

**HINDUSTAN SHIPYARD LIMITED:: GANDHIGRAM :: VISAKHAPATNAM**

**1. RATE CONTRACT WORKS FOR COMPLETE DESIGN, SUPPLY, INSTALLATION, TESTING, COMMISSIONING & TRIALS OF HVAC SYSTEM AND REFRIGERATION PLANT.**

**2. SCOPE OF SUPPLY AND WORK OF THE SUPPLIER:**

- 2.1 The scope of supply shall be follows on RATE CONTRACT basis.
- Design and obtaining the approval of drawings from HSL, NAVY, ICG and Classification societies as required.
  - Complete supply of equipment, materials and spares as per the design and approved drawings and Classification rules.
  - Installation of equipment and materials supplied as per the approved drawings.
  - Commissioning of the AC, Ventilation & Refrigeration system to the satisfaction of HSL, NAVY, ICG & Classification Societies.
  - Tests & trials of the AC, Ventilation & Refrigeration system.
  - Maintenance of the AC, Ventilation & Refrigeration system till the delivery of the vessel.
  - Arranging inspection and certification for equipment and materials as required by Classification rules.
  - Spares shall be supplied as described in the relevant paras of this specification.

**Note:**

In other words, design, obtaining approval of drawings, supply of necessary equipment & materials, installation of equipment / materials, installation of equipment materials & spares on board the ship with necessary foundations, commissioning and testing and maintenance of AC, Ventilation & refrigeration system till delivery of the ship on turnkey - **RATE CONTRACT BASIS** is the scope of this contract.

- 2.2 The suppliers shall give their quotation for the basic types of vessels listed at Annexure-A. For the types of ships not listed in Annexure-A, price will be considered on PRO-RATA basis as mutually agreed.
- 2.3 The rate contract is valid for 3 years from the date of placement of order.

**2.4 Rules & Regulations to be followed for design, installation, testing and trials- as mentioned in the relevant build specifications.**

- 2.4.1 Rules & Regulations for ABS High speed Craft Oct 2001.
- 2.4.2 Class Notation – as mentioned in the build specification.
- 2.4.3 Relevant IRS Rules if the ship is of **dual class**.
- 2.4.4 SOLAS rules as applicable to this type of vessel.
- 2.4.5 Noise levels on board to be maintained as per IMO Resolution A-468 (XII).
- 2.4.6 Indian Standards / International Standards shall be followed.
- 2.4.7 Load line regulations as applicable for ventilation system.
- 2.5 Preservation and lubrication of necessary parts of the equipment before dispatch to prevent corrosion.

- 2.6 Packing, Transporting and delivery of all equipments at Shipyard.
- 2.7 The equipment to be supplied shall be properly tested at the manufacturer's works before dispatch and to be certified that the equipment are in order.
- 2.8 The complete equipment shall be in working condition as soon as it is erected on board.
- 2.9 HSL/OWNER may depute representatives to witness the shop trials. OWNER will have the right to inspect the equipment in case considered necessary. The local expenditure for boarding, lodging and transportation of personnel involved for inspection shall be borne by the supplier.
- 2.10 A separate quotation shall be given for the above.
- 2.11 Any other parts of the Space / Cabin that are omitted in the enclosed drawings and technical specifications but are necessary for the proper ventilation / rule requirements.

**2.12 Shipyard shall provide the following information:**

- 2.12.1 On placement of order – The following documents shall be provided to the supplier.
- a) GA Plan
  - b) Structural fire protection Plan
  - c) Insulation Plan
  - d) Deck covering Plan
  - e) Paneling arrangement
  - f) Piping & Cable arrangement (other than related to AC & Vent system).
  - g) Accommodation arrangement layout
  - h) Structural Plans as required
  - i) Any other plans as required by the supplier.

**2.13 General:**

Quotations shall be in quadruplicate.

- 2.14 Suppliers are requested to confirm compliance to the specification clauses and any deviations may be indicated against the same.
- 2.15 **Spares:** Class / Manufacturer's recommended spares for unrestricted services for complete system shall be included in the offer.
- 2.15.1 **On board spares:** Quotation for manufacturer's recommended spares for the two years operation of each vessel along with part numbers shall be submitted with item wise cost along with the offer. The list of onboard spares will be finalized in consultation with Owner and order for the same will be placed along with the main equipment.
- 2.15.2 **B & D Spares:** Quotations in triplicate for maker's recommended B&D spares (with part numbers) for five (5) years maintenance of each vessel, valid for 180 days shall be supplied along with the offer with item-wise cost. The list of B&D spares will be finalized in consultation with Owner and order for the same will be placed along with the main equipment.
- 2.15.3 **Class / manufacturer's recommended tools for complete system shall be supplied.**

2.15.4 **Parts List:** Parts list along with price and escalation formula to support the spares for 10 years shall be provided along with the offer.

**2.16 Product Support:**

2.16.1 Supplier shall confirm the Provision of Product Support by providing for a minimum period of 20 years from the date of delivery of the vessel for the complete system being supplied by them.

2.16.2 In case any equipment is likely to become obsolete, supplier should inform HSL/Indian Coast Guard / Indian Navy 3 years in advance enabling them to assess the requirement "Life Time Buy" of spares.

**2.17 *Weights of equipment / Items are critical in the projects, hence keeping in view the criticality of these weights on the ship's design, this parameter shall be given utmost consideration to minimize the weight while placement of the final order.***

2.18 A list of all equipment / accessories / spares / tools in the scope of supply including optional equipment with unit weight in kgs. and quantity of each item per vessel shall be provided along with the offer.

1.17 Any item / requirement not indicated in this specification, but required for the operational requirement for any of the systems offered shall be indicated/provided without any extra cost to HSL.

**2. GUARANTEE:**

2.1 The equipment offered shall be complete in all respects as to their compliance with the latest regulations specified and to their function and performance free from manufacturing and material defects and shall give full satisfaction to Shipyard and Ship owners.

2.2 The supplier shall guarantee the design equipment, and works on board against any defects or failures that may arise due to faulty design, defective material employed or poor workmanship involved on their part for a period of 12 months from the date of delivery of the vessel to the owners, or 30 months from the date of dispatch of the last batch of materials / documents whichever is earlier.

2.3 The supplier shall either arrange to repair/replace the defective parts of the equipment during the guarantee period at their cost at the earliest and by quickest possible means at the port of call of the ship. The suppliers shall provide further guarantee of 12 months in respect of such parts replaced during the guarantee period.

**3. INSPECTION AT HSL :**

3.1 The equipment / accessories shall be inspected in Shipyard in relation to the specifications / relevant approved drawings / Bill of materials and all deviations and for any defects observed shall be notified to supplier for making good by the supplier free of cost.

3.2 However, the above initial inspection in our stores shall not in any way relieve the suppliers of their responsibility for all the short comings and defects that may come to light when the equipments are fitted on board and when they are duly commissioned / tested for their performance evaluation.

4. **Rejection Criteria:** Your offer will be **rejected** if the documents mentioned below are not furnished along with the quotation. (Documents related to similar works undertaken earlier may be furnished)

1. Preliminary single line schematic layouts for AC, Mechanical and Natural Ventilation Systems.
2. Schematic air flow diagram of AHU / each fan system indicating the AHU / Fan location and the spaces being served by the AHU / Fan.
3. Cabin wise air quantity chart.
4. Cabin-wise heat load calculations.
5. Detailed drawings consisting of overall dimensions, foundation details of the offered AHUs and other fans.
6. Characteristics curves for the fans above and details of their motors.
7. Data on noise levels of AHU and each Fan.
8. Drawings / Technical leaflets for spiral ducts, duct fittings, bhd/ deck coamings, terminal units like diffusers, Punkah louvers and grills and wire nets etc. fire dampers, smoke dampers, control dampers, volume dampers, filters (including grease filters) water tight doors with rain shields etc.
9. Preliminary Bill of Materials including spares for the offered equipment. Spares shall be indicated separately item-wise.
10. Type approval certificate from any National Authority and IRS complying to SOLAS complying to SOLAS / National Authority requirements / Classification rules shall be supplied for the following equipment. (Ref. Para-3.1.2, 3.5).
  - 1 Spark Prof fans.
  - 2 Explosion proof motors
  - 3 Terminal units i.e. Cabin units / diffusers etc.
  - 4 Low flame spread characteristic certificate for combustible materials used in AC, Mechanical and natural Vent. System.
  - 5 Automatic Fire / Smoke Dampers.
11. Approximate weight of equipment and other materials.
12. Clause-wise confirmation to all the clauses of the entire technical specification.

5. **Training:**

5.1 At **OEM's works: (if required by owners)**

1. The supplier shall arrange for the training of the owner's personnel at OEM's works for three weeks for each vessel.
2. The supplier shall be responsible for imparting the adequate training for both the operators and maintainers in their works as well as while testing, tuning, commissioning and operation of the equipment.

3. The supplier shall submit a separate quotation for the expenses of travelling, boarding, lodging & transportation of owner's personnel.

#### 5.2 **On Board Training:**

In addition to the above training, six (6) weeks training for onboard Operations and maintenance is to be given to the complete ship's crew.

#### 6.0 **General Data:**

- 6.1 Noise level limits: Noise levels on board to be maintained as per IMO Resolution A-468 (xii).
- 6.2 Volumes of the cabins to be considered from G.A furnished and shall be as per Accommodation arrangement and specification.
- 6.3 All the lobbies in living spaces shall also be supplied with conditioned air either directly or through the door grills of the cabins as per the design.
- 6.4 Fresh air exchange requirement (minimum) shall be @ 17cu.m/person/hr.
- 6.5 Basing on the above data, supplier shall design and prepare air volumes, heat calculations, AC and ventilation system layouts, pressure loss calculations.
- 6.7 The ventilation layouts and air quantity chart shall be approved by Indian Coast Guard Indian Navy and Classification authorities after incorporating HSL comments.  
Thickness of the fan cabins located on weather deck shall meet ABS/IRS.
- 6.6 The system shall comply with relevant rules regarding air pollution. Air from Ammunition lockers, galley etc., shall not be re circulated.

#### 7.0 **Documents to be submitted for Shipyard / Owners / Class approval in case of order:**

1. Single line schematic layouts for AC, Mechanical and Natural Ventilation Systems separately.
1. Schematic Air Flow diagrams for AHU each fan system indicating the AHU / Fan location and the spaces being served by the AHU / Fan.
2. Deck wise two line layout drawings combining AC, Mechanical and Natural Vent. Systems, meeting the structural fire protection water tight integrity requirements. The drawing shall indicate size and thickness of the trunking, duct fittings, deck and bhd. coamings, control / fire / smoke dampers, terminal unit type, size and capacity etc.
3. Cabin wise air quantity charts.
4. Cabin wise heat load calculations
5. Pressure loss calculations
6. Detailed drawings consisting of overall dimensions, foundation details of the selected AHU and other fans.
7. Characteristics curves for the above fans and details of their motors.
8. Data on Noise Levels of AHU and each fan.
9. Drawings / Technical leaflets for Pre-insulated spiral ducts, non insulated spiral ducts, duct fittings, bhd/deck coamings, terminal units like diffusers , grills and wire nets etc. fire / smoke / control / volume dampers , filters (including grease filters), water tight doors with rain shields etc. alternatively for Al. ducting also.
10. Detailed drawings for canopy and grease filters for each galley.
11. Detailed bill of materials including spares for the equipment / materials

being supplied. Spares shall be separately indicated.

12. Type approval certificates from any National Authority and IRS complying to SOLAS / National Authority requirements / Classification rules shall be supplied for the following equipment.
  1. Spark proof fan
  2. Explosion proof motors
  3. Terminal units i.e. Cabin units / Diffusers, Punkah louvers etc.
  4. For combustible materials used for AC, Mech, & Natural Ventilation Systems.
  5. Automatic Fire dampers and smoke dampers.
13. Drgs. of condenser, chillers, sea water pumps and all machinery
14. Item-wise weight for all equipment and materials.
15. Foundation drawings of all equipment
16. Trial formats to submit for HSL/Owners approval two months before commissioning of the equipment.

**NOTE:** The above documentation other than certificates and technical leaflets shall also be provided to Shipyard in Auto Cad 2000 version either through E-mail or in a CD.

**8.0 Documents to be submitted after Shipyard and Owners approval in 3 hard copies.**

1. The vent. Layouts shall be submitted to National Authority and IRS after incorporating comments from Shipyard and owners and simultaneously same shall be forwarded to HSL for carrying out the work on board. Approved vent. Layouts from National Authority and ABS / IRS shall be sent back to Shipyard within 8 weeks after final approval from Shipyard.
2. Revised bill of materials including spares basing on the corrected drawing shall be submitted for Shipyard approvals.
3. Installation / dimensional drawings with foundation details for dual condensing units and all equipment schematic and layout drawings for piping system, Bhd/Deck fittings, insulation details etc, shall be supplied within one month from placement of order for HSL approval.

**NOTE:** The above documentation shall be provided to Shipyard in Auto Cad 2000 version either through E-mail or in a CD.

**9.0 Documents to be submitted along with the equipment :**

- 1 Eight (8) copies of all documents, literature maintenance schedule and spare parts lists / catalogues and instruction manuals etc., in nine plastic folders. The instructions manuals shall include complete detailed description and operation of the plant and its various controls.
- 2 Classification Society Tests / Inspection Certificates in triplicate for compressors, oil separators, condensers, receiver, heat exchangers, Freon valves, all motors , cooling / heating coils, S.W. Pumps etc. as per Annexure-II & III.
- 3 Manufacturer's works test / material certificates in six (6) copies of AHU, all fans and their motors, duct equipment valid calibration certificates etc.
- 4 Type approval certificates from any National Authority and IRS complying to SOLAS / National Authority requirements / Classification Rules shall be supplied for the following equipment.
  1. Spark proof fans

2. Explosion proof motors
3. Terminal units i.e. Cabin units / Diffusers, Punkah louvers etc.
4. For combustible materials used for AC, Mech, & Natural Vent. Systems.
5. Automatic Fire dampers and smoke dampers.

**10.0 COMPLETION CERTIFICATE**

Satisfactory completion certification for erection, testing, commissioning and builders / Class / Owners / Sea Trial shall be issued by concerned production departments, after furnishing the satisfactory certificates from Owners/class after completion of respective works to enable settlements etc.

## Annexure -A

### Categories of ships listed for rate contract of HVAC & refrigerant system

**1. Type of Ship- FAC / Navy: 30 TR AC plant** ( with one running , another standby condensing unit), 2 x ATU , 2 nos supply and 1 no exhaust ventilation fan for each of forward and aft engine room, other ventilation system. Plant working on R134A refrigerant. AC Compressor can be open type screw/ semihermatic reciprocation/ open type reciprocating . AC, Ventilation system designed as per NES 102 or ISO 7547 , electrical as per EEDQ071R3 . Material schedule as per Naval requirement. Complete plant is Non shock graded type. Scope of supply shall also include supply of 2 nos seawater cooling pump for AC plant and refrigerant system

**2.Type of ship- IPV / Coast guard** : AC Plant capacity 25-30 TR ( with one running , another standby condensing unit), 1 X ATU and FCU. 2 nos supply and 1 no exhaust ventilation fan for each of forward and aft engine room, other ventilation system. Plant working on R404A refrigerant. All equipment meeting ABS/IRS or similar Classification society only. AC, Ventilation plant to meet SOLAS and Load Line requirement. AC plant to design as per ISO 7547, motor as per marine standard. Material schedule as per standard marine application. scope include 2 nos cooling sea water pump and refrigerant system

**3. Type of Ship- Survey Vessel- Catamaran type / Navy: 40 TR AC plant** (with one running, another standby condensing unit),2 X ATU. All ventilation system with all ventilation systems and fans . Plant working on R134A refrigerant. AC Compressors are open type screw. AC, Ventilation system designed as per NES 102 or ISO 7547 , electrical as per EEDQ071R3 . Material schedule as per naval requirement. Complete plant is Non shock graded type. scope of supply also include supply of 2 nos seawater cooling pump for AC plant and refrigerant system.

**4.Type of Ship-Naval OPV-3 x 60-70 TR Chilled water plant** ( 2 running, one stdby)- 3 X ATUs, FCUs, Heat Exchangers. All ventilation system with all ventilation systems and fans .2 x2.5- 4TR Provision cooling plants for cold and cool rooms. Only AC chilling units and Refrigeration Plant condensing units are shock grade II type supported with shock calculation. Plants working on R134A refrigerant. AC Compressors are open type screw . AC, Ventilation system designed as per NES 102 or ISO 7547 , electrical as per EEDQ071R3 . Material schedule as per naval requirement. .scope of supply include supply of 2 nos seawater cooling pump ( common for AC, Ref plant) and 2 no Chilled water pumps for AC plant and refrigerant system.

**5.Type of Ship-Coast Guard OPV- 2 x 90 TR Chilled water plant** ( 1 running, one stdby)- 3 X ATUs, FCUs, Heat Exchangers. All ventilation system with all ventilation systems and fans .2 x2 TR Provision cooling plants for cold and cool rooms. All the design and equipment are non shock graded type as per marine standard. Plants working on R404A refrigerant. AC Compressors are semihermatic screw . AC, Ventilation system designed as per ISO 7547 , Material and electrical as per Marine

standard . scope of supply include supply of 2 nos seawater cooling pump ( common for AC, Ref plant) and 2 no Chilled water pumps for AC plant .

6. HVAC & Refrigeration system for Passenger ships of 700 capacity
7. HVAC & Refrigeration system for Passenger ships of 1200 capacity
8. HVAC & Refrigeration system for 30,000 dwt bulkers
9. HVAC & Refrigeration system for 53,000 dwt bulkers
10. HVAC & Refrigeration system for Technology Demonstration vessel for DRDO – approx. complement 150.
11. . HVAC & Refrigeration system for Coast Guard / Navy Training Vessels – approx. Complement 265

The scope of supply shall include first charge of Refrigerant gas and compressor oil included up to test and Trial.

All flameproof motors to comply IS 2148 specification.

**General exclusion from scope:-**sea watering piping, Chilled water piping valves, installation of same. Cable supply, laying, termination.

**General Common scope for all ships-**

- AC Condensing or chilling units including shock mounts where required.
- Air Treatment units as required.
- Fan coil units as required
- Heat exchangers as required.
- Shock calculation as required
- Shock test if applicable
- 1 lot copper pipe, controls, gauges, thermometer for both AC and Refrigeration Plant between condensing units and ATUs/ Air cooler units.
- AC Starting cum control panel, ATU/FCU/HE starters.
- 1 lot pre insulated spiral round ducts, fittings and supply terminals.
- 1st charge (up to commissioning, testing) Refrigerant gas and compressor oil.
- 1 lot Ventilation Fans
- 1 lot Starters for Ventilation fans.
- 1 lot Manual Fire flap
- 1 lot weather deck grills with cover/ Mushroom Ventilator/ Gooseneck.
- 1 lot GI/ MS Rectangular duct material.
- 1 lot Supply/ exhaust terminals.
- Refrigerant system