requirement please see item 1.13 of Appendix I – Order specification general requirement.

The additional on board spare parts shall be provided according to owner requirement:
(Note: if the following items have already been included in maker's recommendation, this part can be cancelled)

3.2 Guarantee Periods:

Please see item 1.9 of Appendix I – Order specification general requirement.

4- Applicable Rules

LR

Rules and Regulations of USCG for Foreign Vessels Operating in the Navigable Waters of the United States (CFR title 33 – Navigation and Navigable Waters, Part 151 Subpart D (installation of BWTS), 34.15-10 and 34.15-30, Part 162.060-20 (Design and construction requirement), CFR Title 29 part 1918 – Safety and Health Regulations for Longshoring, without Certificate nor Inspection.

5- Description of the equipment

5.1. Characteristics

5.1.1. Operation and ergonomics

Attention will be made to provide easy access to junction boxes, connections, and auxiliary equipment, for easy maintenance.

5.1.2. Painting and corrosion protection

All painting to be the supplier's account. The equipment including seating and fixations must be treated against corrosion in a ship's environment.

The final colour must be according the general document Appendix I.

Same for electrical control boxes: their final colour must be according the general document Appendix I.

5.1.3. Maintenance requirements

The equipment will indicate in instruction manual, the maintenance program (visits periodicity, overhauling length, necessary personal: number, qualification…)

The other requirement please see item 1.8 of Appendix I – Order specification general requirement.

5.2. Described

5.2.1. Ambience conditions

See general document Appendix I.

5.2.2. Other requirements

Valves:

Unless otherwise stipulated, the valves shall be to ISO, DIN norms or equipment.

The supplier shall check that clearance between the body and the flange in way on bolts allows for an easy access of a high nut.

Valves with internal threading shall be fitted with an opening indicator.

Marking of nominal pressure and diameter shall confirm to the standard.

Bodies shall be perfectly debarred and clean.

An indestructible labeling must indicate the fluid direction.

Protection:

The insulating materials used to be anti-creeping and treated to resist salty air, oil mist and hydrocarbons, as well as termites and fungus.

Accessories and special tools:

The materials have to be equipped with all accessories required for their good operation (safety valves, purging and venting cocks, pressure gauges, temperature gauges, level gauges,…)

The inspection covers fitted on the equipment have to be provided with jack-screws in a large enough and with the necessary handling grips according to the sizing of the inspection covers.

The exterior removable parts (for example coupling flanges) must have detachable proper protections complying with the rules in force.

5.3. Integration to the ship

5.3.1. Weights

The weight has to be provided by the supplier at the bid time.
A conformity certificate will be delivered with the equipment.
Yard will go to the maker factory spot checking during the document study if necessary.

5.3.2. Functional interfaces

Yard electrical supply: 6600 V or 440V or 220 V / 60 Hz:
The detail see the general document: Appendix I.

All supply limits on tubes will be ended using flanges.

If another type of flange is used, the supplier has to provide the counter-flange, gasket, nuts, bolts and washers. Concerning the unions to be installed by shipyard.

The inlet and outlet ports of different equipment and accessories in chain will be homogeneous and of the same dimension.

The supplier must indicate the dismounting spaces required for his equipment on the general arrangement drawings.

6- Acceptance

To be by LR, shipyard and owner.

Receipt conditions by shipyard and owner: It shall only be final after satisfactory workshop tests, and final testing on board.

7- Delivery and storage:

All equipments to be delivered to China, Hudong-Zhonghua Shipbuilding group Co, Ltd/ShangHai.

Packaging to be suitable for outside, long term ocean transportation and long term storage.

All lifting and handling instructions to be clearly indicated.

All electric / electrical components to be delivered with suitable protection, and storage instructions, if any.

8- Documents:

Contractual documents and drawings will be supplied according general document Appendix I.

The maker should supply:

After contract:
- Manufacturing program schedule (electric format).
- Q/A plan (electric format)
-Approval drawing (electrical format+ hard copies):
  - General arrangement for each module including all mechanical interface (position, size...)
  - PID diagrams
  - Instrumentation list
  - Drawings of items supplied loose
  - External connection diagrams (electric, pneumatic steam...)
  - Electric wiring diagrams for all control panel, starter...
  - Spares parts lists.

Working drawing (electrical format):
After approval drawing approved:
- Working drawing (same as approval drawing + installation and maintenance instructions, operation manuals)

Before FAT (if have):
- Workshop test procedure (electrical format).
- Commissioning procedure for dock and sea trials or gas trial (electrical format).
- The vender internal test results shall be submitted to the SHIPYARD at least one week before FAT

(electrical format).
-The official FAT test report on the result to shipyard with separated document (electrical format).

At delivery in final drawing (electrical format+ hard copies):
- Same as working document, plus
- All quality/ workshop test report for each vessel.
- All Class certificates