संख्या. पी-63013/200/01/2022/मोड-I/सीसुबल/3727-39

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 16 अगस्त 2024

सेवा में,

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

विषयः **अनुमोदित गुणात्मक आवश्यकता /परीक्षण निर्देशों का प्रेषण**

तकनीकी विशेषज्ञों के उप समूह द्वारा किए गये सूत्रीकरण एवं महानिदेशक सीमा सुरक्षा बल द्वारा अनुमोदित " Mechanized Boat" के संशोधित गुणात्मक आवश्यकता/परीक्षण निर्देशों को आपकी अग्रिम कार्यवाही हेतु प्रेषित किया जाता हैं।

संलग्न : उपरोक्तनुसार

आनन्द सिंह 16/8/24
(आनन्द सिंह तक्षक)
उप महानिरीक्षक (रसद)

प्रतिलिपि :-

1. **तकनीकी निदेशक**
   The Technical Director
   राष्ट्रीय सूचना-विज्ञान केन्द्र, नोर्थ ब्लाक, 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 सूत्रीकरण किये गये गुणात्मक आवश्यकता /परीक्षण निर्देशों जोकि गृह मंत्रालय की वैबसाईट (पुलिस आधुनिकीकरण संभाग) के गुणात्मक आवश्यकता पोर्टल में मशीनरी एवं उपकरण के साथ निगरानी उपकरण वर्ग के अर्न्तगत कमांक संख्या-39 पर पहले से अपलोड है के स्थान इस पत्र के साथ संलग्न संशोधित गुणात्मक आवश्यकता /परीक्षण निर्देशों को अपलोड करने का श्रम करें।
2. SO (IT), North Block, MHA
   (Through E-mail)
   (E-mail address: soit@nic.in)
   : कृपया उपरोक्तानुसार कार्यवाही करने का श्रम करें।
3. तकनीकी विंग, सीमा सुरक्षा बल
   : कृपया उक्त उपकरण के गुणात्मक आवश्यकता/ परीक्षण निर्देशों को सीमा सुरक्षा बल की वैबसाईट पर अपलोड करने का श्रम करें।
4. Sh. Anoop Dhanvijay, Director- Buyer Management (CPSEs & Central Ministries), GOI. Ministry of Commerce & Industry, Government e-Marketplace. Jeevan Tara Building.5-Parliament Street. New Delhi-110001
   E-mail:- anoop.dhanvijay@gem.gov.in
   For info with request to upload the approved Revised QRs & TDs of **"Mechanized Boat"** on GeM Portal. Copy of QRs & TDs is attached with this letter.
5. Prov Dte (Water Wing, FHQ, BSF
   : वास्ते सूचनार्थ आपके पत्र संख्या-12/1127/ 23-पी/507 दिनांक 27 फरवरी 2024 के संदर्भ में।
6. फाईल।

QRs & TDs OF Mechanized Boat - Revision

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
1.	Functions	The boat shall be designed to carry out day/night coastal patrol and surveillance operation in, Creeks of Gujarat/Sundarban and Inland Water of India. The boat shall be highly sea worthy. 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 in 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.	Check the navigational system for night ops. Trial be carried out in shallow during day and night.	Must be as per Specification
2.	Class	MB should conform to IRS or any other member of IACS class. The suitable notation under appropriate class to be provided subject to operation of boat in the Creek/Sunderban/Inland Water of India. Classification society should consult with user department to confirm the suitability of vessel at the area of Employment of concerned organization before any kind of approval of design/construction stage approval. Boat should have hard chine shape planning hull with optimum dead rise angle to meet the desired speed and stability requirement. The builder should exhibit the final 3D GA drawings graphics for analysis of Comfortness/Ops requirement by the owner/purchaser.	Check the criteria with classification society representative. Examine the class certificate issued by classification society with the specified class notation for compliance.	Must be as per Specification
3.	General Features	a) The Mechanized boat should be capable of operating in shallow waters in minimum depth of 5 feet in extreme tropical conditions. b) Should be capable of operating in shallow waters. c) The MB should have a service life of 15 years for machinery equipment and hull of the boat. The MB should be able to have sustained operation of 4-6 hrs per day with annual exploitation not less than 2000 hrs. d) Excellent directional stability and good sea keeping hull characteristics. e) Regime of Operation:- Machinery installation should be such that undesirable vibrations, noise etc are minimized and measured parameters during trial shall conform to class Rules. Should have high	Check the criteria with classification society representative and check physically the fender and other items as per class requirement. Check fuel tank size. It should be sufficient for 24 hours operations.	Must be as per Specification

S/ No		QRs/Technical Specification	Trial Directives	Result expected/ desired
		operational availability and system redundancy. (f) Should be capable of mission periods of 24 hours with 16 hours run at average cruising speed with full load. g) 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. h) All round fendering (vertically placed) on crafts side. i)) Should have Armour Protection to wheelhouse/control cabin including Bullet proof glass and open able window for cross ventilation. Ballistic test as per approved procedure and schedule to meet NIJ-111/EN 1063 standard. j) The MB should be fully compliant with MARPOL Regulations in force, built to classification society norms and SOLAS compliant in respect of boat safety as applicable. k) Latest design concepts for boats, with respect to ergonomics and crew comfort are to be included. l) The boat should have class approved fire fighting appliances, life saving appliances and other required accessories. m) As the boat has to run in costal water so GMDSS certificate required and also required fitments of AIS. n) 03 Nos. each 9 Cm size Port hole (It should be covered with round disk of bullet resistant material) on Port & STBD at suitable place be provided to fire the weapon from inside the cabin. o) All SS materials should be Marine grade SS-316. p) Multifunction Rader chart plotter, GPS, Echo sounder, AIS are required. q) Engine room must have sufficient place to carry out repair and maintenance. r) Main engine & its accessories and its electronics devices like control panel, control unit, parameter display unit, wheel house operating console units and monitoring system related to Engine should be the scope of main Engine manufacturer (OEM) compatible with Gear box and propulsion unit. s) Power generation (DG Set) and it's all auxiliary systems, like control & monitoring system should be the scope of DG Set engine manufacturer. t) If electronic control and monitoring system not manufactured by the	Examine certificate issued by classification society for compliance to SOLAS requirement and safety plan as per class rules. Ballistic test carried out to check the quality to the prototype boat. Check certificate etc.	

<table>
<tr><th>S/ No</th><th colspan="2">QRs/Technical Specification</th><th>Trial Directives</th><th>Result expected/ desired</th></tr>
<tr><td></td><td></td><td>same company of engine or the scope of the original engine manufacturer (OEM), then such engines will not be accepted.
u) Firm should finalize and project only one each make of engine, gear box and propulsion unit (selection of engine should confirm the compatibility of selection of gear box make and propulsion unit make) with complete literatures/ manuals/specification/part catalogue/OBS & BDS list etc. alongwith technical bid. Offering of multiple engine not be accepted.</td><td></td><td></td></tr>
<tr><td>4.</td><td>Operating Profile</td><td>
<table>
<tr><th>S/No</th><th>Speed of Mechanized boat in knots</th><th>No of Hours</th><th>Operating Time</th></tr>
<tr><td>a</td><td>From 15 knots upto 20 knots</td><td>200 Hrs</td><td>10% of annual exploitation</td></tr>
<tr><td>b</td><td>From 10 knots upto 15 knots</td><td>800 Hrs</td><td>40% of annual exploitation</td></tr>
<tr><td>c</td><td>From 08 knots upto 12 knots</td><td>600 Hrs</td><td>30% of annual exploitation</td></tr>
<tr><td>d</td><td>upto 08 knots</td><td>400 Hrs.</td><td>20% of annual exploitation</td></tr>
</table>
</td><td>Check as per requirement.</td><td>Must be as per Specification</td></tr>
<tr><td>5.</td><td>Supervision during Construction</td><td>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. Boat builders would be required to provide all inspection facilities at yard premises 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.</td><td>Check as per requirement</td><td>Must be as per Specification</td></tr>
<tr><td>6.</td><td>Life Time Support</td><td>The Shipyard is to obtain a Contractual commitment from the various equipment suppliers to provide Product Support for a minimum period of 10 years including electronics, after delivery of the last MB. In case the equipment is likely to become obsolete, the manufacturer of boat should be committed to give a clear three year notice to the BSF.</td><td>Product support records to be checked.</td><td>Must be as per Specification</td></tr>
<tr><td>7.</td><td>General instruction</td><td>Preliminary stability / calculation, power, resistance & endurance calculations General arrangements plan of boat along with lay out of major machinery / equipment's & system duly vetted by Classification Society 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 offer.</td><td>Check record physically.</td><td>Must be as per Specification</td></tr>
<tr><td>8.</td><td>Length</td><td>To accommodate the required facility/machineries comfortably.
Length hull moulded - Minimum 13 Mtr
Beam - According to the ship stability criteria and design requirement</td><td>Check with measuring tape in clam water and tally with approved drawing.
Check lines plan and</td><td>Must be as per Specification</td></tr>
</table>

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
			general arrangement drawings.	
9.	Draught	Not exceeding 0.7 Mtr at full load	Check draft marking made by builder on full load.	Must be as per Specification
10.	Displacement And weight	As per given endurance, loading and speed requirement. Boat should light weight and Heavy strength material in hull.	Check classification society approved stability booklet.	Must be as per Specification
11.	Propulsion	a) Two inboard turbo charged water cooled class approved marine diesel engines driving suitable Jet propulsion gear box compatible with main engine. b) Electronic control and monitoring system for engine, gear box and propulsion system. c) Easy electrical starting system of Main Engines by battery. d) Remote starting/ stopping of main engines from the wheel house and locally from engine room. Electrical and mechanical starting system in main engine is to be provided in each engine separately. e) Silencer for main engine exhaust system should be catered for.	Check its functionality as per specifications recommendation of OEM in presence of class society representative.	Must be as per Specification
12.	Fendering	Boat shall have heavy duty 'D' shape rubber fender all along the boat. 04 Nos. portable pneumatic fenders size (Length -2.5' x Width-1')	Check fender for adequacy/ location. Check class approvals certificate for materials.	Must be as per Specification
13.	Fresh water capacity	1000 Ltrs.	Check tank, empty the tank. Fill tank with measured volume of 1000 ltrs	Must be as per Specification
14.	Maximum speed	20 knots at full load correspondence to 85% MCR of the engine rating at sea state 2 conditions.	To be physically checked in sea state-2 with GPS during sea trials with and against tide/ current & by calculating the distance travelled & time taken.	Must be as per Specification
15.	Cruising Speed	**13 to 15** Knots at full load	To be checked during speed trial.	Must be as per Specification

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16.	Endurance	Endurance is 10 hours at full load in cruising speed of 15 Knots.	Trial to be carried out for 2 hrs @ 15 knots with full load (man & materials with eqpts) during sea trial (favour & against the current) distance travelled & fuel consumed to be recorded. Check & calculate fuel tank capacity meets endurance requirements	Must be as per Specification
17.	Floor	As per class approved, should be Anti-skid floor/ deck.	To be physically check for antiskid flooring as per class approved drawing.	Must be as per Specification
18.	Seaworthiness	The craft shall be capable of maintaining 12 knots speed without impairing crew or craft performance in sea conditions of the Creek/ Sundarban Area. Stability up to sea state 4 and survivability up to sea state 5.	(a) To be checked during speed trial. (b) Boat builder to provide class approved certificate.	Must be as per Specification
19.	Complement	Mechanized Boat shall have a capacity of 15 people on board including Crew. The boat shall be fitted with twin engine of sufficient horse power to generate desirable speed and endurance.	Seating capacity & sleeping arrangement to be physically checked.	Must be as per Specification
20.	Environ-mental conditions	The equipment and the machinery fitted on the MB should be marinised and capable of satisfactory operation, under the following environmental conditions:- a) Wind speed up to 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 36000 PPM. f) Tidal current 5 to 6 knots. g) Wave height 2 to 9 feet.	Assess environmental condition. Check class approved for all environmental condition.	Must be as per Specification
21.	Standard	a) The crafts shall be designed and constructed as per IRS class notation or any other member of IACS. Main engines, gear boxes and generators are to be type approved by IRS or any other member of IACS. b) The craft shall be fully compliant with MARPOL and SOLAS regulations as applicable. Material for pipes, valves, pumps etc. shall be	a) Class type approved certificate to be provided by the boat builder. b) Check class approval certificate and to be	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		in accordance with class specifications/marine grade. c) All underwater fitting, pipes cables, bilge pumps etc are to be class approved type for marine intended applications. d)The boat shall be having a GRP/FRP planning hull. Hull, deck and wheel house shall be constructed using IRS approved composite materials i.e. High quality marine grade Gel coats, vinyl ester resins & Reinforcements. e) The reinforcements like non crimp fabric, core materials (PVC/PU Foam), and glass fabrics shall be used. (f) Good intact and Damage stability, damage survivability, watertight integrity and crew/equipment protection. g) The upper side deck layout/fitting, crafts-side and interior arrangements shall facilitate easy boarding operations and keep crew fatigue within acceptable parameters. h) The boat shall be designed to cater clear uncluttered areas and well laid out deck for ease of operation and movement. i) The Hull below water line shall be painted with the Tin free Anti fouling paint system as per the latest IMO regulations international paint scheme (for 5 years). j) The construction shall be done in controlled temperatures/humidity to gain the best laminate properties. k) All SS Material used in the Deck or any other of marine Grade of SS 316. All the materials, workmanship and finish shall be of the highest standard/quality and as per class requirement. l) All wind screen/ glass should be bullet proof. m) All ply wood should be 100% water proof marine ply wood. All wood fittings should be high quality seasoned teak wood. n) In the engine room final coat shall be of approved fire retardant resin. o) All workmanship and finishing of boat will be entire satisfaction of the owner. p) 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.	checked physically. c) To be checked physically. d) Check material used certificate issued by class society/accredited lab. e) Check test certificate. f) Check physically in presence of rep of classification society. Stability booklet of each Boat shall be approved by class society g) Check physically. h) To be checked physically i) Check the certificate j) Classification certificate to be checked. k) Check test report of SS items. It should be SS-316. l) Check certificate for bullet proof property. m) Check material test certificate. n) Check physically o) Check physically. p) Check relevant documents.	

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
22.	Hull	a) The hull shall be constructed in accordance with classification society rules and shall be of single piece FRP mould with smooth mat finish scratch proof Gel Coat outer finish in single mold with light weight heavy strength. b) Under deck includes longitudinal and transverse stiffeners and sub division bulkheads, with anti-flooding and damage control as per class requirements. c) To have minimum draught for easy beaching and sail in shallow water. Bottom should be strengthened for this purpose. d) The hull should be strengthen to resist the slamming effect of the water waves as per the sea state specified in QRs. (e) All compartments for peak deck, engine room, tiller deck & wheel house to be water tight as bulkheads.	a) Check the hull physically in presence of IRS rep. It should be as per class society recommendation. b) Certificate to this effect be obtained from the builder. c) Check draft certificate also physically. d) Check in presence of rep of Classification Society. e) Check protection for propeller.	Must be as per Specification
23.	Main Diesel Engine	The MB should be fitted with suitably rated class approved twin inboard diesel engines(one per shaft) directly coupled to class approved reversible reduction gearboxes driving suitable Jet propulsion system meeting the speed requirement. The propulsion package should cater for shallow water operations. The propulsion system should be designed to achieve desired performance throughout the life of the boat(15 years) The following requirements for main diesel engine are to be ensured:- a) The main diesel engine power should be suitably rated so as to achieve a maximum speed of not less than 20 knots and reliable operation as per the operating profile of the vessel over the service life of the vessel. b) Operation of the engine in the specified operating profile and duty should be validated by the engine OEM and all warranties for the engine as provided by the OEM should hold good for all exploitation regimes. Confirmation from OEM with respect to the same is to be provided by the Builder in their technical offer. c) Remote starting/stopping of main engine from wheel house and locally from engine, electrical and mechanical starting system in main engine. d) In order to ensure independent availability of propulsion system, the Main-Engine driven sea water pump shall supply cooling water requirements of the entire propulsion train (including the gearbox) e) The main diesel engine should be type approved and MARPOL latest applicable standard compliant. Engine should have mechanical fuel pump	Type approved certificate to be provided by the boat builder alongwith Unit Certification of each main engine - Prepare main engine for operation. - 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. - Start port main engine. Stop as soon as LO pressure are achieved. -Repeat– Start–Stop 10 times.	Must be as per Specification

<table>
<tr><th>S/ No</th><th colspan="2">QRs/Technical Specification</th><th>Trial Directives</th><th>Result expected/ desired</th></tr>
<tr><td></td><td></td><td>with facility to control electronically (This clause included to run the engine in case of electronic control system failure).
f) Tubes of all cooling water heat exchangers external to the engine should be of Class approved suitable for operation in a corrosive extreme tropical marine environment. Zinc Protectors shall be provided in end covers.
g) The main diesel engine is to be electrically started through batteries. Redundancy is to be provided in the form of at least two independent battery sources that can be cross connected to start either engine.
h) All electronic components, controls and wiring used on the engine and the Boat are to be marine version complying with IP 65 rating.
i) Maintenance and supportability to be ensured anywhere in India through OEM authorized Indian reps.
j) Sufficient ventilation blowers are to be provided in the engine room suction at front of engine room delivery from back side of engine room to ensure that the maximum rise of air temperature not more than 13° C above ambient in enclosed mode
k) Sea water cooling pump shall be made brass body & brass impeller (rubber impeller will not sustain the operation in the area of employment of Creek/Sundarban and Inland water of India) of class approved material.
l) Cooling suction lines to be suitably placed as not to get exposed to air during rolling/pitching of the boat in waves. It should remain immersed in water throughout its operation.
m) All electric control panels of main engine parameter like throttle, switches etc. should be of the same make and model as the engine to ensure compatibility.
n) Only specific engine make and model to be provided by bidders along with technical bid.
o) Proper cross ventilation at both fore (intake) and aft side (out let) of engine room to be provided.</td><td>- Carry out same for STBD side main engine also. No. of starts given:-
Port– 10 starts, STBD–10 starts
<table><tr><td>Attempts</td><td colspan="3">Time in (Sec)</td></tr><tr><td></td><td>ME (P)</td><td>ME (S)</td><td>DG Set</td></tr><tr><td>1</td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td></tr></table>Note:- specific gravity of batteries to be checked before and after endurance trial.
- Check Engine start/stop and check battery provided meets the rated output. Record specific gravity batteries before/after engine start.</td><td></td></tr>
<tr><td>24.</td><td>Reduction Gear Box</td><td>a) The reduction gearbox should be marinised and built to classification standards and rigidly mounted. The gearbox suitable to Jet propulsion. Thrust bearings are to be incorporated within the gearbox. The gearbox is to be complete with its auxiliary equipment, systems, controls and instrumentation. The gearbox operating profile is to match the engine</td><td>a) Type approved certificate to be provided by the boat builder along with Unit Certification of each GB.
(b) Gear Box performance</td><td>Must be as per Specification</td></tr>
</table>

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		operating profile. b) Operation of the gearbox in the specified operating profile and duty should be validated by the gearbox OEM and all warranties for the gearbox as provided by the OEM should hold good for all exploitation regimes. Confirmation from OEM with respect to the same is to be provided by the Builder in their technical offer. c) Facility for lubrication of the gearbox is to be provided in case the shaft is required to be trailed for a prolonged duration.	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. c) Speed achieved during various RPM be recorded.	
25.	Power	a) Both of the following standard power supplies (as appropriate) are to be used on the craft:- (i) 230 V 50 HZ 1ph. (ii) 24V DC. b) The boat shall be fitted with 02 Nos 230V, 1 Phase AC 50Hz Marine Diesel Generator including AC plant (01 for standby) having sufficient capacity to cater for the entire electrical equipment and with a minimum 10% growth margin. The generator shall have its controls and indicator gauges near the generator and remote position at Coxswain's post. The gen set shall be fitted with silencer to reduce the noise. c) 2 KVA invertor battery backup system to cater for uninterrupted power supply, for a minimum duration of 06 hrs to essential equipment viz. controls, navigation, communication, lighting and domestic equipment 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 for both generator and UPS. d) Make of generators should be of reputed firm and having an indigenous service facility.	(a) Full power trials of boat at 100% MCR and to be conducted for one hour with recording of all system parameters. (b) Class type approved certificate to be provided by the boat builder. (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.	Must be as per Specification
26.	Electric system	All the electrical equipment, cables and fittings, machinery and associated systems shall be of IP 57 and above proven design and shall conform to Classification rules.	Functioning of all electrical fitments to be checked during functional trials.	Must be as per

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		All electrical equipment, cables and fittings shall be of proven design, reputed make and conforming to classification society rules. Classification Society test certificates shall be submitted for Generators/ Battery banks and Main Switch Board (instrumentation and switch gear). Sockets are to be provided at appropriate locations for 12/24V DC and 230V AC .		Specification
27.	Shore supply arrangement	A waterproof shore supply connection box 230 V, 1 phase, 50 Hz alongwith 50 Mtr shore cable shall be fitted on weather deck at an appropriate position conforming to Classification rules, to meet the requirements of the harbour loads.	To be checked during functional trial.	Must be as per Specification
28.	Batteries	Adequate number of 12 V DC Lead Acid maintenance free Gel type batteries sourced from reputed firms are to be provided to cater for 24 V battery back system and for starting of DG/ main 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 boat generator as well as from 230V, 50 Hz shore supply.	Specific gravity of batteries to be recorded. To be physically checked.	Must be as per Specification
29.	Motor	All motor shall be confirmed to classification rules suitable for marine use. Sitting of motors should be as per classification society's regulations. Type of enclosure protection for motors at weather deck should be IP 56 and below deck can be IP 55.	Load trial be carried out during functional trials.	Must be as per Specification
30.	Cables	a) Electrical Cables conforming to Class requirements shall be used. LFH cables conforming to marine specifications shall be used in main switch board, control panels etc. b) 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.	Type approved certificate of cable to be provided.	Must be as per Specification
31.	Search Light	Two high definition, high beam, marinised Search lights for 360 degree having detection range 500 meter, identification range 400 meter and recognition 300 meter. Same mentioned at srl No. 47	Check functioning of search light manually and remote operations.	Must be as per Specification
32.	Fuel Tanks and Fuel System	Fuel tanks and fuel system is to cater for the following:- a) Separate fuel tanks for each main engine are to be provided. The tanks are to be located at appropriate place as per design and are to be interconnected.	Check fuel capacity .Tank capacity to meet endurance requirement	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		b) The fuel tanks should be of marine grade **Class approved material** .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. c) Fuel capacity to be designed in consonance with the type of engines and as per endurance criteria with 25% reserve. d) "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 also visual fuel level indicator provided in each tank. e) The vent pipes shall terminate in atmosphere and be positioned with a NRV to avoid ingress of rain water or spray. f) Separate class approved certificate be obtained for each fuel tank separately and produced.		
33.	Armament	Location for Main and Secondary Armament Gun mounting for LMG /MMG alongwith NIJ level-3 protection to be provided in such a 270 degree fire power (Forward) at the top of the boat and aft deck 270 degree fire power (rear) of the boat with NIJ level III protection to overlap the arc fire. Armament Locker 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.	Check mounting of weapons. Check stowage area adequacy. Builder to submit weight calculations with BP panels fitted and prepare preliminary intact stability booklet for Class approval.	Must be as per Specification
34.	Fire Fighting and Damage Control-Approved Type and Portable Fire Fighting Appliances	The boat shall be equipped with fire pump synchronized bilge pump facilities from sea chest, fire line, fire hydrant, automatic emergency lighting and automatic fire fighting arrangements along with fire hose and fire nozzle to be provided as per class requirements. Portable damage control equipment such as plugs, wedges, etc to be provided. Adequate portable fire extinguishers to meet the requirement of Classification Society rules are to be provided. The portable firefighting appliances shall be supplied and distributed throughout the boat. Suitable brackets/clamps shall be provided for securing them. Smoke and heat detector sensor alarm should be provided.	Arrangement of Fire Fighting Equipment, their operation to be checked physically as per Class approved drawing.	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
35.	Life Saving Appliances - Approved Type	Type Lifesaving appliances will be in accordance with SOLAS/Class requirements. 06 Hazardous Duty Life Jackets–As per technical specifications enclosed as Annexure-'I' to QRs. 15 life Jackets SOLAS approved(Jacket type). 02 life Buoys SOLAS approved with proper hanging/stowage arrangement on outer deck along with 30 Mtrs life lines. 01 Life buoy with self-igniting light. 01 Life buoy with self-activating smoke signals 01 Solas approved life raft with 12 men capacity to be provided. Stowage arrangements for life raft on the roof of wheel house to be made.	i) Lay out the buoys/jackets count and record. (ii) Check stowage area. (iii) Check class approved certificates. (iv) Random testing of kit be done to ensure functionality. (v) Check class approved certificate and expiry date of life raft.	Must be as per Specification
36.	Vibration, Shock and Noise	(i) Hull Vibrations. The vessel and all equipment should be free from excessive vibrations. (ii) Propulsor 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 and ISO standard 6954 guidelines for permissible vibration on the board. (iii)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.	To be checked while sea trial.	Must be as per Specification
37.	Towing Equipment's	Suitable towing arrangement, to tow a disabled boat of equal size, to be provided as per classification society approval.	To be physically checked. Load Test Certificate of tow hook/ arrangement is to be provided.	Must be as per Specification
38.	Lifting and towing Arrangements	It should have suitable lifting arrangement for being hoisted on the jetty. Support plan, indicating the main underwater projections are to be prepared and sent to Owner for reference. The lifting arrangement is to be load tested as per Class. A cradle for undertaking	Check lifting points in number & location. Check strengthening record position.	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		maintenance/stowage during monsoons is to be provided. Tools (including special tools) and arrangements for lifting and shifting of heavy machinery including engines, gearboxes etc. are to be provided for carrying out periodic maintenance routines as specified by the equipment OEMs.	Load Test Certificate to be provided by builder.	
39.	Ropes	Poly propylene (PP)/ Polyamide ropes of following length and thickness to be provided for berthing, towing, mooring, and anchoring the boat. a) For berthing - 12 mm dia - 100 meters b) For towing - 18 mm dia - 50 meters. c) For mooring - 12 mm dia - 100 meters d) For anchoring - 18 mm dia - 100 meters.	To be physically checked. Materials test certificate to be provided by builder.	Must be as per Specification
40.	Weather Covers	Two sets of lightweight Canvas Covers are to be supplied for all weather deck machinery and accessories.	To be physically checked	Must be as per Specification
41.	Window Wipers	All front windows be provided heavy duty wipers (Class approved, marine grade). Motor should be top of wind screen.	To be physically checked & functioning to be tested.	Must be as per Specification
42.	Accommodation and Habitability	Ventilation: Wheel house/Accommodation spaces are to be air conditioned as per Class requirements. Adequate forced /cross ventilation is to be provided in the machinery spaces as per Class. A heavy duty Air conditioner should be provided of a reputed firm which runs smoothly on the generator during peak summer time and having an indigenous service facility. Cabin: A seating arrangement for 10 personnel is to be provided in the cabin. This enclosed area is to be provided laminated troughed glass and have all round clear vision. The seating arrangements are to be of contemporary design. Wall Fan, cross ventilation for crew comfortness, seating arrangement for capacity of 10 persons. All Furniture shall be of modular Design. The layout of accommodation space, Bathrooms and WC should be modern and ergonomically designed to facilitate comfort and utility. Any additional items contributing to comfort may be incorporated with Owner's approval. Four personnel sleeping arrangement in fore cabin to be provided. Wheel house : Wheel house must be separated/combined with cabin as per design comfortness. Steering console shall be equipped with equipment's	To be physically checked. To be checked physically as per approved drawing plan. Functional test of all equipment to be carried out & recorded.	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		as per machinery specifications. A stainless steel mast to carry various navigational lights and flags as per practice shall be provided on top of the wheel house. Arrangements for DCP & mechanical foam type fire extinguisher to be provided. A bulkhead mounted electric fan along with two portable chairs and a bulkhead mounted hinged table top to be provided. Space should also be provided for keeping VHF sets and marine set battery next to the coxswain's chair. a) All equipments, accessories etc should have securing arrangements for rough weather condition. b) Night lighting arrangements (Red lights) to be provided. c) 04 Nos wall fan/bunks fan and open able window for cross ventilation in case of AC shut down. d) Both cabin/wheel house should be all around bullet proof to meet NIJ-III/EN 1063 standard. e) Low power electrical socket should be provided with alternate seats.	Check securing arrangements. Check night lighting arrangements.	
43.	Sanitary	Suitable sanitary system, including washbasin, toilet with a holding tank/ flushing out arrangement is to be provided.	To be physically checked as per approved drawing.	Must be as per Specification
44.	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 stowage area for anchor and anchor chain/cable, check drainage arrangement.	Must be as per Specification
45.	Fore cabin	This compartment shall provide convenient sleeping arrangement for a minimum of 04 persons with mattress, blankets, bed sheets and pillows. Adequate electrical light and fan fitting along with suitable blower system and 02 Nos hatches may be installed for proper ventilation. Locking cupboards shall be provided. Extra storage facilities shall be provided under the bunks. Rack for accommodating 10 Nos Rifles and 2 Nos LMG along with ammunition.	To be physically checked as per approved drawing.	Must be as per Specification
46.	Instrumentation Panel	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 gearbox will be controlled form the helms console. The control station in the helms console should have provision for starting, stopping, monitoring control	To be physically checked. All parameter to be recorded for correctness during performance/functional	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		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 water temperature gauge d) Engine oil temperature gauge e) Gear box oil pressure and oil temperature gauge. f) Speedometer g) Single lever engine/gear box control system. h) Rudder angle indicator. i) Light indicator j) Magnetic compass. k) Engine oil pressure alarm l) Engine oil pressure trip m) Engine oil temperature alarm n) Engine water temperature trip o) Gearbox oil pressure alarm p) Gearbox oil pressure trip q) Gearbox oil temperature alarm r) Emergency main engine stop s) Over speed trip mechanism and indication t) Hour counter u) Ammeters/voltmeters for monitoring battery charging/battery voltage/load current v) Exhaust temperature gauges w) Other instruments as per class requirement x) Fire alarming indication system OR Multi function display unit	trials.	
47.	Navigational equipment. Approved Type	a) Magnetic compass	Check the liquid magnetic compass as per OEM specification. Check its functionality.	Must be as per Specification

S/ No	QRs/Technical Specification	Trial Directives	Result expected/ desired
		Check accuracy with the help of GPS.	
	b) Multifunction Chart plotter, Radar, Echo sounder, GPS etc is required -01 No.	Check functioning of equipment and type approval certificate.	Must be as per Specification
	c) Navigation light should be accordance with IRPCS rating	Check the class certificate & check the functionality of navigation light on deck physically by switching ON and OFF 10 to 15 times. Check arc of navigation light.	Must be as per Specification
	d) Horn should be accordance with IRPCS rating.	Check the functionality of horn on deck physically by switch ON and OFF 15 times.	Must be as per Specification
	e) Two high definition, high beam, marinised Search lights for 360 degree having detection range 500 meter, identification range 400 meter and recognition 300 meter.	Check functioning of search light manually and remote operations.	Must be as per Specification
	f) Anemometer	Check functioning and type approval certificate.	Must be as per Specification
	g) Wet and Dry bulb thermometer	Check functioning and type approval certificate.	Must be as per Specification
	h) Barometer	Check the barometer as per OEM specification. Check its functionality and the accuracy and type approval certificate.	Must be as per Specification
	i) Loud hailer (50W) with PA facility.	Check functionality of Siren by switching ON & Off 10 to 15 times.	Must be as per Specification
	j) Police light/siren	Check the equipment, OEM manual and instructions.	Must be as per

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
				Specification
		k) Binoculars -02 No (one for day light and one with night vision capability).	Check physically.	Must be as per Specification
		l) AIS should be provided in multifunction combined screen of Radar, GPS Echo sounder also.	Check class certificate of the equipments.	Must be as per Specification
		m) EPIRB should be provided	Check class certificate of the equipments.	Must be as per Specification
48.	Steering	Hydraulic steering operated from wheelhouse helms/command console	Check its functionality.	Must be as per Specification
49.	Deck	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.	To be physically checked. Materials test certificate to be provided by builder.	Must be as per Specification
50.	Guard Rails	Stainless steel guard rails of min 20 mm dia with stanchions shall be provided around the main deck as per GA. GA. Stainless steel material for guard rail should be SS-316 storm rails also be provided all along raised deck house.	To be physically checked from location as per GA. Materials test certificate to be provided by builder.	Must be as per Specification
51.	Deck Fittings	Four is no stainless steel bollards, four in No SS fairlead and four in No SS Cleats conforming to SS 316 material. 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. Provision for Towing arrangement should also be provided. Brow should be provided on both sides of the boat for unidirectional movement of person on board with provision of aluminum alloy light weight ladder.	To be physically checked. Check load test certificate for each fitting (either from the OEM of the fitting or any other suitable certifying agency post testing).	Must be as per Specification
52.	First Aid Box	First aid box to be installed.	To be physically checked	Must be as per Specification
53.	Redundancy Aspects	The craft's systems should be designed keeping aspects of redundancy and independent operability in perspective. It should be feasible to	To be physically checked	Must be as per

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		isolate defective equipment and fittings without affecting overall performance.		Specification
54.	Certificate	The following Certificate and Documents shall be supplied at the time of delivery of the vessel:- a. Classification Certificate as per construction of boat according to the class notation mentioned at Srl No.2 above issued by Classification Society Rules. b. GA drawing (built) along with other plan approved by class. c. Stability booklet. d. All system like LSA, FFA, fuel oil, bilge, electrical etc as per class requirement arrangement plan to be provided.	Clean approved drawing to be obtained from builder.	Must be as per Specification
55.	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 bridge panel. The bilge system is to be designed in accordance with classification society regulation. However, as a minimum a motor/engine driven bilge pump and a manual semi rotary brass bilge pump is to be provided.	Check functioning of bilge pump and alarm system.	Must be as per Specification
56.	Deck Machinery and Seamanship Fittings Approved Type	Following Equipment/accessories shall be provided conforming to Class requirements:- a) Anchor winch (Mechanical) to the boat suitable for tidal current of 6 Knots speed and wind speed up to 30 Knots. b) Anchor cable/PP rope 60 Mtrs length with adequate breaking strength as per class requirements. c) All lifting appliances and gears to be load tested to static and running load. d) Awning and stanchions for all aft deck rigid acrylic sheet e) Two set of acrylic canvas cover for all upper deck fittings and equipment. f) Soft patch be provided for shipping in/shipping out of main engine, generators and heavy machinery installed in the engine room. g) Hawse pipe and Anchor recess. h) Bollards, Mooring/Freeing Ports, and towing arrangements. i) Two in no. Grapinal anchors of 40 Kgs weight with joining shackles. j) Two in nos. polypropylene ropes of 25 mm dia. 40 mtrs length fitted with suitable thimble of SS.	To be physically checked	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		k) Cleats and Fairleads. l) Mooring Towing ropes. m) Wire reels. n) Berthing Gear. o) Gangway Opening. p) Guard rail stanchions. q) Embarkation ladder. r) An additional 30 Kg anchor with 50 mtrs rope should be provided for additional safety.		
57.	Fitting & Fixtures	All fitting fixture to be SS-316 grade unless other metal is suitable for a particular operation or superior.	Material test certificate to be provided.	Must be as per Specification
58.	Painting and finishers Painting	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 Mechanized Boat shall be painted in disruptive pattern colour with markings as per user requirement. iv) The Mechanized Boat name, ID No., BSF Emblem and National Flag shall be fixed on both sides of the Hull at superstructure at an appropriate place.	To be physically checked	Must be as per Specification
59.	Recommend material specification for engineering/electrical system – **as per class requirement.**		Check physically with used material certificate.	
60.	Document	a) Priced purchase order copies for ordered equipment/machinery. b) Copy of technical advice floated to various firms for equipment/ machinery be forwarded to BSF simultaneously. c) All drawings are class approved – 03 set copy. d) Ships maintenance schedule, Trials protocols for BSF final approval (Six copies per craft). e) 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). f) Manual with regards to installation, operation and maintenance of various equipment/fittings systems and part identification list of all machinery and equipment's (three copies per craft).	To be checked physically	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
		g) Service manual of engine, gear box, Jet propulsion, DG Set etc. (02 copies each). h) Tools for engine specified/required for maintenance as per OEM. i) Docking plan to be provided (02 Copies) j) Details of onboard spares for 5 years to be provided. k) Part catalogue of all machineries and equipment's (Two Copies per Craft)		
61.	Spares	List of onboard spares for 01 year and B&D spares for 05 years for engine and gearbox DG Set and other boat gadgets quantity to touch up painting of all shipside & body as per original paint scheme shall be prepared by the boat builder based on OEM recommendations. One set of OBS and base depot spares for each boat shall be supplied by the boat builder. The boat builder will furnished the OBS and base depot list with tender documents. In the list of OBS and BDS provided by the supplier. BSF will reserve the right to make any amendments (addition/deletion or increase/decrease in the quantity) as per its requirement. The decision of BSF will be final in this regard.	To be checked physically.	Must be as per Specification
62.	Guarantee/ Warranty	The firm will have to provide 02 years guarantee/warranty for Mechanized Boat from the date of acceptance of consignee location in satisfactory condition. Guarantee & warranty services on site (BSF deployment location) shall be provided by the OEM/authorized service agencies of respective machineries. The Guarantee / warrantee for the MB shall be comprehensive i.e. for all systems. The company will provide all consumables (except fuel) for the period of guarantee / warrantee. The OEM service provider shall provide the past service performance of such engines for last 05 years.	Check relevant documents.	Must be as per Specification
63.	3D design animation	Complete design scheme, drawings and 3D design animation (in any suitable software) to be provided by the builder to finalize the comfortness and operational requirement of purchaser and for discussion between purchaser, class society and builder before finalization of drawings. 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.	To be checked.	Must be as per Specification

S/ No	QRs/Technical Specification		Trial Directives	Result expected/ desired
64.	Supervision	One officer along with team of 03 members (including 01 SO each from Wksp, Master & Engine Driver) be detailed to supervise the construction of the boat in various stage of construction. They will visit the building yard and all machineries and equipment manufacturing yard / company in a regular interval to confirm the quality and ensure the boat shall be built as per required specification.		Must be as per Specification

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Approved /Not approved

Director General
Boarder Security Force

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 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.

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).
      (j) 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 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.
   (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). However, SOLAS requirement of twin buoyancy chamber is not applicable.
   (c) Necessary certificates for Type approval are also to be submitted.

5. Product Support & Performance Guarantee The supplier has to guarantee the satisfactory performance of the life jacket for a minimum period of five years and product support for the same duration from the date of delivery.

6. 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 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 jackets are to be furnished along with 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 alongwith each life jackets.
(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.

7. Documentation 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	

8. Warranty. The life jacket with its associated components is to be guaranteed for stipulated performance for 5 years. The system supplied shall be warranted from defects, arising due to manufacturer and performance for the said period and cover all the defects arising from malfunction through design faults, inappropriate material, bad production and non-conformance to specifications. Any expense on account of repair/supply of spares against guarantee defects is to be borne by the supplier.

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