



**SPECIFICATION FOR STERN GEAR ARRANGEMENT FOR 6 NOS. QUAD PROPULSION CATAMARAN TYPE SURVEY VESSELS FOR INDIAN NAVY, YARD NOS. 257 TO 262**

**1.1 STERN GEAR SPECIFICATIONS**

Sr. No.	Description / Requirements	Material Specification	Qty. / Ship	Confirmation / declaration by stern gear manufacturer / supplier																
1	Propeller cone Bolts for fitment of propeller cone	Manganese Bronze, Class / Indian Navy approved SS 316	4 Nos. 1 Ship set	..... Nos./ship ..... set/ship																
2	Propeller fixed pitch type 2 nos. RH and 2 nos. LH. (Propellers are required to comply ISO Class II standard) a) Propeller keys b) Locking bolts for keys c) Propeller nut (2 nos. RH and 2 nos. LH) Vessel's propulsion machinery exploitation will be assumed as to ensure vessel operation of 4500 hours per year. Speed, range, endurance and mission duration is clearly specified as follows;	Manganese Bronze, Class / Indian Navy approved  SS } Material as per Class / SS 316 } Indian Navy standard Bronze }	4 Nos.  4 Nos. 4 Sets 4 Nos.	..... Nos./ship  a) ..... Nos./ship b) ..... Nos./ship c) ..... Nos./ship																
	<table border="1"> <thead> <tr> <th>Speed range [knots] and operating mode</th> <th>Installed engine power required [kw]</th> <th>% of annual hours [% of 4500 hours]</th> <th>No. of propulsion drive in operation</th> </tr> </thead> <tbody> <tr> <td>0 to 6 knots, hydrographic survey operation</td> <td>[1x895]</td> <td>10% [450 hours]</td> <td>One</td> </tr> <tr> <td>12 knots, cruising / economical speed operation</td> <td>[2x895]</td> <td>80% [3600 hours]</td> <td>Two</td> </tr> <tr> <td>18 knots, sprint/full speed operation</td> <td>[4x895] *</td> <td>10% [450 hours]</td> <td>Four</td> </tr> </tbody> </table> <p><b>Note:</b> * propellers shall be designed / manufactured such a way that the sprint / maximum speed should be achieved at 85% MCR of installed and deployed main engine power.</p>	Speed range [knots] and operating mode	Installed engine power required [kw]	% of annual hours [% of 4500 hours]	No. of propulsion drive in operation	0 to 6 knots, hydrographic survey operation	[1x895]	10% [450 hours]	One	12 knots, cruising / economical speed operation	[2x895]	80% [3600 hours]	Two	18 knots, sprint/full speed operation	[4x895] *	10% [450 hours]	Four			
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0 to 6 knots, hydrographic survey operation	[1x895]	10% [450 hours]	One																	
12 knots, cruising / economical speed operation	[2x895]	80% [3600 hours]	Two																	
18 knots, sprint/full speed operation	[4x895] *	10% [450 hours]	Four																	
3	Rope guard	Bronze, Class / Indian Navy approved	4 Nos.	..... Nos./ship																



Sr. No.	Description / Requirements	Material Specification	Qty. / Ship	Confirmation / declaration by stern gear manufacturer / supplier
4	Aft stern bearing housing with ford end nose fairing ("A" bracket boss) complete with set of "A" bracket arms a) Aft stern boss bearing  b) Bolts for locking of aft stern boss bearings c) Bearing housing ("A" bracket boss) and aft bearing to be suitably sized and arranged for poured chock installation	Forged steel, Class & Indian Navy approved Class & Indian Navy approved type, water lubricated S.S. 316 Chock fast / resin chock material to be classification society approved type	4 Nos. each  4 Nos.  1 Set As per installation requirements	..... nos./ship  a) ..... nos./ship  b) ..... set/ship c) ..... ..... .....
5	Stern tube (Approx. 130 mm dia x 4.8 mtr length). Ford and aft ends of stern tube to facilitate as bearing housing for stern tube ford and aft bearings respectively. Accordingly stern tube to be also provided with suitable bearing limit rings at suitable locations in ford and aft sides of stern tube. Stern tube ford and aft ends and its respective bearings are to be suitably sized and arranged for poured chock installation. Moreover ford end of stern tube to be provided with fixing / interface arrangement for the fitment of water lubricated type stern tube ford seal. Stern tube ford end / seal to have necessary arrangement / connection for water lubrication.	Schedule steel pipe of IRS approved material and as per Indian Navy standards	4 Nos.	..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... nos./ship
6	a) Stern tube ford and aft bearings four nos. each  b) Bolts for locking of ford and aft stern tube bearings	Indian Navy and classification society approved type, water lubricated S.S. 316	8 Nos.  1 set	a) ..... ..... nos./ship  b) ..... set/ship
7	Forward stern tube seal a) Indian Navy approved type, suitable for water lubricated stern gear arrangement. Seal to have suitable arrangement for replacement in floating condition of the vessel b) Fasteners for forward stern tube seal	Indian Navy and classification society approved type and material / construction as per the manufacturer's standard SS 316	4 Nos.	..... a) ..... ..... ..... nos./ship b) ..... set/ship
8	Propeller shaft (Approx 95 mm dia x 4.9 mtr length)	SS, Class/Indian Navy approved Grade .....	4 Nos.	..... nos./ship



Sr. No.	Description / Requirements	Material Specification	Qty. / Ship	Confirmation / declaration by stern gear manufacturer / supplier
9	Propeller shaft forward coupling matching with gearbox output coupling a) Nut for propeller shaft (coupling end) b) Key for propeller shaft forward coupling c) Locking bolts for key d) Bolts and nuts with approved type locking arrangement for propeller shaft forward coupling flange to gearbox coupling flange	Forged steel, Class / Indian Navy approved Bronze, Class/IN approved SS, Class/IN approved SS 316, Class/IN approved HT (as per class requirements), Class/IN approved	4 Nos. 4 Nos. 4 Nos. 4 Sets 4 Sets	..... nos./ship ..... nos./ship ..... nos./ship ..... set/ship ..... set/ship
10	Plummer block with bearing and suitable lubrication arrangement [for shaft support in engine room, if required]	As per Indian Navy standard and class requirements	As per requirement	..... nos./ship
11	Suitable shaft locking gear, shaft brake and shaft turning gear	As per requirements and Indian Navy / class standards as applicable	4 Nos. each	..... nos. each /ship
12	Shaft revolution transmitter/s and meter/s with complete arrangement / fittings / accessories	As per requirements and Indian Navy / class standards as applicable	4 Nos. each	..... nos. each /ship
13	Torsion meter with complete arrangement / fittings / accessories	As per requirements and Indian Navy / class standards as applicable	4 Nos. each	..... nos. each /ship
14	Stern gear arrangement including its all accessories to work satisfactorily under following site condition <u>Ambient air temp.:</u> (-) 10° C to (+) 40° C <u>Maximum temp. in engine room:</u> (+) 55° C <u>Sea water temp.:</u> up to 35° C <u>Relative humidity / salinity:</u> Up to 90% condensation at 35° C salinity of water up to 35 PPM			..... ..... ..... ..... .....



Sr. No.	Description / Requirements	Material Specification	Qty. / Ship	Confirmation / declaration by stern gear manufacturer / supplier
15	<p><b><u>Operating criteria and other requirements</u></b></p> <p>(A) Propulsion system and its associated components should be capable of efficient operation under the following conditions of vessel during operation;</p> <p>a) Heel: 20<sup>0</sup> continuous either side  b) Roll: 20<sup>0</sup>  c) Trim: 5<sup>0</sup> continuous  d) Pitch: 6<sup>0</sup></p> <p>(B) Arrangement/system/components offered should have reliability and maintainability for a minimum mission period of four weeks.</p> <p>(C) The equipments / system offered should confirm and comply to the Indian Navy RFP requirements as applicable</p> <p>(D) All electrical instruments / components to be capable of continuous operation when fitted at any direction upto an angle of 30<sup>0</sup> from vertical plane passing through the centre line of the equipment.</p> <p>(E) <u>Sea Worthiness</u>: The vessel together with its machinery and equipments / system to be capable to transit on all the headings up to sea state 4 and capable of conducting hydrographic survey operation up to sea state 3. The vessel and its machinery and equipments also to be survivable at best heading up to sea state 5.</p>			<p>.....</p> <p>(A) .....</p> <p>.....</p> <p>a) .....</p> <p>b) .....</p> <p>c) .....</p> <p>d) .....</p> <p>(B) .....</p> <p>.....</p> <p>(C) .....</p> <p>.....</p> <p>(D) .....</p> <p>.....</p> <p>.....</p>
16	<p>Temperature measuring arrangement for shaft line bearings as required.</p> <p><b>Note:</b> DME specification 405 (R2), 411,412,413 &amp; 424 of Indian Navy are to be used as guidance specifications for selection, supply and installation of instrumentation/alarm/trips. Deviations if any, are to be clearly stated by the vendor in their technical offer with adequate justification.</p>	As per requirements and Indian Navy / class standards as applicable	4 sets	..... set/ship
17	Control for propulsion system will be microprocessor based auto control system, with distributed digital control system. Accordingly propulsion system / stern gear to be provided with suitable interface arrangements for proper integration as may be required.	As per requirements and Indian Navy / class standards as applicable	As per requirement	..... .....





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	<p>The stern gear should also meet international norms on personnel safety. SOLAS regulation on personnel safety. TVA calculations shall be carried out by main engine manufacturer. However stern gear data, propeller data etc. required for carrying out TV analysis and calculations to be furnished by stern gear / propeller manufacturer well in advance.</p>			<p>.....            .....            .....            .....</p>
23	<p>Maintenance Manuals, installation / operation manuals, spare part catalogue and arrangement &amp; detail drawings to be provided inline with D-787 of Indian Navy.</p>		6 sets each	<p>.....            .....            ..... sets each/vessel</p>
24	<p><b>Warranty:</b> 12 months from the date of delivery of the respective vessel to the Indian Navy</p>			<p>.....            .....</p>
25	<p>Delivery of six ship sets are strictly required at shipyard as per following schedule            1<sup>st</sup> ship set     June 2008            2<sup>nd</sup> ship set     Sept 2008            3<sup>rd</sup> ship set     Dec 2008            4<sup>th</sup> ship set     Mar 2009            5<sup>th</sup> ship set     June 2009            6<sup>th</sup> ship set     Sept 2009</p>			<p>.....            .....            .....            .....            .....            .....</p>
26	<p><b>Training:</b> The ship's crew, shore maintenance staff and staff of training school to be trained at the OEM's factory premises for each of the ship on the operation maintenance and of repair methodology of machinery / system installed onboard. Training aids comprising of cut section models, audio visual / CBT packages on operation, maintenance and repair activities are to be provided by vendor. The training schedule will be prepared in consultation with IHQ – MOD well in advance. Entire cost for the training to be borne by the vendor.</p>			<p>.....            .....            .....            .....            .....</p>
27	<p><b>Commissioning:</b> Installation and commissioning assistance by competent service engineer as per yard schedule at vendor's cost</p>			<p>.....            .....</p>



Sr. No.	Description / Requirements	Material Specification	Qty. / Ship	Confirmation / declaration by stern gear manufacturer / supplier
28	<p><b><u>Approval of drawings and specifications</u></b>            Within two weeks of placement of order the manufacturer is to forward to the yard, a drawing and technical information / calculation schedule indicating list of documents / drawings and proposed dates by which these will be submitted to the yard, class, statutory authority and IHQ-MOD(N) respectively for their approval. This list should contain the drawings / documents / information / calculations etc. required as per all above agencies / authorities. All the drawings and technical information are to be submitted by the manufacturer on magnetic media with required number of hard copies for onward submission to IHQ-MOD[N] for their approval and record. All the drawing / technical information that requires yard / class / statutory authority approval are to be first submitted by the manufacturer to all above for their approval and after obtaining their approvals same shall be submitted to IHQ-MOD(N) for their final scrutiny, comments and approval.</p>			
29	<p><b><u>Equipment drawings</u></b>            Before manufacturing/supplying any equipment, fitting or material, the manufacturer is to forward final detailed drawing / specification for the prior approval of all concern. Approval of the yard, class and statutory authority as applicable shall be obtained by the manufacturer prior to submission to IHQ-MOD[N]. The approval of any proposal, specification, drawing will not exonerate the manufacturer from their responsibility in connection with the correct supply and functioning of the systems and complete installation</p>			
30	<p><b><u>As made drawings and distribution of documents</u></b>            The manufacturer to furnish a list of "As made" drawings of various equipment proposed to be supplied. Same shall be subject to approval of the yard and IHQ-MOD(N). All drawings and documents are required to be supplied on magnetic media also in addition to the hard copies. The electronic documents to be in compliance with IETM/CALS format.</p>			







## 1.2 TECHNICAL AND OTHER INFORMATION

Following drawing/data/information to be submitted along with your technical offer

	<b>Requirements / Description</b>	<b>To be confirmed and submitted by manufacturer / supplier</b>
1	Dimensional G.A. Drawing with weight of the each item for complete stern gear arrangement, propeller, stern tube seal etc. and its accessories	
2	Stern gear detail and installation drawing considering poured chock [chock fast] installation	
3	Drawing/circuit diagram for stern gear system like S.W. cooling etc	
4	Electrical system drawings for instrumentation and monitoring system	
5	Separate drawing for water lubricated stern seal arrangement with the details of afloat seal replacement procedure	
6	Details of S.W. supply required for water lubricated stern bearings. e.g. pressure, flow, temperate at inlet / discharge etc.	
7	DME 452 is to be the guiding document for preparation and distribution of all technical / information	
8	Introduction of organization including details of turnover, sales figures and reference list	
9	Construction / performance details of equipment / machinery offered	
10	Product support strategy including minimum stock level, lead time for supply, rupee payment facility for imported items if any	
11	Details of service network	
12	Details of import content as applicable and indigenisation plans for the same	
13	Life cycle costing taking in to consideration, operating, watch keeping, maintenance, spares and other associated costs	
14	General content of standard documentation being provided [details of operation manual, technical manual, PIL, watch keeping, calendar based routines, stock calculations etc.]	
15	Letter of undertaking contractual commitment to provide product support for a minimum period of 15 years after delivery of the last vessel to Indian Navy or 20 years after delivery of the vessel whichever is later. In case the equipment / machinery is likely to become obsolete, the vendor should confirm to give a clear three years notice to the Indian Navy to assess the requirement of "life time buy" of the spares. The vendor should also confirm and ensure supply of these items prior to discontinuation of the production facilities	



1.3 **ONBOARD SPARES AS A STANDARD SCOPE OF SUPPLY FOR STERN GEAR ARRANGEMENT FOR 2 YEARS (OPERATION CYCLE: 4500 HOURS / ANNUM) OPERATION OF THE SHIP AS PER CLASS REQUIREMENT AND MAKER'S STANDARD (LIST OF ABOVE SPARES TO BE SUBMITTED WITH QTY. SPECIFIED)**

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1.4 **TOOLS, SPECIAL TOOLS, JIGS AND FIXTURES REQUIRED FOR THE INSTALLATION / OPENING AND GUARANTEED OPERATION CYCLE OF TWO YEARS AS A STANDARD SCOPE FOR STERN GEAR ARRANGEMENT AS PER CLASS REQUIREMENT AND MAKER'S STANDARD (LIST OF ABOVE TOOLS TO BE SUBMITTED WITH QTY. SPECIFIED)**

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1.5 **BASE AND DEPOT SPARES FOR STERN GEAR ARRANGEMENT FOR 5 YEARS OPERATION OF THE SHIP AS PER MAKER'S STANDARD (LIST OF ABOVE SPARES TO BE SUBMITTED WITH QTY. AND ITEM RATE / PRICE SPECIFIED)**

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