H1993A -98A General technical requirement of Hull piping part

1. The vendor's proposal and products shall meet Class requirements.
2. Maker technical condition should be consistent with specification requirements (POS and Appendix I). If not, maker should clarify in deviation list and give clear explanation before signature. And also should be confirmed by Shipyard. If any default found after signature, the specification (POS, Appendix I, HZ comment sheets) must be followed without extra cost even if the maker drawing has been approved by HZ shipyard.
3. Any deviation list with POS and Appendix I, please filling in the separated WORD file. If not, shipyard thinks no any deviation with POS and Appendix I.
4. Grease nipples throughout shall be of ball type (JIS B 1575 A-PT 1/8) or ISO standard fabricated from stainless steel 316 as far as applicable.
5. Necessary name plates, caution plates, and instruction plates for machinery and control panels, electric equipments, valves, gauges etc, to be provided by vender. Especially in case that two or more equipments are installed, the mark of No.1, No.2, No.3 to be shown on all of the related name plates.
6. For all plates on machinery equipment located inside equipment BRASS; all plates weather exposed/external equipment SUS 316L.
7. All name plates and notices shall be described in English language and in SI system.
8. In updated technical proposal, any updated items, please give a color mark for easy to compare with original one. And on face page, the document revision need be indicated, and second page need give a simple description for each updated items. The requirement is also suitable for approval drawing, working drawing and final drawing.
9. Any asbestos material is forbidden.
10. Only environmentally safe and hazard-free materials are to be used in the construction of the Vessel according to internationally recognized best practice. All materials and system contents used during construction and fitted to the Vessel shall be non-toxic smoke-emitting, non-PVC and fire retardant as well as being Halon, CFC (Chloro-fluorocarbon), HCFC (Hydro-Chloro-Fluorocarbon), PCB (polychlorinated biphenyl) and asbestos free throughout, with particular attention being paid to insulation systems and pipe flange gasket/jointing material.
11. The Suppliers shall provide MD/SDoC files to complete IHM for approval by Class Society. Statement confirms that the vessel is free of hazard materials as above mentioned shall be provided by the maker. For the first vessel, the statement shall be certificated by the third party for the domestic maker's products.

    Materials containing CFC or HCFC not to be used. No materials which are not allowed as per US EPA VGP 2013 to be used. Provision of certification confirming that no forbidden materials are used to be provided and also specified in the IHM.
12. Equipments, such as spare parts, components, packages etc, or materials containing flammable constituents shall be locally or fully protected with fire-proof materials.
13. The vendor shall provide class certificate according to class rules.
14. The SI system of measurement shall be used for all equipment procured for these vessels.
15. In any case, the following units shall be used for all drawings, plans, manuals, and instrumentation: Length in Meters and mm, Mass in Kg, Time in seconds and hours, Weight

in MT, Pressure MPa or Pa, flow rate in MT/h, kg/h, m3/h or Nm3/h, Velocity in m/s, Heat transfer and Power in kW, Heating Value in kcal/kg, Specific Fuel Consumption in g/kW/h, Energy in calories or kilocalories, and Temperature in degrees C. All documents and drawings for the design, construction, and operation of equipment shall be prepared and submitted in the English language.

16. Maker/vendor should submit the maintenance procedure and instruction for long-term storage when submitting working plan. Maintenance instruction for long term storage should include control points concerned with period from shipping to delivery of ship such as shipping, outdoor storage, installation on board, periodical idle operation, etc.
17. Maker/vendor shall carry on the training of maintenance procedure and instruction for shipyard.
18. Please note the scope or technical requirement will be revised according to detailed design later. So before approved by shipyard, vendor cannot start manufacture any products.
19. The vender should be reply within 3 days after receiving the technical comments email from Shipyard.
20. Other Items
    a) Products proposed for our projects;
    b) Feature of the product, compared with your competitors;
    c) Scheduled maintenance plan and cost
    d) Latest world wide after service organization including the organization for Service Engineer and inventory of spares. As per executed maker list, maker shall have a global supplier network and aftersales service;
    e) Reference list (Overall, LNG carriers and reference list of delivery to Hudong Zhonghua shipbuilding with the vessel owner’s name).
21. Maker should supply outline drawings with all necessary dimensions or Auto CAD format drawings for all equipment to shipyard. The weight, maintenance space shall also be indicated clearly. 3D model with STP or IGES format is also required.
22. If it is not required by shipyard, there should be no any "option" items in the technical proposal, approval drawing, working drawing and finished drawing. All the items marked with "option" in above mentioned documents should be supplied by maker without any extra costs.
23. All the recommendations from the manufacture should be addressed by the manufacturer themselves and included in their quotation.

Please confirm the following specification requirements are met:

a) IMO International Code on Intact Stability (IS Code),2008 (applicable part A only) and all latest Amendments. (any exceptions such as part A Chapter 1.2 Dynamic stability Phenomena are to be stated).

b) International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 and all latest amendments.

c) International Ship and Port Facility Security (ISPS) Code 2003, the application of ISPS to be limited to below:

-Automatic Identification System (AIS)

-Ship Security Alert System (SSAS)

-IMO number

d) IMO Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 and IMO Res.MEPC.379(80) – 2023 Guidelines for the Development of the Inventory of Hazardous Materials and (EU) No 1257/2013 of the European Parliament and of the Council on Ship Recycling (EU SRR).

e) IMO Code on noise levels on board ships 2012 Adoption of Resolution MSC 337 (91) (for mandatory requirements only, substitute IMO A.468(XII)).

f) IMO "Code on Alerts and Indicators, Resolution A.1021(26) 2009 and latest amendment".

g) IMO Code for Approval of Ballast Water Management Systems (BWMS Code), IMO Resolution MEPC.300(72).

h) SIGTTO ESD Systems – Recommendations for Emergency Shutdown and Related Safety systems (2021).

i) SIGITTO Guidelines for the Alleviation of Excessive Surge Pressures on ESD for Liquefied Gas Transfer Systems (2018).

j) SIGITTO Recommendations for Management of Cargo Alarm Systems (2019).

k) SIGTTO Recommendations for Valves on Liquefied Gas Carriers, Second Edition 2023.

l) SIGTTO, LNG Marine Loading Arms and Manifold Draining, Purging and Disconnection Procedures. (2017).

m) GIIGNL Custody Transfer Handbook 6th Edition (2021).

n) Marine Environmental, Safety and Quality Assurance Criteria for International Ocean/Seagoing Tanker Vessels in ExxonMobil Affiliate Service, 2017 Edition, Permanent provision only for “MUST” & “Strongly Preferred” items applicable to this size vessel.

o) IMO Resolution MEPC 364(79) - 2022 Guidelines on the method of Calculation of the attained Energy Efficiency Design Index (EEDI) and all amendments.

p) IMO Resolution MEPC.365(79) and MEPC. 374(80) - 2022 Guidelines on the survey and certification of the Energy Efficiency Design Index (EEDI) and all amendments.

q) Maritime and Port Authority of Singapore, port marine circular No. 04 of 2013, Recommendatory Measure for vessels crossing the traffic separation scheme (TSS) and precautionary areas in the Singapore strait during the hours of darkness.

r) Arc Flash Assessment for the 440V IEC 61641.

s) IACS Unified Requirements for New buildings, which has been formally published and in force at the date of signing contract.

t) SIGTTO Guide for Gas Trials on LNG Carriers, 2023.

u) United States Environmental Protection Agency (EPA) Vessels General Permit (VGP) 2013 VGP issued by US EPA, the requirement compulsorily applicable to foreign flag vessel calling US ports, including the use of Environmentally Acceptable Lubricants (EALs), where applicable.

v) IMO LSA Code – Life Saving Appliances and all latest amendments.

w) IMO FSS Code – Fire Safety Systems and all latest amendments.

x) IMO NOx Technical Code (2008)-Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines and all Amendments.

GENERAL REQUIREMENT OF ELECTRICAL PART

1. The detail one line diagram for system should be provided by vendor. The outline drawing, fitting information, equipment weight and cut hole of cable entrance should be included in the approval drawing.
2. All indicating and pilot lamps shall be of LED type.
3. The Total Harmonic Distortion (THD) is within the Class limits. If not meet the requirement, harmonic filter or other solution need to be supply by manufacturers for free.
4. Colour

   5.1 Colour of electrical equipment Standard colour scheme of finishing paint for metal surface of electrical equipment shall be as mentioned below. And, inner metal surface shall also be finished with manufacturer's standard colour.

   5.2 Generator, motor, switchboard, starter, and other panel/console form equipment：7.5 BG 7/2 (Blue green).

   5.3 Navigation equipment, radio and communication equipment, automation equipment, lighting equipment, small electrical equipment and galley/laundry equipment：Manufacturer's standard.

   5.4 Outfit for emergency operation Red.
5. Each earth points (bolt) for systems with PE, IE, IS shall be geographically separated with approx. 75 -100cm at the source end. Each earthing system shall have its own individual earth bar inside of cabinets. Instrument cables shall be earthed in the supply end only.
6. All electrical equipment should provide cable glands for shipyard cables according to cable specification and the cable gland should be installed on the equipments, not loose supply. And the cable gland material shall follow cabinet material, eg the cabinet is made by metal, the cable gland shall be also by metal.
7. All intrinsically safe, flameproof, increased safety and other safe type equipment shall be certified as such by an approved testing authority, coded, and tagged.
8. In general motors shall be of the totally enclosed fan cooled (TEFC) induction type. Motor dimension shall be in accordance with IEC publication 60072. Insulation shall be class “F” with Class “F” temperature rise. and motors shall be rated for continuous 110% of full load duty(shaft power). Electric motors 46 deg C without performance degradation.
9. Motors shall be of cast iron squirrel cage type with sealed bearings.
10. The power factor shall be above 0.8 at least for all water and oil pump motor, fan motor, cargo pump and compressor motor.
11. The enclosures for motors located in machinery space shall be at least to IP44 standard, with or without fan cooling. Terminal box enclosures shall be to IP55 standard in all instances. Motors exposed to the weather shall be IP56.
12. Motors which power above 5kW (except short time duty, fans, submerged type and explosion protected type) to shall be equipped with a test nipple to facilitate the same test condition for measurement every time for the portable vibration monitoring equipment.

13. Motors in humid areas, on exposed deck and motors 15kW and above shall be equipped with space Heater.
14. Any active signal output to IAS shall be provided with isolation module (4-20ma signals with power output need to be isolated).
15. Serial links to IAS shall be provided as following requirement.
    The following serial link quantity is anticipated, in general, important serial link shall be duplicated but not be limited to the followings:

Packages	Protocol	I/O	Serial links qty
CTS (could be included inside IAS)	Modbus	100	2
Inert gas generator system	Modbus	100	2
N2 generator	Modbus	80	2
Integrated navigation system	Modbus or NMEA	100	4
Water ballast treatment system	Modbus	150	2
Loading computer	Modbus	120	2
Fire detection system	Modbus or TCP/IP	440	2
Gas detection system	Modbus	150	2
Oil mist detection system	Modbus	50	2
Generator(dual fuel engine)	Modbus or TCP/IP	1000	4+4
Main engine	Modbus	1500	4
Main engine GVU	Modbus	120	2
Main engine wear monitoring	Modbus	10	2
M/E bridge remote control	Modbus	100	2
Auxiliary boiler	Modbus	200	2
Gas combustion unit	Modbus	180	2
Voyage data recorder	Modbus or NMEA	350	1
Master clock	Modbus or NMEA	10	1
Data collection monitoring	Modbus	100	1
Ship performance monitor	Modbus	120	2
Local network system	TCP/IP	100	1
Tank level gauging	Modbus	20	1

16. The control panels and devices for navigation and radio equipment, M/E and DF generator provided by equipment venders, which required external 24V DC power supply by shipyard, shall be provided with build-in power isolating and voltage stabilizing device. And if the signals, which with power, the signal isolators also

shall be provided by equipment venders.

17. All intrinsically safe, flameproof, increased safety and other safe type equipment shall be certified as such by an approved testing authority, coded, and tagged. Explosion proof grade in LNG environment should be not less than IIB T3.The explosion proof grade for dangerous cargo hold on the container vessel should be not less than IIB T4(need be modified according to the specification). The equipments in the painting room should be explosion proof type.
18. An ammeter and Running hour meter shall be provided on the front door of the starter for the essential motors and for motors of 5Kw and above and any single continuous running motor. Instrumentation class 2.5 shall be used.
19. Common alarm should be provided. The type of digital alarm signal need be NC contact type.
20. During operating conditions, each equipment(except lighting fixture) shall have at least 10M ohm insulation resistance. Insulation resistance of Lighting fixture should be indicated in the drawing.
21. The type of the required external signals should be confirmed by the shipyard(pulse signal should be confirmed especially).
22. The vendor shall inform yard the special cable if necessary use in TA stage. The cable length supplied by the vendor would be confirmed during the approval. The vendor should provide special cable (Fiber optical, CAT 7, Profibus, Canbus etc), especially if use Fiber optical, the connectors and connection work are vendor's scope.
23. The communication interface usually should be RS485, RS422 or TCP/IP. Communication protocol usually should be NEMA0183, MODBUS etc.
24. A register of all software implemented in the onboard systems shall be provided at vessel delivery, showing the equipment fitted, serial numbers and the latest software version fitted. A set of back-up software for all onboard systems also to be submitted with ships delivery. The Purchaser shall be kept informed of progress throughout all stages of the system development, and all formal testing shall be witnessed by the Purchaser's representative. The systems shall be so designed and implemented as to ensure a high level of fault tolerance such that the single failure of any component, power supply, or device shall not prevent normal system operation, nor compromise the integrity of the system. Modeling and simulation testing of software throughout the development period shall provide key validation evidence of the software's capabilities, integrity, and its ability to meet the user requirements. The software quality plan shall be based on ISO and Classification Society requirements, and be submitted to the Purchaser for approval.
25. The battery lifetime must keep at least two(2) years after ship delivery.
26. Maker should in charge of the cable path on the equipment and indicate the cable entry, especially for Life boat, re liquid, Refrigerating plant, main engine and all the unit equipment.
27. Alarm sensors and processing cards shall be independent of those used for process control.