TENDER SPECIFICATION FOR MARINE TYPE DUAL HEAT EVAPORATOR (FRESH WATER MAKER)
(CAPACITY: 10000 US GALLONS PER DAY)
BNS SOMUDRA AVIJAN

1. **Name of Equipment**. Marine Type Dual Heat Evaporator (Fresh Water Maker) (Capacity: 10000 US Gallons/Day).

2. **Purpose**. The Marine Type Dual Heat Evaporator (Fresh Water Maker) will be used onboard BNS SOMUDRA AVIJAN (Ex USCG RUSH) to produce fresh water from seawater in vapour evaporation method using steam produced from boiler and waste heat recovery from the ship's Diesel Generators (2 in number DG each of 550 KW capacity). The primary source of the heat should be Steam from onboard boiler. The Marine Type Dual Heat Evaporator will be installed in the main engine room of the ship and will replace the existing old Marine Type Dual Heat Evaporator (TU-106 HR, Riley-Beaird, Inc. USA).

3. **Quantity**. 1 (one) complete set.

4. **Manufacturer, Principal Supplier & Local Agent**. Names and full address of manufacturer, principal and local agent are to be mentioned.

5. **Year of Manufacture**. 2025 or later.

6. **Country of Origin**. USA, UK, EU Countries, Japan, Australia, Norway and Switzerland.

7. **Manufacturing Country**. USA, UK, EU Countries, Japan, Australia, Norway and Switzerland.

8. **Certificates/Authentication Documents**. Following certificates are to be furnished to ascertain the genuinity of source and item in order to establish chain of links from the original source to supplied item:

   a. One certificate by the manufacturer in favor of the supplier (in case of manufacturer as direct source).

   b. Two certificates, one by the manufacturer to authorized agent and other by the authorized agent to supplier (in case of authorized agent as immediate source).

   c. Three certificates, first one by manufacturer to authorized agent, second one by authorized agent to sub-agent and third one by sub-agent to supplier (in case sub-agent as immediate source). If the supplier is unable to obtain the first certificate (by manufacturer to authorized agent), relevant document to prove agency-ship of claimed agent of the recognized manufacturer is to be provided.

9. **Operating Environment, Inclination of Ship & Operational Condition.**

   a. **Operating Environment.**

Ambient Conditions		
(1)	Air Temperature	20°C – 60°C
(2)	Sea Water Temperature	15°C – 35°C
(3)	Humidity	Up to 95%
(4)	Salinity	35,000–40,000 ppm

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b. **Inclination of Ship**. The plant should be efficiently operated when the ship experiences following athwart ship, and fore and aft inclinations:

Ser	Direction	Static	Dynamic
(1)	Athwartship	± 15°	± 25°
(2)	Fore and Aft	± 10°	± 15°

c. **Operational Condition**. Marine Type Dual Heat Evaporator (Fresh Water Maker) must be capable to run and produce fresh water at all ship speeds and while at anchor.

10. **Power Supply**. 440 V, 60 Hz, 3 Phase (±10% tolerance). Auxiliary power consumption by the plant is to be mentioned (Existing power consumption 24 KW).

11. **Standard**. Offered plant must be consisting of marine-grade equipment complying relevant international standards like ASME / ABS / BV / DNV-GL or equivalent.

12. **Scope of Supply**.

a. 01x Marine Type Dual Heat Evaporator (Fresh Water Maker) plant with all associated items for immediate operation) (as per paragraphs 17).

b. Necessary piping arrangement (as per paragraph 18).

c. Standard accessories (as per paragraph 21).

d. Optional items (as per paragraph 22).

e. Standard tools (as per paragraph 23).

f. Spare parts and consumables (as per paragraphs 24 and 25).

g. Installation, Test/Trial &Acceptance (as per paragraph 25).

h. Training (as per paragraph 26).

j. FAT and PSI (as per paragraph 27).

k. Documentation & Certificates (per paragraphs 28 and 29).

l. Warranty (as per paragraph 30).

13. **Site Visit**. Prospective bidders may visit the ship to have a technical survey in order to quote suitable plant including confirmation of installation space and compatibility requirements.

14. **Principle of Operation**. Plant should work based on Heat Recovery and Steam Evaporation principle. The steam produced by boiler should be regarded as the main heat source as the heat recovery potential of jacket water from generator is quite low during anchor and single DG operation. The plant should require minimum maintenance effort.

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15. **Design & Sales Record**. Offered plant should be similar or very closed to existing model design as per para 16. Bidder is to provide record of sales of identical/ similar models in naval platforms.

16. **Existing Marine Type Dual Heat Evaporator (Fresh Water Maker) (TU-106 HR, Riley – Beaird, Inc. USA Capacity: 10,000 US GPD).**

a. Sea Feed Pump.

Model: Blackmer system one frame S power end
Capacity: 130 GPM @ 73.6 feet Head
RPM: 3550
Weight: 130 lbs
Electric Motor: 10 hp, 3550 rpm, 3Ph, 460 V AC, 60 Hz, Weight – 149 lbs

b. Brine Pump.

Model: Blackmer system one LD-17 power end
Capacity: 120 GPM @ 60.6 feet Head
RPM: 1750
Weight: 248 lbs
Electric Motor: 5 hp, 1750 rpm, 3Ph, 460 V AC, 60 Hz, Weight – 133 lbs

c. Distillate Pump.

Model: Blackmer system one frame S power end
Capacity: 10 GPM @ 111 feet Head
RPM: 3550
Weight: 110 lbs
Electric Motor: 10 hp, 3550 rpm, 3Ph, 460 V AC, 60 Hz, Weight – 114 lbs

d. Vacuum Pump.

Model: AT 64 (With air jet combination)
Capacity: 30-40 CFM, 2-2.5" Hg ABS
Total Head: 0.5 psig
Electric Motor: 5 hp, 1750 rpm, 3Ph, 450 V AC, 60 Hz

e. Steam Heater Condensate Drain Pump.

Model: 1 x 1-1/2 CCL
Capacity: 3.0 GPM @ 110 feet Head
RPM: 3600
Weight: 89 lbs
Electric Motor: 3.0 hp, 3600 rpm, 3Ph, 440 V AC, 60 Hz

f. Chemical Feed System

Metering Pump.

Model: M-75
Capacity: 1.9 GPH
Discharge pressure: 145 psig maximum
RPM: 1750
Electric Motor: 1750 rpm, 1 Ph, 115 V AC, 60 Hz

Tank.

Capacity: 30 gallons

Material: Polyethylene (Shell), Steel (Lid)

Agitator.

Motor: 1800 rpm, 1 Ph, 115 V, 60 Hz
Materials: 316 stainless steel (Shaft and Impeller)

g. Modular Salinity Indicating System Solid State (Control Panel).
Salinity Indicating Panel No 1:

Panel Item 36:

Manufacturer: McNab
Model: MDM-ATC-10-9D-DSTMB
Meter Range: 0-10 GPG
Number of Channels: 9
Dumping Channel: 1
Dumping Channels Timer Set: 15 minutes

Panel Item 40:

Manufacturer: McNab
Model: MDM-ATC-3D-DSMB
Meter Range: 0-10 GPG
Number of Channels: 3

Salinity Cell and Valve – Items 37 and 41:

Model: (with 20 feet cable) MC-80/L-2A
Model: (with 06 feet cable) MC-81/L-2A

Temperature Sensing Cell-Item 38:

Model: T-6

h. Modular Salinity Indicating System Solid State (Control Panel).
Salinity Indicating Panel No 2:

Panel Item 36:

Manufacturer: McNab
Model: MDM-ATC-10-9D-DSTMB
Meter Range: 0-10 GPG
Number of Channels: 9
Dumping Channel: 1
Dumping Channels Timer Set: 15 minutes

17. **Technical Specification** (To be provided for offered Marine Type Dual Heat Evaporator).

a. **Type**. Marine Type Dual Heat Evaporator (Fresh Water Maker).

b. **Model**. To be mentioned.

c. **Production Capacity**. Not less than 10000 US Gallons/day. (Minimum acceptable limit during trial is 7,926 gallon or 30 Ton per day with DGs and Boilers).

d. **Heat Source**. Steam from ship borne boiler/Steam Generator (main source) and jacket water from Diesel Generators.

e. **Heat Input Requirement**. To be mentioned.

f. **Seawater Flow Rate**. To be mentioned.

g. **Electrical Power Requirement**. To be mentioned. Not more than 20 KW.

h. **Construction & Materials**. Evaporator shell, tube plates and baffles must be constructed entirely of copper–nickel (CuNi) 90/10. Water boxes must be Bronze casting. Demister must be Monel mesh. Seawater feed pump & distillate pump must be bronze-nickel alloy RG6 and must be designed to minimize scaling.

j. **Net Weight**. To be mentioned. Weight of existing unit in operating condition: 11338 lbs.

k. **Dimensions**. To be mentioned. Maximum available space for installation: 104 x 98.5 x 99 inches (L × W × H).

l. **Working Principle**. In vacuum environment, seawater is evaporated using an automated dual-heat system (boiler steam and jacket water). Distillate is collected and pumped to fresh water tank and brine is automatically discharged.

m. **Distillate Quality**. TDS ≤ 10 ppm (Typical), Suitable for drinking after mineral addition (if required).

n. **Marine Type Dual Heat Evaporator (Fresh Water Maker) Components**. All necessary components based on manufacturer's design are to be provided like Vacuum pump, Air/Brine Hydro-Ejector Distillate pump, Brine ejector pump, Evaporator (Fresh Water Maker) chamber, Condenser, Control panel, Protection instruments, necessary valves, fittings, gauges and pipes. Performance of all components should commensurate with the existing plant. Details of the following components to be mentioned in the offer (Model, Capacity, Weight, RPM, Weight, material, Power Rating, Electric Phase, Voltage, Frequency etc):

(1) Sea Feed Pump.
(2) Brine Pump.
(3) Distillate Pump.
(4) Vacuum Pump/ Air/Brine Hydro-Ejector.
(5) Steam Heater Condensate Drain Pump.
(6) Metering Pump.
(7) Tank.
(8) Agitator.
(9) Modular Salinity Indicating System Solid State (Control Panel).

The system must utilize a high-efficiency, water driven Air/Brine hydro-ejector or Vacuum pump.

p. **Control & Monitoring**. Necessary control panel is to be provided for smooth operation of the plant. Following control and monitoring panel and instruments are to be provided in addition to manufacturer specific other options:

(1) ON/OFF selector.

(2) Pressure and temperature gauges.

(3) Flow meters.

(4) Distillate conductivity (TDS) indicator.

(5) High temp / low pressure alarms.

(6) Running hour meter.

(7) Safety cut-outs.

(8) Automatic distillate dump in case of high TDS.

(9) Fresh water meter.

(10) Relief valves.

(11) Dump valve.

(12) Steam pressure reducing valve.

(13) Condensate level controller.

(14) Feed temperature regulator.

(15) Automated steam control/Thermostatic Valve.

q. **Heat Exchanger Type.** The condenser has to be a straight-tube type heat exchanger and the evaporator must be a U-tube type heat exchanger.

r. **Steam Booster.** The system must be capable of simultaneous, concurrent operation utilizing both jacket water and steam. To guarantee zero cross-contamination, the system must utilize a primary heating block and an independent, automated steam booster heater. Steam injection must be dynamically modulated by the unit's thermostatic control valves with provision of manual control.

s. **Scale Inhibitor.** Unit must be supplied with an integrated, vacuum-driven scale inhibitor liquid dosing system connected directly to the evaporator shell.

t. **Power Source**. The plant must operate with ship borne generator supply i.e, 440 V, 3Ph and 60 Hz.

u. **Continuous Operating Capability**. The plant should be capable of continuous operation during long sea voyage.

18. **Piping Arrangement**. Necessary piping arrangement needs to be done onboard to connect the boilers with the existing steam circuit so that offered plant can be readily usable. Marine grade pipes are to be used and pipes are to be tested at 15 bar.

19. **Quality of Water Produced**. Produced water must comply with WHO & EEC standards (TDS ≤ 10 ppm). Produced water is to be colourless, odourless and free of contamination. It should be safe for human consumption after standard mineralization (if needed).

20. **Water Testing Kit**. Water testing kits for TDS, pH, salinity, conductivity etc., are to be provided for a minimum of 5,000 hours operation of the plant.

21. **Standard Accessories**. Standard accessories must include all items and accessories essential to operating the Marine Type Dual Heat Evaporator (Fresh Water Maker), whether mentioned in the specification or not. The price of standard accessories is to be included in the FOB value. However, an itemised price list of standard accessories is to be provided with the offer for reference value only.

22. **Optional Items**. A list of optional items (if any) for Marine Type Dual Heat Evaporator (Fresh Water Maker) is to be mentioned, indicating the itemised price. Technical details of these items should be given in the offer. Only the prices of selected items by BN will be added to the total price while evaluating the comparative prices of the suppliers.

23. **Standard Tools.** 01 (one) set of standard tools for the maintenance of the Marine Type Dual Heat Evaporator (Fresh Water Maker) is to be provided. The price of standard tools is to be included in the FOB value. However, an itemised price list of standard tools is to be provided with the offer for reference value only.

24. **Spare Parts**. A recommended list of spare parts required for 05 years of satisfactory operation must be provided, indicating the itemised price. Only the prices of selected items by BN will be added to the total price while evaluating the comparative prices of the suppliers.

a. **Mechanical Spares**.

Ser	Item	Remark
(1)	Variable rate dosing pump	
(2)	All cooler tube stack	
(3)	Bearing (all type)	For all pumps and moving parts

Ser	Item	Remark
(4)	Pump impeller and shaft	For all pumps
(5)	Seals	For all pumps, valves, etc
(6)	All types of valves	All types
(7)	Pressure and temperature gauges	All types
(8)	Driving belt/ coupling	All types
(9)	TDS indicator	
(10)	Flow meter & running hour meter	
(11)	Chemical	

b. **Electrical Spares**.

Ser	Item	Remark
(1)	Salinity indicating system solid state controller	All types
(2)	Salinity cell	All types
(3)	Magnetic contactors	All types
(4)	Indicator light	All types
(5)	Solenoid valves	All types
(6)	Sensors	All types
(7)	Switches	All types

25. **Installation, Test, Trial, Commissioning& Acceptance**. Installation, test, trial and commissioning onboard BNS SOMUDRA AVIJAN are to be under the supervision of manufacturer's technical expert. Acceptance will be provided by BN after satisfactory test, trial and commissioning. The plant must be capable to produce at least 7,926 gallon or 30 Ton per day of fresh water with only from the steam generated by the two boilers to be accepted (without jacket water from generator).

26. **Training**. Training for effective operation and maintenance of the Marine Type Dual Heat Evaporator (Fresh Water Maker) for a minimum of 3 working days is to be provided by experienced/expert technician. Cost of airfare, accommodation, food and other expenses of the training engineer/ engineers are to be borne by the manufacturer/ supplier.

27. **Pre-Shipment Inspection (PSI) and Factory Acceptance Test (FAT).**

a. Pre-shipment Inspection (PSI) and Factory Acceptance Test (FAT) will be carried out by 02 (Two) BN officers for 04 (Four) days, excluding the journey period, at the buyer's expense. The supplier should inform the buyer about the date and schedule of PSI and FAT at least 8 (eight) weeks before the commencement of the said PSI and FAT. After inspection, a joint inspection report will be prepared and signed by both the seller and buyer's representatives.

b. On return from the country of supplier, the BN officers will submit a report to DNE. DNE, through DTS, will, in turn, forward the final decision along with the PSI and FAT report within 02 weeks, based on which DGDP will render clearance for the shipment of stores to the supplier concerned. The supplier will not ship any item of the contract without clearance from the DGDP.

c. All types of movement/ transportation (air, sea, road, rail) of the BN officers within the manufacturer/ supplier's country, reception and arrangement for entry into the country/ concerned area for the PSI and FAT are to be borne by the supplier.

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28. **Documentation**. Two sets of following documents are to be provided:

a. Operation manual.
b. Maintenance manual.
c Parts catalogue.
d. Installation drawings.
e. Electrical diagrams.
f. Workshop repair manual.

29. **Certificates**. Following certificates are to be provided:

a. Certificate of Conformity.
b. Hydrostatic Test Certificate.
c. FAT/Performance Certificate.
d. EN 10204 type 3.1 Material Traceability Certificates or equivalent.

30. **Warranty**. Warranty for trouble free operation is to be given by the manufacturer for a period at least 01 (One) year from the date of acceptance by the buyer. During the warranty period, if the Marine Type Dual Heat Evaporator (Fresh Water Maker) remains non-operational for any action pending by the supplier, the warranty period will be extended for the same period. The warranty covers all parts and labour (including OEM or authorized service engineer's cost) throughout the warranty period.

31. **Shipment**.

a. The supplier will arrange the shipment of all items by sea to Chittagong Port, Bangladesh.

b. All items are to be delivered in sea/ air worthy packing to ensure safe transit by sea/ air.

c. All packages are to have packing notes showing their contents in details and all packages shall be marked with the name and address of the consignee and gross weight.

d. The supplier will arrange transportation of all supplied items from the respective sea/ airport to NSD, Chattogram.

e. **Port of Shipment.** Any port of the manufacturing country. In case of shipment through any port of manufacturer's authorized dealer, relevant manufacturer's certificate is to be provided as a proof of genuineness of the offered item.

32. **Delivery.** The items are to be delivered within **six (06) months** from the date of signing the contract to the following **consignee**:

The Commanding Officer
Naval Stores Depot Chattagram
New Mooring, Chattogram, Bangladesh

33. **Validity of Offer.** The offer should remain valid till **180 days** from the date of tender opening.

34. **Currency.** Foreign Currency.

35. **Terms of Payment**. L/C for the full purchase amount will be opened in favour of the principal supplier under the following payment terms:

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a. 80% of the total LC value will be paid on delivery of the items described under the scope of supply and on production of necessary shipping documents.

b. The remaining 20% of the LC value will be paid upon producing an 'Acceptance Certificate' after a satisfactory test and trial jointly carried out by the buyer's and supplier's representatives.

36. **Condition for Acceptance of Quotation**. Quotation has to have supporting documents (booklets, leaflet, catalogue, brochure etc) having detailed particulars of the offered Marine Type Dual Heat Evaporator (Fresh Water Maker). If detailed information regarding specifications, maker's books and catalogues, spare parts, accessories, scope of supply, authentication certificate etc are not provided, the quotation will not be accepted.

37. **Compliance**. A compliance statement fulfilling all the requirement of the tender is to be submitted for evaluation of the quotations. Stating mere 'Yes' or 'No' will not suffice and detailed description/ information as required is to be given. An incomplete compliance statement may attribute to cancellation of the offer. If any clause of this specification does not commensurate with the offered Marine Type Dual Heat Evaporator (Fresh Water Maker), the deviation has to be spelt out clearly.