

**TECHNICAL SPECIFICATION FOR SIGHTING OF SHFT CENTRE LINE, RUDDER CENTER
ILNE STERN TUBE ALONG WITH BUSHES AND PIPE LINE ASSEMBLY AND FITMENT OF
PROPELLER,RUDDER STOCK ANDN RUDDER & RELATED WORKS FOR 11138-41.**

1. SCOPE OF WORK OF CONTRACTOR

1.1 DETAILED DESCRIPTION OF WORK ON STERN TUBE /PROPELLER etc.

1. Preliminary sightings to be carried out as per Engineering department procedure after giving reference points by Erection department by keeping targets at forward & aft of Main Engine , two targets each at forward stern bush area and aft stern bush area.
2. Telescope to be used (at fr.-1) and sight line to be established .Hull bores are to be checked for this sight line at forward and aft of Main Engine chock height to be checked for this sight line. Main Engine Chock height to be checked from the sight line. Intermediate shaft bearing height also be checked in similar manner.
3. Stern tube assembly to be inserted into hull and targets to be placed at forward and aft stern tube area (forward one target and aft of Main engine by cutting the sight line. Intermediate Shaft bearing height also to be checked in similar manner.
4. Stern tube assembly to be inserted into hull and targets to be placed at forward and aft stern tube area (forward one target and aft two targets minimum) for establishing the centerline.
5. Necessary equipment to adjust the center of stern tube to be made by contractor.
6. After centering the stern tube, to be offered ton QC, class, owners and stern tube to be locked firmly to avoid any deviation after chock fasting.
7. Necessary help to be given to chock fast service engineers for pouring chock fast.
- 7(a) Drilling of stern tube bosses which are welded to the hull ford &aft is to be welded out in situ as per drawing.
8. After chock fasting of stern tube assembly confirmatory sighting to be shown to surveyors. Targets to be set up to the geometric centers of forward and aft stern bosses and deviations are to recorded. Minimum two numbers of targets in each of the stern tube bosses to be provided, one number at light sources target and the other at Rudder center line and check in confirmatory sighting with telescope.
- 8(a)Centre Line references are to be taken by welding two pieces on forward side of stern tube.
9. Propeller shaft is to be inserted in to the stern tube through stern tube bearings and positioned with forward seal with the help of chain of blocks and crane.
10. Necessary chain blocks are to be arranged for positioning propeller as per drawing. Propeller is to be lifted in position on the propeller position on the propeller shaft and fitted hydraulically on the on the propeller shaft as per the drawing and procedure. Propeller is to be presented to the surveyors.
11. After assembling the propeller, aft and forward seals are to be assembled and wire lashing to be done. Propeller nut locking is to be done and propeller to be fitted to the propeller. Grease to fill in the propeller cap.
12. Stern tube to be filled with lube oil (approx. 120 liters) and leak test of forward and aft seals to be shown to surveyors. Ford and aft seal tanks to be installed and oil to be filled

13. After completion of all the above jobs free turning of the propeller to be demonstrated with the help of chain blocks after giving a temporary support at the forward and propeller shaft as there is only one stern tube bush at aft.
14. Before floating of the vessel propeller shaft is to be locked in position for vessel floating.
15. Staging for carrying out for all the above jobs are to be arranged by the contractor However Staging material will be supplied by HSL.
16. Preliminary sighting, confirmatory sighting etc., are to be done as per HSL procedure and standards under stabilized temperature conditions , where the Hull moments are minimum. Chock fasting of stern tube done at night preferably.
17. Propeller shaft and propeller installations are to be completed and contractor, if required shall carry out any other jobs over and above this.
18. All the above jobs are to be done as per drawings and HSL procedures to the entire satisfaction of the surveyors DNV, IRS and HSL.
19. Material handling for carrying out all the above jobs including arranging of chain blocks, propeller shaft and propeller bushes and hydraulic jacks etc. are to be done by the contractor. The material / equipments will be supplied by HSL.
20. All the above , jobs are to be done in accordance with drawing nos.64100 & 64300 and the instruction manuals of stern tube bearings and seals.
21. The total work to be done as per PPPM schedule.
22. Required bedding shall be carried out as per the metal chocks as required for installing shaft bearing.
23. Propeller and propeller shaft bedding is also to be carried out if required.
- 24. Machining of 8 no.s holes on main engine bed plate**

1.2 Detailed Description of work on Rudder Horn Boring.

1. Necessary arrangements to be made for establishing centerline of rudder horn.
2. Proof circles to be made on top and bottom rudder horn.
3. Boring bar, bearings necessary supports to fit place for carrying out boring of rudder horn and bore facing as per the drawings.
4. Final centerline of rudder horns to check by using piano wire and establishes the deviation between stern tube and rudder centerline. In situ machining of bottom and top horns in the bore and face to be carried out as per the final centre line.
5. Final measurements of rudder horns (top & bottom) to be measured and given to HSL Machine shop to carryout machining of bushes.
6. After machining, bushes to be fitted in place after keeping bushes in dry ice.(Dry Ice HSL supply).
7. Rudder to be lifted and kept in place by using chain blocks.Pintle to be fitted hydraulically and nut to be tightened & blocked as per drawing & procedure
8. Closing plates of Rudder to be done following the steel drawings.
9. Rudder Actuator (rotary vane steering gear) to be lowered on to the rudder stock and to be pressed hydraulically to the required length.
10. Chock heights to be measured after adjusting the height of actuator and seat.
11. After machining to the required sizes by machine shop chocks to be welded and shown to class.

12. After completion holes to be drilled on chocks reaming of holes to be done.
13. After measuring hole sizes bolts will be machined to size by machine shop.
14. After machining of bolts all bolts to be fitted in place & nuts to be torque tightened.
- 15. Filling of hydraulic oil in steering gear actuator unit & power pack, assisting service engineer during and after commissioning, tests and trials and attending defects after commissioning**

POST SEA TRIAL WORKS: DISMANTLING & ASSEMBLING OF ONE NO. CYLINDER AS PER OWNER'S CHOICE

- 01. Dismantling & assembling of one cylinder head as per owner's choice.**
- 02. Dismantling & assembly of piston (01 no).**
- 03. Dismantling & assembly of 01 No. crosshead bearing as per owner's choice.**
- 04. Dismantling, inspection & assembly of 01 No. main bearing as per owner's choice.**
- 05. Dismantling & assembly of 1 No. of connecting rod big end bearing.**
- 06. Assembling & torque tightening of the above.**
- 07. Cleaning of crank case and LO sump thoroughly to the satisfaction of HSL Engineer / Ship staff.**
- 08. Prepare the engine for starting up.**
- 09. Handing over of tools / tackles etc. taken from ship tools etc.**

2. **SCOPE OF WORK OF SHIPYARD**

- 2.1 Shipyard shall supply all the relevant drawings and manuals connected to the above jobs.
- 2.2 Shipyard shall provide materials / facilities like staging, lighting power supply chain blocks crane and Oxygen / Acetylene etc., at free of cost.
- 2.3 Shipyard shall provide Technical guidance to the contractor, if required.
- 2.4 The hydraulic jacks Telescope and connected materials required for pressing of bushes and installation of propeller shaft and propellers shall be provided by HSL.
- 2.5 Metal chock shall be provided as required.

3. **QUALITY OF WORK**

- 3.1 The above job is to be presented to the surveyors , Owners, Q.C and Engg. Dept at each stage of job completed as per Para 1.1.
- 3.2 The comments / suggestions made by the surveyors / owners, Q.C and Engg. The contractor shall carry out.
- 3.3 The Fits and tolerances indicated on the drgs .Are to be Strictly adhered to by the contractor.
- 3.4 The entire job is to be completed to the satisfaction of the attending surveyors / owners.

4. **GUARANTEE**

- 4.1 The contractor shall furnish a guarantee for workmanship for a period of 12 Months from the date of delivery of vessel . During this period and / or during dock trials and seal trials or

during ship guarantee period if any defect is found , it shall be rectified or replaced by the contractor at his cost or by Shipyard at the contractors cost.

5. PRICE

5.1 The contractor shall submit quotation in triplicate indicating price in lump sum for carrying out the entire job.

6. IMPORTANT

6.1 The contractor should accept / confirm all the above clauses of this technical Specification. Incomplete quotations are liable to be treated as invalid.