

भारत सरकार, गृह मंत्रालय
महानिदेशालय सीमा सुरक्षा बल
(रसद निदेशालय: आधुनिकीकरण सैल)
(Email-comdtord@bsf.nic.in)
(Fax: 011-24367683)

ब्लाक संख्या . 10,
सीजीओ काम्पलैक्स,
लोधी रोड, नई दिल्ली-03
दिनांक 25 मई 2025

सेवा में,

महानिदेशक:- आसाम राईफलस (through LOAR), केन्द्रीय ओद्योगिक सुरक्षा बल,
केन्द्रीय रिजर्व पुलिस बल, भारतीय तिब्बत बोर्डर पुलिस, सशस्त्र सीमा बल,
राष्ट्रीय सुरक्षा गार्ड एवं पुलिस अनुसन्धान एवं विकास ब्योरो

विषय: अनुमोदित गुणात्मक आवश्यकता / परीक्षण निर्देशों का प्रेषण

तकनीकी विशेषज्ञों के उप समूह द्वारा किए गये सूत्रीकरण एवं महानिदेशक सीमा सुरक्षा बल द्वारा अनुमोदित "Medium Crafts" उपकरण के संसोधित गुणात्मक आवश्यकता/परीक्षण निर्देशों को आपकी अग्रिम कार्यवाही हेतु प्रेषित किया जाता है।

संलग्न : उपरोक्तनुसार

आनन्द सिंह
(आनन्द सिंह तक्षक)
उप महानिरीक्षक (रसद)

प्रतिलिपि :-


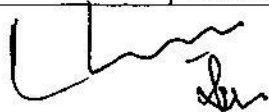
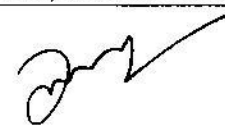
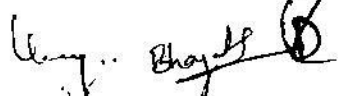

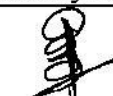

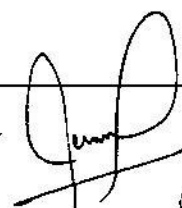
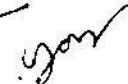
- तकनीकी निदेशक
The Technical Director
राष्ट्रीय सूचना-विज्ञान केन्द्र, नोर्थ ब्लॉक,
गृह मंत्रालय, नई दिल्ली
NIC, North Block, MHA
New Delhi (द्वारा ई-मेल)
(ई-मेल पता : mpsugandhi@nic.in)
: आपसे अनुरोध है कि उक्त उपकरण के गुणात्मक आवश्यकता / परीक्षण निर्देशों जोकि गृह मंत्रालय की वेबसाइट (पुलिस आधुनिकीकरण संभाग) के गुणात्मक आवश्यकता पोर्टल में मशीनरी एवं उपकरण के साथ निगरानी उपकरण वर्ग के अन्तर्गत क्रमांक संख्या-54 पर पहले से अपलोड है के स्थान इस पत्र के साथ संलग्न संशोधित गुणात्मक आवश्यकता/ परीक्षण निर्देशों को अपलोड करने का श्रम करें।
- SO (IT), North Block, MHA
(Through E-mail)
(E-mail address: soit@nic.in)
: कृपया उपरोक्तानुसार कार्यवाही करने का श्रम करें।
- Sh. Samarth Sharma,
Director Nodal Officer for MHA GeM,
3rd Floor, Jeevan Bharti Building Conaught Lane,
Janpath Cannaught Place, N/ Delhi-110001
E-mail:directorcategory13@gem.gov.in
For info with request to upload the approved QRs & TDs of "Medium Crafts"-Revision on GeM Portal. Copy of QRs & TDs is attached with this letter.
- तकनीकी विंग, सीमा सुरक्षा बल
: कृपया उक्त उपकरण के गुणात्मक आवश्यकता/परीक्षण निर्देशों को सीमा सुरक्षा बल की वेबसाइट पर अपलोड करने का श्रम करें।
- रसद निदेशालय, (जल स्कंध), सीमा सुरक्षा बल
: आपके यूओ संख्या-1989 दिनांक 04 सितम्बर 2024 के सन्दर्भ में अनुमोदित "Medium Crafts" उपकरण के संसोधित गुणात्मक आवश्यकता/ परीक्षण निर्देशों को आपके सूचनार्थ एवं अग्रिम कार्यवाही हेतु प्रेषित जाता है।
- फाईल

QRS& TDS OF MEDIUM CRAFTS- REVISION

S/No	QRs/Technical Specification		Trial Directive
1.	Role & Functions and Night operation.	<p>The boat shall be designed to carry out day/night coastal patrol and surveillance operation in, Creeks of Gujarat inland water and coastal area of India, Brahmaputra river & Sunder bans Delta of Bengal. The craft shall be highly sea worthy (operative in sea state-4 and survivability up to sea state-5). The boat shall have propulsion, power generation, lifesaving protection and other engineering and electrical systems to carry out safe and reliable operation to perform the following functions.</p> <ol style="list-style-type: none"> Patrol in shallow coastal waters by day and night. To carry out coordinated and secure operation with Force. Protection Vessels and other crafts/boats deployed. Seaward anti-terrorist patrols for security of coastal installations own vessels and own coast. Search and rescue. <p>Vessel will be fully equipped with navigation facilities with floods lighting, spotlights and other equipment for complete night operability. Navigational lights set as per COLREG requirements.</p>	Check the navigational system for day/night Ops. Check physically shallow water trials by day and night.
2.	Class	The Vessel shall be built to comply with IRS-HSLC& LC Rules or any classification society of IACS class notation SWASTIK, SUL, HSLC, RS-1, Patrol, "Special Government Service" SWASTIKIY "for operation within 20 nautical mile from coast" having sea condition such that the design significant for sea state 4 and survivability-5. Craft should have Front V-shape 'hard chine planning hull with optimum dead rise angle to meet the desired speed and stability requirement.	Check the criteria with classification society rep. Examine the class certificate issued by classification society with the specified class notation for compliance.
3.	Capacity	Medium Craft shall have a capacity of 12 people on board including Crew. The boat shall be fitted with twin engine of sufficient Horse power to generate 25 Knots speed at full RPM.	Check with 12 people load.
4.	General Features	<ol style="list-style-type: none"> The Medium Craft should be capable of operating in shallow waters in extreme tropical conditions. Should be capable of operating in minimum 6 feet shallow waters The boat shall have an expected life of 15 years with an annual exploitation of not less than 2000 Hours. The boat shall have excellent directional stability and good sea keeping hull characteristics. The boat shall have high operational ability and system redundancy. The boat should be able to carry out sustained/employment for 3 days 	Check as per test procedure of classification society. Sample of NIJ-III/EN 1063 standard with light weight bullet proof material. Ballistic test carried out to the quality in a approved laboratory and the test certificate to be provided by the firm. Fender to be checked physically.

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	<p>independently without refuelling for total duration of 18 Hours at cruising speed.</p> <p>g) The boat shall be constructed in such a way that all machinery and equipment shall have ease of operation and low maintenance requirements with low life cycle cost.</p> <p>h) The boat shall have all round heavy duty fenders on crafts side.</p> <p>i) Should have Armour Protection to wheelhouse/control cabin including Bullet proof glass Ballistic test as per approved procedure and schedule to meet NIJ-III /EN 1063 standard with light weight bullet proof material.</p> <p>j) The MC should be fully compliant with applicable MARPOL Regulations in force, built to classification society norms, SOLAS compliant, as applicable in respect of boat safety and certificate of GMDSS required as per 14-NT(2)/98 dated 10th Mar 2000.</p>	
5.	<p>Ergonomics</p> <p>Latest design concepts for boats, with respect to ergonomics and crew comfort are to be included. The automation features and functional aspects in machinery Operations are to be provided considering the indicated crew. Details of machinery controls and automation are to be indicated.</p>	Check physically.
6.	<p>Environmental Conditions</p> <p>The equipment and the machinery fitted on the MC should be marinated and capable of satisfactory operation, under the following environmental conditions:-</p> <p>a) Wing speed up to 30 knots</p> <p>b) Ambient air temperature from zero to + 50°C.</p> <p>c) Water temperature from 10°C to 50°C.</p> <p>d) Max relative humidity of 90% at 32°C.</p> <p>e) Salinity of water up to 36000 PPM.</p> <p>f) Tidal water 4.5 mtrs. raise and fall daily 2 times.</p> <p>g) Tidal current 5 to 6 Knots.</p> <p>h) Depth of water up to 20 mtrs.</p> <p>i) Wave height – 2 to 9 feet (0.6 Mtr to 2.75 Mtr)</p> <p>j) Water density from appx. 1010 to 1030 kg/m³.</p> <p>Creek water which have presence of hyacinth, miscellaneous floating items like dry wood pieces, polyethene bags, branches of trees/plants, buoys, fishing net and mud sediments.</p>	Check Class certificate regarding design of boat considering the environmental condition.
7.	<p>Operating Environment</p> <p>The vessel employment can occur at any time at day or night, and will typically be operated in varying sea and weather conditions. The craft is well suited to operate in Creek area of Gujarat along the border region of india and also suited to operate along the length of Coastal/ Inland water of India. The vessel will be based at shore station and may be berthed in the water at a pier or slip. The vessel and all of its equipment is capable of operating continuously in specified environmental conditions, All</p>	Check all function physically during trial and check approval of class for drawing.

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		equipment onboard is designed for the marine environmental and is of the best quality and capable of satisfactory operation in specified environmental / geographical conditions. The hull bottom structure should be strengthened with additional longitudinal and transverse stiffeners for docking the vessel on soft ground.																														
8.	Operating Profile	<p>Operating Profile</p> <p>The MC shall confirm to following operating profile-</p> <table><tr><th>S /No</th><th>RPM</th><th>Speed of Medium Craft in knots</th><th>No of Hours</th><th>Operating Time</th></tr><tr><td>a</td><td>Full RPM</td><td>From 20 knots up to 25 knots</td><td>200 hrs.</td><td>10 % of annual exploitation</td></tr><tr><td>b</td><td>High RPM</td><td>From 15 knots up to 20 knots</td><td>800 Hrs</td><td>40 % of annual exploitation</td></tr><tr><td>c</td><td>Medium RPM</td><td>Form 10 knots up ot 15 knots</td><td>600 Hrs</td><td>30 % of annual exploitation</td></tr><tr><td>d</td><td>Low RPM</td><td>From 07 knots up to 10 knots</td><td>400 Hrs</td><td>20% of annual exploitation</td></tr></table>					S /No	RPM	Speed of Medium Craft in knots	No of Hours	Operating Time	a	Full RPM	From 20 knots up to 25 knots	200 hrs.	10 % of annual exploitation	b	High RPM	From 15 knots up to 20 knots	800 Hrs	40 % of annual exploitation	c	Medium RPM	Form 10 knots up ot 15 knots	600 Hrs	30 % of annual exploitation	d	Low RPM	From 07 knots up to 10 knots	400 Hrs	20% of annual exploitation	Check the class certificate in this regard.
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9.	Supervision during Construction	<p>As the vessels are being built to class, these would be inspected by the classification society as per class requirement. However the owner shall undertake stage wise additional inspection during Hull, Engine installation, Accommodation etc. Shipyard would be required to provide all inspection facilities at OEM premises/builders yard to the inspecting team. Periodic reviews by the Owner would be conducted for ascertaining work progress by a team including technical officer and member from user end for the complete project.</p> <p>One officer along with team of 3 members (including 01 SO each from WKSP, Master & Engine Driver) be detailed to supervise the construction of the vessel in stage wise. They will visit the building yard and all machineries / equipment manufacturing yard/company in a regular interval to confirm the quality and ensure the vessel shall be built as per requirement specification.</p>					Periodic check as per requirement																									
10.	Life Time Support	<p>The Shipyard is to obtain a contractual commitment from the various equipment suppliers to provide Product Support for a minimum period of 15 years including electronics eqpts, after delivery of the last MC. In case the equipment is likely to become obsolete, the manufacturer should be committed to give a clear three-year</p>					Product support certificate be checked.																									

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		notice to the BSF.	
11.	General Instruction	Preliminary stability calculations, power, resistance and endurance calculations, general arrangement plan of boat along with layout of major machinery/equipment & system are to be submitted along with technical offer. Also, the offered design shall be proven design and in case of new design model test report of the design is to be submitted by the builder within 3 months of issue of AT along with 3D design & drawing etc.	Check the records physically.
12.	Hull Vibrations	The vessel and all equipment should be free from excessive vibrations. The hull design and details of construction are to be such as to avoid vibrations that tend to cause damage to equipment or hull structure or to interfere with the proper functioning of the equipment on board.	Check physically
13.	Propulsion Induced Vibrations	Special care should be taken for the design of the package to minimize propulsion induced hull vibrations. Torsional and lateral/axial vibration calculations for the propulsion system shall be made in the design stage to demonstrate the acceptability of vibration levels. Maximum vibration for main equipment is not to exceed levels stipulated vide ISO- 10816.	Check physically
14.	Noise	The design, construction, workmanship and installation of all machinery and associated equipment shall be such that the noise levels and sound frequencies will permit normal conversation at all operating positions under all conditions. Every practical effort is to be made to minimize the equipment noise by use of vibration mounts below all machinery.	Check physically
15.	Length, Beam & Draft	a) Length molded 20 Mtrs. (Minimum) b) Beam molded 5 Mtrs. (Minimum) c) Draft (maximum) 1.2 Mtrs at full load. d) Depth (Minimum) 3.15 Mtr	a) Check with measuring steel tape in calm water and tally with approved drawing. b) Check with measuring steel tape in calm water and tally with approved drawing. C) Check draft marking made by builder on full load. d) Check with measuring steel tape.
16.	Propulsion	a) Two marine class approved inboard diesel engines directly coupled with reversible reduction class approved gear boxes driving suitable Water jet propulsion system suitable for low drafts operations. b) Hydraulic/electronics steering system control unit of Water Jet should be the product of OEM of water jet manufacturer or direct responsibility/scope of the OEM of the Water jet propulsion system.	a) Check its functionality as per recommendation of OEM in presence of class society representative and certificate issued by the class. b) Boat builder to provide type











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		c) If Water jet propulsion system extended outside of Aft hull, then it should be provided with guard rails/platform of SS-316 for troops for cleaning and maintenance etc. Suction duct be provided with grill of SS-316 to avoid sucking of foreign objects in the jet system or any other auto cleaning arrangement.	approved certificate from the classification society. Check the bill of order of the equipment's and certificate from the OEM of Jet propulsion. c) Check Physically.
17.	Speed	Maximum speed - 25 knots with full load at maximum RPM of Engine. Cruising speed - 20 knots at full load.	To be checked during speed trial in conditions of sea state (as per AT) with GPS in full load by calculating the distance travelled & time taken (favor and against the tide).
18.	Fresh water capacity	5000 ltrs	Check the dimensions of the tank calculate the volume of 5000 ltrs
19.	Endurance	Not less than 300 NM/15 hours at average cruising speed of 20 knots with full load.	Trial to be carried out for 4.5 hrs@ 20 knots with full load (man & materials with eqpts) during sea trial (favour & against the current) distance travelled & fuel consumed to be recorded.
20.	Fuel capacity	Fuel tank capacity will be minimum 7500 Ltrs. The fuel oil filling arrangement shall be flush deck type with watertight screwed for filling the tanks. The tanks shall be fitted necessary filling strainer and external wire gauge strainer, a shut off cock. The filler cap secured by a non-ferrous chain. The vent- pipes shall terminate in atmosphere and positioned with a NRV to avoid ingress of rain water or spray.	Check the dimensions of the tank calculate the volume of 7500 ltrs.
21.	Fuel tank	Fuel tanks and fuel system is to cater for the following: - a) Separate fuel tanks for each main engine are to be provided with arrangement to run both engine from both tank. b) The tanks are to be located at appropriate place as per design and are to be interconnected. c) The fuel tanks should be of marine grade SS 316 with EPI Coat with baffles to reduce sloshing. The tanks are to have suitable inspection manhole, filling point on deck, drainage valve and suction lines with valves for each engine with water separator and filters. The tanks to be constructed with internal and external water tight welding at all joints. d) The tank with suitable inspection manhole for cleaning purpose, filling point on deck, drainage valve, air vent and suction line with valves for each engine that include water filter separator.	a) Check physically. b) Check physically. c) Check with class certificate. d) Check physically. e) Check physically. f) Check physically in calm water and also check calibration certificate. g) Check physically.


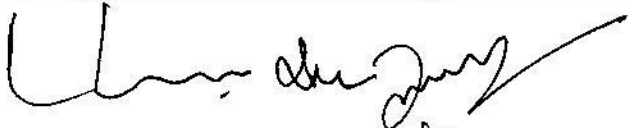





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	<ul style="list-style-type: none"> e) "Digital tank level indicators" are to be provided for the fuel tanks. The fuel state indication is to be provided on the bridge/wheel house control panel. f) Visual fuel level indicator provided in each tank. Calibration fuel level chart plate be installed in every tank adjacent to the visual fuel level indicator. g) The vent pipes shall terminate in atmosphere and be positioned with a NRV to avoid ingress of rain water or spray. <p>Fuel tank should be approved by class. Separate class approved certificate be obtained for each fuel tank separately and produced.</p>	
22.	<p>Construction</p> <ul style="list-style-type: none"> a) The crafts shall be designed and constructed as per IRS class or equivalent notation of LRS/ABS/DNV or any other member of IACS. b) The craft shall be fully compliant with MARPOL and SOLAS regulations, as applicable. c) All under water fittings, pipes, cables, bilge pumps etc are to be approved type for marine intended applications. Main engines, gear boxes and generators are to be type approved for marine application by class society. d) The hull shall be constructed of FRP sandwich construction and shall be of single piece of FRP mould with smooth mat finish scratch proof gel coat outer finish in single mould. The FRP/GRP construction should be of vacuum infusion method for high strength with low weight. A valid works approval certificate regarding provision of vacuum infusion construction facility available with yard should be submitted along with the technical bid by the bidder. Class certificate that the vessel is built by the vacuum infusion method is to be submitted. e) The boat shall have good intact and Damage stability, damage survivability, watertight integrity and crew/equipment protection. f) The upper and side deck layout/fitting, craft-side and interior arrangements shall facilitate easy boarding operations and keep crew fatigue within acceptable parameters. g) The boat shall be designed to cater clear uncluttered areas and well-laid out deck for ease of operation and movement. h) The boat shall have Armour Protection to wheelhouse including Bullet proof glass. Ballistic panels and glasses shall be of NIJ-III/EN 1063 standard (Non-metallic) light weight bullet proof material. i) The finishing and workmanship of the whole craft construction will be of owner satisfaction. j) The construction of boat should be done in controlled temperature/humidity to gain the best lamination property. 	<ul style="list-style-type: none"> a) Check the hull physically in presence of Class rep. It should be as per class society recommendation. Certificate to this effect is obtained from the builder. b) Type approved / class certificate to be provided by the boat builder. c) Class certificate be checked. d) Check material used and vacuum infusion method of FRP lamination certificate issued by class society/accredited lab. e) Stability booklet of each craft shall be approved by class society. f) Check physically. g) Check physically. h) Builder to furnish the requisite certificates obtained from the National/International level accredited test laboratory for the Armour protection prototype Inspection. Builder to submit weight calculations with BP panels fitted and prepare preliminary intact stability booklet for class approval. i) Check physically. j) Check class certificate.

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		k) Any involvement of marine regulation other than specified in the QRs which is required to be considered for the quality/required parameters while approving of design/constructing of the boat, stage wise/items wise may be ensured by the builder to get it approved by Classification Society.	k) Check class certificate.
23.	Sea Worthiness	The craft shall be capable of operating in sea conditions up to sea state-4. The craft shall remain operational with reduced performance in conditions at sea state 4 and shall have survivability up to sea state 5.	Class approved certificate to be provided by builder.
24.	Fendering	The craft to have heavy duty suitable fender all around the craft with appropriate size minimum wall thickness of 38 to 50 mm, 3 Nos heavy duty pneumatic fenders each on port and STBD side of size 3' x 1.5'. The fendering system has a service life of at least five (5) years before requiring major overhaul or replacement.	Check fender for adequacy/location. Check class/lab approval certificate for materials.
25.	Special features	<ul style="list-style-type: none"> a) As per the class requirement, anchor/cable along with windlass/winch shall be provided suitable for anchoring in the water condition mentioned in the environmental condition as mentioned at srl No. 6 of QSR. The complete system shall have galvanic protection inside cable locker. b) Escape routes NBCD/FF equipment's signs shall be made photo luminescent. c) All fitting appliances and gears shall be load tested to static and running load. The Certificate concerning this shall be provided by the yard after obtaining them from the respective OEMs. d) Awning and stanchions for all open deck shall be provided. Green fiber sheet properly bolted with SS material on the top of awning or suitable to hold the solar panels. e) Two set of canvas cover for all open deck fittings and equipment shall be provided. f) Soft patch shall be provided for shipping in/shipping out of main engine, generators and heavy machinery installed in the engine room. g) Low noise levels are vitally important to mission effectiveness and long term crew health. Noise levels be reduced wherever possible. h) The consoles of vessel should be weather tight. i) The hull, deck, console and cabin has confirm service life of at least 15 years. 	<ul style="list-style-type: none"> a) Load test certificate approved by accredited lab to be provided by builder. b) To be checked physically. c) To be checked physically as well as class certificate. d) To be checked physically as well as class certificate. e) To be checked physically. f) Check physically. g) To be checked physically. h) To be checked physically. i) To check class certificate.
26.	Armament	Location for Main and Secondary Armament mountings. The Craft shall be fitted with Gun mounting for MMG on bridge top middle Fwd, AGS at foxle, LMG at quarter deck Aft (Port 180 degree & STBD 180 degree), Maintain 270 degree fire power for bridge top MMG and AGS to avoid ricochet of bullets from mast and other equipment installed on deck. All gun mounting with NIJ level - III /EN- 1063 standard light weight protection. In addition 01 HMG 12.7	Check physically.

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	<p>SRCG weapon at middle AFT with 270 degree Arc of Fire with Remote Operating weapon System with day & night camera and operating / control system from wheel house, RL and Sonic Weapon, the location of the weapon is decided at the time of design. BSF will provide the weapon or complete drawing of weapon/fittings for mountings etc to the firm to make the weapon mountings.</p> <p>Armament Locker</p> <p>The armament locker shall be provided in conformance to the QR's and shall have the capacity of storing ammunition. Essential safety features and flame retardant paint shall be provided in armament locker.</p>	
27.	<p>Navigational Equipment</p> <p>The crafts shall be fitted with the following Approved Type navigational & communicational equipment:</p> <ol style="list-style-type: none"> Navigational RADAR with AIS 24 nm range with ARPA facilities to track minimum 10 targets having approximate 10" Video display unit of reputed make. Magnetic compass Echo Sounder. The fitment should be done in such a way to protect the sensor during grounding/beaching. DGPS Navigation light as applicable as per COLREG of reputed make. Anemometer Wet and Dry bulb thermometer Barometer Digital marine chart display 2 set of Hydrographic Chart each of Sunderban and Creek area as per consignee requirement be provided with parallel ruler and dividers. Loud hailer & PA system. Police light & Siren/Horn (Electrical) with loud speaker, microphone and electronic unit. Heavy duty Window wipers should be provided in the all-front windscreens. Binoculars (7x50 marine type- 02 Nos.) Search light for 360-degree coverage operating from wheel house having detection range 500 meters, identification 400 meters and reorganization 300 meters during clear environment visibility. Electric horn with range of 01 Km. Marine set. <p>Note:- Multifunctional display of various navigation system/equipment's wherever</p>	<p>Examine the eqpt physically. Check type approval certificate of the Eqpts where ever applicable and carry out functional test.</p> <ol style="list-style-type: none"> Check the specification provided by OEM and functioning. Test the functionality of eqpt during day & night hours and ascertain whether it is working properly for detection and recognition of target at reasonable distance. Check the compass and its swing Check the eqpts and take readings Check functioning of DGPS. Check functioning of Navigation light. It should meet COLREG requirements. Check functioning of Anemometer. Check correctness of temp and functioning of thermometer. Check functioning of Barometer.

S/No	QRs/Technical Specification		Trial Directive
		<p>applicable. All displays should have the ability brightened and dimmer for night navigation.</p>	<p>i) Check physically. j) Check physically. k) Check functioning of loud hailer & PA system l) Check functioning of police light & Siren/Horn (Electrical) m) Check functioning of window wipers. n) Check functioning of Binoculars and its resolution. o) Check functioning of SL and range. Also check remote operation of search light. p) Check physically. q) Check functionality physically.</p>
28.	Communication al equipment	<p>The following Approved Type communicational equipment shall be fitted on the medium craft. All equipment will be provided in the wheel house.</p> <p>a) HF Transceiver – 01 No. b) VHF Transceiver (MMB) – 01 No. c) Portable VHF Transceiver – 02 Nos. d) Search and rescue Transponder (9GHz) – 02 Nos. e) Emergency Radio Beacon (EPIRB) – 01 No. f) Distress alert transponder.</p> <p>Internal Communication:</p> <p>a) Intercom (Main Broadcast) and telephone (Talk back system) shall be provided. b) Sound powered telephone shall be provided between wheel house, machinery compartment and accommodation spaces. c) All compartments will be provided with public address speaker.</p>	<p>Check operations. Check functioning of HF/VHF sets. Check functioning of Intercom and public address systems.</p>
29.	Machinery Main Engines	<p>a) The boat shall have two commercial rated turbo charged after cooled inboard marine diesel engines reputed make having indigenous product support of appropriate capacity coupled with marine class approved reversible gearboxes of reputed make having indigenous product support reputed make coupled with suitable propulsion system for shallow water operation should with the desirable draft. The main engines are to be type approved and latest applicable IMO/MARPOL requirements compliant by classification society.</p>	<p>a) The boat builder to provide type approval certificate from the classification society along with Unit Certification of each engine and gearbox. b) The boat builder to provide type approval certificate from the</p>

S/No	QRs/Technical Specification	Trial Directive
	<p>b) The boat shall have Electronic control and monitoring system for engine, gear box and propulsions system.</p> <p>c) The boat shall have easy electrical starting system of Main Engines by independent battery. Redundancy is to be provided in the form of at least two independent battery sources that can be cross connected to start either engine. The boat shall have remote starting/stopping of main engines from the wheel house and locally from engine.</p> <p>d) The wet exhaust system is to be used with suitable noise reduction arrangement for main engine and generator prime mover.</p> <p>e) Testing lamp with 10 mtr cable – 02 Nos</p> <p>f) Engine room ventilation – Sufficient ventilation blowers are to be provided in order to ensure that the maximum rise of air temperature between supply and exhaust air is restricted to 10° C. During design the inlet blower should be placed at front side of the engine room and outlet blower should be placed at aft side of engine room.</p> <p>g) The main engine control and monitoring system should be the product of main engine OEM or the scope/responsibility of OEM of main engine. Also the responsibility of general service and complete brake down service of main engine and its control /monitoring system through main engine OEM/OEM authorized service agency only.</p> <p>h) The engine (s) should be able to carry out sustained operations for about 8-10 hrs per day, with an annual exploitation of about 2000 hrs.</p> <p>i) The bidder should select/nominate only one type/make of engine with all literature and related OBS list along with technical bid. Quoting multiple engines make and model is not permitted.</p> <p>j) The selection of marine engine should be done with control unit of complete system.</p>	<p>classifications society. Check functioning of all controls and monitoring systems on console.</p> <p>c) Check manual and remote start/stop of engine from wheel house and locally. Start stop engine for 10 times. Check gravity of battery before and after start/stop of engine. All reading/engine parameters to be recorded</p> <p>d) Check physically.</p> <p>e) Check physically.</p> <p>f) Check physically.</p> <p>g) Check main engine and all parameters as under:-</p> <p>i) Prepare main engine for operation.</p> <p>ii) Start port main engine. Stop as soon as Low pressures are achieved.</p> <p>iii) Repeat – Start – Stop 10 times.</p> <p>iv) Carry out same for STBD side main engine also. No. of starts given:- Port – 10 starts, STBD –10 starts</p>

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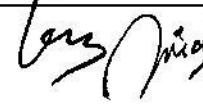

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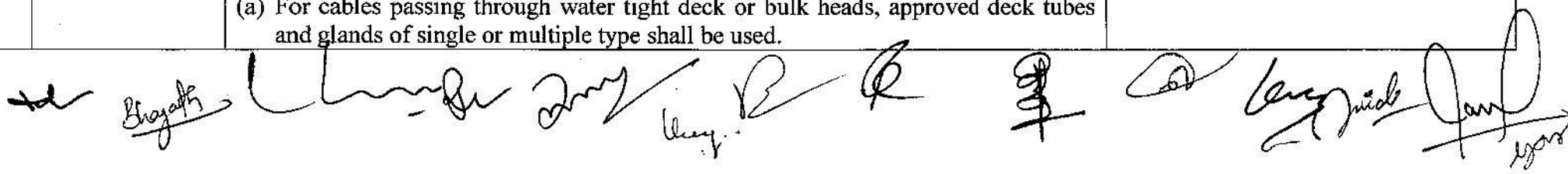
S/No	QRs/Technical Specification			Trial Directive				
				Attempts	Time in (Sec)			
					ME (P)	ME (S)	DG Set	
					1.			
					2.			
					3.			
					4.			
					5.			
					6.			
					7.			
					8.			
					9.			
					10.			
				Note:- specific gravity of batteries to be checked before and after endurance trial if applicable.. h) to (j) Check physically				
30.	Power	<p>a) Power generation and distribution system should conform to Classification Society norms. A suitable power source of adequate capacity, to meet the entire electrical load of the craft including battery charging is to be provided. A load analysis chart justifying the capacities of the power supply source and a single line schematic diagram showing arrangement of the power generation and distribution is to be provided along with the technical offer.</p> <p>b) Two (Class Approved marine type) DG sets each capable of meeting complete crafts load at all times with 25% reserve capacity shall be provided. Generators should be suitable for continuous unattended parallel operation.</p> <p>c) In addition, the battery system of adequate capacity with independent charging facility shall be provided for starting of main engines/generator sets and meeting emergency power requirements including automatic emergency lighting arrangements.</p> <p>d) Solar bipole flexible panel along with hybrid inverter power multiple power point tracking (MPPT) 2 to 5 KW charging from solar and DG set and secondary batteries 300 AMP/HRS 24 VOLTS with suitable power backup for 24 hrs for 10 lights, 10 Fans, as an alternate source for general lighting and crew comfort required to be installed at place of canopy/awning of Aft side of Medium crafts</p>	<p>a) Full power trials of DG at 100% MCR and to be conducted for 60 min with recording of all system parameters.</p> <p>b) Type approved certificate to be provided by the boat builder. DG Set performance trial to be conducted by running for one hour continuously on full load. All parameters of DG Set must be in normal limits specified by the DG Set manufacturers. This trial will be done twice after interval of half hour.</p> <p>c) Check battery charging facility and capacity of battery to meet automatic emergency lighting arrangements.</p>					

Note:- specific gravity of batteries to be checked before and after endurance trial if applicable..

h) to (j) Check physically

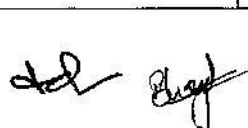
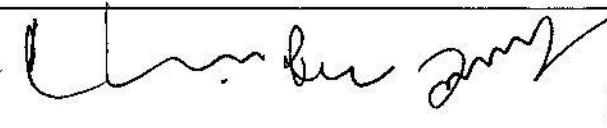
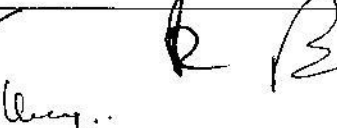

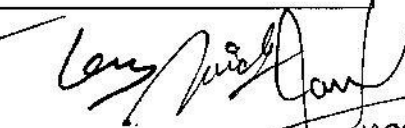
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S/No	QRs/Technical Specification		Trial Directive
		maximum space for solar Pannel to attain the maximum power. Remaining will be charged through DG set while in operation.	d) Check physically.
31.	Electric system	<p>a) All the electrical equipment, cables and fittings, machinery and associated systems shall be of Ingress Protection (IP) rating of IP – 65 and above and shall conform to Classification rules.</p> <p>b) Construction of the electrical equipment and machinery shall be such that all installation, main cabling & maintenance work including removal & replacement of component scan be performed from front.</p> <p>c) Testing lamp with 36 mtr cable.</p> <p>d) Lightening arrester – To be provided as per class requirements.</p>	<p>a) Check type approval/material test certificate of class/accredited lab</p> <p>(b to c) Check physically.</p> <p>d) Check class certificate.</p>
32.	Supply system	A emergency battery backup system to cater for uninterrupted power supply, for a minimum duration of 06 hrs to essential equipment viz. RADAR, controls, navigation and communication, lighting and domestic equipment's to be provided. Emergency Lighting/Emergency lighting fittings etc supplied from 24 Volts DC distribution board shall be fitted to provide illumination to access ways, passageways, in compartments and as approved by Class rules. If it is compatible with solar back up battery system, then one compatible conversion unit/system should be installed in place of emergency battery backup system. Emergency battery capacity calculation to be done accordingly.	To be checked during functional/performance trials.
33.	Shore supply arrangement	<p>A water tight shore supply connection box with 50 mtr supply cable shall be fitted on weather deck at an appropriate position conforming to Classification rules, to meet the requirements of the harbor loads.</p> <p>A reel for stowing the flexible cable 50 mtr will be provided and suitably located on the main deck.</p>	To be checked during functional/performance trials
34.	Batteries	Adequate numbers of 12 V DC Lead Acid maintenance free batteries sourced from reputed firms are to be provided to cater for battery backup system and for starting of DG/engine as applicable. Batteries are to be located in well-ventilated space and will be housed in suitable FRP/hard wood boxes with internal lead lining. Suitable battery charging arrangement for charging of batteries from the craft's generator as well as from 230 V, 50Hz shore supply is to be approved.	<p>Specific gravity and AHC rating of batteries to be recorded if applicable.</p> <p>It should meet the power requirement of the craft.</p> <p>Check housing of batteries.</p>
35.	Cables	<p>Cables conforming to Class requirement shall be used. Class approved Limited Fire Hazards (LFH) cables conforming to marine specifications shall be used in main switch board, control panels etc. The under mentioned aspects shall be considered during installation of cables.</p> <p>(a) For cables passing through water tight deck or bulk heads, approved deck tubes and glands of single or multiple type shall be used.</p>	<p>Check type approval/material test certificate of class/accredited lab.</p> <p>(a) to (e) Check physically</p>



S/No	QRs/Technical Specification		Trial Directive
		<p>(b) Proximity to pipe joints, hot positions, hatch ways and openings which may render the cables liable to damage shall be avoided.</p> <p>(c) Avoidance of congestion of cables and awkward bends.</p> <p>(d) Cables shall be fixed on perforated M.S galvanized planting mounted on vertical bulkhead as far as possible, but where this cannot be arranged, they shall be fixed to perforate planting on the underside of the beams.</p> <p>(e) Each and every cable shall be affixed with indelible brass identification tallies at each end before entering equipment. The tally shall indicate circuit code number as shown on relevant Drawings.</p>	
36.	Motor	All motor shall be conforming to classification rules suitable for marine use. Sitting of motors should be as per classification society's regulations.	To be checked during functional/performance trials. Full load trial of all Motor and pump to be carried out.
37.	Fire Fighting & Damage Control	<p>Firefighting equipment as per class rules and approved type shall be provided. Portable fire extinguisher shall be provided throughout the vessel as required to meet the class/SOLAS requirements.</p> <p>The machinery spaces is to be provided with a suitable fixed firefighting system operated from the bridge and fire & smoke detection system meeting class requirements. The alarm indication is to be available at the bridge panel. Fire pump/hydrant, automatic emergency lighting, automatic fire fighting arrangements in engine-room and magazine shall be provided. On board emergency hull repair kit and shoring arrangement to control flooding. To extract the unwarranted sea water deposited due to the unforeseen damage of the vessel. 01 No. class approved Marine DD fire pump with trolley capacity of 3 to 5 LPS (liter per second) with 20 mtr foldable delivery pipe with fire hydrant shall be provided.</p>	<p>i) Obtain and check certificate provided by class society.</p> <p>ii) Test the eqpt to ascertain its functionality.</p> <p>iii) Check functioning of sensors of fire detection systems.</p>
38.	Bilge System	<p>A suitable bilge alarm system is to be provided to indicate high water level in the bilge. The alarm indication is to be available on the bilge panel. The bilge system is to be designed in accordance with classification society regulation. However, minimum a motor (vertical type) /Engine driven bilge pump and a manual portable bilge pump is to be provided.</p> <p>One single phase submersible pump open well type with capacity 3 to 5 LPS (liter per second) should be fitted at the lowest keel portion in engine room to pump out bilge water in case of over flooding due to any valve failure etc.</p>	Arrangement of bilge system is to be physically checked with the class approved drawing and functional test to be witnessed along with class Rep.
39.	Life Saving Appliances	<p>Lifesaving appliances will be in accordance with SOLAS/Class approved type.</p> <p>(i) 04 number Hazardous Duty Life Jackets-As per Annexure- 'I'</p> <p>(ii) Two 12 men SOLAS approved life raft with HRRU to be provided.</p>	<p>(i) Lay out the buoys/jackets count and record.</p> <p>(ii) Check certificate of life raft</p>

S/No	QRs/Technical Specification		Trial Directive
		<ul style="list-style-type: none"> (iii) 25 Nos life jackets Class approved type with zip system, 3 lockable strip, whistle, retro reflecting tape. This should be jacket type so that troops can operate easily by wearing the life jacket. (iv) 08 life buoys with S.I light & 30 Mtrs life line SOLAS approved are to be provided. (v) One SOLAS approved set of rocket parachute flares is to be provided. (vi) General emergency alarm, Emergency instruction/muster station. 	<p>and its expiry date.</p> <ul style="list-style-type: none"> (iii) Check certificates. (iv) Check certificates. (v) Check certificates. (vi) Check physically.
40.	Air conditions/ Ventilation	The craft shall be provided with marine type heavy duty hydrophilic fins 5 star split air-conditioning system of reputed make at wheel house 1.5 ton 02 Nos (01 Port and 01 STBD side) and all accommodation spaces (SO,s cabin 1 ton 2 Nos and Crew cabin 1.5 ton 4 Nos.). All outer unit may be suitably placed/fixed considering the operational environment (rolling and pitching) at top. All drain system of inner unit should be placed toward Aft because while sailing of the boat will Fwd trim up and proper drain system to be provided for waste water of the split AC inner unit. All wheel house & accommodation places should be provided cross ventilation/forced ventilation as per class requirements for use in case of AC shut down/break down. Adequate forced ventilation is to be provided in the machinery spaces, exhaust may be provided at wash places and WCs etc as per Class.	<ul style="list-style-type: none"> (i) Check AC plants, switch on-off (Repeat the process 15 times) (ii) Check temp in wheel house/compartment to test is functionality. (iii) Obtain and check class approved certificates.
41.	Galley	<ul style="list-style-type: none"> a) The common galley with adequate space shall be provided: - <ul style="list-style-type: none"> i. Hot Plate – 02 Nos (2000 Watts each) ii. Induction stove - 01 Nos. (2000 W). iii. Microwave Oven. (heavy duty) iv. Electric rice cooker – 02 Nos v. Tea urn – 02 Nos. vi. Water cooler cum purifiers with suitable RO system 50 LPH (Liter per hours) vii. Storage racks & sinks. b) Complete set of cutlery and accessories as per complement shall be provided:- <ul style="list-style-type: none"> i) Refrigerator 90 ltrs capacity – 01 No. ii) Deep freezer (50 Ltrs. Capacity) – 01 No. iii) All other utensil required for making food and serve food water etc. for 16 personnel. iv) Flask 1 Ltrs. – 02 Nos. v) 2 or 3 Ltrs. instant Water heater/geyser c) Securing arrangements need to be provided for all galley equipment. d) Induction Stove should be provided with rails for retaining cooking utensils. 	<ul style="list-style-type: none"> a) Check all equipment for its functionality. b) Check and count all cutlery and accessories as per ship inventory. <ul style="list-style-type: none"> i) Check Refrigerator and its functionality for one hour cooling should be adequate. ii) Check Gallery for adequacy of space as per GA drawing and functioning of equipments provided/fitted in Galley. c) Check Securing arrangements physically. d) Check physically.

S/No	QRs/Technical Specification		Trial Directive
42.	Stowage space for Ration	Sufficient space for storage for ration shall be provided for complete crew for the mission period of 03 days.	Check adequacy of space for stowage of Ration.
43.	Recreational facilities	TVRO (Television Receive Only) system with Model- S6 SUPER TRACK MAKE-KNS MARITIME TVRO ANTENNA required to be installed with one year subscription (English and Hindi channels) of Tata play or Airtel or any other reputed DTH with suitable package for recreation of troops. 01 LED 45 Inches smart TV of a reputed brand required to be installed in dining/recreation room and 01 LED smart TV 32 Inches each at SO's and Crew accommodation for recreation purpose.	Check physically.
44.	Rudder and Steering arrangements	Rudder not required. Suitable hydraulic/electronic steering system compatible to the Water Jet propulsion be provided. Hydraulic/electronics steering system control unit should be the product of OEM of Water jet manufacturer or direct responsibility/scope of the OEM of the Water jet propulsion system	Check its functionality as per recommendation of OEM in presence of classification society representative. Boat builder should provide type approved certificate.
45.	Wheelhouse/ Bridge	<ul style="list-style-type: none"> a) Wheelhouse to have Armour protection NIJ-III/EN-1063 light weight protection including bullet proof glass. b) Overhead vision (Hatch). c) Suitable seating for 10 crew in the wheel house cabin and height /reach adjustable 2 captain chair at steering and co-driver seat. d) All seats should have the shock absorber. e) The Windows height of Port &STBD should be placed/covered so that the troops can observe the outside by sitting on the seat. f) All the wind screen should be inclined top to forward for good visibility of captain. The front glass should be positioned to clear observation from the captain chair. g) 02 each openable small port holes of 100 MM diameter (with openable bullet proof cover) be provided at Port &STBD for firing by the troops from inside with their personnel weapons. h) Curtains should be provided at all windows and wind screens. i) All electrical panels light/screen and accommodation light installed in the wheel house should have the dimmer unit to black out for night navigation. j) Steering system hydraulic/electronic k) Engine/propulsion controls and instrumentation. l) Master control panel for systems. m) Remote control facility, for starting/stopping/operation of engines including engine performance monitoring panels, fuel state indicators, battery state 	<ul style="list-style-type: none"> a) Check test certificates. b) to r) Stand in wheel house and test the visibility. Stand in wheel house and test the visibility for overhead. Ensure sitting by crew members. Check for comfort and easy operating of consoles. Check for easy operation. Check number and location of controls for easy viewing by the Master. Carry out functional test. Check for number location and other details. Check AC/ventilation for adequacy/comfort functioning. Check windows/hatches for number/location and test functionality. Test general lighting for adequacy. <p>Test dedicated lighting for</p>

S/No	QRs/Technical Specification		Trial Directive
		<p>indicators, battery charging indicator etc, as per classification society rules to be provided. Coxswain post to be fitted with Communication console.</p> <p>n) Provision of adequate numbers of electric sockets, USB port and multiple ports in wheel house to be catered for mobile charging.</p> <p>o) Night lighting arrangement to be provided.</p> <p>p) Proper cross ventilation arrangement to be made in the Wheel House by providing openable water tight Windows 01 each at port and STBD side.</p> <p>q) Multi-functional display unit with Map etc. be installed with 5-year subscription for update the map software.</p> <p>r) 01 wash room with western closet is required at wheel house.</p>	<p>number/location for adequacy. Check for availability/location and test for its functionality</p>
46.	Accommodation and Habitability	<p>Coxswain Post: One enclosed area with a seating arrangement for 12 personnel is to be provided. The seats are to be provided with shock absorption device and seat belts. The seating arrangement, cup boards and stowage design are to be of contemporary design. All furniture shall be of modular Design.</p>	<p>To be physically checked as per GA.</p>
47.	Complement	<p>Accommodation: Sitting capacity: - 12 persons including helmsman & cart man</p> <p>Sleeping bunk accommodation :- 12 person (04 Subordinate officers & 08 crews)</p> <p>a. One cabin for 04 Subordinate Officers and bathroom attached placed as per design.</p> <p>b. Dormitory accommodation with bunk type bed for 08 personnel having two bathroom with hatch and forced ventilation (blower).</p> <p>c. Adequate dining space for crew.</p> <p>d. All cabins to be adequately furnished/carpeted with standard fitting, 2" mattress (Hard Kini foam), blankets, pillow, bed sheets, wall clocks, curtains, towel etc. All Furniture, Cabin fittings, Bath room fittings shall be of modular Design. The layout of accommodation space, Galley, Bathrooms and WC should be modern and ergonomically designed to facilitate comfort and utility. Any additional items contributing to comfort may be incorporated.</p> <p>e. All accommodation places/bunks should be fitted with socket for mobile/laptop charging and sufficient bunk fan for comfortness while AC system shut down.</p> <p>f. All bathroom should have 2-3 Liter capacity instant geyser facility.</p> <p>g. Securing arrangement should be provided for all loose fitted equipment's.</p>	<p>Seating capacity & sleeping arrangement to be physically checked as per GA.</p>
48.	Sanitary	<p>Suitable sanitary system, including wash basin, toilet with a holding tank/flushing out arrangement and sewage disposal is to be provide as per class requirements. WCs are to be provided with integral macerating/treatment unit with provision to discharge over board or to shore collection unit.</p>	<p>To be physically checked as per approved drawing.</p>

S/No	QRs/Technical Specification		Trial Directive
49.	Redundancy Aspects	The crafts systems should be designed keeping aspects of redundancy and independent operability in perspective. It should be feasible to isolate defective equipment and fittings without affecting overall performance.	Physically checked.
50.	Forepeak	For peak shall be built for stowage of anchor chain cable and other ropes. A Naval pipe of stainless steel shall be fitted in the compartment for anchor chain/cable. Arrangement for securing the inboard end of the chain / cable shall be provided the compartment. A drainage arrangement shall be provided as per class requirements.	Check and obtain type approval certificate of class for Anchor and Anchor chain cable.
51.	Fore cabin	This compartment shall provide convenient sleeping arrangement. Adequate electrical light fitting and AC shall be provided. Locking cupboards shall be provided. Extra storage facilities shall be provided under the bunks. Rack for accommodating Rifles- 12 Nos, LMG-02 Nos, AGS- 01 No, RL - 01 No, Sonic WPN- 01 No, MMG-01 No and HMG - 01 No along with ammunition is to be provided.	To be physically checked as per approved drawing.
52.	Deck, Machinery and Seamanship Fittings	<p>Deck shall be constructed with GRP sandwich Laminates as per classification society Rules. All the exposed surfaces of the main deck shall be given antiskid finish. Additional chafing laminate shall be provided in way of anchor arrangements.</p> <p>Following Equipment/accessories shall be provided conforming to class requirements :-</p> <ul style="list-style-type: none"> (a) Anchor and chain cable suitable for environmental condition mentioned at Srl No. 6 of QR to be as per class requirement. (b) Hawse pipe and Anchor recess (c) Anchor Windlass to with stand the environmental condition mentioned at Srl No. 6 of QR to be as per class requirement. (d) Bollards, Mooring/Freeing Ports, Fairleads, and Towing Arrangements. (e) Bollards, Cleats and Fairleads. Four in number stainless steel bollards, four in number SS fairlead and four in number SS Cleats conforming to SS-316 material shall be provided. All these fittings shall be fastened through GRP on to a SS backing plate with nut bolts and SS fasteners. The backing plate shall be laid up and covered up with adequate no. of GRP layers. (f) Mooring Towing ropes. (g) Doors/Hatches - To be of lightweight construction and arrangement complying with National/International Standards. <p>The certification of anchor arrangement be done by the class as per the environmental requirements.</p>	<ul style="list-style-type: none"> a) Check class specification and certificate. b) Check anchor and mooring equipment physically and check its functionality during the sea trial. c) Materials test report of Bollard, Cleats, Fairleads and Ropes. d) Suitability and ease of embarking ladder on port and STBD side be checked. e) Check material certificate. f) Check load test certificate. g) Check certificates also physically.
53.	Guard Rails and	a) Stainless steel SS-316 guard rails of min 20 mm dia with stanchions shall be	To be physically checked from

S/No	QRs/Technical Specification		Trial Directive
	Ladders	<p>provided all along the craft. Stainless steel SS-316 storm rails also be provided all along raised deck house. Pole of the guard rail/strengthened accordingly. Suitable SS ladder should be provided to reach at upper deck.</p> <p>b) Suitable SS foot holds should be provided at lower side of wind screen to clean the wind screen by troops comfortably.</p> <p>c) Detachable ladder for boarding from small speed boats 02 Nos.</p>	location as per GA. Materials test certificate to be provided by builder.
54.	First Aid Box	02 Nos first aid boxes to be installed (01 at wheel house and 01 at accommodation area)	Check physically.
55.	Fitting & Fixing	All metallic fitting & fixture including railings, blower bodies/base, nuts, bolts, screws, washers, clamps etc. to be SS-316 marine grade. No ferrous metal used in any place. Class certification to this effect should be provided suitable for infusion process.	Check type approval/material test certificate of class/accredited lab.
56.	Materials	<p>i. Vinyl ester grade resin (suitable for vacuum infusion system) to be used and approved by any member of IACS classification society.</p> <p>ii. Glass Reinforced plastic materials used in construction such as Chopped Standard Mat, Woven Roving etc. shall be IACS member approved.</p> <p>iii. Core materials approved by IACS member shall be used.</p> <p>iv. All SS Material used in the deck or any other spaces should be marine grade of SS 316.</p> <p>v. All the materials, workmanship and finish shall be of the high standard/quality and as per class and user requirement.</p> <p>vi. All windscreen/glass should be toughened glass.</p> <p>vii. All ply wood should be 100% water proof marine ply wood.</p> <p>viii. All wood fittings should be high quality seasoned teak wood.</p> <p>ix. In the Engine room final coat shall be of class approved fire retardant resin.</p> <p>x. Antifouling paint is to be used for hull below the water line.</p> <p>xi. Material for engineering/electrical systems attached as Annexure- 'II'</p> <p>xii. Suitable anti-fouling system to be provided by the OEM for the water jet units.</p>	Check type approval/material test certificate of class/accredited lab and other physically check.
57.	Documentation and Publications	<p>i. Equipment/machinery cost details for record and condemnation process</p> <p>ii. Copy of technical advice floated to various firms for equipment/machinery be forwarded to BSF simultaneously.</p> <p>iii. All drawings i.e. 3D design soft copy, GA Drawing , electrical circuit drawing are class approved – 03 set.</p> <p>iv. As built final building specification, as fitted drawing and consolidated schedule of piping, painting, insulation, paneling and deck lay-up on delivery of</p>	Physically check and check approved certificates.

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S/No	QRs/Technical Specification		Trial Directive
		<p>craft(three copies per craft).</p> <p>v. Manual with regards to installation, operation and maintenance of various equipment/fittings systems and part identification list (three copies per craft).</p> <p>vi. Service manual of all engine and accessories.</p> <p>vii. Part catalogue/identification list of all engine and accessories.</p> <p>viii. Stability booklet is to be approved by Class and provided.</p> <p>ix. Docking plan.</p> <p>x. Firefighting plan, LSA plan, LSS plan, Radio & communication plan, Navigational arrangement plan.</p> <p>xi. SS 316 material used as per Srl No. 55 of QRs should be provided as per national/international standard.</p> <p>xii. Load Test certificate of anchor arrangement as per environmental condition mentioned at Srl No. 6 of QRs should be provided.</p> <p>xiii. Fuel tank pressure test report witnessed by class.</p> <p>xiv. 02 set of Hydrographic map of Sundarbans& Creek area with parallel ruler and dividers</p> <p>xv. Complete vessel built class certificate</p> <p>xvi. Builder certificate</p> <p>xvii. A valid works approved certificate for yard capacity of vacuum infusion method of fiber lamination.</p> <p>01 set of complete Documentation per craft plus 02 Nos for official use, total 03 copies are to be provided in printed hard copies. In addition CD and soft copies & software for reading to be provided.</p>	
58.	Painting and finishers	<p>i. Hull area below the waterline shall be painted with Anti fouling paint as per the latest IMO regulations schedule and enclosed as Annexure- III.</p> <p>ii. The armament lockers shall be painted with flame retardant painting system.</p> <p>iii. The Medium Craft shall be painted in disruptive pattern colour with BSF/user markings.</p> <p>iv. The Medium Craft name, ID No. and BSF/user Emblem and National Flag shall be fixed on both sides of the Hull at superstructure at an appropriate place.</p>	Check material test report of paints. Check pattern of painting, craft name and BSF/user force emblem.
59.	Tools	One set of tools specified by OEM for all engine/equipment and accessory installed in the Medium Craft to be provided.	Check physically.
60.	Displacement and Weight	As per given endurance, loading and speed requirements. Weight – As per design of the boat..	Check its class approval test certificate.
61.	Instrumentation	Machinery space is to be provided with suitable acoustic/Fire/Thermal insulation. A	Check all the instrument functioning.

S/No	QRs/Technical Specification	Trial Directive
<p>●</p>	<p>Panel</p> <p>suitable monitoring and control system for the main engines and gear box is to be provided in the helms console. The engines and gearbox will be controlled from the helms console. The control station in the helms console should have provision for starting, stopping, monitoring control and operation of main and auxiliary machinery. All instrumentation panels are to be watertight. All gauges are to be provided with integrated lighting with dimmer facility. Essential machinery instrumentation shall include the following (list is indicative and shall be enhanced as per OEM recommendations):- Latest Technology Multi-functional digital display system may be used.</p> <ul style="list-style-type: none"> a) Engine Tachometer b) Engine oil pressure gauge c) Engine cooling with a temp gauge d) Engine oil temperature gauge e) Gear box pressure gauge f) Speedometer g) Single lever engine/gear box control system h) Light indicator i) Engine oil pressure alarm j) Engine oil pressure trip k) Engine oil temperature alarm l) Engine water temperature trip m) Gearbox oil pressure alarm n) Gearbox oil pressure trip o) Gearbox oil temperature alarm p) Emergency main engine stop q) Over speed trip mechanism and indication r) Lub oil pressure gauges for engines and gearboxes s) Fresh water temperature gauge t) Hour counter u) Ammeters/voltmeters for monitoring battery charging/battery voltage/load current v) Exhaust temperature gauges 	
62.	<p>Miscellaneous</p> <ul style="list-style-type: none"> a) Overhead fresh water tank with capacity 500 liters with proper pumping system from main tank is suggested to install at top of wheel house with connect to all wash rooms and galley etc. b) 01 Laptop of reputed Make i.e. Dell, HP, ACER etc of latest version along with 	Check all parameters.

42

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S/No	QRs/Technical Specification	Trial Directive
	<p>laser jet printer required to be provided.</p> <p>c) 01 latest high resolution digital camera of reputed firm i.e. Canon or Nikon is required to be provided.</p> <p>d) All bath/wash rooms should have exhaust fan.</p> <p>e) Awning should be designed to with stand the load and provision of flexible solar panels during sailing in the various sea states mentioned at Srl No. 1 of QRs. The size to designed to avoid sliding damage while placing the vessel alongside of the other vessel /Jetty.</p> <p>f) All hinges of hatches and doors to be placed in the Aft side so that the natural wind can easily flow inside while sailing.</p> <p>g) Mast Should be foldable type with hydraulic / electric lifting and down facility.</p> <p>h) 02 Nos each 32 Amp socket (male & female) with switch on either Aft side of the cabin.</p> <p>i) Pneumatic Fender with allarroundtyres interlocked with SS chain and ropes, Size 1 Mtrdia and 1.5 Mtr Length. 02 Nos</p> <p>j) High definition CC TV Camera with IR installed in engine room 01 No, on top 04 Nos on top with complete system with recording storage of 07 days.</p>	
63.	<p>3D Design of Vessel</p> <p>Complete design scheme, drawings and 3D design animation (in any suitable software) to be provided by the builder to finalize the design comfortness and operational requirement of user . After discussion on this 3D design between user, class society and builder the final design and drawings should be decided. Amendments in the 2D and 3D drawing animation may be incorporated in the GA drawing as per the user's requirement before approval of GA drawing by respective class. Soft copy of all drawing related to vessel required to be provided by vessel manufactured firm.</p>	Check physically.
64.	<p>Guarantee /Warrantee</p> <p>The firm have to provide 02 years guarantee/warranty for boat from date of acceptance of consignee location in satisfactory condition. Guarantee/warranty service on site (BSF deployment locations) shall be provided by the OEM/authorized service agencies of respective machineries. The Guaranty/Warrantee shall be comprehensive i.e. for all system. The company will provide the all-consumable items, spares, batteries etc. including oil/lubricant (Except fuel) for whole of the period of guaranty/warrantee on free of cost. All periodical maintenance should be done by the OEM for all machineries. The OEM service provider shall provide the past service performance of such engines in India for the last 05 years.</p>	To be obtained certificates.




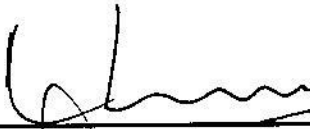








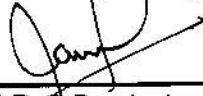

S/No	QRs/Technical Specification	Trial Directive
65.	OBS (On Board S)	a) List of OBS attached as Annexure- 'IV' required to be supplied by firm along with Medium crafts at the time of delivery.
		Check physically.

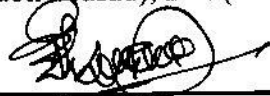

 (Sanjay Singhal), IPS, SDG (HR), BSF

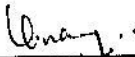

 (Ashok Kumar), DIG (SIW), BSF



 (Mahabir Prasad), DIG(WW), BSF



 (K K Dhawan), ~~Principal~~ ^{Chief} Surveyor, IRS
 (through VC)

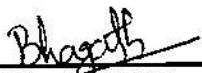

 (Lt. Col D C Pant), Assam Rifle (through VC)



 (K L Puri), SP, BPR&D



 (Vinay Barthwal), Dy Director, DCPW

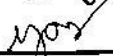

 (Capt Raman), Team Cdr, NSG

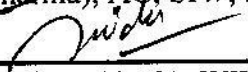

 (Rakesh Kumar Jha), AC, IT Wing,
 CRPF


 (Bhagath R), AC, SSB



 (Ph. K K Sharma), AC, SIW, BSF


 (Inspr/Tele Ram Gopal Meena), ITBP


 (SI/Exc Yatik Anand), CISF


 (SI/WKSP Jaidev Singh), WW, BSF

Approved/Not approved


 Director General
 Border Security Force

TECHNICAL SPECIFICATIONS OF HAZARDOUS DUTY LIFE JACKET (HDLJ)

This statement of technical requirement covers the design, manufacturing, supply, testing and product support for single buoyance Hazardous Duty Life Jacket (HDLJ) DS CAT No N4220-000835 (Indian Navy) required to be worn by personnel whilst carrying out hazardous duties at sea such as Boarding Party Ops, Seamanship evolutions, High speed boat operations etc.

Construction. The HDLJ should be manufactured considering following requirements:-

General Requirements

As per para 1.2 of SOLASLSA code, MSC resolution 48 (66)

As per para 5 of SOLASLSA code, MSC resolution 207 (81)

The quality of workmanship (e.g. seam stitching, fixing of various fixtures, ergonomics of design and placement of fixtures etc.) must be of high order.

It should be fitted with a whistle made of a rustproof material, capable of making a loud shrill note in fresh water / sea water, and firmly secured by a cord.

Vest. HDLJ should be fitted on a nylon sleeveless mesh vest. Vest should have pockets / pouches HDLJ should also have means for airlifting a survivor during search and rescue operation.

The buoyancy of Life jacket should be at least 16 kg in fresh water. Weight of HDLJ should not exceed 1.5 kg. Life jackets should be suitable for use by adults.

Emergency Gears. HDLJ should be provided with the following emergency gears, suitably affixed on HDLJ :-

Distress Marker Light and Battery Unit. A distress light with a water activated battery is to be provided for locating the wearers in darkness or fog. There must be a provision to replace battery and / or lamp if it has been utilized. The light and the battery should have a shelf life of five years from the date of delivery onwards.

Buddy Line. A five foot buddy line should be attached to the HDLJ. The line should have a loop on the end to connect to a rescue boat or to another person.

Auto-inflation mechanism and valise / bladder material should confirm to the test requirements of MSC 81 (70).

Additional Features.

The model number and the year of manufacture, buoyancy and details of approving authority should be printed on the Life jacket.

Each Life jacket should have mark of inspecting authority on the valise and a permanent marking of date of expiry.

Testing and Certification.

HDLJ should have the approval of national authorities like Navy / DOT/MMD/ Coast Guard of the country of manufacture or confirm to SOLAS specifications.

The life jackets should have been type tested in accordance with IMO resolution MSC 81 (70) and 226 (82) & sub sequent applicable resolution.

However, SOLAS requirement of twin buoyancy chamber is not applicable.

Necessary certificates for Type approval are also to be submitted.

Handwritten signatures and initials are present at the bottom of the page, including a signature that appears to be 'Bhagat' and several other illegible signatures and initials.

Spares. The On Board spares (OBS), and test equipment and the quantity, if any are to be recommended by the supplier. Such recommendations are to be commensurate with the reliability of critical components and component use in the jacket. Special tools and test equipment are to be supplied for on board maintenance.

On Board Spares. An itemized list of OBS, special tools and special equipment, which will be supplied with the life jacket are to be furnished along with the main offer. The OBS are to cater for all onboard maintenance routines and possible repair requirements. The OBS should include the following.

All spares required for exploitation up to 2 years.

One set of general-purpose maintenance tools along with each life jacket.

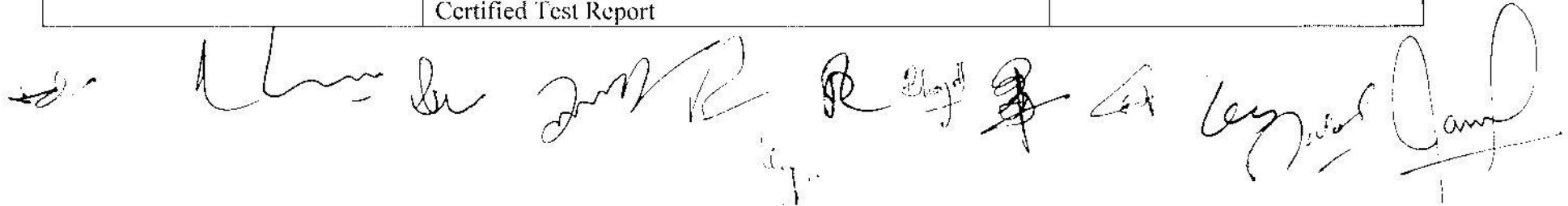
One set of special tools required for dis-assembling / assembling of components for repair by replacement.

OBS list is to be furnished.

Detailed specification of various components is also required to be provided.

Document. Each life jacket should be provided with an operation, technical and maintenance manual, type test and acceptance test certificates. In addition following documents are to be provided by the supplier :-

Description	Content	Copies
	Field and Depot Maintenance Manual	
	Parts and Tools Catalogue	
Technical Data	GA Drawing	
	Test Procedure and Documentation	
	Minor Repair Procedure	
	Certified Test Report	

A series of handwritten signatures and initials in black ink, spanning across the bottom of the page below the table. The signatures are stylized and vary in length, with some appearing to be full names and others being initials or abbreviations.

RECOMMENDED MATERIAL SPECIFICATION FOR ENGINEERING SYSTEM

S/no	Description	Pipes	Fittings	Valves	Flanges	Fasteners
1.	Lub oil system	Copper – up to 6 bar as per BS 2871 Cu-Ni 90/10-10 bar as per BS 2871	Gun Metal BS 1400 LG4C	Gun Metal BS 1400 LG4C	Gun Metal BS 1400 LG4C	Aluminium Bronze as per NES 837 part -II
2.	Fuel oil system	90-10 Cu-Ni	GM to BS 1400 LG4C	GM to BS 1400 LG4C	GM to BS 1400 LG4C	Aluminium Bronze as per NES 837 part -II
3.	Fresh water system (Domestic)	Copper/GI sheet	GM to BS 1400 LG4C/SS to AISI 316	GM to BS 1400 LG4C/SS to AISI 316	GM to BS 1400 LG4C/SS to AISI 316	Aluminium Bronze as per NES 837 part -II
4.	Sea water fire main, Ballast, Salvage (Suction/discharge)	90-10 Cu-Ni	NAB as per NES 747 part -II	NAB as per NES 747 part -II	NAB as per NES 747 part -II	Aluminium Bronze as per NES 837 part -II
5.	Compressed Air system a. Air upto 8 Bar pr b. Air pr 8 to 30 bar c. Above 30 and upto 276 bars.	a). Seamless steel to BS 3601 class 22 or 27 or seamless copper b). Seamless steel to BS3602HFS or CDS class 360 & 410 c. Solid drawn 70/30 Cu Ni to NES 780 part 3	SS to AISI -316	Gun metal BS 1400 LG4C or Carbon steel	Aluminium Bronze or SS to AISI -316	Aluminium Bronze of stainless steel
6.	Hydraulic system	Stainless steel	Stainless steel	Stainless steel to ASTM A 216	Stainless steel to ASTM A 216	Stainless steel
7.	All fittings & fixtures including Nut,Bolt,Screw,washer, Clamps, Railing, Attachment etc should be SS-316 marine Grade.					

Preference is to be given to centrifugal pumps for the above applications

Material for Pumps

Casing - AI Bronze to DGS 8520/GM to DGS 203

Shaft - Stainless steel AISI 316

Impeller - AI Bronze to DGS 8520

Wear Ring - LB BS 1400 LPB 1

Pumps for Lub oil and Fuel Oil – preference will be given to screw type pumps for this application.

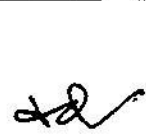
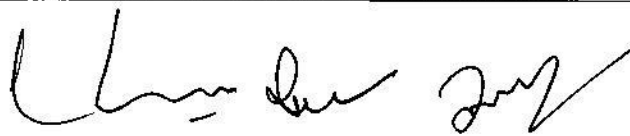

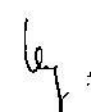


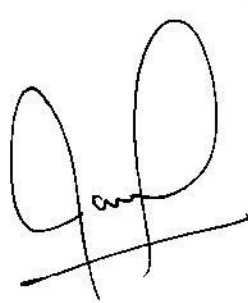
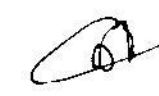



Seals. Mechanical seals are to be provided for all types of pumps.

[Handwritten signatures and initials are present below the text, including "R", "R", "leg", "Bhagat", "Jan", "yan", and several other illegible marks.]

PROPOSED PAINTING SCHEDULE OF MEDIUM CARFTS

Anti fouling paint system as per latest International Maritime Organization (IMO) regulations shall be applied to hull bottom (below water line) The pattern of the paint on the outer body part of the boat will be disruptive with combination of OG& cream / smoke gray color. Inside of hull paint color should be pale cream.

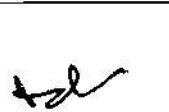
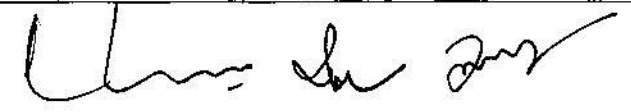
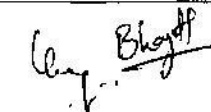




(i)	Anti-Fouling Paint :- Pen guard HB primer (Epoxy primer) 01 Coat-100 Micron (DFT) Safeguard universal ES grey tie coat 01 Coat-100 Micron (DFT) Sea Quantum pro-u light red- 01 coat-150 micron (DFT) (Silyl Acrylate Anti-fouling self-polishing paint) Sea quantum pro-u-dark red -01 coat-150 micron (DFT) (Silyl acrylate anti-fouling self-polishing paint)
(ii)	Jet system/bucket & bucket system & propulsion nozzle & bucket system to be painted with metal oxide paint & primer.
(iii)	AFT deck and all rounds walk way anti-skid painting.


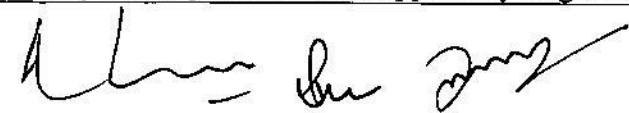

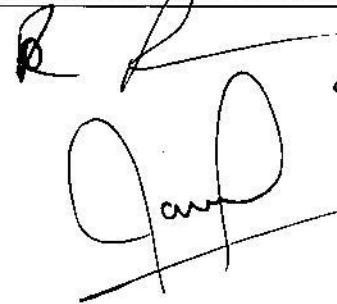
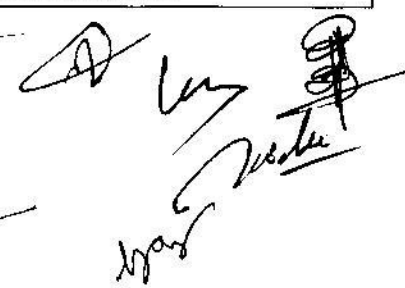
PROPOSED ON BOARD SPARES OBS LIST REQUIRED TO BE PROVIDED WITH EACH MEDIUM CRAFTS

S/NO	PARTICULARS	QTY	REMARKS
Main Engine			
	All type Lub Oil filters	04 Set	
	All type Diesel filter	04 Set	
	All lub Oil	For 02 time replacement	
	All type belts	02 Set	
	Water Separator	02 Set	
	Tappet gasket	04 set	
	Air cleaner filter	04 Set	
	Coolant (Qty as per Engine Requirement)	For 02 time replacement	
	Sea Water Cooling Pump	02 Nos	
	Sea Water cooling pump impeller	04 Set	
	Sea Water pump repair Kit	04 Set	
	Engine Oil drain plug gasket	08 Set	
	Heat exchanger pressure cap big & small	04 Set	
	All Anodes	04 Set	
	Thermostat	02 No	
	Turbo Charger Base gasket both side	04 Set	
	Injector "O" Ring Set	03 Set	
	Toxic seal with elastomer lips various size / all type for engine injector pipes	02 Packet 24 Nos Each.	
	"V" Belt Alternator	04 No	
	Relay for starter	02 No	
	Protective circuit breaker	04 No	
	Alternator	01 No	
	Main Engine all sensors with harness	01 set	
	Main Engine heavy duty battery charger	01 No. for each boat.	
Jet Propulsion			
	Coupling Lamina Plate or equivalent spares as per Model	04 set	
	Hydraulic cylinder Assembly	01 set	
	Hydraulic filter	04 set	
	Nozzle and bucket bushes & spacer	02 set	

	Main jet shaft seal complete set with bellow	02 Set	
	All type of Sensors with Harness	01 set	
	All Relay with Harness	01 set	
	Hydraulic hose all type	01 Set	
	Hydraulic cylinder oil seal kit	03 Set	
	Hydraulic pressure gauge	02 Set	
	All Zinc anode	04 Set	
	Shaft coupling bolt complete set	02 Set	
Gear Unit			
	Lub oil filters	04 set	
	Solenoid switch reverse with harness	02 No.	
	Solenoid switch forwarded with harness	02 No.	
	Gear oil (Qty as per Engine requirement)	For 02 times change	
	Zinc anode gear oil cooler	02 Set	
	Main relay forwarded with harness	02 Set	
	Main relay reverse with Harness	02 Set	
	Gear Oil cooler	01 No.	
	Temperature & pressure sensor with Harness	02 Set	
D G Set / Electrical			
	D G Set Oil Filter	02 Set for each DG	
	D G Set Fuel Filter	02 Set for each DG	
	Air Filter	02 Set for each DG	
	Water separator	02 Set for each DG	
	Shut down valve	02 Nos	
	Lub oil	02 Time change	
	Circuit Breaker	01 for each DG	
	Governor Control	01 for each DG	
	All types Sensors	01 Set	
	AVR (Automatic Voltage Regulator)	01 for each DG	
	Over Speed Control	01 for each DG	
	Limit Switch	01 for each DG	
	Sensor (water temperature, Oil Pressure, Lub Oil temperature)	01 for each DG	
	Thermostat	02 for each DG	
	Sea Water Cooling Pump	01 for each DG	
	Sea Water Cooling Pump repair kit	03 for each DG	

	Battery charger	01 for each DG	
Misc items			
	All electrical Bulbs /Tubes	02 set	
	Complete vessel fuse set (Electrical system & all machineries)	02 Set	
	Engine room blower	01 No	
	Vertical Blige pump electric water proof /submersible Pump	01 No	
	Taps,	25% of Total numbers	
	Valves	25% of Total numbers	
	Door locks	50% of Total numbers	
	Flexible hoses	25% of Total numbers	
	Electrical bulbs	25% of Total numbers	
	Tube lights	50% of Total numbers	
	Bulb Holders	25% of Total numbers	
	Flesh valves	25% of Total numbers	
	Toilet flash motor	04 Nos.	
	High pressure motor	02 Nos.	
	All type of hose clams	50 % of Total numbers	
	WC flesh system switches	08 Nos	
	Hot plate Coil (Inner & outer)	04 Set	
	Induction stove	01 Nos.	
	Pneumatic fender	04 Nos.	
	Anchor rope/Chain	01 Nos	
	Multifunctional display screen	01 No.	
	Anchor	01 No.	
	Wiper Blades	04 Nos.	
AIR CONDITION			
	AC Unit (5 star rating 1.5 ton)	01 No	
Note :-	Above Proposed OBS list is not exhaustive may vary as per the make and model of engine/system provided at the time of procurement is while including technical bid by firm. Any spares mentioned above is not the part of vessel machineries then, may be not applicable or any other parts is applicable may be added while quoting in the technical bid by firms. If any other spares offered/supplied by Engine manufacturing needs to be added with the above OBS list.		

F.No. 12/852/2010-P/BSF/WC/MHA-Prov-I
Bharat Sarkar/Government of India
Griha Mantralaya/Ministry of Home Affairs
PM Division

26, Man Singh Road, Jaisalmer House
New Delhi, Dated 26 August, 2015

To,

DsG: AR (through LOAR), BSF, CISF, CRPF, ITBP, SSB, NSG & BPR&D.

Subject: Amendment in the existing QRs/Specification of Medium Crafts.


Reference this Ministry's letter of even number dated 22.07.2015 vide which the revised QRs and Trial Directives in respect of Medium Crafts were accepted and circulated to all concern.

2. In partial modification of this Ministry's letter of even number dated 22.07.2015, the following amendment/revision is made with the approval of the Competent Authority.

QRs of Medium Crafts			
S.No. of QRs	items	Existing Specification	To be read as
28 (a) & (c)	Communication Equipment	a) HF Transreceiver – 01 No. b) Portable VHF Transreceiver – 02 Nos.	a) HF Transreceiver – 01 No*. b) Portable VHF Transreceiver – 02 Nos*. (*) May be provided by the CAPF
39 (vi)	Life Saving Appliances	vi) All seats and Gun mounts to be provided with safety harness and handhold throughout the boat with hydro static release unit.	vi) All seats and Gun mounts to be provided with safety harness and handhold.

3. The remaining text of the QRs for Medium Craft will remain unchanged.


Yours faithfully,


(Manohar N. Sukole)

Under Secretary to the Govt of India
Tel: 23381278

Copy forwarded for necessary action to :-

The Section Officer (IT), MHA: It is requested to host the above mentioned amendments along with the QRs and Trial Directives of Medium Crafts approved vide letter dated 22.07.2015.


(RK Soni)
Section Officer (Prov-I)

Copy to: Director (Procurement), MHA.

F.No. 12/852/2010-P/BSF/WC/MHA-Prov-I -1445
Bharat Sarkar/Government of India
Griha Mantralaya/Ministry of Home Affairs
PM Division

26, Man Singh Road, Jaisalmer House
New Delhi, Dated 22 July, 2015

To,

DsG: AR (through LOAR), BSF, CISF, CRPF, ITBP, SSB, NSG & BPR&D.

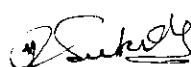
Subject: QRs and Trial Directive for Medium Crafts.

The revised QRs and Trial Directives in respect of Medium Crafts as per Annexure have been accepted by the Competent Authority in MHA.

2. Henceforth, all the CAPFs should procure the above item required by them strictly as per the laid down Technical Specifications/QRs.

Yours faithfully,


Encl: As above


(Manohar N. Sukole)

Under Secretary to the Govt of India
Tel: 23381278

Copy forwarded for necessary action to :-

✓ The Section Officer (IT), MHA: It is requested to host the QRs and Trial Directives (soft copy attached) on the MHA website (under the page of Organizational Set up- Police Modernization Division- Qualitative Requirement under Vehicle Equipments by removing the earlier QRs and Trial Directives dated 24.08.2015.


22/7/15
(Ritesh Kumar)
Section Officer (Prov-II)

Copy to: Director (Procurement), MHA.

TECHNICAL SPECIFICATIONS OF HAZARDOUS DUTY LIFE JACKET (HDLJ)

1. This statement of technical requirement covers the design, manufacturing, supply, testing and product support for single buoyancy Hazardous Duty Life Jacket (HDLJ), DS CAT No N 4220-000835, (Indian Navy) required to be worn by personnel whilst carrying out hazardous duties at sea such as Boarding Party Ops, Seamanship evolutions, High speed boat operations etc.
2. **Construction.** The HDLJ should be manufactured considering following requirements:-
 - (a) **General Requirements**
 - (i) As per para 1.2 of SOLAS LSA code, MSC resolution 48(66).
 - (ii) As per para 5 of SOLAS LSA code, MSC resolution 207(81).
 - (b) The quality of workmanship (eg seam stitching, fixing of various fixtures, ergonomics of design and placement of fixtures etc) must be of high order.
 - (c) It should be fitted with a whistle made of a rustproof material, capable of making a loud shrill note in fresh water/sea water, and firmly secured by a cord.
 - (d) **Vest.** HDLJ should be fitted on a nylon sleeveless mesh vest. Vest should have pockets/pouches. HDLJ should also have means for airlifting a survivor during search and rescue operation.
 - (e) The buoyancy of Life Jacket should be atleast 16 kg in freshwater. Weight of HDLJ should not exceed 1.5 Kg. Life jackets should be suitable for use by adults.
 - (f) **Emergency Gears.** HDLJ should be provided with the following emergency gears, suitably affixed on HDLJ:-
 - (i) **Distress Marker Light And Battery Unit.** A distress light with a water activated battery is to be provided for locating the wearers in darkness or fog. There must be a provision to replace battery and/or lamp if it has been utilized. The light and the battery should have a shelf life of five years from the date of delivery onwards.
 - (ii) **Buddy Line.** A five foot buddy line should be attached to the HDLJ. The line should have a loop on the end to connect to a rescue boat or to another person.
 - (g) Auto-inflation mechanism and valise/bladder material should confirm to the test requirements of MSC 81(70).
3. **Additional Features**
 - (a) The model number and the year of manufacture, Buoyancy and details of approving authority should be printed on the Life jacket.
 - (b) Each Life jacket should have mark of inspecting authority on the valise and a permanent marking of date of expiry.
4. **Testing and Certification.**
 - (a) HDLJ should have the approval of national authorities like Navy/DOT/MMD/Coast Guard of the country of manufacture or confirm to SOLAS specifications.
 - (b) The life jackets should have been type tested in accordance with IMO resolution MSC 81(70) and 226(82) & subsequent applicable resolution. However, SOLAS requirement of twin buoyancy chamber is not applicable.
 - (c) Necessary certificates for Type approval are also to be submitted.

5. **Spares** The On Board spares(OBS),and test equipment and the quantity, if any, are to be recommended by the supplier. Such recommendations are to be commensurate with the reliability of critical components and component use in the jacket. Special tools and test equipment are to be supplied for on board maintenance.

(a) **On Board Spares** An itemized list of OBS, special tool and special equipment, which will be supplied with the life jacket are to be furnished alongwith the main offer. The OBS are to cater for all on-board maintenance routines and possible repair requirements. The OBS should include the following:

- (i) All spares required for exploitation upto 2 years.
- (ii) One set of general-purpose maintenance tools along with each life jacket.
- (iii) One set of special tools required for dis-assembling/assembling of components for repair by replacement.
- (iv) OBS list is to be furnished.
- (v) Detailed specification of various components is also required to be provided.

6. **Document** Each life jacket should be provided with an operating, technical and maintenance manual, type test and acceptance test certificates. In addition following documents are to be provided by the supplier:-

Description	Content	Copies
	Field and Depot Maintenance Manual	
	Parts and Tools Catalogue	
Technical Data	GA Drawing	
	Test Procedure and Documentation	
	Minor Repair Procedure	
	Certified Test Report	

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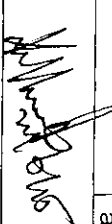
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QUALITATIVE REQUIREMENT/TECHNICAL SPECIFICATION OF MEDIUM CRAFT

Appendix - C

S/No Proposed QRS/Technical Specification

1.	Role & Functions and Night operation	The boat shall be designed to carry out day/night coastal patrol and surveillance operation in, Creeks of Gujarat inland water and coastal area of India, Brahmaputra river & Sunderbans Delta of Bengal. The craft shall be highly sea worthy (operative in sea state-3 and survivability up to sea state-5). The boat shall have propulsion, power generation, lifesaving protection and other engineering and electrical systems to carry out safe and reliable operation to perform the following functions. a) Patrol in shallow coastal waters by day and night. b) To carry out coordinated and secure operations with Force. Protection Vessels and other crafts/boats deployed. c) Seaward anti-terrorist patrols for security of coastal installations own vessels and own coast. d) Search and rescue. Vessel will be fully equipped with night navigation facilities with flood lighting, spotlights and other equipment for complete night operability. Navigational lights set as per COLREG requirements.
2.	Class	The Vessel shall be built to comply with the high speed class rules of IRS or any classification society of IACS class notation SWASTIK, SUL, HSLC, RS-1, Patrol, SWASTIK-1Y or equivalent patrol boat for operation within 20 nautical mile from coast having sea condition such that the design significant wave height not exceeding 4.0 M. Craft should have 'hard chine planning hull with optimum dead rise angle to meet the desired speed and stability requirement.
3.	Capacity	Medium Craft shall have a capacity of 22 people on board including Crew. The boat shall be fitted with twin engine of sufficient Horse power to generate desirable speed in specified environmental conditions.
4.	General Features	a) The Medium Craft should be capable of operating in shallow waters in extreme tropical conditions. b) Should be capable of operating in minimum 6 feet shallow waters. c) The boat shall have an expected life of 15 years with an annual exploitation of not less than 2000 hours. d) The boat shall have excellent directional stability and good sea keeping hull characteristics. e) The boat shall have high operational ability and system redundancy. f) The boat should be able to carry out sustained employment for 7 days independently without refueling for total duration of 22 Hrs at cruising speed. g) The boat shall be constructed in such a way that all machinery and equipment shall have ease of operation and low maintenance requirements with low life cycle cost. h) The boat shall have all round heavy duty fender on crafts side. i) Should have Armour Protection to wheelhouse/control cabin including Bulley proof glass. Ballistic test as per approved procedure and schedule to meet NIJ-11/EN 1063 standard. j) The MC should be fully compliant with applicable MARPOL Regulations in force, built to classification society norms, SOLAS compliant in respect of boat safety and certificate of GMDSS required.
5.	Ergonomics	Latest design concepts for boats, with respect to ergonomics and crew comfort are to be included. The automation features and functional aspects in machinery Operations are to be provided considering the indicated crew. Details of machinery controls and automation are to be indicated.

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Proposed QRS/Technical Specification

S/No	Proposed QRS/Technical Specification																							
6	Environmental Conditions	The equipment and the machinery fitted on the MC should be marinated and capable of satisfactory operation, under the following environmental conditions:- a) Wind speed upto 30 knots b) Ambient air temperature from zero to +50 C. c) Water temperature from 01 C to 40 C. d) Max relative humidity of 90% at 32 C. e) Salinity of water up to 36 PPM.																						
7.	Operating Environment	The vessel employment can occur at any time at day or night, and will typically be operated in varying sea and weather conditions. The craft is well suited to operate in Creek area of Gujarat along the border region of India and also suited to operate along the entire length of Coastal/inland water of India. The vessel will be based at shore stations and may be berthed in the water at a pier or slip. The vessel and all of its equipment is capable of operating continuously in specified environmental conditions. All equipment onboard is designed for the marine environment and is of the best quality and is capable of satisfactory operation in specified environmental/ geographical conditions																						
8.	Operating Profile	<p>Operating Profile</p> <p>The MC shall conform to following operating profile:-</p> <table><tr><th>S/No</th><th>Speed of Medium Craft in knots</th><th>No of Hours</th><th>Operating Time</th></tr><tr><td>a</td><td>From 20 knots up to 25 knots</td><td>200 Hrs</td><td>10% of annual exploitation</td></tr><tr><td>b</td><td>From 15 knots up to 20 knots</td><td>800Hrs</td><td>40% of annual exploitation</td></tr><tr><td>c</td><td>From 10 knots up to 15 knots</td><td>600Hrs</td><td>30% of annual exploitation</td></tr><tr><td>d</td><td>From 07 knots up to 10 knots</td><td>400 Hrs</td><td>20% of annual exploitation</td></tr></table> <p>As the vessels are being built to class, these would be inspected by the Classification Society. The Owner reserves the right to undertake additional inspections either directly or by third party. Shipyard would be required to provide all inspection facilities at OEM premises/builders yard to the inspecting team. Periodic reviews by the Owner would be conducted for ascertaining work progress by a team including technical member from user end.</p>			S/No	Speed of Medium Craft in knots	No of Hours	Operating Time	a	From 20 knots up to 25 knots	200 Hrs	10% of annual exploitation	b	From 15 knots up to 20 knots	800Hrs	40% of annual exploitation	c	From 10 knots up to 15 knots	600Hrs	30% of annual exploitation	d	From 07 knots up to 10 knots	400 Hrs	20% of annual exploitation
S/No	Speed of Medium Craft in knots	No of Hours	Operating Time																					
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c	From 10 knots up to 15 knots	600Hrs	30% of annual exploitation																					
d	From 07 knots up to 10 knots	400 Hrs	20% of annual exploitation																					
9	Supervision during Construction	The Shipyard is to obtain a Contractual commitment from the various equipment suppliers to provide Product Support for a minimum period of 15 years including electronics equipment, after delivery of the last MC. In case the equipment is likely to become obsolete, the manufacturer should be committed to give a clear three year notice to the BSF.																						
10	Life Time Support	Preliminary stability calculations, power, resistance and endurance calculations, general arrangement plan of boat along with layout of major machinery/ equipment & system are to be submitted along with technical offer. Also, the offer design shall be proven design and in case of new design model test report of the design is to be submitted by the builder along with technical officer.																						
11	General Instruction	The vessel and all equipment should be free from excessive vibrations. The hull design and details of construction are to be such as to avoid vibrations that tend to cause damage to equipment or hull structure or to interfere with the proper functioning of the equipment on board.																						
12	Hull Vibrations	Special care should be taken for the design of the package to minimize propulsion induced hull vibrations. Torsional and lateral / axial vibration calculations for the propulsion system shall be made in the design stage to demonstrate the acceptability of vibration levels. Maximum vibration for main equipment is not to exceed levels stipulated vide ISO - 10816.																						
13	Propulsion Induced Vibrations																							

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14.	Noise	The design, construction, workmanship and installation of all machinery and associated equipment shall be such that the noise levels and sound frequencies will permit normal conversation at all operating positions under all conditions. Every practical effort is to be made to minimize the equipment noise by use of vibration mounts below all machinery.
15.	Length, Beam & Draft	a) Length molded 20 M \pm 0.5 M b) Beam molded 5 M \pm 0.3 M c) Draft (maximum) 1.2 M at full load.
16.	Propulsion	Two marine class approved inboard diesel engines directly coupled with reversible reduction class approved gear boxes driving suitable propulsion system suitable for low drafts operations.
17.	Speed	Maximum speed - 25 knots at full load correspondence to 85% MCR of the engine rating. Cruising speed - 20 knots.
18.	Fresh water capacity	5000 ltrs
19.	Endurance	Not less than 360 NM/18 hours at average cruising speed of 20 knots with full load.
20.	Fuel capacity	As per endurance criteria with the provision of 25% reserve or 7000 Ltrs fuel whichever is higher. The fuel oil filling arrangement shall be flush deck type with watertight screwed for filling the tanks. The tanks shall be fitted necessary filling strainer and external wire gauge strainer, a shut off cock. The filler cap secured by a non ferrous chain. The vent-pipes shall terminate in atmosphere and the positioned with a NRV to avoid ingress of rain water or spray.
21.	Fuel tank	Marine grade aluminum / stain less steel fuel tank (s) of adequate capacity EPI coated. Cu/stainless steel fuel lines, suitable dual fuel water separator filters and remote shut off valves are to be provided. The fuel systems are to be designed in accordance with classification society regulation. The tank will suitable inspection manhole, filling point on deck, drainage valve, air vent and suction line with valves for each engine that include water filter separator. Manual sounding facility and remote reading tank content gauge shall be provided for the fuel oil tank. The remote gauge shall be located at the helms man's console in the wheelhouse. Chart indicating plates for monitoring fuel.
22.	Construction	a) The crafts shall be designed and constructed as per IRS class or equivalent notation of LRS/ABS/DNV or any other member of IACS. b) The craft shall be fully compliant with MARPOL and SOLAS regulations, as applicable. c) All under water fittings, pipes, cables, bilge pumps etc are to be approved type for marine intended applications. Main engines, gear boxes and generators are to be type approved for marine application by class society. d) The hull shall be constructed of FRP and shall be of single piece of FRP mould with smooth mat finish scratch proof gel coat outer finish in single mould. e) The boat shall have good intact and Damage stability, damage survivability, watertight integrity and crew/equipment protection. f) The upper and side deck layout/fitting, craft-side and interior arrangements shall facilitate easy boarding operations and keep crew fatigue within acceptable parameters. g) The boat shall be designed to cater clear uncluttered areas and well-laid out deck for ease of operation and movement. h) The boat shall have Armour Protection to wheelhouse including Bullet proof glass. Ballistic panels and glasses shall be of NIJ-11/EN 1063 standard (Non-metallic). i) The finishing and workmanship of the whole craft construction will be of owner satisfaction.

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S/No	Proposed QRs/Technical Specification
	<p>j) The construction of boat should be done in controlled temperature/ humidity to gain the best lamination property.</p> <p>k) Any involvement of marine regulation other than specified in the QRs which is required to be considered for the quality/required parameters while approving of design/constructing of the boat, stage wise/items wise may be ensured by the builder to get it approved by Classification Society.</p> <p>The craft shall be capable of maintaining maximum value of this speed without impairing crew or craft performance in sea conditions up to sea state-3.</p> <p>The craft shall remain operational with reduced performance in conditions above sea state 3 and shall have survivability up to sea state 5.</p>
23	Sea Worthiness
24	Fendering
25	Special features
	<p>The craft to have heavy duty suitable fender all around the craft with appropriate size also pneumatic fenders on port and STBD side. The fendering system has a service life of at least five(5) years before requiring major overhaul or replacement.</p> <p>a) The crafts shall be provided with one number 4 to 5 meters approx. class certified rigid inflatable boat with 40 HP OBM and boat cover as rescue boat alongwith suitable class approved launching/recovery appliances.</p> <p>b) As per the class requirement, anchor/cable along with windlass/winches shall be provided. The complete system shall have galvanic protection inside cable locker.</p> <p>c) Escape routes NBCD/FF equipments signs shall be made photo luminescent.</p> <p>d) All fitting appliances and gears shall be load tested to static and running load. The Certificate concerning this shall be provided by the yard after obtaining them from the respective OEMs.</p> <p>e) Awning and stanchions for all open deck shall be provided.</p> <p>f) Two set of canvas cover for all upper deck fittings and equipment shall be provided.</p> <p>g) Soft patch shall be provided for shipping in/shipping out of main engine, generators and heavy machinery installed in the engine room.</p> <p>h) Low noise levels are vitally important to mission effectiveness and long-term crew health. Noise levels be reduced wherever possible.</p> <p>i) The consoles of vessel should be weather tight.</p> <p>j) The hull, deck, console and cabin has confirm service life of at least 15 years.</p> <p>k) The boat must have fuel tank of 20 liter capacity with connector facility and standby tank with connector facility.</p>
26	Armament
	<p>Location for Main and Secondary Armament</p> <p>The craft shall be fitted with Gun mounting for LMG on bridge top, foxle, quarter deck (port & STBD) in addition, one mounting of MMG shall be provided on bridge top alongwith NIJ level-3 protection in such a way as to facilitate all-round i.e. 360 degree fire power viz on bridge top, forward and aft deck.</p> <p>Armament Locker</p> <p>The armament locker shall be provided in conformance to the QR's and shall have the capacity of storing ammunition. Essential safety features and flame retardant paint shall be provided in armament locker.</p>
27	Navigational Equipment
	<p>The crafts shall be fitted with the following Approved Type navigational & communicational equipment :</p> <p>a. Navigational radar with AIS 24 nm range with ARPA facilities to track minimum 10 targets having approximate 10" Video display unit of reputed make.</p> <p>b. Magnetic compass</p> <p>c. Echo Sounder. The fitment should be done in such a way to protect the sensor during grounding/beaching.</p> <p>d. DGPS</p>

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		<p>e. Navigation light as applicable as per COLREG of reputed make.</p> <p>f. Siren/Horn(Electrical) with loud speaker, microphone and electronic unit.</p> <p>g. Anemometer</p> <p>h. Wet and Dry bulb thermometer</p> <p>i. Barometer</p> <p>j. Chart Table and lockers with parallel ruler and dividers.</p> <p>k. Loud hailer & PA System.</p> <p>l. Police light & Siren</p> <p>m. Heavy duty Window wipers and one clear view screen for front window in way of helmsman.</p> <p>n. Binoculars (7x50 marine type- 02 Nos.)</p> <p>o. Search light for 360 degree coverage having detection range 500 meters, identification 400 meters and recognition 300 meters.</p> <p>p. Electric horn with range of 01 Km.</p>
28.	Communication Equipment	<p>The following Approved Type communicational equipment shall be fitted on the medium craft. All equipment will be provided in the wheel house:</p> <p>a) HF Transceiver – 01 No</p> <p>b) VHF Transceiver (MMB) – 01 No.</p> <p>c) Portable VHF Transceiver – 02 Nos.</p> <p>d) Search and Rescue Transponder (9GHz) – 02 Nos.</p> <p>e) Emergency Radio Beacon (EPIRB) – 01 No.</p> <p>f) Distress alert transponder.</p> <p>Internal Communication:</p> <p>a) Intercom (Main Broadcast) and telephone (Talk back system) shall be provided.</p> <p>b) Sound powered telephone shall be provided between wheel house, machinery compartment and accommodation spaces.</p> <p>c) All compartments will be provided with public address speaker.</p>
29.	Machinery Main Engines	<p>a) The boat shall have two commercial rated turbo charged after cooled inboard marine diesel engines of reputed make having indigenous product support) of appropriate capacity coupled with marine class approved reversible gearboxes of reputed make having indigenous product support reputed make coupled with suitable propulsion system for shallow water operation should with the desirable draft. The main engines are to be type approved and latest applicable IMO/MARPOL requirements compliant by classification society.</p> <p>b) The boat shall have Electronic control and monitoring system for engine, gear box and propulsion system.</p> <p>c) The boat shall have easy electrical starting system of Main Engines by independent battery. Redundancy is to be provided in the form of at least two independent battery sources that can be cross connected to start either engine. The boat shall have remote starting/stopping of main engines from the wheel house and locally from engine.</p> <p>d) The wet exhaust system is to be used with suitable noise reduction arrangement for main engine and generator prime mover.</p> <p>e) Testing lamp with 10 mtr cable – 02 Nos</p> <p>f) Engine room ventilation- Sufficient ventilation blowers are to be provided in order to ensure that the maximum rise of air temperature between supply and exhaust air is restricted to 10° C</p>

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Proposed QRs/Technical Specification

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30.	Power	<p>a) Power generation and distribution system should conform to Classification Society norms. To this end, a suitable power source of adequate capacity, to meet the entire electrical load of the craft including battery charging is to be provided. Aload analysis chart justifying the capacities of the power supply source and a single line schematic diagram showing arrangement of the power generation and distribution is to be provided along with the technical offer.</p> <p>b) Two (Class Approved marine type) DG sets each capable of meeting complete crafts load at all times with 25% reserve capacity shall be provided. Generators should be suitable for continuous unattended parallel operation.</p> <p>c) In addition, the battery system of adequate capacity with independent charging facility shall be provided for starting of main engines/generator sets and meeting emergency power requirements including automatic emergency lighting arrangements.</p>
31.	Electric system	<p>a) All the electrical equipment, cables and fittings, machinery and associated systems shall be of IP rating of IP-57 and above and shall conform to Classification rules.</p> <p>b) Construction of the electrical equipment and machinery shall be such that all installation, main cabling & maintenance work including removal & replacement of component can be performed from front.</p> <p>c) Testing lamp with 36 mtr cable.</p>
32.	Supply system	A emergency battery backup system to cater for uninterrupted power supply, for a minimum duration of 06 hrs to essential equipment viz. radar, controls, navigation, and communication, lighting and domestic equipment's to be provided. Emergency Lighting/Emergency lighting fittings etc supplied from 24VoltsDC distribution board shall be fitted to provide illumination to access ways, passageways, in compartments and as approved by Class rules.
33.	Shore supply arrangement	A water tight shore supply connection box along with 50 mtr supply cable shall be fitted on weather deck at an appropriate position conforming to Classification rules, to meet the requirements of the harbor loads.
34.	Batteries	A reel for stowing the flexible cable 50 mtr will be provided and suitably located on the winch deck.
35.	Cables	<p>Adequate numbers of 12V DC Lead Acid maintenance free batteries sourced from reputed firms are to be provided to cater for battery back system and for starting of DG/engine as applicable. Batteries are to be located in well ventilated space and will be housed in suitable FRP/hard wood boxes with internal lead lining. Suitable battery charging arrangement for charging of batteries from the craft's generator as well as from 230V, 50Hz shore supply is to be approved.</p> <p>Cables conforming to Class requirement shall be used. Class approved LFH cables conforming to marine specifications shall be used in main switch board, control panels etc. The under mentioned aspects shall be considered during installation of cables:</p> <p>(a) For cables passing through water tight deck or bulk heads, approved deck tubes and glands of single or multiple type shall be used.</p> <p>(b) Proximity to pipe joints, hot positions, hatch ways and openings which may render the cables liable to damage shall be avoided.</p> <p>(c) Avoidance of congestion of cables and awkward bends.</p> <p>(d) Cables shall be fixed on perforated M.S. galvanized plating mounted on vertical bulkhead as far as possible, but where this cannot be arranged, they shall be fixed to perforate plating on the underside of the beams.</p> <p>(e) Each and every cable shall be affixed with indelible brass identification tallies at each end before entering equipment. The tally shall indicate circuit code number as shown on relevant Drawings.</p>
36.	Motor	All motor shall be conforming to classification rules suitable for marine use. Siting of motors should be as per classification society's regulations.
37.	Fire Fighting	Firefighting equipment as per class rules and approved type shall be provided. Portable fire extinguisher shall be provided

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S/No	& Damage Control	throughout the vessel as required to meet the class /SOLAS requirements. The machinery spaces is to be provided with a suitable fixed firefighting system operated from the bridge and fire & smoke detection system meeting class requirements. The alarm indication is to be available at the bridge panel. Fire pump/hydrant, automatic emergency lighting, automatic fire fighting arrangements in engine-room and magazine shall be provided. On board emergency hull repair kit and shoring arrangement to control flooding. To extract the unwarranted sea water deposited due to the unforeseen damage of the vessel 01 No. DD fire pump approved type with 30 mtr long hose pipe shall be provided.
38.	Bilge System	A suitable bilge alarm system is to be provided to indicate high water level in the bilge. The alarm indication is to be available on the bilge panel. The bilge system is to be designed in accordance with classification society regulation. However, minimum a motor/engine driven bilge pump and a manual portable bilge pump is to be provided.
39.	Life Saving Appliances	Lifesaving appliances will be in accordance with SOLAS/Class approved type. i) 12 number Hazardous Duty Life Jackets-As per Annexure -'P' to QRS of MC. ii) Two 20 men SOLAS approved life raft with HRU to be provided. iii) 25Nos life jackets Class approved type with zip system, 3 lockable strip, whistle, retro reflecting tape. iv) Four life buoys with S.I. light & life line SOLAS approved are to be provided. v) One SOLAS approved set of rocket parachute flares is to be provided. vi) All seats and gun mounts to be provided with safety harness and handhold throughout the boat with Hydro static release unit.
40.	Air Conditions/ Ventilation	The craft shall be provided with marine type centralized / split air-conditioning system of reputed make at wheel house and all accommodation spaces. All wheel house & accommodation places should be provided cross ventilation / forced ventilation as per class requirements for use in case of AC shut down / break down. Adequate forced ventilation is to be provided in the machinery spaces, wash places and WCs etc as per Class.
41.	Galley	a) The common galley with adequate space shall be provided :- i) Hot Plate - 02 Nos. (2000 W) ii) Microwave Oven iii) Food processor iv) Tea/coffee maker v) Electric rice cooker vi) Tea urn vii) Water cooler cum purifiers with suitable RO system viii) Storage racks & sinks. b) Complete set of cutlery and accessories as per complement shall be provided :- i) Refrigerator 170 - 200 Ltrs ii) Deep freezers - 01 No. iii) All other utensil required for making food for 22 personnel. iv) Water heater/geyser c) Securing arrangements need to be provided for all galley equipments. d) Hot plate should be provided to rails for retaining cooking utensils. Sufficient space for storage for ration shall be provided for complete crew for the mission period of 07 days.
43.	Recreational facilities for Ration	LCD / LED TV and DVD players of a reputed brand in cabin/dining areas of Officers and dining area of crew shall be provided. Omni directional Antennae for 02 DTH connections be provided. All recreational equipments should have adequate securing arrangements.

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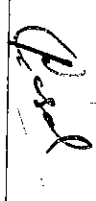
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Proposed QRs/Technical Specification

S/No	Rudder and Steering arrangements	Proposed QRs/Technical Specification
44.		Power hydraulic steering operated from wheel house helms/ command console. The rudder and steering arrangements shall be hydraulically operated and the arrangements shall be capable of operating the craft in water depths of more than 1.5 meter with good maneuverability at low speeds. The arrangements shall be sensitive and provide fine control on speed especially in confine spaces. The stainless steel stocks shall be mechanically operated from the coxswain position with the provision of hand tiller for emergency local operation. A rudder angle indicator shall be fitted in the compartment to facilitate local operation. Adequate redundancy to be provided for steering.
45.	Wheelhouse/ Bridge	i) Wheelhouse to have Armour protection including bullet proof glass. ii) Overhead vision iii) Suitable seating for crew in the Wheel house/bridge. iv) Steering system hydraulic. v) Engine/propulsion controls and instrumentation Chart table vi) Lighting arrangements including dedicated lighting to dedicated seating positions vii) Master control panel for systems viii) Remote control facility, for starting/stopping/operations of engines including engine performance monitoring panels, fuel state indicators, battery state indicators, battery charging indicator etc., as per classification society rules to be provided. Coxswain post to be fitted with Communication console. ix) Agravity type Pendulum wheel indicator is to be provided in the Wheel House. x) Provision of adequate numbers of sockets in wheel house and in accommodation spaces is to be catered for. xi) Night lighting arrangement to be provided. xii) Proper ventilation arrangement to be made in the Wheel House.
46.	Accommodation and Habitability	Coxswain Post : One enclosed area with a seating arrangement for 10 personnel is to be provided. The seats are to be provided with shock absorption device and seat belts. The seating arrangement, cup boards and stowage design are to be of contemporary design. All Furniture shall be of modular Design.
47.	Complement	Accommodation : Sitting capacity :- 10 persons including helmsman & cart man Sleeping accommodation :- 22 person (02 Officer, 02 Sub officers & 18 crews) a) One cabin for 02 Officers and bathroom attached. b) One cabin for 02 Subordinate Officers and bathroom attached. c) Dormitory accommodation for 18 personnel having two bathroom. d) Adequate dining space for crew. e) All cabins to be adequately furnished/carpeted with standard fitting, mattress, blankets, pillow, bed sheets, wall clocks, curtains, towel etc. All Furniture, Cabin fittings, Bath Room fittings shall be of modular Design. The layout of accommodation space, Galley, Bathrooms and WC should be modern and ergonomically designed to facilitate comfort and utility. Any additional items contributing to comfort may be incorporated. f) All accommodation places should be fitted with sufficient bunk fan for comfortness while AC system shut down. g) All bathroom should have geyser facility. h) Securing arrangement should be provided for all loose fitted equipments.
48.	Sanitary	Suitable sanitary system, including wash basin, toilet with a holding tank/ flushing out arrangement and sewage disposal is to be provided as per class requirements. WCs are to be provided with integral macerating/ treatment unit with provision to discharge over board or to shore collection unit

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Proposed QRS/Technical Specification

S/No	Redundancy Aspects	Proposed QRS/Technical Specification
49.	Redundancy Aspects	The crafts systems should be designed keeping aspects of redundancy and independent operability in perspective. It should be feasible to isolate defective equipment and fittings without affecting overall performance.
50.	Forepeak	Fore peak shall be built for stowage of anchor chain cable and other ropes. A Naval pipe of stainless steel shall be fitted in the compartment for anchor chain / cable. Arrangement for securing the inboard end of the chain / cable shall be provided in the compartment. A drainage arrangement shall be provided as per Class requirements.
51.	Fore cabin	This compartment shall provide convenient sleeping arrangement. Adequate electrical light fitting and AC shall be provided. Locking cupboards shall be provided. Extra storage facilities shall be provided under the bunks. Rack for accommodating 18 in Nos. Rifles and 2 in Nos LMG and 01 MMG along with ammunition is to be also provided.
52.	Deck, Machinery and Seamanship Fittings	Deck shall be constructed with GRP laminates as per classification society Rules. All the exposed surfaces of the main deck shall be given antiskid finish. Additional chaffing laminate shall be provided in way of anchor arrangements. Following Equipment/accessories shall be provided conforming to Class requirements:- (a) Class approved Anchor and Chain Cable. (b) Hawse pipe and Anchor recess (c) Class approved Anchor Windlass. (d) Bollards, Mooring/Freeing Ports, Fairleads, and Towing Arrangements. (f) Freeing and Mooring Ports. (g) Bollards, Cleats and Fairleads Four is no stainless steel bollards, four in No SS fairlead and four in No SS Cleats conforming to SS-316 material shall be provided. All these fittings shall be fastened through GRP on to a SS backing plate with SS fasteners. The backing plate shall be laid up and covered up with adequate no. of GRP layers. (h) Mooring Towing ropes. (i) Each deck fitting to be load tested by OEM/reputed testing lab.
53.	Guard Rails	Stainless steel SS-316 guard rails of min 20 mm dia with stanchions shall be provided all along the craft. Stainless steel SS-316 storm rails also be provided all along raised deck house. Pole of the guard rail/strengthened accordingly.
54.	First Aid Box	Two first aid boxes to be installed (one at wheel house and one at accommodation area)
55.	Fitting & Fixing Materials	All fitting fixture to be SS-316 grade unless other type metal marine grade is suitable for a particular operation. i) Vinyl ester grade resin to be used and approved by IRS/IACS classification society. ii) Glass Reinforced plastic materials used in construction such as Chopped Standard Mat, Woven Roving etc. shall be IRS/IACS member approved. iii) Core materials approved by IRS/IACS member shall be used. iv) All SS Material used in the deck or any other spaces should be marine grade of SS 316 v) All the materials, workmanship and finish shall be of the high standard/quality and as per class required. vi) All windscreen/ glass should be toughened glass. vii) All ply wood should be 100% water proof marine ply wood. viii) All wood fittings should be high quality seasoned teak wood. ix) In the Engine room final coat shall be of class approved fire retardant resin. x) TBT free anti fouling paint is to be used for hull below the water line. Material for engineering/electrical systems attached as Annexure 'A' to QRS of MC
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S/No		Proposed QRs/Technical Specification	
57.	Documentation and Publications	i) Priced purchase order copies for ordered equipment/machinery. ii) Copy of technical advice floated to various firms for equipment/machinery be forwarded to BSF simultaneously. iii) All drawings are class approved – 03 set. iv) As built final building specification, as fitted drawing and consolidated schedule of piping, painting, insulation, paneling and deck lay-up on delivery of craft (three copies per craft). v) Manual with regards to installation, operation and maintenance of various equipment/fittings systems and part identification list (three copies per craft). vi) Service manual of all engine and accessories. vii) Part catalogue/identification list of all engine and accessories. viii) Stability booklet is to be approved by Class and provided. ix) Docking plan. x) Fire fighting plan. 01 set of Documentation per craft plus total 04 additional copies are to be provided in printed hard copies in addition to CD-ROM & software for reading.	
58	Painting and finishers	i) Hull area below the waterline shall be painted with a TBT free Anti fouling paint as per the latest IMO regulations. ii) The armament lockers shall be painted with flame retardant painting system. iii) The Medium Craft shall be painted in disruptive pattern colour with BSF/user markings. iv) The Medium Craft name, ID No. and BSF/user Emblem and National Flag shall be fixed on both sides of the Hull at superstructure at an appropriate place.	
59	Tools	One set of tools specified by OEM for all engine/equipment and accessory installed in the Medium Craft	
60	Displacement and Weight	As per given endurance, loading and speed requirements.	
61	Instrumentation panel	Weight - As per design of the boat. Machinery space is to be provided with suitable acoustic insulation. A suitable monitoring and control system for the main engines and gear box is to be provided in the helms console. The engines and gear box will be controlled from the helms console. The control station in the helms console should have provision for starting, stopping, monitoring control and operation of main and auxiliary machinery. All instrumentation panels are to be watertight. All gauges are to be provided with integrated lighting with dimmer facility. Essential machinery instrumentation shall include the following (list is indicative and shall be enhanced as per OEM recommendations) :- (a) Engine Tachometer (b) Engine oil pressure gauge (c) Engine cooling with a temp gauge (d) Engine oil temperature gauge (e) Gear box pressure gauge (f) Speedometer (g) Single lever engine/gear box control system. (h) Rudder angle indicator. (i) Light indicator. (j) Engine oil pressure alarm (k) Engine oil pressure trip	

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(Signatures and stamps are present over the signature lines)

S/No	Proposed QRS/Technical Specification
	(l) Engine oil temperature alarm (m) Engine water temperature trip (n) Gearbox oil pressure alarm (o) Gearbox oil pressure trip (p) Gearbox oil temperature alarm (q) Emergency main engine stop (r) Over speed trip mechanism and indication (s) Lube oil pressure gauges for engines and gearboxes (t) Fresh water temperature gauges (u) Hour counter (v) Ammeters/voltmeters for monitoring battery charging/battery voltage/load current (w) Exhaust temperature gauges

PO :-

(Kunal Mazumdar), DIG(WW), FHQ, BSF, New Delhi

 M-1: [Signature]
 (Rajesh Megi), DC
 NDRF

 M-2: [Signature]
 (Ashish Kumar), DC
 CRPF

 M-3: [Signature]
 (Satvinder Singh), AC, ITBP

 M-4: [Signature]
 (Yogesh Singh), DC, SSB

 M-5: [Signature]
 (S K Thakur), DC,
 Assam Rifle

 M-6: [Signature]
 (Uday Kr Sah), AC, CISF

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 (), NSG

 M-8: [Signature]
 (), BPR&D

 M-9: [Signature]
 (N C Sundar Singh), DC(WW), FHQ BSF New Delhi

 Co-opted Member:- [Signature]
 (K K Dhawan), Principal Surveyor, IRS, New Delhi

Approved/Not Approved

 Director General
 Border Security Force

RECOMMENDED MATERIAL SPECIFICATION FOR ENGINEERING SYSTEM

S.No	DESCRIPTION	PIPES	FITTINGS	VALVES	FLANGES	FASTENERS
1.	Lub Oil System	Copper-upto 6 bar as per BS 2871 Cu-Ni 90/10-10 bar as per BS 2871	Gun Metal BS 1400 LG4C	Gun Metal BS 1400 LG4C	Gun Metal BS 1400 LG4C	Aluminium Bronze as per NES 837 Part II
2.	Fuel Oil System	90-10Cu-Ni	GM to BS 1400 LG4C	GM to BS 1400 LG4C	GM to BS 1400 LG4C	Aluminium Bronze as per NES 837 Part II
3.	Fresh Water System (Domestic)	Copper/ GI Steel	GM to BS 1400 LG4C/ SS to AISI 316	GM to BS 1400 LG4C/ SS to AISI 316	GM to BS 1400 LG4C/ SS to AISI 316	Aluminium Bronze as per NES 837 Part II
4.	Seawater Fire Main, Ballast, Salvage (Suction/Discharge)	90/10 Cu-Ni	NAB as per NES 747 Part II	NAB as per NES 747 Part II	NAB as per NES 747 Part II	Aluminium Bronze as per NES 837 Part II
5.	Compressed Air System (a) Air upto 8 Bar pr (b) Air pr 8 to 30 bar (c) Above 30 and upto 276 bars	(a) Seamless steel to BS 3601 class 22 or 27 or seamless copper (b) Seamless steel to BS3602HFS or CDS class 360 & 410 (c) Solid drawn 70/30 Cu Nito NES 780 Part 3	SS to AISI-316	Gun metal BS 1400 LG4C or Carbon steel	Aluminium Bronze or SS to AISI-316	Aluminium Bronze or Stainless steel
6.	Hydraulic System	Stainless Steel	Stainless Steel	Stainless Steel to ASTM A216	Stainless Steel to ASTM A216	Stainless Steel

(a) Preference is to be given to centrifugal pumps for the above applications.

(b) Material for pumps

(i) Casing- Al Bronze to DGS 8520/GM to DGS 203

(ii) Shaft- Stainless Steel AISI316

(iii) Impeller- Al Bronze to DGS 8520

(iv) Wear Ring-LB BS1400 LPB 1

(c) **Pumps for Lub oil and Fuel Oil.**-Preference will be given to screw type pumps for this application(d) **Seals.** Mechanical seals are to be provided for all types of pumps.

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TRIAL DIRECTIVE FOR CARRYING OUT TRIAL EVALUATION AS PER THE QRS OF MEDIUM CRAFT

S/No	Proposed QRS/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officers
1.	Role Functions and Night operation The boat shall be designed to carry out day/night coastal patrol and surveillance operation in, Creeks of Gujarat inland water and coastal area of India, Brahmaputra river & Sunderbans Delta of Bengal. The craft shall be highly sea worthy (operative in sea state-3 and survivability upto sea state-5. The boat shall have propulsion, power generation, lifesaving protection and other engineering and electrical systems to carry out safe and reliable operation to perform the following functions. a) Patrol in shallow coastal waters by day and night. b) To carry out coordinated and secure operations with Force. Protection Vessels and other crafts/boats deployed. c) Seaward anti-terrorist patrols for security of coastal installations own vessels and own coast. d) Search and rescue. Vessel will be fully equipped with night navigation facilities with flood lighting, spotlights and other equipment for complete night operability. Navigational lights set as per COLREG requirements.	Check the navigational system for night ops. Check physically Shallow water trials by day and night.
2	Class The Vessel shall be built to comply with the high speed class rules of IRS or any classification society of IACS class notation SWASTIK., SUL.HSLC, RS-1, Patrol, SWASTIK-IYor equivalent patrol boat for operation within 20 nautical mile from coast having sea condition such that the design significant wave height not exceeding 4.0 M. Craft should have 'hard chine planning hull with optimum dead rise angle to meet the desired speed and stability requirement.	Check the criteria with classification society rep. Examine the class certificate issued by classification society with the specified class notation for compliance.
3	Capacity Medium Craft shall have a capacity of 22 people on board including Crew. The boat shall be fitted with twin engine of sufficient Horse power to generate desirable speed in specified environmental conditions.	Check with 22 people load.
4	General Features a) The Medium Craft should be capable of operating in shallow waters in extreme tropical conditions. b) Should be capable of operating in minimum 6 feet shallow waters c) The boat shall have an expected life of 15 years with an annual exploitation of not less than 2000 hours. d) The boat shall have excellent directional stability and good sea keeping hull characteristics. e) The boat shall have high operational ability and system redundancy. f) The boat should be able to carry out sustained/employment for 7 days independently without refueling for total duration of 22 Hrs at cruising speed.	Check as per test procedure of classification society. Ballistic test carried out to the quality. Fender to be checked.

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Proposed QRs/Technical Specification:		Trial Directive/ Procedure suggested for trial for Board of Officer.												
	<p>g) The boat shall be constructed in such a way that all machinery and equipment shall have ease of operation and low maintenance requirements with low life cycle cost.</p> <p>h) The boat shall have all round heavy duty fender on crafts side.</p> <p>i) Should have Armour Protection to wheelhouse/control cabin including Bullet proof glass. Ballistic test as per approved procedure and schedule to meet NIJ-111/EN 1063 standard.</p> <p>j) The MC should be fully compliant with applicable MARPOL Regulations in force, built to classification society norms, SOLAS compliant in respect of boat safety and certificate of GMDSS required.</p>													
5.	Ergonomics Latest design concepts for boats, with respect to ergonomics and crew comfort are to be included. The automation features and functional aspects in machinery Operations are to be provided considering the indicated crew. Details of machinery controls and automation are to be indicated.	Check physically.												
6	Environmental Conditions The equipment and the machinery fitted on the MC should be marinated and capable of satisfactory operation, under the following environmental conditions:- a) Wind speed upto 30 knots b) Ambient air temperature from zero to +50 C. c) Water temperature from 01 C to 40 C. d) Max relative humidity of 90% at 32 C. e) Salinity of water up to 36 PPM.	Assess the environment condition. Performance of medium crafts will be physically checked in various environmental conditions.												
7.	Operating Environment The vessel employment can occur at any time at day or night, and will typically be operated in varying sea and weather conditions. The craft is well suited to operate in Creek area of Gujarat along the border region of India and also suited to operate along the entire length of Coastal/inland water of India. The vessel will be based at shore stations and may be berthed in the water at a pier or slip. The vessel and all of its equipment is capable of operating continuously in specified environmental conditions. All equipment onboard is designed for the marine environment and is of the best quality and is capable of satisfactory operation in specified environmental/ geographical conditions	Check physically during trial.												
8.	Operating Profile The MC shall confirm to following operating profile:- <table><tr><th>S/No</th><th>Speed of Medium Craft in knots</th><th>No of Hours</th><th>Operating Time</th></tr><tr><td>a</td><td>From 20 knots up to 25 knots</td><td>200 Hrs</td><td>10% of annual exploitation</td></tr><tr><td>b</td><td>From 15 knots up to 20 knots</td><td>800Hrs</td><td>40% of annual exploitation</td></tr></table>	S/No	Speed of Medium Craft in knots	No of Hours	Operating Time	a	From 20 knots up to 25 knots	200 Hrs	10% of annual exploitation	b	From 15 knots up to 20 knots	800Hrs	40% of annual exploitation	Check as per requirement
S/No	Speed of Medium Craft in knots	No of Hours	Operating Time											
a	From 20 knots up to 25 knots	200 Hrs	10% of annual exploitation											
b	From 15 knots up to 20 knots	800Hrs	40% of annual exploitation											

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S/No		Trial Directive/ Procedure suggested for trial for Board of Officers		
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		From 10 knots up to 15 knots	600Hrs	30% of annual exploitation
		From 07 knots up to 10 knots	400 Hrs	20% of annual exploitation
9	Supervision during Construction	As the vessels are being built to class, these would be inspected by the Classification Society. The Owner reserves the right to undertake additional inspections either directly or by third party. Shipyard would be required to provide all inspection facilities at OEM premises/builders yard to the inspecting team. Periodic reviews by the Owner would be conducted for ascertaining work progress by a team including technical member from user end.		
10	Life Support	The Shipyard is to obtain a Contractual commitment from the various equipment suppliers to provide Product Support for a minimum period of 15 years including electronics equipment, after delivery of the last MC. In case the equipment is likely to become obsolete, the manufacturer should be committed to give a clear three year notice to the BSF.		
11	General Instruction	Preliminary stability calculations, power, resistance and endurance calculations, general arrangement plan of boat along with layout of major machinery/ equipment & system are to be submitted along with technical offer. Also, the offer design shall be proven design and in case of new design model test report of the design is to be submitted by the builder along with technical officer.		
12	Hull Vibrations	The vessel and all equipment should be free from excessive vibrations. The hull design and details of construction are to be such as to avoid vibrations that tend to cause damage to equipment or hull structure or to interfere with the proper functioning of the equipment on board.		
13	Propulsion Induced Vibrations	Special care should be taken for the design of the package to minimize propulsion induced hull vibrations. Torsional and lateral / axial vibration calculations for the propulsion system shall be made in the design stage to demonstrate the acceptability of vibration levels. Maximum vibration for main equipment is not to exceed levels stipulated vide ISO - 10816.		
14	Noise	The design, construction, workmanship and installation of all machinery and associated equipment shall be such that the noise levels and sound frequencies will permit normal conversation at all operating positions under all conditions. Every practical effort is to be		

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officers.
	made to minimize the equipment noise by use of vibration mounts below all machinery.	
15	a) Length molded 20 M \pm 0.5 M b) Beam molded 5 M \pm 0.3 M c) Draft (maximum) 1.2 M at full load.	a) Check with measuring steel tape in calm water and tally with approved drawing. b) Check with measuring steel tape in calm water and tally with approved drawing. c) Check draft marking made by builder on full load. It must be below 1.2 Mtr.
16.	Two marine class approved inboard diesel engines directly coupled with reversible reduction class approved gear boxes driving suitable propulsion system suitable for low drafts operations.	i) Check its functionality as per recommendation of OEM in presence of class society representative. ii) Boat builder to provide type approved certificate from the classification society.
17.	Maximum speed - 25 knots at full load correspondence to 85% MCR of the engine rating. Cruising speed - 20 Knots.	To be checked during speed trial. To be physically checked in conditions upto sea state-2 with GPS with full load during sea trials & by calculating the distance travelled & time taken (with and against the tide).
18.	Fresh water capacity	Check tank, empty the tank. Fill tank with measured volume of 5000 Itrs
19.	Endurance	Trial to be carried out for 4.5 hrs @ 20 knots with full load (man & materials with eqpts) during sea trial (favourable against the current) distance travelled & fuel consumed to be recorded. Check & calculate fuel tank capacity meets endurance requirements
20.	Fuel capacity	To meet the endurance requirement. Physically check the fuel tank.
21.	Fuel tank	a) Obtaining and check class certificate.

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Proposed QRS/Technical Specification

S/No		Trial Directive/ Procedure suggested for trial for Board of Officers
	<p>Cu/stainless steel fuel lines, suitable dual fuel water separator filters and remote shut off valves are to be provided. The fuel systems are to be designed in accordance with classification society regulation.</p> <p>The tank will suitable inspection manhole, filling point on deck, drainage valve, air vent and suction line with valves for each engine that include water filter separator.</p> <p>Manual sounding facility and remote reading tank content gauge shall be provided for the fuel oil tank. The remote gauge shall be located at the helms man's console in the wheelhouse. Chart indicating plates for monitoring fuel.</p>	<p>b) Check the remote gauge function of fuel tank level physically by filling fuel in the tank.</p>
22	<p>Construction</p> <p>a) The crafts shall be designed and constructed as per IRS class or equivalent notation of LRS/ABS/DNV or any other member of IACS.</p> <p>b) The craft shall be fully compliant with MARPOL and SOLAS regulations, as applicable.</p> <p>c) All under water fittings, pipes, cables, bilge pumps etc are to be approved type for marine intended applications. Main engines, gear boxes and generators are to be type approved for marine application by class society.</p> <p>d) The hull shall be constructed of FRP and shall be of single piece of FRP mould with smooth mat finish scratch proof gel coat outer finish in single mould.</p> <p>e) The boat shall have good intact and Damage stability, damage survivability, watertight integrity and crew/equipment protection.</p> <p>f) The upper and side deck layout/fitting, craft-side and interior arrangements shall facilitate easy boarding operations and keep crew fatigue within acceptable parameters.</p> <p>g) The boat shall be designed to cater clear uncluttered areas and well-laid out deck for ease of operation and movement.</p> <p>h) The boat shall have Armour Protection to wheelhouse including Bullet proof glass. Ballistic panels and glasses shall be of NIJ-111/EN 1063 standard (Non-metallic).</p> <p>i) The finishing and workmanship of the whole craft construction will be of owner satisfaction.</p> <p>j) The construction of boat should be done in controlled temperature/ humidity to gain the best lamination property.</p> <p>k) Any involvement of marine regulation other than specified in the QRS which is required to be considered for the quality/required parameters while approving of design/constructing of the boat, stage wise/items wise may be ensured by the builder to get it approved by Classification Society.</p>	<p>i) Check the hull physically in presence of IRS rep. It should be as per class society recommendation.</p> <p>ii) Certificate to this effect be obtained from the builder</p> <p>(a) Type approved certificate to be provided by the boat builder.</p> <p>(b) Engine performance trial to be conducted by running on various RPMs for one hour continuously. All parameters of engine must be in normal limits specified by the engine manufacturers. This trial will be done twice after interval of half hour.</p> <p>(c) Gear Box performance trial to be conducted by running on various RPMs for one hour continuously. All parameters of engine must be in normal limits specified by OEMs. This trial will be done twice after interval of half hour.</p> <p>(d) Check material used certificate issued by class society/accredited lab.</p> <p>(e) Stability booklet of each craft shall be approved by class society.</p> <p>(f) Check finish of fire retardant resin coating in the engine room. There should be no cracks and spots. Check material</p>

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officer.
		<p>used certificate issued by class society.</p> <p>g) Check test report of SS items. It should be SS-316.</p> <p>h) Check finish of fire retardant resin coating in the engine room. There should be no cracks and spots</p> <p>i) Builder to furnish the requisite certificates obtained from the National/International level accredited test laboratory for the Armour protection and bullet proof blast fitted in the Boat during the prototype inspection.</p> <p>j) Builder to submit weight calculations with BP panels fitted and prepare preliminary intact stability booklet for Class approval.</p> <p>Class approved certificate to be provided by builder.</p>
23	<p>Sea Worthiness</p> <p>The craft shall be capable of maintaining maximum value of this speed without impairing crew or craft performance in sea conditions up to sea state-3.</p> <p>The craft shall remain operational with reduced performance in conditions above sea state 3 and shall have survivability up to sea state 5.</p>	
24	<p>Fendering</p> <p>The craft to have heavy duty suitable fender all around the craft with appropriate size also pneumatic fenders on port and STBD side. The fendering system has a service life of at least five(5) years before requiring major overhaul or replacement.</p>	<p>Check fender for adequacy/location. Check class/lab approval certificate for materials.</p>
25	<p>Special features</p> <p>a) The crafts shall be provided with one number 4 to 5 meters approx. class certified rigid inflatable boat with 40 HP OBM and boat cover as rescue boat alongwith suitable class approved launching/recovery appliances.</p> <p>b) As per the class requirement, anchor/cable along with windlass/winch shall be provided. The complete system shall have galvanic protection inside cable locker.</p> <p>c) Escape routes NBCD/FF equipments signs shall be made photo luminescent.</p> <p>d) All fitting appliances and gears shall be load tested to static and running load. The Certificate concerning this shall be provided by the yard after obtaining them from the respective OEMs.</p> <p>e) Awning and stanchions for all open deck shall be provided.</p> <p>f) Two set of canvas cover for all upper deck fittings and equipment shall be provided.</p> <p>g) Soft patch shall be provided for shipping in/shipping out of main engine, generators and</p>	<p>a) Lowering and hosting test of RIB to be carried out as per class requirements including load test of davit capacity.</p> <p>b) Load test certificate approved by accredited lab to be provided by builder.</p> <p>c) To be checked physically.</p> <p>d) To be checked physically.</p> <p>e) To be checked physically.</p> <p>f) To be checked physically.</p> <p>g) Functional test to be carried out.</p> <p>h) To be checked as per approved drawing.</p> <p>i) To be checked physically.</p>

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	<p>heavy machinery installed in the engine room.</p> <p>h) Low noise levels are vitally important to mission effectiveness and long-term crew health. Noise levels be reduced wherever possible.</p> <p>i) The consoles of vessel should be weather tight.</p> <p>j) The hull, deck, console and cabin has confirm service life of at least 15 years.</p> <p>k) The boat must have fuel tank of 20 liter capacity with connector facility and standby tank with connector facility.</p>	<p>j) Class approved certificate to be provided by builder.</p>
26.	<p>Armament</p> <p>Location for Main and Secondary Armament</p> <p>The craft shall be fitted with Gun mounting for LMG on bridge top, foxle, quarter deck (port & STBD) in addition, one mounting of MMG shall be provided on bridge top along with NIJ level-3 protection in such a way as to facilitate all-round i.e. 360 degree fire power viz on bridge top, forward and aft deck.</p> <p>Armament Locker</p> <p>The armament locker shall be provided in conformance to the QR's and shall have the capacity of storing ammunition. Essential safety features and flame retardant paint shall be provided in armament locker.</p>	<p>Check mounting of weapons. Check stowage area adequacy.</p>
27.	<p>Navigational Equipment</p> <p>The crafts shall be fitted with the following Approved Type navigational & communicational equipment :</p> <ol style="list-style-type: none"> Navigational radar with AIS 24 nm range with ARPA facilities to track minimum 10 targets having approximate 10" Video display unit of reputed make. Magnetic compass Echo Sounder. The fitment should be done in such a way to protect the sensor during grounding/beaching. DGPS Navigation light as applicable as per COLREG of reputed make. Siren/Horn(Electrical) with loud speaker, microphone and electronic unit. Anemometer Wet and Dry bulb thermometer 	<p>Examine the eqpt physically. Check type approval certificate of the Eqpts and carry out functional test.</p> <ol style="list-style-type: none"> Check the certificate provided by OEM. Test the functionality of eqpt during night hours and ascertain whether it is working properly for detection and recognition of target at reasonable distance. Check the compass and its swing Check the eqpts. and take readings Check functioning of DGPS. Check functioning of Navigation light. It should meet COLREG requirements. Check functioning of Siren/Horn

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officers
	i. Barometer j. Chart Table and lockers with parallel ruler and dividers. k. Loud hailer & PA System l. Police light & Siren m. Heavy duty Window wipers and one clear view screen for front window in way of helmsman. n. Binoculars (7x50 marine type- 02 Nos.) o. Search light for 360 degree coverage having detection range 500 meters, identification 400 meters and recognition 300 meters. p. Electric horn with range of 01 Km.	(Electrical) g) Check functioning of Anemometer. h) Check correctness of temp and functioning of thermometer. i) Check functioning of Barometer. j) Check physically. k) Check functioning of loud hailer & PA system. l) Check functioning of police light. m) Check functioning of window wiper. n) Check functioning of Binoculars and its resolution. o) Check functioning of SL and range. Also check remote operation of search light. p) Check physically.
28.	The following Approved Type communication equipment shall be fitted on the medium craft. All equipment will be provided in the wheel house: a) HF Transceiver – 01 No. b) VHF Transceiver (MMB) – 01 No. c) Portable VHF Transceiver – 02 Nos. d) Search and Rescue Transponder (9GHz) – 02 Nos. e) Emergency Radio Beacon (EPIRB) – 01 No. f) Distress alert transponder. Internal Communication: a) Intercom (Main Broadcast) and telephone (Talk back system) shall be provided. b) Sound powered telephone shall be provided between wheel house, machinery compartment and accommodation spaces. c) All compartments will be provided with public address speaker.	Check type approval of eqpts for marine operations. Check functioning of HF/VHF sets. Check functioning of Intercom and public address systems.
29.	Machinery Main Engines a) The boat shall have two commercial rated turbo charged after cooled inboard marine diesel engines of reputed make having indigenous product support) of appropriate capacity coupled with marine class approved reversible gearboxes of reputed make having indigenous product support reputed make coupled with suitable propulsion system for shallow water operation should with the desirable draft. The main engines are to be type approved and latest applicable IMO/MARPOL requirements compliant by classification society.	a) The boat builder to provide type approval certificate from the classification society along with Unit Certification of each engine and gearbox.

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officers																						
	<p>b) The boat shall have Electronic control and monitoring system for engine, gear box and propulsion system.</p> <p>c) The boat shall have easy electrical starting system of Main Engines by independent battery. Redundancy is to be provided in the form of at least two independent battery sources that can be cross connected to start either engine. The boat shall have remote starting/stopping of main engines from the wheel house and locally from engine.</p>	<p>b) The boat builder to provide type approval certificate from the classifications society. Check functioning of all controls and monitoring systems on console.</p> <p>c) Check manual and remote start/stop of engine from wheel house and locally. Start stop engine for 10 times. Check gravity of battery before and after start/stop of engine. All reading/engine parameters to be recorded.</p>																						
	<p>d) The wet exhaust system is to be used with suitable noise reduction arrangement for main engine and generator prime mover.</p>	<p>(i) Prepare main engine for operation.</p> <p>(ii) Start port main engine. Stop as soon as Level of Oil (LO) pressure are achieved.</p> <p>(iii) Repeat – Start – Stop 10 times.</p> <p>(iv) Carry out same for STBD side main engine also. No. of starts given:- Port – 10 starts, STBD – 10 starts</p> <table><thead><tr><th>Attemp</th><th>Time in (Sec)</th></tr></thead><tbody><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td></td></tr><tr><td>5</td><td></td></tr><tr><td>6</td><td></td></tr><tr><td>7</td><td></td></tr><tr><td>8</td><td></td></tr><tr><td>9</td><td></td></tr><tr><td>10</td><td></td></tr></tbody></table> <p>Note:- specific gravity of batteries to be checked before and after endurance trial.</p> <p>Check physically.</p>	Attemp	Time in (Sec)	1		2		3		4		5		6		7		8		9		10	
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	<p>e) Testing lamp with 10 mtr.cable – 02 Nos</p> <p>f) Engine room ventilation- Sufficient ventilation blowers are to be provided in order to ensure that the maximum rise of air temperature between supply and exhaust air is</p>	<p>Check physically.</p>																						

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officer.
30.	<p>restricted to 10° C.</p> <p>a) Power generation and distribution system should conform to Classification Society norms. To this end, a suitable power source of adequate capacity, to meet the entire electrical load of the craft including battery charging is to be provided. Aload analysis chart justifying the capacities of the power supply source and a single line schematic diagram showing arrangement of the power generation and distribution is to be provided along with the technical offer.</p> <p>b) Two (Class Approved marine type) DG sets each capable of meeting complete crafts load at all times with 25% reserve capacity shall be provided. Generators should be suitable for continuous unattended parallel operation.</p> <p>c) In addition, the battery system of adequate capacity with independent charging facility shall be provided for starting of main engines/generator sets and meeting emergency power requirements including automatic emergency lighting arrangements.</p>	<p>a) Full power trials of boat at 100% MCR and to be conducted for 60min with recording of all system parameters.</p> <p>b) Type approved certificate to be provided by the boat builder.</p> <p>c) DG Set performance trial to be conducted by running for one hour continuously on full load. All parameters of DG Set must be in normal limits specified by the DG Set manufacturers. This trial will be done twice after interval of half hour. Check battery charging facility and capacity of battery to meet automatic emergency lighting arrangements.</p>
31.	<p>a) All the electrical equipment, cables and fittings, machinery and associated systems shall be of IP rating of IP-57 and above and shall conform to Classification rules.</p> <p>b) Construction of the electrical equipment and machinery shall be such that all installation, main cabling & maintenance work including removal & replacement of component can be performed from front.</p> <p>c) Testing lamp with 36 mtr cable.</p>	<p>a) Check type approval/material test certificate of class/accredited lab</p> <p>b) & c) Check physically.</p>
32.	<p>A emergency battery backup system to cater for uninterrupted power supply, for a minimum duration of 06 hrs to essential equipment viz. radar, controls, navigation, and communication, lighting and domestic equipment's to be provided. Emergency Lighting/Emergency lighting fittings etc supplied from 24VoltsDC distribution board shall be fitted to provide illumination to access ways, passageways, in compartments and as approved by Class rules.</p>	<p>To be checked during functional/performance trials.</p>
33.	<p>A water tight shore supply connection box along with 50 mtr supply cable shall be fitted on weather deck at an appropriate position conforming to Classification rules, to meet the requirements of the harbor loads.</p> <p>A reel for stowing the flexible cable 50 mtr will be provided and suitably located on the winch deck.</p>	<p>To be checked during functional/performance trials</p>

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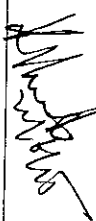
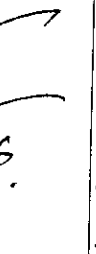

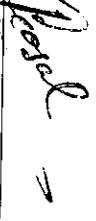
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S/No	Proposed QRS/T Technical Specification		Trial Directive/ Procedure suggested for trial for Board of Officers
34.	Batteries	Adequate numbers of 12V DC Lead Acid maintenance free batteries sourced from reputed firms are to be provided to cater for battery back system and for starting of DG/engine as applicable. Batteries are to be located in well ventilated space and will be housed in suitable FRP/hard wood boxes with internal lead lining. Suitable battery charging arrangement for charging of batteries from the craft's generator as well as from 230V, 50Hz shore supply is to be approved.	Specific gravity and Ahc rating of batteries to be recorded. It should meet the power requirement of the crafts. Check housing of batteries.
35.	Cables	Cables conforming to Class requirement shall be used. Class approved LFH cables conforming to marine specifications shall be used in main switch board, control panels etc. The under mentioned aspects shall be considered during installation of cables: (a) For cables passing through water tight deck or bulk heads, approved deck tubes and glands of single or multiple type shall be used. (b) Proximity to pipe joints, hot positions, hatch ways and openings which may render the cables liable to damage shall be avoided. (c) Avoidance of congestion of cables and awkward bends. (d) Cables shall be fixed on perforated M.S. galvanized plating mounted on vertical bulkhead as far as possible, but where this cannot be arranged, they shall be fixed to perforate plating on the underside of the beams. (e) Each and every cable shall be affixed with indelible brass identification tallies at each end before entering equipment. The tally shall indicate circuit code number as shown on relevant Drawings.	Check type approval/material test certificate of class/accredited lab. (a) to (e) Check physically
36.	Motor	All motor shall be conforming to classification rules suitable for marine use. Siting of motors should be as per classification society's regulations.	To be checked during functional/performance trials. Full load trial of all Motor and Pump to be carried out.
37.	Fire Fighting & Damage Control	Firefighting equipment as per class rules and approved type shall be provided. Portable fire extinguisher shall be provided throughout the vessel as required to meet the class /SOLAS requirements. The machinery spaces is to be provided with a suitable fixed firefighting system operated from the bridge and fire & smoke detection system meeting class requirements. The alarm indication is to be available at the bridge panel. Fire pump/hydrant, automatic emergency lighting, automatic fire fighting arrangements in engine-room and magazine shall be provided. On board emergency hull repair kit and shoring arrangement to control flooding. To extract the unwarranted sea water deposited due to the unforeseen damage of the vessel 01 No. DD fire pump, approved type with 30 mtr long hose pipe shall be provided.	i) Obtain and check certificate provided by class society. ii) Test the eqpt to ascertain its functionality. iii) Check functioning of remote sensor of fire detection systems.
38.	Bilge System	A suitable bilge alarm system is to be provided to indicate high water level in the bilge.	Arrangement of bilge system is to be

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officer,
39.	<p>The alarm indication is to be available on the bilge panel. The bilge system is to be designed in accordance with classification society regulation. However, minimum a motor/engine driven bilge pump and a manual portable bilge pump is to be provided.</p> <p>Lifesaving appliances will be in accordance with SOLAS/Class approved type.</p> <p>i) 12 number Hazardous Duty Life Jackets-As per Annexure -'P' to QRs of MC.</p> <p>ii) Two 20 men SOLAS approved life raft with HIRU to be provided.</p> <p>iii) 25Nos life jackets Class approved type with zip system, 3 lockable strip, whistle, retro reflecting tape.</p> <p>iv) Four life buoys with S.I. light & life line SOLAS approved are to be provided.</p> <p>v) One SOLAS approved set of rocket parachute flares is to be provided.</p> <p>vi) All seats and gun mounts to be provided with safety harness and handhold throughout the boat with Hydro static release unit.</p>	<p>physically checked with the class approved drawing and functional test to be witnessed alongwith Class Rep.</p> <p>i) Lay out the buoys/jackets count and record.</p> <p>ii) Check certificate of life raft and its expiry date.</p> <p>iii) Check class approved certificates.</p> <p>iv) Check class approved certificates.</p> <p>v) Check class approved certificates.</p> <p>vi) Random testing of kit be done to ensure functionality.</p>
40.	<p>The craft shall be provided with marine type centralized / split air-conditioning system of reputed make at wheel house and all accommodation spaces. All wheel house & accommodation places should be provided cross ventilation / forced ventilation as per class requirements for use in case of AC shut down / break down. Adequate forced ventilation is to be provided in the machinery spaces, wash places and WCs etc as per Class.</p>	<p>i) Check AC plants, switch on-off (Repeat the process 15 times)</p> <p>ii) Check temp in wheel house/compartment to test is functionality.</p> <p>iii) Obtain and check class approved certificates.</p>
41.	<p>a) The common galley with adequate space shall be provided :-</p> <p>i) Hot Plate - 02 Nos. (2000 W)</p> <p>ii) Microwave Oven</p> <p>iii) Food processor</p> <p>iv) Tea/coffee maker</p> <p>v) Electric rice cooker</p> <p>vi) Tea urn</p> <p>vii) Water cooler cum purifiers with suitable RO system</p> <p>viii) Storage racks & sinks.</p> <p>b) Complete set of cutlery and accessories as per complement shall be provided :-</p> <p>i) Refrigerator 170 - 200 Ltrs</p> <p>ii) Deep freezers - 01 No.</p> <p>iii) All other utensil required for making food for 22 personnel.</p> <p>iv) Water heater/geyser</p> <p>c) Securing arrangements need to be provided for all galley equipments.</p> <p>d) Hot plate should be provided to rails for retaining cooking utensils.</p>	<p>i) Check all equipment for its functionality.</p> <p>ii) Check and count all cutlery and accessories as per ship inventory</p> <p>iii) Check Refrigerator and its functionality for one hour cooling should be adequate.</p> <p>iv) Check Galley for adequacy of space as per GA drawing and functioning of equipments provided/ fitted in Galley.</p> <p>v) Check Securing arrangements physically.</p>

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Proposed QRS/Technical Specification

S/No	Proposed QRS/Technical Specification		Trial Directive/ Procedure suggested for trial for Board of Officers
42.	Storage space for Ration	Sufficient space for storage for ration shall be provided for complete crew for the mission period of 07 days.	Check adequacy of space for stowage of Ration.
43.	Recreational facilities	LCD / LED TV and DVD players of a reputed brand in cabin/dining areas of Officers and dining area of crew shall be provided. Omni directional Antennae for 02 DTH connections be provided. All recreational equipments should have adequate securing arrangements.	Check physically.
44.	Rudder and Steering arrangements	Power hydraulic steering operated from wheel house helms/ command console. The rudder and steering arrangements shall be hydraulically operated and the arrangements shall be capable of operating the craft in water depths of more than 1.5 meter with good maneuverability at low speeds. The arrangements shall be sensitive and provide fine control on speed especially in confine spaces. The stainless steel stocks shall be mechanically operated from the coxswain position with the provision of hand tiller for emergency local operation. A rudder angle indicator shall be fitted in the compartment to facilitate local operation. Adequate redundancy to be provided for steering.	Check its functionality as per recommendation of OEM in presence of classification society representative. Boat builder should provide type approved certificate.
45.	Wheelhouse/ Bridge	i) Wheelhouse to have Armour protection including bullet proof glass. ii) Overhead vision iii) Suitable seating for crew in the Wheel house/bridge iv) Steering system hydraulic. v) Engine/propulsion controls and instrumentation Chart table vi) Lighting arrangements including dedicated lighting to dedicated seating positions vii) Master control panel for systems viii) Remote control facility, for starting/stopping/operations of engines including engine performance monitoring panels, fuel state indicators, battery state indicators, battery charging indicator etc., as per classification society rules to be provided. Coxswain post to be fitted with Communication console. ix) Agravity type Pendulum wheel indicator is to be provided in the Wheel House. x) Provision of adequate numbers of sockets in wheel house and in accommodation spaces is to be catered for. xi) Night lighting arrangement to be provided. xii) Proper ventilation arrangement to be made in the Wheel House.	(i) Stand in wheel house and test the visibility for 360 degree (all rounds). Stand in wheel house and test the visibility for overhead. Ensure sitting by crew members. Check for comfort and easy operating of consoles. Check for easy operation. Check number and location of controls for easy viewing by the Master. Carry out functional test. Check for number, location and other details. Check AC/ventilation for adequacy/comfort functioning. (ii) Check windows/hatches for number/location and test functionality. Test general lighting for adequacy. (iii) Test dedicated lighting for number/location for adequacy. Check for availability/location and test for its functionality.
46.	Accommodation and Habitability	Coxswain Post : One enclosed area with a seating arrangement for 10 personnel is to be provided. The seats are to be provided with shock absorption device and seat belts. The seating arrangement, cup boards and stowage design are to be of contemporary design.	To be physically checked as per GA.

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officer.
	All Furniture shall be of modular Design.	
47.	Complement Accommodation : Sitting capacity :- 10 persons including helmsman & cart man Sleeping accommodation :- 22 person (02 Officer, 02 Sub officers & 18 crews) a) One cabin for 02 Officers and bathroom attached. b) One cabin for 02 Subordinate Officers and bathroom attached. c) Dormitory accommodation for 18 personnel having two bathroom. d) Adequate dining space for crew. e) All cabins to be adequately furnished/carpeted with standard fitting, mattress, blankets, pillow, bed sheets, wall clocks, curtains, towel etc. All Furniture, Cabin fittings, Bath Room fittings shall be of modular Design. The layout of accommodation space, Galley, Bathrooms and WC should be modern and ergonomically designed to facilitate comfort and utility. Any additional items contributing to comfort may be incorporated. f) All accommodation places should be fitted with sufficient bunk fan for comfortness while AC system shut down. g) All bathroom should have geyser facility. h) Securing arrangement should be provided for all loose fitted equipments.	Seating capacity & sleeping arrangement to be physically checked as per GA.
48.	Sanitary Suitable sanitary system, including wash basin, toilet with a holding tank/ flushing out arrangement and sewage disposal is to be provided as per class requirements. WCs are to be provided with integral macerating/ treatment unit with provision to discharge over board or to shore collection unit	To be physically checked as per approved drawing.
49.	Redundancy Aspects The crafts systems should be designed keeping aspects of redundancy and independent operability in perspective. It should be feasible to isolate defective equipment and fittings without affecting overall performance.	Physically checked.
50.	Forepeak Fore peak shall be built for stowage of anchor chain cable and other ropes. A Naval pipe of stainless steel shall be fitted in the compartment for anchor chain / cable. Arrangement for securing the inboard end of the chain / cable shall be provided in the compartment. A drainage arrangement shall be provided as per Class requirements.	Check and obtain type approval certificate of class for Anchor and Anchor chain cable.
51.	Fore cabin This compartment shall provide convenient sleeping arrangement. Adequate electrical light fitting and AC shall be provided. Locking cup-boards shall be provided. Extra storage facilities shall be provided under the bunks. Rack for accommodating 18 in Nos. Rifles and 2 in Nos LMG and 01 MMG along with ammunition is to be also provided.	To be physically checked as per approved drawing.
52.	Deck, Deck shall be constructed with GRP laminates as per classification society Rules. All the	i) Check as per class specification.

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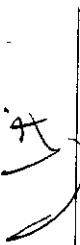
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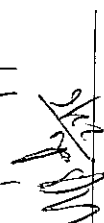
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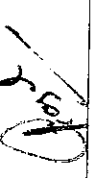
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S/No	Proposed QRS/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officers
Machinery and Seamanship fittings	<p>exposed surfaces of the main deck shall be given antiskid finish. Additional chaffing laminate shall be provided in way of anchor arrangements.</p> <p>Following Equipment/accessories shall be provided conforming to Class requirements:-</p> <ul style="list-style-type: none"> (a) Class approved Anchor and Chain Cable. (b) Hawse pipe and Anchor recess. (c) Class approved Anchor Windlass. (d) Bollards, Mooring/Freeing Ports, Fairleads, and Towing Arrangements. (f) Freeing and Mooring Ports. (g) Bollards, Cleats and Fairleads. Four is no stainless steel bollards, four in No SS fairlead and four in No SS Cleats conforming to SS-316 material shall be provided. All these fittings shall be fastened through GRP on to a SS backing plate with SS fasteners. The backing plate shall be laid up and covered up with adequate no. of GRP layers. (h) Mooring Towing ropes. (i) Each deck fitting to be load tested by OEM/reputed testing lab. 	<ul style="list-style-type: none"> ii) Check anchor and mooring equipment physically and check its functionality during the sea trial. iii) Materials test report of Bollard, Cleats, Fairleads and PP Ropes. iv) Suitability and ease of embarking ladder on port and STBD side be checked. v) checked material certificate. vi) Check load test certificate.
53. Guard Rails	Stainless steel SS-316 guard rails of min 20 mm dia with stanchions shall be provided all along the craft. Stainless steel SS-316 storm rails also be provided all along raised deck house. Pole of the guard rail/strengthened accordingly.	To be physically checked from location as per GA. Materials test certificate to be provided by builder.
54. First Aid Box	Two first aid boxes to be installed (one at wheel house and one at accommodation area)	Check physically.
55. Fitting & Fixing	All fitting fixture to be SS-316 grade unless other type metal marine grade is suitable for a particular operation.	Check type approval/material test certificate of class/accredited lab.
56. Materials	<ul style="list-style-type: none"> i) Vinyl ester grade resin to be used and approved by IRS/IACS classification society. ii) Glass Reinforced plastic materials used in construction such as Chopped Standard Mat, Woven Roving etc. shall be IRS/IACS member approved. iii) Core materials approved by IRS/IACS member shall be used. iv) All SS Material used in the deck or any other spaces should be marine grade of SS 316 v) All the materials, workmanship and finish shall be of the high standard/quality and as per class required. vi) All windscreen/ glass should be toughened glass. vii) All ply wood should be 100% water proof marine ply wood. viii) All wood fittings should be high quality seasoned teak wood. ix) In the Engine room final coat shall be of class approved fire retardant resin. 	Check type approval/material test certificate of class/accredited lab and other physically check.

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S/No	Proposed QRs/Technical Specification	Trial Directive/ Procedure suggested for trial for Board of Officer.
57.	<p>x) TBT free anti fouling paint is to be used for hull below the water line. Material for engineering/electrical systems attached as Annexure 'Q' to QRs of MC.</p> <p>i) Priced purchase order copies for ordered equipment/machinery.</p> <p>ii) Copy of technical advice floated to various firms for equipment/machinery be forwarded to BSF simultaneously.</p> <p>iii) All drawings are class approved – 03 set.</p> <p>iv) As built final building specification, as fitted drawing and consolidated schedule of piping, painting, insulation, paneling and deck lay-up on delivery of craft (three copies per craft).</p> <p>v) Manual with regards to installation, operation and maintenance of various equipment/fittings systems and part identification list (three copies per craft).</p> <p>vi) Service manual of all engine and accessories.</p> <p>vii) Part catalogue/identification list of all engine and accessories.</p> <p>viii) Stability booklet is to be approved by Class and provided.</p> <p>ix) Docking plan.</p> <p>x) Fire fighting plan.</p> <p>01 set of Documentation per craft plus total 04 additional copies are to be provided in printed hard copies in addition to CD-ROM & software for reading</p>	Physically check.
58	<p>i) Hull area below the waterline shall be painted with a TBT free Anti fouling paint as per the latest IMO regulations.</p> <p>ii) The armament lockers shall be painted with flame retardant painting system.</p> <p>iii) The Medium Craft shall be painted in disruptive pattern colour with BSF/user markings.</p> <p>iv) The Medium Craft name, ID No. and BSF/user Emblem and National Flag shall be fixed on both sides of the Hull at superstructure at an appropriate place.</p> <p>One set of tools specified by OEM for all engine/equipment and accessory installed in the Medium Craft.</p>	Check material test report of paints. Check pattern of painting, craft name and BSF/user force emblem.
59	Tools	Check physically.
60	Displacement and Weight	Check it class approval test certificate.
61	Instrumentation Panel	Check all the instruments functioning.

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Co-opted Member:

Not attended

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Proposed QRs/Technical Specification

Trial Directive/ Procedure suggested for
trial for Board of Officers

	be enhanced as per OEM recommendations) :-	
(a) Engine Tachometer	(b) Engine oil pressure gauge	
(c) Engine cooling with a temp gauge	(d) Engine oil temperature gauge	
(e) Gear box pressure gauge	(f) Speedometer	
(g) Single lever engine/gear box control system.		
(h) Rudder angle indicator.	(i) Light indicator	
(j) Engine oil pressure alarm	(k) Engine oil pressure trip	
(l) Engine oil temperature alarm	(m) Engine water temperature trip	
(n) Gearbox oil pressure alarm	(o) Gearbox oil pressure trip	
(p) Gearbox oil temperature alarm		
(q) Emergency main engine stop		
(r) Over speed trip mechanism and indication		
(s) Lube oil pressure gauges for engines and gearboxes		
(t) Fresh water temperature gauges		
(u) Hour counter		
(v) Ammeters/voltmeters for monitoring battery charging/battery voltage/load current		
(w) Exhaust temperature gauges		

PO :-

(Kunal Mazumdar), DIG(WW), FHQ, BSF, New Delhi

M-1:-

(Rajesh Negi), DC
NDRF

M-2:-

(ASHISH KANTAN, DC)
CRPF

M-3:-

(Satvinder Singh) AC, ITBP

M-4:-

(Yogesh Singh), DC, SSB

M-5:-

(S K Thakur), DC,
Assam Rifle

M-6:-

(Uday Kr Sah), AC, CISF

M-7:-

Not attended
(), NSG

M-8:-

(Dr. Anand)
Geopdt, BPR&D
DySP

M-9:-

(N C Sundar Singh), DC(WW), FHQ BSF New Delhi

Co-opted Member:-

(K K Dhawan), Principal Surveyor, IRS, New Delhi

Approved/Not Approved

Director General

Border Security Force