

**HINDUSTAN SHIPYARD LIMITED
VISAKHAPATNAM-530 005
ENQUIRY TECHNICAL SPECIFICATION OF MARINE ELECTRIC CABLES FOR
INSTALLATION ON INSHORE PATROL VESSELS(IPVs) FOR INDIAN COAST
GUARD (ICG) OUR YARD NOS.11157 TO 11158**

1. SCOPE OF SUPPLY:

- 1.1 The supply shall include the complete material as described in the subsequent paragraphs of the technical specification.
- 1.2 All the cables shall be supplied in non-returnable drums of not less than 200 Meters +5% length.
- 1.3 **Quantities and Sizes of cables indicated in this specification are tentative. The same may be increased or decreased at the time of ordering.**
- 1.4 The scope of supply shall include secure packing, transporting and delivery of the material in Shipyard. Both loose ends of the cables on drum shall be covered with watertight caps to avoid entry of moisture into the cables during storage.
- 1.5 The offered cables shall have validated DNV / LRS / ABS / IRS Class / IMO, etc., Type Approval certificate for Marine use. A copy of Type Approval certificate shall be enclosed to the Technical bid. Also the cables shall be arranged for Batch Inspection by ABS / IRS Class at Makers work shop. Class Inspection Certificate and Makers Works Test Certificates shall be furnished along with cables.
- 1.6 Cables shall be identified by Printing/Embossing on the outer sheath of the cable. The marker material shall be suitable for its service and should give the following information at regular intervals. Manufacturer's or Trade Name, IEC-60092-350, Halogen Free, IEC-60332-3, Category A', Year of Manufacture, Size and Voltage Grade.

2. STANDARDS :-

The finished cables as a whole and the quality and quantity of the materials employed therein shall conform to IEC Publication 60092-350 with the latest amendments, and to be provided with ABS certificate of compliance for use in marine applications

- 2.1 All cables shall be of flame retardant type and shall satisfy the vertical flammability test as per IEC Publication 60332-3, Category-'A' and Halogen Free-satisfying Test requirements of IEC 60754-1&2.
- 2.2 Where cables are to be fire resistant they are to comply with tests IEC 60331-21 series.
- 2.3 All cables shall be round in shape and non-compacted.
- 2.4 The maximum overall diameter for the cables shall be within the dimensions as specified in clause no. 3.1.2 & 3.2.2 below.

3. TECHNICAL SPECIFICATION:

3.1 Power Cables:

3.1.1 Construction:

The power cables of the following construction shall be supplied.

3.1.1.1 Conductor :

Annealed, Tinned, Circular Stranded Copper Conductors in accordance with IEC-60228, Class-2.

3.1.1.2 Insulation :

Suitably compounded cross linked polyethylene (XLPE) Insulation to 16 mm² and HF85 Plastic above 25 mm².

3.1.1.3 The insulation shall be with printed numbers for each core for identification.

Alternatively the insulation itself may be coloured with different colour for each core for identification.

3.1.1.4 Annealed copper wire braiding shall be provided uniformly and surface shall be free from scratches. The coverage of braiding shall conform to the requirements of IEC standards.

3.1.1.5 Black coloured Outer sheath of halogen free, heat resistant and flame retardant type confirming to IEC – 60092-350 as amended shall be provided. The sheath shall also comply with the requirement to meet flame retardant test of IEC – 60332-3 Category - “A”. Type of sheathing material shall be indicated in the offer.

3.1.2 Sizes and Quantity Requirement of Power Cables.

Sl. No.	Nom. Section of Each Conductor (Sq. mm)	No. of Cores	Outer Dia. (Approx.) (mm)	Voltage Grade (KV)	Quantity Req.(Mtrs)
1	25	3	23	0.6/1.0	800
2	16	3	20	0.6/1.0	700
3 ¥	16	3	21	0.6/1.0	300
4 ¥	10	3	19	0.6/1.0	1900
5	6	3	15	0.6/1.0	1150
6	4	3	14	0.6/1.0	1150
7	2.5	3	12	0.6/1.0	1650
8	4	2	13	0.6/1.0	1100
9	2.5	2	11.5	0.6/1.0	11000

Note: ~~¥~~- Fire Resistant cable to comply with IEC 331-21

3.2 Control Cables:

3.2.1 Construction:

Construction of the control cables shall be same as power cables detailed under 3.1.1 above. However, core identification shall be provided by printing Arabic Numbers on insulation itself for each core.

3.2.2 Sizes and Quantity Requirement of Control Cables:

The Sizes and quantities required of the control cables specified under 3.2.1 are indicated in the following table.

Sl. No.	Nom. Section of Each Conductor (Sq. mm)	No. of Cores	Outer Dia. (Approx.) (mm) (* - Tolerance)	Voltage Grade (KV)	Quantity Req.(Mtrs)
1	1	2	10	0.6/1.0	3150
2	1.5	2	10.5	0.6/1.0	14000
3 ¥	1.5	2	12	0.6/1.0	400
4	1	3	10.5	0.6/1.0	2100
5	1	4	11	0.6/1.0	900
6	2.5	4	13	0.6/1.0	1150
7	1	5	12	0.6/1.0	1350
8	1	7	13	0.6/1.0	550
9	1.5	8	15.5	0.6/1.0	650
10	1.5	10	18	0.6/1.0	850
11	1	18	19.5	0.6/1.0	550
12	1	20	20.5	0.6/1.0	450
13	1	37	26	0.6/1.0	1000
14	1	60		0.6/1.0	500

Note: ~~¥~~- Fire Resistant cable to comply with IEC 331-21

3.3 Telephone Cables:

3.3.1 Telephone Cables of the following construction shall be supplied.

3.3.1.1 Annealed, Tinned, Stranded Copper Conductor of high conductivity.

3.3.1.1.2 Insulation :

Suitably compounded cross linked polyethylene (XLPE).

3.3.1.3 Core Identification shall be by providing numbered tape on insulation or by printing Arabic numbers on insulation itself for each core.

3.3.1.4 The cores shall be twisted together into pair / pairs and laid up.

3.3.1.5 Over the laid up pairs bedding shall be provided with a suitable polyester tape for wire braiding.

3.3.1.6 The assembly shall be provided with annealed, copper wire braiding on the above bedding, conforming to IEC-60092-350 requirements.

3.3.1.7 Black coloured Outer sheath of halogen free, flame retardant type conforming to IEC – 60092-350 as amended shall be provided. The sheath shall also comply with the requirement to meet flame retardant test of IEC – 60332-3 Category - “A”. Type of sheathing material shall be indicated in the offer.

3.3.2 Sizes and Quantity Requirement of Telephone cables:

The sizes and quantities required for the Telephone cables specified under clause no.3.3.1 are indicated in the following Table.

Sl. No.	Nom. section of each Conductor (Sq. mm)	No. of pairs	No. of cores	Voltage grade	Quantity Reqd. (Mtrs)
1*	0.75	2	4	150/250V	3150
2*	0.75	6	12	150/250V	750

Note: * - These cables shall have individual pair screening in addition to common copper wire braiding.

4 TESTING AND INSPECTION:

4.1 Routine Tests:

The following tests specified in IEC-60092-350 shall be conducted on all the cable lengths covered in the specification.

- 4.1.1 Measurement of Conductor Resistance.
- 4.1.2 High Voltage Test.
- 4.1.3 Insulation Resistance test.

4.2 Special Tests:

The following special tests specified by IEC 60092-350 shall be carried out on the sample from 10% of the total length of cables.

- 4.2.1 Conductor Examination
- 4.2.2 Check of Dimensions
- 4.2.3 Hot set Test for XLPE Insulation and Sheath.
- 4.2.4 Watertightness Test.
- 4.2.5 Test for Metal coating for copper wires.

5. The Tenderer shall necessarily furnish the following in the Technical bid.

- 5.1 Complete Construction Details such as thickness of insulation, thickness of sheathing materials, diameter of wirebraid, overall diameters, weight, etc., along with technical leaf lets / literature for the offered cables.
- 5.2 Weight factor is critical in the design of the ship. Hence, tenderers shall offer **Light Weight Cables** to the extent possible. Weight factor shall also be considered for Technical evaluation.
- 5.3 Copies of Type Approval Certificates for the offered cables.
- 5.4 Reference list.
- 5.5 The Clause wise confirmations to all the clauses of enquiry Technical Specification, indicating deviations if any, for our consideration.

MANAGER
(Electrical Designs)