No. SY-18020/1/2021-SBR
Government of India
Ministry of Ports, Shipping and Waterways
(SBR Section)

Transport Bhawan, Parliament Street
New Delhi- 110001
Dated the, 31st January, 2022

OFFICE MEMORANDUM

Subject : Standard Operating Procedure (SOP) for Procurement of Deep-Sea Fishing Vessels-Clarification regarding FRP vessels

The undersigned is directed to refer to this Ministry's OM of even number dated 08.02.2021 on the subject mentioned above wherein a copy of the Standard Operating Procedure(SOP) for Procurement of Deep-Sea Fishing Vessels was furnished and to say that the said SOP was for steel hull vessels. The Nodal Authority has deliberated the approval of SOP and design of FRP vessel for fishing. Accordingly, following additions have been accepted for qualification of FRP boat building yard, as mentioned in Annex-I of the said SOP issued on 08.02.2021.

Para of Annex-I	For Steel hull Vessel	For FRP Vessel
C(v)	Skilled labourer (minimum-3)	Skilled labourer (minimum-2)
C(vi)	Qualified Welders (Minimum-2) & Machinery and outfit team	Experienced FRP technician (Minimum-2) & Machinery and outfit team
G(v)	Blasting & Painting Facilities	Painting Facilities

2. The rest of the provisions of the SOP issued vide OM of even number dated 08.02.2021 would be same for SOP for FRP Vessel. The consolidated SOP for steel hull and FRP vessels is enclosed. It is requested to kindly ensure immediate implementation of the SOP.

Enclosures: As stated

(Vanlalthuom)
Under Secretary to Govt. of India
Ph. 011-23722252
Email: v.thoum@nic.in

To,

1. Secretary, Department of Fisheries, Krishi Bhavan, Dr. Rajendra Prasad Road,New Delhi-110001. Email: secy-fisheries@nic.in

2. Director, Central Institute of Fisheries Technology. CIFT Junction, Willingdon Island, Matsyapuri P.O., Cochin-682 029, Kerala. **Phone** : 0484-2412300; E-mail :aris.cift@gmail.com; cift@ciftmail.org

3. The Chairman & Managing Director, Cochin Shipyard Ltd., Permanoor, P.O Bag No.1653, Kochi-682016, Fax: 484- 2384001, **Email:** cmd@cochinshipyard.com

4. Chairman, Indian Register of Shipping, 104, Copia Corporate Suites, District Centre, Jasola.

5. Prof. Hari V Warrior, Head of the Department, Ocean Engg and Naval Architecture Department, Indian Institute of Technology Kharagpur, Kharagpur- 721302. Email: warrior@naval.iitkgp.ernet.in

Copy to:

1. Addl. PS to Hon'ble Minister of Ports,Shipping and Waterways
2. PS to Secretary, Ministry of Ports,Shipping and Waterways
3. PS to Additional Secretary (PS&W)
4. PS to JS(S)

PRADHAN MANTRI MATSYA SAMPADA YOJANA (PMMSY) & ATMANIRBHAR BHARAT ABHIYAN

Standard Operating Procedure

for

Procurement of Deep-Sea Fishing Vessels

TABLE OF CONTENT

INTRODUCTION

The Pradhan Mantri Matsya Sampada Yojana (PMMSY) aims to enhance fish production to 220 lakh metric tons by 2024-25 from 137.58 lakh metric tons in 2018-19 at an average annual growth rate of about 9%. The ambitious scheme will result in doubling export earnings to Rs.1,00,000 crore and generate about 55 lakhs direct and indirect employment opportunities in fisheries sector over a period of next five years. One of the trust areas for this is development of deep-sea fishing.

Government of India (GoI) is also pursuing the ambitious "Atmanirbhar Bharat Abhiyan" aimed at attaining Self Reliance, which would in turn lead to heightened Make in India and manufacture in India. This initiative aims to promote not only the MSME's and domestic industries, but it also seeks to facilitating large-scale employment generation, while at the same time ensuring that India becomes truly self-reliant in all spheres. The Public Procurement (Preference to Make in India) Order 2017, "PPP-MII Order, 2017", as amended in June 2020 is also relevant in this context.

The Ministry of Ports, Shipping & Waterways as part of its commitment to implement the directives of GoI wishes to promulgate necessary guidelines to enable and ensure compliance with this initiative in its areas of administration and operations. As part of the many steps being initiated in this regard, it proposes to issue Standard Operating Procedures (SoP) to be complied with to facilitate Procurement of standardized Deep-Sea Fishing Vessels (DSFV) under the PMMSY scheme. In this regard, the following SoP for procurement of standardized DSFV is hereby promulgated, for strict compliance:

1. To assist the state fisheries departments in expeditious implementation of PMMSY, this Ministry proposes to issue **Approved Standardized DSFV Design & Specifications (ASDDS).** The ASDDS shall provide the minimum basic design parameters under which the vessels are to be constructed. DSFV's constructed in compliance of the ASDDS promulgated by this Ministry shall be eligible for subsidy under the PMMSY scheme.

2. The ASDDS shall be developed for a certain number of vessel variants (initially about 3 types), based on recommendations of a 'Nodal Authority' (NA), chaired by Director, Central Institute of Fisheries Technology (CIFT) and comprising of representative from The Indian Register of Shipping (IRS) representing Ministry of Shipping as Certification Agency , Cochin Shipyard Limited (CSL) representing Ministry of Shipping as Ship Building specialist, and representative from the Naval Architecture Department of the Indian Institute of Technology (Kharagpur) or IIT Madras for the DSFV's built under the PMMSY scheme.

3. The ASDDS, which will cover the Basic design aspects such as Outline Specifications, General Arrangement, Basic Calculations, Basic Structural Drawings, etc. will be prepared by CSL, technically vetted by CIFT and approved 'In Principle' by IRS. Thereafter, the

ASDDS will be published on the website. For any additional requirement to the minimum basic parameter, approval has to be taken from respective agency.

4. The detailed design & engineering for vessel construction shall be carried out either by the shipyard building the vessel or through any capable design agency in India.

5. State Fisheries Departments may identify beneficiaries and form tri-partite agreement between Beneficiary, State Government and Builder, for procurement of DSFV's complying with ASDDS.

6. DSFV's complying with the ASDDS shall be built in Indian shipyards empaneled by the State Government in compliance with the minimum eligibility criteria laid out in Annexure-1.

7. Quality Control checks as per the Quality Assurance Plan and issuance of Final Certificate (complying to Annexure -2) for the DSFV construction shall be undertaken through IRS, on chargeable basis.

8. Maximization of localization is mandated for key components like engines, generators, shafting, propulsion and valves to support Indian MSME's under the Atmanirbhar Bharat Abhiyan.

   Note: For construction of vessels with designs other than those published under ASDDS shall be technically vetted by CIFT and approved by IRS and built in yards qualified as per this SOP, in order to be eligible for PMMSY scheme.

INDICATIVE TIMELINES

Development & promulgation of ASDDS Development and promulgation of ASDDS shall be done as per the indicative timelines below

Sl No.	Task Description	Proposed Date	Action By
1.	Official Promulgation of SoP and Formation of Nodal Authority (NA)	T_0	MoPSW
2.	Sharing primary details of first 2 DSFV variants to NA	$T_0 + 5$	CSL
3.	Sharing primary details of third DSFV variants to NA	$T_0 + 15$	CSL
4.	Review, finalization & approval of the primary design details	$T_0 + 30$	NA
5.	Publication of final Design	$T_0 + 43$	MoPSW

Design Package –

- The ASDDS package defines a high-level framework to ensure a benchmarked level of performance & quality as well as safety & stability of DSFV's when constructed.

- At the same time, it permits ample room and required flexibility to Shipyards for fine-tuning the details during the production design/ engineering & procurement stages, to allow adequate competitiveness among the Shipyards as well as to meet local customer requirements.

- The final 'In-principle Approved' ASDDS design package published shall comprise of General Arrangement Drawing, Outline Specification, Midship Section Drawing, Profile & Deck Plans and Preliminary Stability Calculations.

- Any deviation sought from the 'In-Principle Approved' drawings and stability calculations, during construction of a DSFV, shall be approved by IRS.

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Annex - 1 : QUALIFICATION OF BOAT BUILDING YARD

Every application for the registration of the building yard shall be accompanied by the following.

A. Extend of Land and Ownership

i. Ownership : Own/ Lease/ Joint ownership with consent
ii. Location : Preferably Near sea shore

B. Registration requirement

i. At least MSME registration
ii. GST

C. Experience in Boat Building

i. Minimum 3 years' experience with track-record of having built at least two boats of similar or larger size with Steel / FRP as required.
ii. Experienced Group leader
iii. Qualified Naval Architect for the entire duration of the project
iv. Qualified Quality control Inspector for the entire duration of the project
v. Skilled Laborer-(minimum -3 for steel hull and 2 for FRP vessels)
vi. Qualified Welders (Minimum -2) for steel hull vessels and Experienced FRP technician (Minimum-2) for FRP vessels & Machinery and outfit Team

D. Financial Qualification

i. Net worth/ Solvency (10% of the unit cost)
ii. IT statements for last 3 years
iii. TIN number
iv. GST

E. Emergency Management

i. Firefighting emergency management equipment (to be certified by fire service)

F. Insurance Policy

i. Insurance for the Yard and Boats build/ repair/ modified and personnel in the yard (till taking over of Boat by owner)

G. In house facilities required (either owned or outsourced)

i. Three phase Electricity supply with Power Backup

ii. Generator Room
iii. Office Room
iv. Covered Storage as necessary.
v. Blasting & Painting Facilities (Blasting facilities not required for FRP vessels)
vi. NDT facilities
vii. Quality control department and records of inspections.

2. Functioning of the Building Yard

Following condition shall be followed by every owner of building yard.

A. Prior sanction shall be obtained from the authorized officer of the respective State Government for the construction of a new vessel. For this, a declaration showing the purpose and use of the vessel shall be furnished by the owner.

B. The building yard should be equipped with fire safety system and first aid facility.

3. Inspection of Building Yard

Inspection agency may inspect the building yard at any time without prior notice and check whether the conditions specified are satisfactory or not. If the conditions are not satisfied, steps to issue a stop memo at site or give certain period for rectifying the defect. On failure to comply with the conditions, report to be given to the adjudicating authority (State Government).

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Annex-2 : CERTIFICATION OF THE VESSEL

The vessel shall be constructed based on the approved design approved "in principle" by IRS with respect to the adequacy of hull structure and stability aspects, for the intended operation.

1. Certification Process

   a. The vessel construction will be broadly governed by the ASDDS/ technical specification published by The Ministry of Ports, Shipping & Waterways and based on the plans approved in principle by IRS.

   b. For structural adequacy verification, Rules and Regulation for the construction and classification of steel/ FRP ships by the Indian Register of Shipping (IRS) will apply.

   c. For stability verification, recommended criteria for fishing vessel of the 2008 IS Code would apply.

   d. Construction is to be as per good shipbuilding practices and documented quality standards/practices of shipyard.

   e. An inclining Experiment should be carried out at final stage of construction of the fishing vessel. The results from the experiment would be compiled in the form of a report and submitted for review to IRS. The approved lightship particulars will form the basis for preparation of stability booklet which will be submitted for review to IRS.

   f. For sister vessels, a draught survey will be carried out in lieu of the Inclining Experiment and provided deviation from lead vessel is within acceptable limits [as per criteria in clause 8.1.2, chapter 8 of IS Code 2008], stability documentation can be endorsed.

   g. The functioning of the vessel and its essential equipment will be tested in a formal sea trial; a detailed procedure/ protocol of which may be submitted for review.

   h. Technical documents as mandated by Class (General arrangement, tank plan, Structural plans, Stability booklet etc.) shall be reviewed/ approved by IRS.

   i. Safety equipment shall be inline with the requirements of State Government

   j. On satisfactory completion of the inspection, test & trials the boats would be issued with an inspection certificate indicating the scope and compliance status.

2. The material of construction of Hull shall be pre-approved by IRS.

3. Construction Supervision

a. The representative of Indian Register of Shipping (IRS) shall conduct inspection during various stages of construction as mandated by IRS, as applicable and the stage certificates and survey records shall be maintained in a register by the owner of the yard to ensure that the construction is in adherence to the approved plan.

b. Yard should have its quality inspection plans for the vessel which shall be reviewed by State government / IRS prior to construction of vessel.

c. Stability verification and final stability documents endorsement.

d. Witnessing of the Inclining Experiment or draught Survey by IRS.

e. Witnessing of the Sea trials & functioning of main engine, propeller, rudder, steering gear, bilge pump etc.

f. Final commissioning of Fish handling equipment and Refrigeration solutions shall be done in the presence of IRS or CIFT representative.

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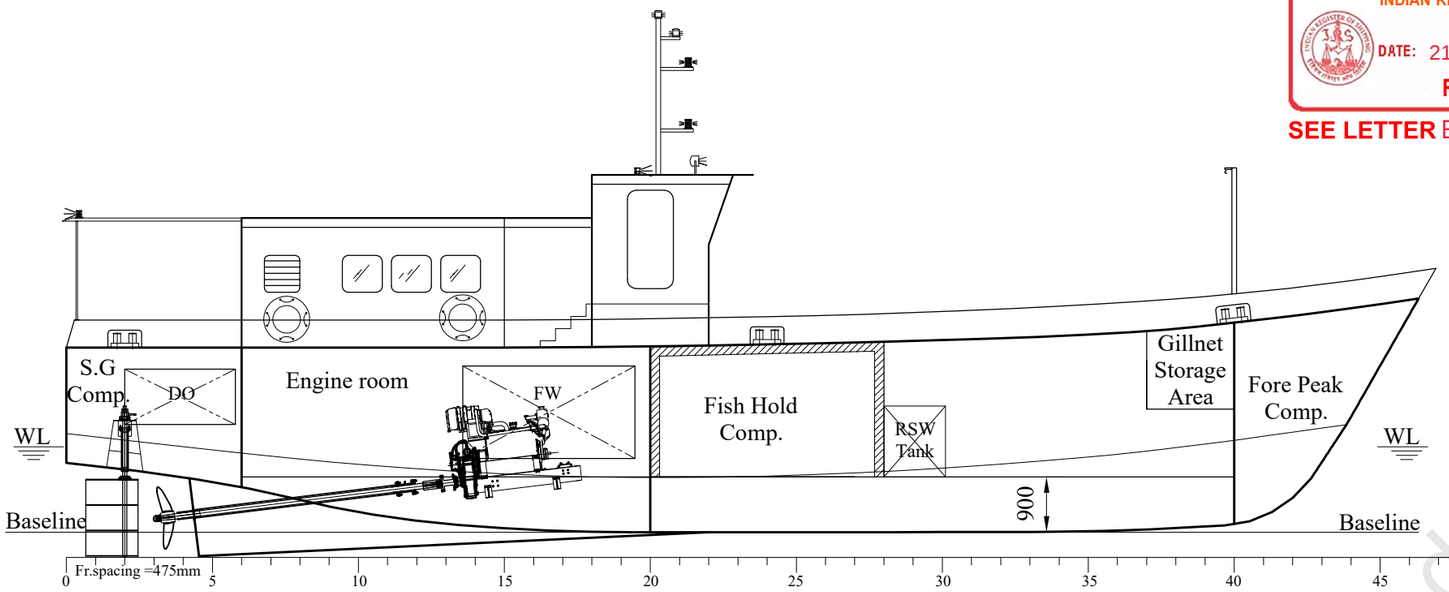
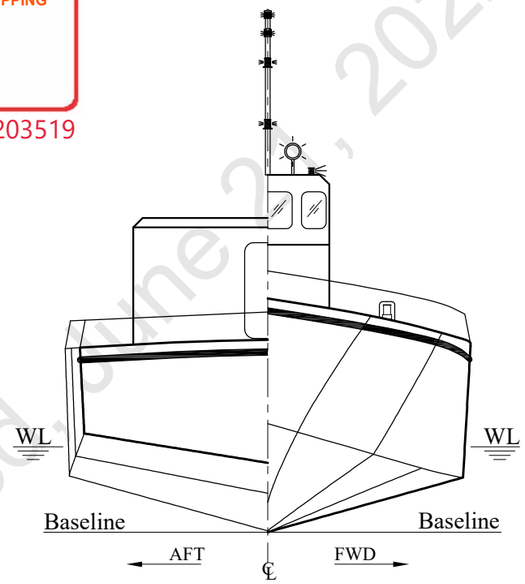
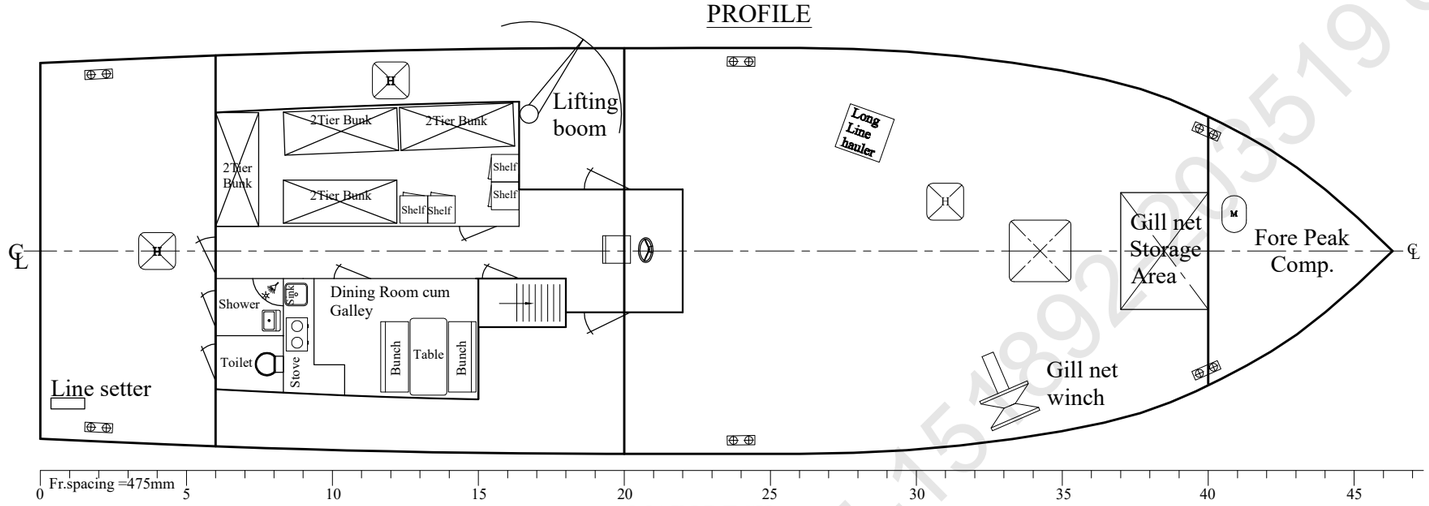


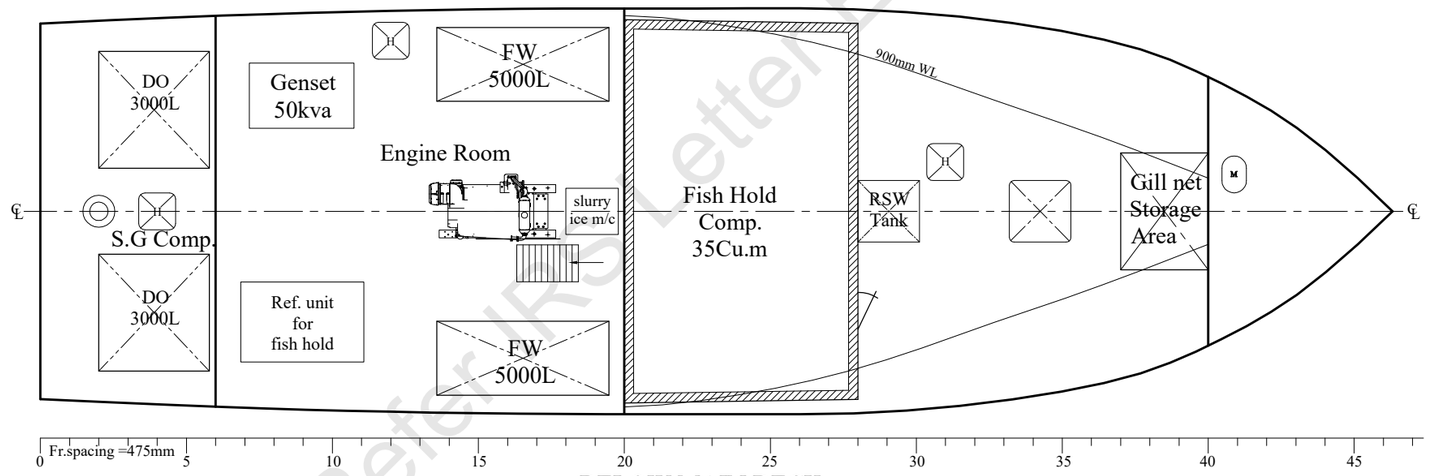
PROFILE



END VIEW



MAIN DECK



BELOW MAIN DECK

PRINCIPAL PARTICULARS

Length overall	: 22.000 m
Length @ WL	: 20.589 m
Breadth	: 6.509 m
Depth	: 3.037 m
Draft	: 1.400 m
Displacement	: 80.20 t
Speed	: 8knots
Engine	: ALM DTI,190 hp @2000RPM
Gear box	: HG 13, 4:1 Ratio
Genset	: 50 KVA
FW	: 2x 5000 L
FO	: 2x 3000 L
Chilled storage	: 35m³+ RSW / SLURRY ICE
Crew	: 8Nos.

Rev	Date	Description	Made by	Checked by
00	25-04-'22	- -	SL	AG

CLIENT
SAMUDRA SHIPYARD (P) LTD.

TITLE
GENERAL ARRANGEMENT

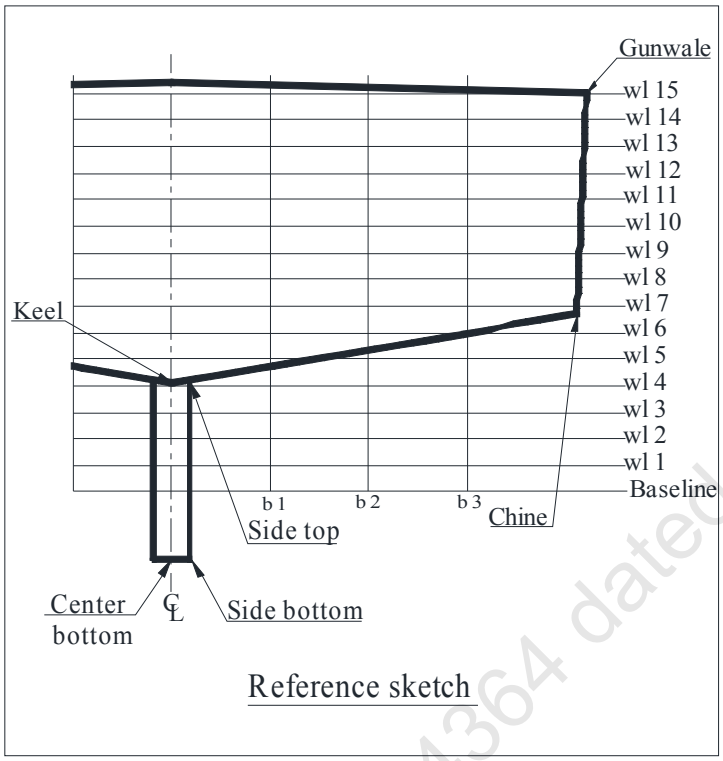
VESSEL NAME
22M FRP TUNA LONGLINER CUM GILLNETTER

VVC INDUSTRIES RESEARCH & SERVICES PVT. LTD.
XXXV/194, Automobile Road
Palarivattom, Kochi-682 025.
(Formerly Industries Research & Services)

Scale	Drawing No.	Sh.No.	Rev
1:100	11459-0201	1/1	00

File No: 11459-0201 Rev00 General arrangement 2022 04 25

OFFSET TABLE
(Drg No.11459-0203 Rev00 Offset Table, 28 April 2022)



Reference sketch

Note:-
All measurements are given in meters.
Longitudinal distance is measured from transom to forward
Height is measured from baseline (Positive upwards from baseline).

Reference Document:-
Lines Plan, Dwg. No.-11459-0202 Rev00

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 23 May 2022
NOTED FOR INFORMATION

SEE LETTER E-152662-204364

Prepared for,
Samudra Shipyard Pvt. Ltd.,
Aroor

Prepared by,
Sumilal TS

Checked by,
Augustin PI

VVC Industries Research & Services Pvt. Ltd.
(Formerly Industries Research & Services)
35/194, Automobile Road,
Palarivattom, Kochi-682025

CONTENTS

Main Particulars

Length overall : 22.00 m
Breadth mld. : 6.509 m (Excluding fender)
Depth : 3.037 m

HULL OFFSET

Transom

Item	Longitudinal	Half breadth	Height
Keel	0.000	0.000	1.128
wl 6	0.000	0.451	1.200
b 1	0.000	0.750	1.248
b 2	0.000	1.500	1.367
wl 7	0.000	1.705	1.400
b 3	0.000	2.250	1.487
wl 8	0.000	2.959	1.600
Chine	0.000	2.984	1.604
wl 9	0.000	2.994	1.800
wl 10	0.000	3.004	2.000
wl 11	0.000	3.014	2.200
wl 12	0.000	3.024	2.400
wl 13	0.000	3.035	2.600
wl 14	0.000	3.045	2.800
Gunwale	0.000	3.055	3.000

St 1

Item	Longitudinal	Half breadth	Height
Keel	0.475	0.000	1.077
b 1	0.475	0.750	1.195
wl 6	0.475	0.782	1.200
b 2	0.475	1.500	1.313
wl 7	0.475	2.053	1.400
b 3	0.475	2.250	1.431
Chine	0.475	3.005	1.550
wl 8	0.475	3.008	1.600
wl 9	0.475	3.017	1.800
wl 10	0.475	3.027	2.000
wl 11	0.475	3.037	2.200
wl 12	0.475	3.047	2.400
wl 13	0.475	3.057	2.600
wl 14	0.475	3.067	2.800
Gunwale	0.475	3.077	3.000

St 2

Item	Longitudinal	Half breadth	Height
Keel	0.950	0.000	1.021
b 1	0.950	0.750	1.139
wl 6	0.950	1.139	1.200
b 2	0.950	1.500	1.257
b 3	0.950	2.250	1.374
wl 7	0.950	2.414	1.400
Chine	0.950	3.026	1.496
wl 8	0.950	3.031	1.600
wl 9	0.950	3.041	1.800
wl 10	0.950	3.050	2.000
wl 11	0.950	3.060	2.200
wl 12	0.950	3.069	2.400
wl 13	0.950	3.079	2.600
wl 14	0.950	3.089	2.800
Gunwale	0.950	3.098	3.000

St 3

Item	Longitudinal	Half breadth	Height
Keel	1.425	0.000	0.961
wl 5	1.425	0.249	1.000
b 1	1.425	0.750	1.079
b 2	1.425	1.500	1.198
wl 6	1.425	1.513	1.200
b 3	1.425	2.250	1.317
wl 7	1.425	2.777	1.400
Chine	1.425	3.046	1.443
wl 8	1.425	3.054	1.600
wl 9	1.425	3.063	1.800
wl 10	1.425	3.073	2.000
wl 11	1.425	3.082	2.200
wl 12	1.425	3.091	2.400
wl 13	1.425	3.101	2.600
wl 14	1.425	3.110	2.800
Gunwale	1.425	3.119	3.000

St 4

Item	Longitudinal	Half breadth	Height
Keel	1.900	0.000	0.894
wl 5	1.900	0.657	1.000
b 1	1.900	0.750	1.015
b 2	1.900	1.500	1.136
wl 6	1.900	1.893	1.200
b 3	1.900	2.250	1.258
Chine	1.900	3.067	1.390
wl 7	1.900	3.067	1.400
wl 8	1.900	3.076	1.600
wl 9	1.900	3.085	1.800
wl 10	1.900	3.094	2.000
wl 11	1.900	3.103	2.200
wl 12	1.900	3.113	2.400
wl 13	1.900	3.122	2.600
wl 14	1.900	3.131	2.800
Gunwale	1.900	3.140	3.000

St 5

Item	Longitudinal	Half breadth	Height
Keel	2.375	0.000	0.819
b 1	2.375	0.750	0.945
wl 5	2.375	1.077	1.000
b 2	2.375	1.500	1.071
b 3	2.375	2.250	1.197
wl 6	2.375	2.266	1.200
Chine	2.375	3.087	1.338
wl 7	2.375	3.089	1.400
wl 8	2.375	3.098	1.600
wl 9	2.375	3.107	1.800
wl 10	2.375	3.116	2.000
wl 11	2.375	3.124	2.200
wl 12	2.375	3.133	2.400
wl 13	2.375	3.142	2.600
wl 14	2.375	3.151	2.800
Gunwale	2.375	3.159	3.000

St 6

Item	Longitudinal	Half breadth	Height
Keel	2.850	0.000	0.735
wl 4	2.850	0.368	0.800
b 1	2.850	0.750	0.868
wl 5	2.850	1.493	1.000
b 2	2.850	1.500	1.001
b 3	2.850	2.250	1.135
wl 6	2.850	2.617	1.200
Chine	2.850	3.106	1.287
wl 7	2.850	3.111	1.400
wl 8	2.850	3.119	1.600
wl 9	2.850	3.128	1.800
wl 10	2.850	3.136	2.000
wl 11	2.850	3.144	2.200
wl 12	2.850	3.153	2.400
wl 13	2.850	3.161	2.600
wl 14	2.850	3.170	2.800
Gunwale	2.850	3.178	3.000

St 7

Item	Longitudinal	Half breadth	Height
Keel	3.325	0.000	0.637
b 1	3.325	0.750	0.781
wl 4	3.325	0.848	0.800
b 2	3.325	1.500	0.925
wl 5	3.325	1.890	1.000
b 3	3.325	2.250	1.069
wl 6	3.325	2.931	1.200
Chine	3.325	3.125	1.237
wl 7	3.325	3.131	1.400
wl 8	3.325	3.139	1.600
wl 9	3.325	3.147	1.800
wl 10	3.325	3.155	2.000
wl 11	3.325	3.163	2.200
wl 12	3.325	3.171	2.400
wl 13	3.325	3.179	2.600
wl 14	3.325	3.188	2.800
Gunwale	3.325	3.196	3.000

St 8

Item	Longitudinal	Half breadth	Height
Keel	3.800	0.000	0.523
wl 3	3.800	0.363	0.600
b 1	3.800	0.750	0.682
wl 4	3.800	1.306	0.800
b 2	3.800	1.500	0.841
b 3	3.800	2.250	1.000
wl 5	3.800	2.250	1.000
Chine	3.800	3.142	1.189
wl 6	3.800	3.143	1.200
wl 7	3.800	3.150	1.400
wl 8	3.800	3.158	1.600
wl 9	3.800	3.166	1.800
wl 10	3.800	3.173	2.000
wl 11	3.800	3.181	2.200
wl 12	3.800	3.188	2.400
wl 13	3.800	3.196	2.600
wl 14	3.800	3.204	2.800
Gunwale	3.800	3.211	3.000

St 9

Item	Longitudinal	Half breadth	Height
Keel	4.275	0.000	0.415
b 1	4.275	0.750	0.589
wl 3	4.275	0.799	0.600
b 2	4.275	1.500	0.762
wl 4	4.275	1.666	0.800
b 3	4.275	2.250	0.935
wl 5	4.275	2.532	1.000
Chine	4.275	3.159	1.145
wl 6	4.275	3.161	1.200
wl 7	4.275	3.168	1.400
wl 8	4.275	3.175	1.600
wl 9	4.275	3.182	1.800
wl 10	4.275	3.189	2.000
wl 11	4.275	3.197	2.200
wl 12	4.275	3.204	2.400
wl 13	4.275	3.211	2.600
wl 14	4.275	3.218	2.800
Gunwale	4.275	3.225	3.000

St 10

Item	Longitudinal	Half breadth	Height
Keel	4.750	0.000	0.324
wl 2	4.750	0.311	0.400
b 1	4.750	0.750	0.508
wl 3	4.750	1.125	0.600
b 2	4.750	1.500	0.692
wl 4	4.750	1.939	0.800
b 3	4.750	2.250	0.877
wl 5	4.750	2.752	1.000
Chine	4.750	3.173	1.103
wl 6	4.750	3.177	1.200
wl 7	4.750	3.184	1.400
wl 8	4.750	3.190	1.600
wl 9	4.750	3.197	1.800
wl 10	4.750	3.204	2.000
wl 11	4.750	3.211	2.200
wl 12	4.750	3.218	2.400
wl 13	4.750	3.225	2.600
wl 14	4.750	3.231	2.800
Gunwale	4.750	3.238	3.000

St 11

Item	Longitudinal	Half breadth	Height
Keel	5.225	0.000	0.246
wl 2	5.225	0.597	0.400
b 1	5.225	0.750	0.439
wl 3	5.225	1.375	0.600
b 2	5.225	1.500	0.632
wl 4	5.225	2.153	0.800
b 3	5.225	2.250	0.825
wl 5	5.225	2.931	1.000
Chine	5.225	3.187	1.066
wl 6	5.225	3.191	1.200
wl 7	5.225	3.198	1.400
wl 8	5.225	3.204	1.600
wl 9	5.225	3.211	1.800
wl 10	5.225	3.217	2.000
wl 11	5.225	3.224	2.200
wl 12	5.225	3.230	2.400
wl 13	5.225	3.237	2.600
wl 14	5.225	3.243	2.800
Gunwale	5.225	3.250	3.000

St 12

Item	Longitudinal	Half breadth	Height
Keel	5.700	0.000	0.183
wl 1	5.700	0.064	0.200
b 1	5.700	0.750	0.382
wl 2	5.700	0.818	0.400
b 2	5.700	1.500	0.581
wl 3	5.700	1.572	0.600
b 3	5.700	2.250	0.780
wl 4	5.700	2.326	0.800
wl 5	5.700	3.081	1.000
Chine	5.700	3.198	1.031
wl 6	5.700	3.204	1.200
wl 7	5.700	3.210	1.400
wl 8	5.700	3.216	1.600
wl 9	5.700	3.223	1.800
wl 10	5.700	3.229	2.000
wl 11	5.700	3.235	2.200
wl 12	5.700	3.241	2.400
wl 13	5.700	3.248	2.600
wl 14	5.700	3.254	2.800
Gunwale	5.700	3.260	3.000

St 13

Item	Longitudinal	Half breadth	Height
Keel	6.175	0.000	0.133
wl 1	6.175	0.248	0.200
b 1	6.175	0.750	0.336
wl 2	6.175	0.988	0.400
b 2	6.175	1.500	0.538
wl 3	6.175	1.729	0.600
b 3	6.175	2.250	0.741
wl 4	6.175	2.470	0.800
Chine	6.175	3.209	1.000
wl 6	6.175	3.215	1.200
wl 7	6.175	3.221	1.400
wl 8	6.175	3.227	1.600
wl 9	6.175	3.233	1.800
wl 10	6.175	3.239	2.000
wl 11	6.175	3.245	2.200
wl 12	6.175	3.252	2.400
wl 13	6.175	3.258	2.600
wl 14	6.175	3.264	2.800
Gunwale	6.175	3.270	3.000

St 14

Item	Longitudinal	Half breadth	Height
Keel	6.650	0.000	0.095
wl 1	6.650	0.387	0.200
b 1	6.650	0.750	0.299
wl 2	6.650	1.121	0.400
b 2	6.650	1.500	0.503
wl 3	6.650	1.855	0.600
b 3	6.650	2.250	0.708
wl 4	6.650	2.590	0.800
Chine	6.650	3.218	0.971
wl 5	6.650	3.219	1.000
wl 6	6.650	3.225	1.200
wl 7	6.650	3.231	1.400
wl 8	6.650	3.236	1.600
wl 9	6.650	3.242	1.800
wl 10	6.650	3.248	2.000
wl 11	6.650	3.254	2.200
wl 12	6.650	3.260	2.400
wl 13	6.650	3.266	2.600
wl 14	6.650	3.272	2.800
wl 15	6.650	3.278	3.000
Gunwale	6.650	3.278	3.000

St 15

Item	Longitudinal	Half breadth	Height
Keel	7.125	0.000	0.063
wl 1	7.125	0.500	0.200
b 1	7.125	0.750	0.269
wl 2	7.125	1.230	0.400
b 2	7.125	1.500	0.474
wl 3	7.125	1.959	0.600
b 3	7.125	2.250	0.680
wl 4	7.125	2.689	0.800
Chine	7.125	3.224	0.947
wl 5	7.125	3.225	1.000
wl 6	7.125	3.231	1.200
wl 7	7.125	3.237	1.400
wl 8	7.125	3.243	1.600
wl 9	7.125	3.249	1.800
wl 10	7.125	3.255	2.000
wl 11	7.125	3.261	2.200
wl 12	7.125	3.267	2.400
wl 13	7.125	3.273	2.600
wl 14	7.125	3.279	2.800
wl 15	7.125	3.285	3.000
Gunwale	7.125	3.285	3.001

St 16

Item	Longitudinal	Half breadth	Height
Keel	7.600	0.000	0.038
wl 1	7.600	0.589	0.200
b 1	7.600	0.750	0.244
wl 2	7.600	1.316	0.400
b 2	7.600	1.500	0.451
wl 3	7.600	2.042	0.600
b 3	7.600	2.250	0.657
wl 4	7.600	2.768	0.800
Chine	7.600	3.226	0.926
wl 5	7.600	3.229	1.000
wl 6	7.600	3.235	1.200
wl 7	7.600	3.241	1.400
wl 8	7.600	3.247	1.600
wl 9	7.600	3.254	1.800
wl 10	7.600	3.260	2.000
wl 11	7.600	3.266	2.200
wl 12	7.600	3.272	2.400
wl 13	7.600	3.278	2.600
wl 14	7.600	3.284	2.800
wl 15	7.600	3.291	3.000
Gunwale	7.600	3.291	3.003

St 17

Item	Longitudinal	Half breadth	Height
Keel	8.075	0.000	0.019
wl 1	8.075	0.656	0.200
b 1	8.075	0.750	0.226
wl 2	8.075	1.380	0.400
b 2	8.075	1.500	0.433
wl 3	8.075	2.103	0.600
b 3	8.075	2.250	0.641
wl 4	8.075	2.827	0.800
Chine	8.075	3.226	0.910
wl 5	8.075	3.229	1.000
wl 6	8.075	3.235	1.200
wl 7	8.075	3.242	1.400
wl 8	8.075	3.249	1.600
wl 9	8.075	3.255	1.800
wl 10	8.075	3.262	2.000
wl 11	8.075	3.268	2.200
wl 12	8.075	3.275	2.400
wl 13	8.075	3.282	2.600
wl 14	8.075	3.288	2.800
wl 15	8.075	3.295	3.000
Gunwale	8.075	3.295	3.006

St 18

Item	Longitudinal	Half breadth	Height
Keel	8.550	0.000	0.006
wl 1	8.550	0.700	0.200
b 1	8.550	0.750	0.214
wl 2	8.550	1.422	0.400
b 2	8.550	1.500	0.422
wl 3	8.550	2.144	0.600
b 3	8.550	2.250	0.629
wl 4	8.550	2.867	0.800
Chine	8.550	3.222	0.898
wl 5	8.550	3.226	1.000
wl 6	8.550	3.233	1.200
wl 7	8.550	3.240	1.400
wl 8	8.550	3.247	1.600
wl 9	8.550	3.254	1.800
wl 10	8.550	3.262	2.000
wl 11	8.550	3.269	2.200
wl 12	8.550	3.276	2.400
wl 13	8.550	3.283	2.600
wl 14	8.550	3.290	2.800
wl 15	8.550	3.298	3.000
Gunwale	8.550	3.298	3.011

St 19

Item	Longitudinal	Half breadth	Height
Keel	9.025	0.000	0.000
wl 1	9.025	0.720	0.200
b 1	9.025	0.750	0.208
wl 2	9.025	1.443	0.400
b 2	9.025	1.500	0.416
wl 3	9.025	2.165	0.600
b 3	9.025	2.250	0.624
wl 4	9.025	2.887	0.800
Chine	9.025	3.215	0.891
wl 5	9.025	3.219	1.000
wl 6	9.025	3.227	1.200
wl 7	9.025	3.235	1.400
wl 8	9.025	3.243	1.600
wl 9	9.025	3.251	1.800
wl 10	9.025	3.259	2.000
wl 11	9.025	3.267	2.200
wl 12	9.025	3.275	2.400
wl 13	9.025	3.283	2.600
wl 14	9.025	3.291	2.800
wl 15	9.025	3.299	3.000
Gunwale	9.025	3.299	3.016

St 20

Item	Longitudinal	Half breadth	Height
Keel	9.500	0.000	0.000
wl 1	9.500	0.722	0.200
b 1	9.500	0.750	0.208
wl 2	9.500	1.444	0.400
b 2	9.500	1.500	0.416
wl 3	9.500	2.165	0.600
b 3	9.500	2.250	0.623
wl 4	9.500	2.887	0.800
Chine	9.500	3.203	0.887
wl 5	9.500	3.208	1.000
wl 6	9.500	3.217	1.200
wl 7	9.500	3.226	1.400
wl 8	9.500	3.235	1.600
wl 9	9.500	3.244	1.800
wl 10	9.500	3.253	2.000
wl 11	9.500	3.262	2.200
wl 12	9.500	3.271	2.400
wl 13	9.500	3.281	2.600
wl 14	9.500	3.290	2.800
wl 15	9.500	3.299	3.000
Gunwale	9.500	3.300	3.022

St 21

Item	Longitudinal	Half breadth	Height
Keel	9.975	0.000	0.000
wl 1	9.975	0.716	0.200
b 1	9.975	0.750	0.210
wl 2	9.975	1.432	0.400
b 2	9.975	1.500	0.419
wl 3	9.975	2.148	0.600
b 3	9.975	2.250	0.629
wl 4	9.975	2.864	0.800
Chine	9.975	3.179	0.888
wl 5	9.975	3.185	1.000
wl 6	9.975	3.197	1.200
wl 7	9.975	3.208	1.400
wl 8	9.975	3.219	1.600
wl 9	9.975	3.231	1.800
wl 10	9.975	3.242	2.000
wl 11	9.975	3.253	2.200
wl 12	9.975	3.264	2.400
wl 13	9.975	3.276	2.600
wl 14	9.975	3.287	2.800
wl 15	9.975	3.298	3.000
Gunwale	9.975	3.300	3.029

St 22

Item	Longitudinal	Half breadth	Height
Keel	10.450	0.000	0.000
wl 1	10.450	0.704	0.200
b 1	10.450	0.750	0.213
wl 2	10.450	1.408	0.400
b 2	10.450	1.500	0.426
wl 3	10.450	2.113	0.600
b 3	10.450	2.250	0.639
wl 4	10.450	2.818	0.800
Chine	10.450	3.143	0.892
wl 5	10.450	3.151	1.000
wl 6	10.450	3.166	1.200
wl 7	10.450	3.181	1.400
wl 8	10.450	3.196	1.600
wl 9	10.450	3.210	1.800
wl 10	10.450	3.225	2.000
wl 11	10.450	3.240	2.200
wl 12	10.450	3.254	2.400
wl 13	10.450	3.269	2.600
wl 14	10.450	3.283	2.800
wl 15	10.450	3.297	3.000
Gunwale	10.450	3.300	3.037

St 23

Item	Longitudinal	Half breadth	Height
Keel	10.925	0.000	0.000
wl 1	10.925	0.686	0.200
b 1	10.925	0.750	0.219
wl 2	10.925	1.374	0.400
b 2	10.925	1.500	0.437
wl 3	10.925	2.062	0.600
b 3	10.925	2.250	0.655
wl 4	10.925	2.750	0.800
Chine	10.925	3.095	0.900
wl 5	10.925	3.105	1.000
wl 6	10.925	3.125	1.200
wl 7	10.925	3.145	1.400
wl 8	10.925	3.164	1.600
wl 9	10.925	3.183	1.800
wl 10	10.925	3.203	2.000
wl 11	10.925	3.221	2.200
wl 12	10.925	3.240	2.400
wl 13	10.925	3.259	2.600
wl 14	10.925	3.278	2.800
wl 15	10.925	3.296	3.000
Gunwale	10.925	3.300	3.045

St 24

Item	Longitudinal	Half breadth	Height
Keel	11.400	0.000	0.000
wl 1	11.400	0.664	0.200
b 1	11.400	0.750	0.226
wl 2	11.400	1.329	0.400
b 2	11.400	1.500	0.451
wl 3	11.400	1.996	0.600
b 3	11.400	2.250	0.676
wl 4	11.400	2.664	0.800
Chine	11.400	3.037	0.911
wl 5	11.400	3.048	1.000
wl 6	11.400	3.074	1.200
wl 7	11.400	3.100	1.400
wl 8	11.400	3.125	1.600
wl 9	11.400	3.150	1.800
wl 10	11.400	3.175	2.000
wl 11	11.400	3.199	2.200
wl 12	11.400	3.223	2.400
wl 13	11.400	3.247	2.600
wl 14	11.400	3.271	2.800
wl 15	11.400	3.294	3.000
Gunwale	11.400	3.300	3.054

St 25

Item	Longitudinal	Half breadth	Height
Keel	11.875	0.000	0.000
wl 1	11.875	0.636	0.200
b 1	11.875	0.750	0.236
wl 2	11.875	1.275	0.400
b 2	11.875	1.500	0.470
wl 3	11.875	1.917	0.600
b 3	11.875	2.250	0.704
wl 4	11.875	2.561	0.800
Chine	11.875	2.968	0.926
wl 5	11.875	2.980	1.000
wl 6	11.875	3.014	1.200
wl 7	11.875	3.046	1.400
wl 8	11.875	3.079	1.600
wl 9	11.875	3.111	1.800
wl 10	11.875	3.142	2.000
wl 11	11.875	3.173	2.200
wl 12	11.875	3.203	2.400
wl 13	11.875	3.233	2.600
wl 14	11.875	3.262	2.800
wl 15	11.875	3.291	3.000
Gunwale	11.875	3.300	3.063

St 26

Item	Longitudinal	Half breadth	Height
Keel	12.350	0.000	0.000
wl 1	12.350	0.605	0.200
b 1	12.350	0.750	0.248
wl 2	12.350	1.214	0.400
b 2	12.350	1.500	0.493
wl 3	12.350	1.827	0.600
b 3	12.350	2.250	0.737
wl 4	12.350	2.444	0.800
Chine	12.350	2.889	0.943
wl 5	12.350	2.901	1.000
wl 6	12.350	2.943	1.200
wl 7	12.350	2.984	1.400
wl 8	12.350	3.025	1.600
wl 9	12.350	3.064	1.800
wl 10	12.350	3.103	2.000
wl 11	12.350	3.142	2.200
wl 12	12.350	3.179	2.400
wl 13	12.350	3.216	2.600
wl 14	12.350	3.252	2.800
wl 15	12.350	3.288	3.000
Gunwale	12.350	3.300	3.073

St 27

Item	Longitudinal	Half breadth	Height
Keel	12.825	0.000	0.000
wl 1	12.825	0.572	0.200
b 1	12.825	0.750	0.262
wl 2	12.825	1.150	0.400
b 2	12.825	1.500	0.521
wl 3	12.825	1.732	0.600
b 3	12.825	2.250	0.777
wl 4	12.825	2.319	0.800
Chine	12.825	2.802	0.964
wl 5	12.825	2.812	1.000
wl 6	12.825	2.863	1.200
wl 7	12.825	2.913	1.400
wl 8	12.825	2.962	1.600
wl 9	12.825	3.010	1.800
wl 10	12.825	3.057	2.000
wl 11	12.825	3.103	2.200
wl 12	12.825	3.148	2.400
wl 13	12.825	3.192	2.600
wl 14	12.825	3.236	2.800
wl 15	12.825	3.279	3.000
Gunwale	12.825	3.296	3.084

St 28

Item	Longitudinal	Half breadth	Height
Keel	13.300	0.000	0.000
wl 1	13.300	0.538	0.200
b 1	13.300	0.750	0.278
wl 2	13.300	1.082	0.400
b 2	13.300	1.500	0.552
wl 3	13.300	1.632	0.600
wl 4	13.300	2.187	0.800
b 3	13.300	2.250	0.823
Chine	13.300	2.710	0.987
wl 5	13.300	2.714	1.000
wl 6	13.300	2.774	1.200
wl 7	13.300	2.832	1.400
wl 8	13.300	2.890	1.600
wl 9	13.300	2.946	1.800
wl 10	13.300	3.001	2.000
wl 11	13.300	3.054	2.200
wl 12	13.300	3.107	2.400
wl 13	13.300	3.159	2.600
wl 14	13.300	3.210	2.800
wl 15	13.300	3.260	3.000
Gunwale	13.300	3.283	3.096

St 29

Item	Longitudinal	Half breadth	Height
Keel	13.775	0.000	0.001
wl 1	13.775	0.504	0.200
b 1	13.775	0.750	0.297
wl 2	13.775	1.014	0.400
b 2	13.775	1.500	0.589
wl 3	13.775	1.530	0.600
wl 4	13.775	2.051	0.800
b 3	13.775	2.250	0.876
wl 5	13.775	2.577	1.000
Chine	13.775	2.611	1.013
wl 6	13.775	2.675	1.200
wl 7	13.775	2.742	1.400
wl 8	13.775	2.807	1.600
wl 9	13.775	2.872	1.800
wl 10	13.775	2.935	2.000
wl 11	13.775	2.996	2.200
wl 12	13.775	3.056	2.400
wl 13	13.775	3.116	2.600
wl 14	13.775	3.174	2.800
wl 15	13.775	3.231	3.000
Gunwale	13.775	3.261	3.109

St 30

Item	Longitudinal	Half breadth	Height
Keel	14.250	0.000	0.001
wl 1	14.250	0.469	0.200
b 1	14.250	0.750	0.319
wl 2	14.250	0.944	0.400
wl 3	14.250	1.425	0.600
b 2	14.250	1.500	0.631
wl 4	14.250	1.912	0.800
b 3	14.250	2.250	0.938
wl 5	14.250	2.403	1.000
Chine	14.250	2.504	1.041
wl 6	14.250	2.566	1.200
wl 7	14.250	2.641	1.400
wl 8	14.250	2.715	1.600
wl 9	14.250	2.787	1.800
wl 10	14.250	2.858	2.000
wl 11	14.250	2.928	2.200
wl 12	14.250	2.995	2.400
wl 13	14.250	3.062	2.600
wl 14	14.250	3.127	2.800
wl 15	14.250	3.191	3.000
Gunwale	14.250	3.230	3.123

St 31

Item	Longitudinal	Half breadth	Height
Keel	14.725	0.000	0.001
wl 1	14.725	0.434	0.200
b 1	14.725	0.750	0.344
wl 2	14.725	0.875	0.400
wl 3	14.725	1.321	0.600
b 2	14.725	1.500	0.680
wl 4	14.725	1.771	0.800
wl 5	14.725	2.226	1.000
b 3	14.725	2.250	1.010
Chine	14.725	2.392	1.072
wl 6	14.725	2.446	1.200
wl 7	14.725	2.530	1.400
wl 8	14.725	2.612	1.600
wl 9	14.725	2.693	1.800
wl 10	14.725	2.771	2.000
wl 11	14.725	2.848	2.200
wl 12	14.725	2.924	2.400
wl 13	14.725	2.998	2.600
wl 14	14.725	3.070	2.800
wl 15	14.725	3.141	3.000
Gunwale	14.725	3.189	3.138

St 32

Item	Longitudinal	Half breadth	Height
Keel	15.200	0.000	0.002
wl 1	15.200	0.399	0.200
b 1	15.200	0.750	0.373
wl 2	15.200	0.806	0.400
wl 3	15.200	1.216	0.600
b 2	15.200	1.500	0.737
wl 4	15.200	1.630	0.800
wl 5	15.200	2.048	1.000
b 3	15.200	2.250	1.096
Chine	15.200	2.272	1.106
wl 6	15.200	2.316	1.200
wl 7	15.200	2.408	1.400
wl 8	15.200	2.499	1.600
wl 9	15.200	2.587	1.800
wl 10	15.200	2.674	2.000
wl 11	15.200	2.759	2.200
wl 12	15.200	2.841	2.400
wl 13	15.200	2.923	2.600
wl 14	15.200	3.002	2.800
wl 15	15.200	3.080	3.000
Gunwale	15.200	3.139	3.154

St 33

Item	Longitudinal	Half breadth	Height
Keel	15.675	0.000	0.004
wl 1	15.675	0.363	0.200
wl 2	15.675	0.736	0.400
b 1	15.675	0.750	0.407
wl 3	15.675	1.112	0.600
wl 4	15.675	1.491	0.800
b 2	15.675	1.500	0.805
wl 5	15.675	1.873	1.000
Chine	15.675	2.146	1.142
wl 6	15.675	2.176	1.200
b 3	15.675	2.250	1.347
wl 7	15.675	2.276	1.400
wl 8	15.675	2.375	1.600
wl 9	15.675	2.471	1.800
wl 10	15.675	2.565	2.000
wl 11	15.675	2.658	2.200
wl 12	15.675	2.748	2.400
wl 13	15.675	2.837	2.600
wl 14	15.675	2.923	2.800
wl 15	15.675	3.008	3.000
Gunwale	15.675	3.080	3.172

St 34

Item	Longitudinal	Half breadth	Height
Keel	16.150	0.000	0.007
wl 1	16.150	0.325	0.200
wl 2	16.150	0.665	0.400
b 1	16.150	0.750	0.450
wl 3	16.150	1.007	0.600
wl 4	16.150	1.352	0.800
b 2	16.150	1.500	0.886
wl 5	16.150	1.699	1.000
Chine	16.150	2.015	1.181
wl 6	16.150	2.025	1.200
wl 7	16.150	2.134	1.400
wl 8	16.150	2.240	1.600
b 3	16.150	2.250	1.620
wl 9	16.150	2.344	1.800
wl 10	16.150	2.445	2.000
wl 11	16.150	2.545	2.200
wl 12	16.150	2.643	2.400
wl 13	16.150	2.739	2.600
wl 14	16.150	2.833	2.800
wl 15	16.150	2.925	3.000
Gunwale	16.150	3.011	3.191

St 35

Item	Longitudinal	Half breadth	Height
Keel	16.625	0.000	0.014
wl 1	16.625	0.284	0.200
wl 2	16.625	0.591	0.400
b 1	16.625	0.750	0.503
wl 3	16.625	0.900	0.600
wl 4	16.625	1.211	0.800
b 2	16.625	1.500	0.984
wl 5	16.625	1.525	1.000
wl 6	16.625	1.840	1.200
Chine	16.625	1.875	1.222
wl 7	16.625	1.978	1.400
wl 8	16.625	2.091	1.600
wl 9	16.625	2.202	1.800
b 3	16.625	2.250	1.887
wl 10	16.625	2.312	2.000
wl 11	16.625	2.419	2.200
wl 12	16.625	2.524	2.400
wl 13	16.625	2.628	2.600
wl 14	16.625	2.729	2.800
wl 15	16.625	2.828	3.000
Gunwale	16.625	2.932	3.212

St 36

Item	Longitudinal	Half breadth	Height
Keel	17.100	0.000	0.025
wl 1	17.100	0.237	0.200
wl 2	17.100	0.510	0.400
b 1	17.100	0.750	0.574
wl 3	17.100	0.786	0.600
wl 4	17.100	1.064	0.800
wl 5	17.100	1.345	1.000
b 2	17.100	1.500	1.110
wl 6	17.100	1.628	1.200
Chine	17.100	1.723	1.267
wl 7	17.100	1.804	1.400
wl 8	17.100	1.924	1.600
wl 9	17.100	2.043	1.800
wl 10	17.100	2.159	2.000
b 3	17.100	2.250	2.158
wl 11	17.100	2.274	2.200
wl 12	17.100	2.387	2.400
wl 13	17.100	2.498	2.600
wl 14	17.100	2.607	2.800
wl 15	17.100	2.714	3.000
Gunwale	17.100	2.838	3.238

St 37

Item	Longitudinal	Half breadth	Height
Keel	17.575	0.000	0.043
wl 1	17.575	0.183	0.200
wl 2	17.575	0.419	0.400
wl 3	17.575	0.659	0.600
b 1	17.575	0.750	0.675
wl 4	17.575	0.904	0.800
wl 5	17.575	1.151	1.000
wl 6	17.575	1.402	1.200
b 2	17.575	1.500	1.277
Chine	17.575	1.553	1.318
wl 7	17.575	1.604	1.400
wl 8	17.575	1.730	1.600
wl 9	17.575	1.855	1.800
wl 10	17.575	1.980	2.000
wl 11	17.575	2.102	2.200
wl 12	17.575	2.223	2.400
b 3	17.575	2.250	2.444
wl 13	17.575	2.343	2.600
wl 14	17.575	2.460	2.800
wl 15	17.575	2.575	3.000
Gunwale	17.575	2.726	3.268

St 38

Item	Longitudinal	Half breadth	Height
Keel	18.050	0.000	0.066
wl 1	18.050	0.131	0.200
wl 2	18.050	0.330	0.400
wl 3	18.050	0.533	0.600
wl 4	18.050	0.741	0.800
b 1	18.050	0.750	0.808
wl 5	18.050	0.954	1.000
wl 6	18.050	1.171	1.200
Chine	18.050	1.364	1.374
wl 7	18.050	1.380	1.400
b 2	18.050	1.500	1.589
wl 8	18.050	1.507	1.600
wl 9	18.050	1.634	1.800
wl 10	18.050	1.762	2.000
wl 11	18.050	1.890	2.200
wl 12	18.050	2.018	2.400
wl 13	18.050	2.146	2.600
b 3	18.050	2.250	2.763
wl 14	18.050	2.274	2.800
wl 15	18.050	2.399	3.000
Gunwale	18.050	2.587	3.306

St 39

Item	Longitudinal	Half breadth	Height
Keel	18.525	0.000	0.091
wl 1	18.525	0.085	0.200
wl 2	18.525	0.247	0.400
wl 3	18.525	0.413	0.600
wl 4	18.525	0.584	0.800
b 1	18.525	0.750	0.988
wl 5	18.525	0.761	1.000
wl 6	18.525	0.942	1.200
wl 7	18.525	1.128	1.400
Chine	18.525	1.159	1.433
wl 8	18.525	1.265	1.600
wl 9	18.525	1.393	1.800
b 2	18.525	1.500	1.967
wl 10	18.525	1.521	2.000
wl 11	18.525	1.651	2.200
wl 12	18.525	1.780	2.400
wl 13	18.525	1.910	2.600
wl 14	18.525	2.041	2.800
wl 15	18.525	2.171	3.000
b 3	18.525	2.250	3.121
Gunwale	18.525	2.403	3.356

St 40

Item	Longitudinal	Half breadth	Height
Keel	19.000	0.000	0.126
wl 1	19.000	0.045	0.200
wl 2	19.000	0.170	0.400
wl 3	19.000	0.300	0.600
wl 4	19.000	0.435	0.800
wl 5	19.000	0.574	1.000
wl 6	19.000	0.719	1.200
b 1	19.000	0.750	1.242
wl 7	19.000	0.868	1.400
Chine	19.000	0.941	1.495
wl 8	19.000	1.007	1.600
wl 9	19.000	1.134	1.800
wl 10	19.000	1.262	2.000
wl 11	19.000	1.391	2.200
b 2	19.000	1.500	2.368
wl 12	19.000	1.521	2.400
wl 13	19.000	1.652	2.600
wl 14	19.000	1.783	2.800
wl 15	19.000	1.916	3.000
Gunwale	19.000	2.187	3.409

St 41

Item	Longitudinal	Half breadth	Height
Keel	19.475	0.000	0.258
wl 2	19.475	0.067	0.400
wl 3	19.475	0.167	0.600
wl 4	19.475	0.272	0.800
wl 5	19.475	0.381	1.000
wl 6	19.475	0.495	1.200
wl 7	19.475	0.613	1.400
Chine	19.475	0.710	1.559
wl 8	19.475	0.735	1.600
b 1	19.475	0.750	1.625
wl 9	19.475	0.857	1.800
wl 10	19.475	0.983	2.000
wl 11	19.475	1.111	2.200
wl 12	19.475	1.240	2.400
wl 13	19.475	1.371	2.600
b 2	19.475	1.500	2.796
wl 14	19.475	1.503	2.800
wl 15	19.475	1.635	3.000
Gunwale	19.475	1.947	3.464

St 42

Item	Longitudinal	Half breadth	Height
Keel	19.950	0.000	0.558
wl 3	19.950	0.014	0.600
wl 4	19.950	0.088	0.800
wl 5	19.950	0.172	1.000
wl 6	19.950	0.262	1.200
wl 7	19.950	0.357	1.400
wl 8	19.950	0.456	1.600
Chine	19.950	0.470	1.626
wl 9	19.950	0.566	1.800
wl 10	19.950	0.683	2.000
b 1	19.950	0.750	2.111
wl 11	19.950	0.805	2.200
wl 12	19.950	0.931	2.400
wl 13	19.950	1.061	2.600
wl 14	19.950	1.193	2.800
wl 15	19.950	1.328	3.000
b 2	19.950	1.500	3.254
Gunwale	19.950	1.680	3.519

St 43

Item	Longitudinal	Half breadth	Height
Keel	20.425	0.000	1.140
wl 6	20.425	0.020	1.200
wl 7	20.425	0.096	1.400
wl 8	20.425	0.179	1.600
Chine	20.425	0.220	1.695
wl 9	20.425	0.268	1.800
wl 10	20.425	0.368	2.000
wl 11	20.425	0.476	2.200
wl 12	20.425	0.591	2.400
wl 13	20.425	0.712	2.600
b 1	20.425	0.750	2.660
wl 14	20.425	0.839	2.800
wl 15	20.425	0.971	3.000
Gunwale	20.425	1.369	3.577

St 44

Item	Longitudinal	Half breadth	Height
Keel	20.900	0.000	1.879
wl 10	20.900	0.047	2.000
wl 11	20.900	0.134	2.200
wl 12	20.900	0.232	2.400
wl 13	20.900	0.338	2.600
wl 14	20.900	0.453	2.800
wl 15	20.900	0.574	3.000
b 1	20.900	0.750	3.274
Gunwale	20.900	1.000	3.640

St 45

Item	Longitudinal	Half breadth	Height
Keel	21.375	0.000	2.709
wl 14	21.375	0.046	2.800
wl 15	21.375	0.152	3.000
Gunwale	21.375	0.589	3.707

St 46

Item	Longitudinal	Half breadth	Height
Keel	21.850	0.000	3.538
Gunwale	21.850	0.146	3.777

Fwd end

Item	Longitudinal	Half breadth	Height
Keel	22.000	0.000	3.800

DECK OFFSET

Transom

Item	Longitudinal	Half breadth	Height
Center line	0.000	0.000	3.130
b 1	0.000	0.750	3.109
b 2	0.000	1.500	3.082
b 3	0.000	2.250	3.042
Gunwale	0.000	3.055	3.000

St 1

Item	Longitudinal	Half breadth	Height
Center line	0.475	0.000	3.130
b 1	0.475	0.750	3.109
b 2	0.475	1.500	3.083
b 3	0.475	2.250	3.043
Gunwale	0.475	3.077	3.000

St 2

Item	Longitudinal	Half breadth	Height
Center line	0.950	0.000	3.130
b 1	0.950	0.750	3.110
b 2	0.950	1.500	3.084
b 3	0.950	2.250	3.045
Gunwale	0.950	3.098	3.000

St 3

Item	Longitudinal	Half breadth	Height
Center line	1.425	0.000	3.130
b 1	1.425	0.750	3.111
b 2	1.425	1.500	3.085
b 3	1.425	2.250	3.046
Gunwale	1.425	3.119	3.000

St 4

Item	Longitudinal	Half breadth	Height
Center line	1.900	0.000	3.130
b 1	1.900	0.750	3.111
b 2	1.900	1.500	3.086
b 3	1.900	2.250	3.047
Gunwale	1.900	3.140	3.000

St 5

Item	Longitudinal	Half breadth	Height
Center line	2.375	0.000	3.130
b 1	2.375	0.750	3.112
b 2	2.375	1.500	3.087
b 3	2.375	2.250	3.047
Gunwale	2.375	3.159	3.000

St 6

Item	Longitudinal	Half breadth	Height
Center line	2.850	0.000	3.130
b 1	2.850	0.750	3.112
b 2	2.850	1.500	3.087
b 3	2.850	2.250	3.048
Gunwale	2.850	3.178	3.000

St 7

Item	Longitudinal	Half breadth	Height
Center line	3.325	0.000	3.130
b 1	3.325	0.750	3.112
b 2	3.325	1.500	3.088
b 3	3.325	2.250	3.049
Gunwale	3.325	3.196	3.000

St 8

Item	Longitudinal	Half breadth	Height
Center line	3.800	0.000	3.130
b 1	3.800	0.750	3.112
b 2	3.800	1.500	3.088
b 3	3.800	2.250	3.049
Gunwale	3.800	3.211	3.000

St 9

Item	Longitudinal	Half breadth	Height
Center line	4.275	0.000	3.130
b 1	4.275	0.750	3.112
b 2	4.275	1.500	3.088
b 3	4.275	2.250	3.050
Gunwale	4.275	3.225	3.000

St 10

Item	Longitudinal	Half breadth	Height
Center line	4.750	0.000	3.130
b 1	4.750	0.750	3.112
b 2	4.750	1.500	3.088
b 3	4.750	2.250	3.050
Gunwale	4.750	3.238	3.000

St 11

Item	Longitudinal	Half breadth	Height
Center line	5.225	0.000	3.130
b 1	5.225	0.750	3.112
b 2	5.225	1.500	3.088
b 3	5.225	2.250	3.050
Gunwale	5.225	3.250	3.000

St 12

Item	Longitudinal	Half breadth	Height
Center line	5.700	0.000	3.130
b 1	5.700	0.750	3.112
b 2	5.700	1.500	3.089
b 3	5.700	2.250	3.051
Gunwale	5.700	3.260	3.000

St 13

Item	Longitudinal	Half breadth	Height
Center line	6.175	0.000	3.130
b 1	6.175	0.750	3.113
b 2	6.175	1.500	3.089
b 3	6.175	2.250	3.051
Gunwale	6.175	3.270	3.000

St 14

Item	Longitudinal	Half breadth	Height
Center line	6.650	0.000	3.130
b 1	6.650	0.750	3.113
b 2	6.650	1.500	3.090
b 3	6.650	2.250	3.052
Gunwale	6.650	3.278	3.000

St 15

Item	Longitudinal	Half breadth	Height
Center line	7.125	0.000	3.131
b 1	7.125	0.750	3.114
b 2	7.125	1.500	3.091
b 3	7.125	2.250	3.053
Gunwale	7.125	3.285	3.001

St 16

Item	Longitudinal	Half breadth	Height
Center line	7.600	0.000	3.133
b 1	7.600	0.750	3.116
b 2	7.600	1.500	3.093
b 3	7.600	2.250	3.055
Gunwale	7.600	3.291	3.003

St 17

Item	Longitudinal	Half breadth	Height
Center line	8.075	0.000	3.136
b 1	8.075	0.750	3.119
b 2	8.075	1.500	3.095
b 3	8.075	2.250	3.058
Gunwale	8.075	3.295	3.006

St 18

Item	Longitudinal	Half breadth	Height
Center line	8.550	0.000	3.141
b 1	8.550	0.750	3.122
b 2	8.550	1.500	3.099
b 3	8.550	2.250	3.062
Gunwale	8.550	3.298	3.011

St 19

Item	Longitudinal	Half breadth	Height
Center line	9.025	0.000	3.146
b 1	9.025	0.750	3.127
b 2	9.025	1.500	3.102
b 3	9.025	2.250	3.066
Gunwale	9.025	3.299	3.016

St 20

Item	Longitudinal	Half breadth	Height
Center line	9.500	0.000	3.152
b 1	9.500	0.750	3.132
b 2	9.500	1.500	3.107
b 3	9.500	2.250	3.071
Gunwale	9.500	3.300	3.022

St 21

Item	Longitudinal	Half breadth	Height
Center line	9.975	0.000	3.159
b 1	9.975	0.750	3.138
b 2	9.975	1.500	3.112
b 3	9.975	2.250	3.078
Gunwale	9.975	3.300	3.029

St 22

Item	Longitudinal	Half breadth	Height
Center line	10.450	0.000	3.167
b 1	10.450	0.750	3.145
b 2	10.450	1.500	3.119
b 3	10.450	2.250	3.084
Gunwale	10.450	3.300	3.037

St 23

Item	Longitudinal	Half breadth	Height
Center line	10.925	0.000	3.175
b 1	10.925	0.750	3.152
b 2	10.925	1.500	3.126
b 3	10.925	2.250	3.092
Gunwale	10.925	3.300	3.045

St 24

Item	Longitudinal	Half breadth	Height
Center line	11.400	0.000	3.184
b 1	11.400	0.750	3.161
b 2	11.400	1.500	3.134
b 3	11.400	2.250	3.101
Gunwale	11.400	3.300	3.054

St 25

Item	Longitudinal	Half breadth	Height
Center line	11.875	0.000	3.193
b 1	11.875	0.750	3.170
b 2	11.875	1.500	3.143
b 3	11.875	2.250	3.110
Gunwale	11.875	3.300	3.063

St 26

Item	Longitudinal	Half breadth	Height
Center line	12.350	0.000	3.203
b 1	12.350	0.750	3.180
b 2	12.350	1.500	3.152
b 3	12.350	2.250	3.119
Gunwale	12.350	3.300	3.073

St 27

Item	Longitudinal	Half breadth	Height
Center line	12.825	0.000	3.214
b 1	12.825	0.750	3.190
b 2	12.825	1.500	3.162
b 3	12.825	2.250	3.130
Gunwale	12.825	3.296	3.084

St 28

Item	Longitudinal	Half breadth	Height
Center line	13.300	0.000	3.226
b 1	13.300	0.750	3.202
b 2	13.300	1.500	3.174
b 3	13.300	2.250	3.141
Gunwale	13.300	3.283	3.096

St 29

Item	Longitudinal	Half breadth	Height
Center line	13.775	0.000	3.239
b 1	13.775	0.750	3.215
b 2	13.775	1.500	3.186
b 3	13.775	2.250	3.153
Gunwale	13.775	3.261	3.109

St 30

Item	Longitudinal	Half breadth	Height
Center line	14.250	0.000	3.254
b 1	14.250	0.750	3.229
b 2	14.250	1.500	3.200
b 3	14.250	2.250	3.167
Gunwale	14.250	3.230	3.123

St 31

Item	Longitudinal	Half breadth	Height
Center line	14.725	0.000	3.270
b 1	14.725	0.750	3.245
b 2	14.725	1.500	3.215
b 3	14.725	2.250	3.181
Gunwale	14.725	3.189	3.138

St 32

Item	Longitudinal	Half breadth	Height
Center line	15.200	0.000	3.287
b 1	15.200	0.750	3.262
b 2	15.200	1.500	3.231
b 3	15.200	2.250	3.196
Gunwale	15.200	3.139	3.154

St 33

Item	Longitudinal	Half breadth	Height
Center line	15.675	0.000	3.305
b 1	15.675	0.750	3.280
b 2	15.675	1.500	3.248
b 3	15.675	2.250	3.212
Gunwale	15.675	3.080	3.172

St 34

Item	Longitudinal	Half breadth	Height
Center line	16.150	0.000	3.324
b 1	16.150	0.750	3.300
b 2	16.150	1.500	3.266
b 3	16.150	2.250	3.229
Gunwale	16.150	3.011	3.191

St 35

Item	Longitudinal	Half breadth	Height
Center line	16.625	0.000	3.345
b 1	16.625	0.750	3.320
b 2	16.625	1.500	3.286
b 3	16.625	2.250	3.247
Gunwale	16.625	2.932	3.212

St 36

Item	Longitudinal	Half breadth	Height
Center line	17.100	0.000	3.367
b 1	17.100	0.750	3.343
b 2	17.100	1.500	3.307
b 3	17.100	2.250	3.268
Gunwale	17.100	2.838	3.238

St 37

Item	Longitudinal	Half breadth	Height
Center line	17.575	0.000	3.392
b 1	17.575	0.750	3.369
b 2	17.575	1.500	3.332
b 3	17.575	2.250	3.293
Gunwale	17.575	2.726	3.268

St 38

Item	Longitudinal	Half breadth	Height
Center line	18.050	0.000	3.420
b 1	18.050	0.750	3.398
b 2	18.050	1.500	3.361
b 3	18.050	2.250	3.323
Gunwale	18.050	2.587	3.306

St 39

Item	Longitudinal	Half breadth	Height
Center line	18.525	0.000	3.453
b 1	18.525	0.750	3.432
b 2	18.525	1.500	3.398
b 3	18.525	2.250	3.363
Gunwale	18.525	2.403	3.356

St 40

Item	Longitudinal	Half breadth	Height
Center line	19.000	0.000	3.491
b 1	19.000	0.750	3.470
b 2	19.000	1.500	3.439
Gunwale	19.000	2.187	3.409

St 41

Item	Longitudinal	Half breadth	Height
Center line	19.475	0.000	3.533
b 1	19.475	0.750	3.511
b 2	19.475	1.500	3.482
Gunwale	19.475	1.947	3.464

St 42

Item	Longitudinal	Half breadth	Height
Center line	19.950	0.000	3.579
b 1	19.950	0.750	3.555
b 2	19.950	1.500	3.526
Gunwale	19.950	1.680	3.519

St 43

Item	Longitudinal	Half breadth	Height
Center line	20.425	0.000	3.629
b 1	20.425	0.750	3.601
Gunwale	20.425	1.369	3.577

St 44

Item	Longitudinal	Half breadth	Height
Center line	20.900	0.000	3.680
b 1	20.900	0.750	3.650
Gunwale	20.900	1.000	3.640

St 45

Item	Longitudinal	Half breadth	Height
Center line	21.375	0.000	3.731
Gunwale	21.375	0.589	3.707

St 46

Item	Longitudinal	Half breadth	Height
Center line	21.850	0.000	3.783
Gunwale	21.850	0.146	3.777

Fwd end

Item	Longitudinal	Half breadth	Height
Center line	22.000	0.000	3.800

SKEG OFFSET

Aft end

Item	Longitudinal	Half breadth	Height
Center bottom	2.156	0.000	-0.506
Side bottom	2.156	0.135	-0.506
Side top	2.011	0.135	0.880

St 5

Item	Longitudinal	Half breadth	Height
Center bottom	2.375	0.000	-0.506
Side bottom	2.375	0.135	-0.506
Side top	2.375	0.135	0.838

St 6

Item	Longitudinal	Half breadth	Height
Center bottom	2.850	0.000	-0.506
Side bottom	2.850	0.135	-0.506
Side top	2.850	0.135	0.757

St 7

Item	Longitudinal	Half breadth	Height
Center bottom	3.325	0.000	-0.474
Side bottom	3.325	0.135	-0.474
Side top	3.325	0.135	0.658

St 8

Item	Longitudinal	Half breadth	Height
Center bottom	3.800	0.000	-0.441
Side bottom	3.800	0.135	-0.441
Side top	3.800	0.135	0.554

St 9

Item	Longitudinal	Half breadth	Height
Center bottom	4.275	0.000	-0.409
Side bottom	4.275	0.135	-0.409
Side top	4.275	0.135	0.448

St 10

Item	Longitudinal	Half breadth	Height
Center bottom	4.750	0.000	-0.376
Side bottom	4.750	0.135	-0.376
Side top	4.750	0.135	0.360

St 11

Item	Longitudinal	Half breadth	Height
Center bottom	5.225	0.000	-0.343
Side bottom	5.225	0.135	-0.343
Side top	5.225	0.135	0.284

St 12

Item	Longitudinal	Half breadth	Height
Center bottom	5.700	0.000	-0.311
Side bottom	5.700	0.135	-0.311
Side top	5.700	0.135	0.219

St 13

Item	Longitudinal	Half breadth	Height
Center bottom	6.175	0.000	-0.278
Side bottom	6.175	0.135	-0.278
Side top	6.175	0.135	0.172

St 14

Item	Longitudinal	Half breadth	Height
Center bottom	6.650	0.000	-0.246
Side bottom	6.650	0.135	-0.246
Side top	6.650	0.135	0.133

St 15

Item	Longitudinal	Half breadth	Height
Center bottom	7.125	0.000	-0.213
Side bottom	7.125	0.135	-0.213
Side top	7.125	0.135	0.100

St 16

Item	Longitudinal	Half breadth	Height
Center bottom	7.600	0.000	-0.180
Side bottom	7.600	0.135	-0.180
Side top	7.600	0.135	0.076

St 17

Item	Longitudinal	Half breadth	Height
Center bottom	8.075	0.000	-0.148
Side bottom	8.075	0.135	-0.148
Side top	8.075	0.135	0.058

St 18

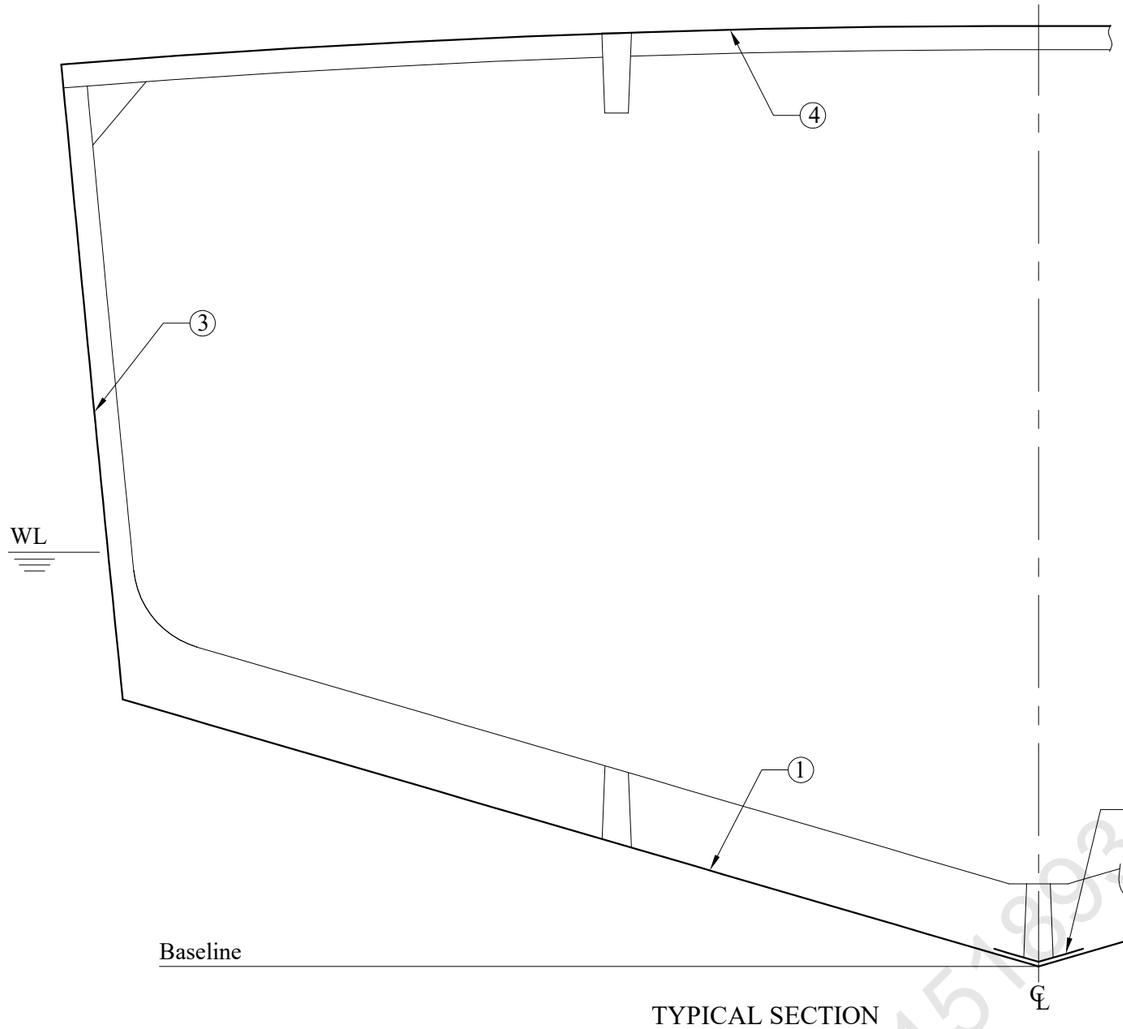
Item	Longitudinal	Half breadth	Height
Center bottom	8.550	0.000	-0.115
Side bottom	8.550	0.135	-0.115
Side top	8.550	0.135	0.044

St 19

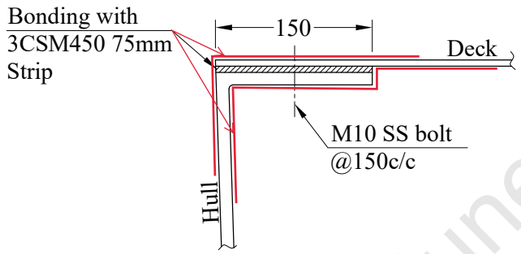
Item	Longitudinal	Half breadth	Height
Center bottom	9.025	0.000	-0.083
Side bottom	9.025	0.135	-0.083
Side top	9.025	0.135	0.039

Fwd end (St 20)

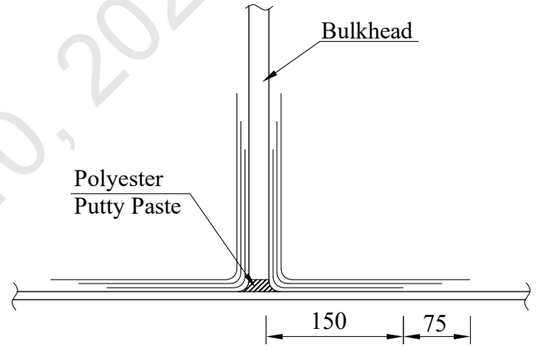
Item	Longitudinal	Half breadth	Height
Center bottom	9.500	0.000	-0.050
Side bottom	9.500	0.135	-0.050
Side top	9.500	0.135	0.037



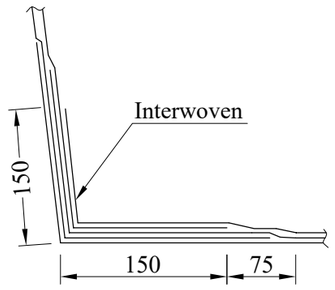
TYPICAL SECTION



HULL TO DECK CONNECTION



BHD. TO HULL CONNECTION



TRANSOM/SIDE TO BOTTOM/SIDE

AS AMENDED

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 10 Jun 2022
REVIEWED

SEE LETTER E-151893-203520

LAMINATION DETAILS OF HULL

① BOTTOM	② KEEL	③ SIDE/TRANSOM	④DECK	⑤BULKHEAD
Gelcoat+ 2CSM300+ 4(CSM450+WR610)+ 2CSM300+WR610 Upto 150mm above WL	Bottom+ 1CSM300+ 1(CSM450+WR610)+ 1CSM300 (300mm width) On either sides	Gelcoat+ 2CSM300+ 3(CSM450+WR610)+ 2CSM300	Gelcoat+ 2CSM300+ 3(CSM450+WR610)+ 2CSM300	1CSM450+1WR610+1CSM450+ 12mm Plywood + 1CSM450+1WR610+1CSM450

MINIMUM LAMINATE PROPERTIES

Tensile Strength	124 N/mm²
Tensile Modulus	6890 N/mm²
Glass Content	0.35
Shear Strength	60 N/mm2

PLYWOOD PROPERTIES

Plywood	IS710
Shear Strength (min.)	0.7 N/mm²
Shear Modulus (min.)	12 N/mm²

PRINCIPAL PARTICULARS

LENGTH OVERALL	: 22.0 m
BREADTH	: 6.509 m
DEPTH (MOULDED)	: 3.037 m
DRAFT (HULL)	: 1.400 m
DISPLACEMENT	: 80.20 T
SPEED	: 8.0 knots

Yard Nos.: 21/01 to 21/03

Rev	Date	Description	Made by	Checked by
00	21-04-'22	- -	SL	AG

CLIENT
SAMUDRA SHIPYARD (P) LTD.

VVC INDUSTRIES RESEARCH & SERVICES PVT. LTD.
XXXV/194, Automobile Road
Palarivattom, Kochi-682 025.
(Formerly Industries Research & Services)

TITLE
LAMINATION SCHEDULE

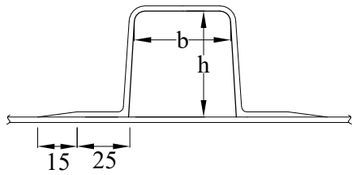
VESSEL NAME
22M FRP TUNA LONGLINER CUM GILLNETTER

Scale	Drawing No.	Sh.No.	Rev
As Shown	11459-0301	1/1	00

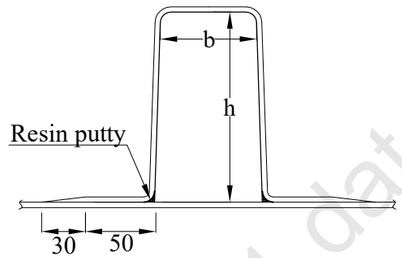
File No: 11459-0301 Rev00 Lamination schedule 2022 04 21

STIFFENER LAMINATION DETAILS

Member	Size (Top hat) (bxh)	Lamination	Core	Remarks
Floor	80 x 240*	1CSM300+ 4(CSM450+WR610)+ 1CSM450	--	* Refer sheet 3& 6
Side Frame	80 x 80	1CSM300+ 4(CSM450+WR610)+ 1CSM450	--	
Side Frame (Fr.34 to Fr.39)	80 x 170	1CSM300+ 4(CSM450+WR610)+ 1CSM450	--	
Deck beam	80 x 80	1CSM300+ 3(CSM450+WR610)+ 1CSM450	--	
Center girder	80 x 280*	1CSM300+ 4(CSM450+WR610)+ 3CSM300	--	* Refer sheet 3& 6
Side girder	80 x 240	1CSM300+ 4(CSM450+WR610)+ 1CSM450	--	
Deck girder	80 x 270	1CSM300+ 4(CSM450+WR610)+ 1CSM450+2CSM450	--	
Bhd stiffener	80 x 140	1CSM300+ 4(CSM450+WR610)+ 1CSM450	--	



TYPICAL DECK BEAM/SIDE FRAME LAP



TYPICAL FLOOR/GIRDER LAP

CONTENTS:-

PRINCIPAL PARTICULARS

LENGTH OVERALL	: 22.0 m
BREADTH	: 6.509 m
DEPTH (MOULDED)	: 3.037 m
DRAFT (HULL)	: 1.400 m
DISPLACEMENT	: 80.20 T
SPEED	: 8.0 knots
ENGINE	: 190hp @ 2000RPM
GB Ratio	: 4:1

Yard Nos.: 21/01 to 21/03

MINIMUM LAMINATE PROPERTIES

Tensile Strength	124 N/mm²
Tensile Modulus	6890 N/mm²
Glass Content	0.35

PLYWOOD PROPERTIES

Plywood	IS710
Shear Strength (min.)	0.7 N/mm²
Shear Modulus (min.)	12 N/mm²

File No: 11459-0302 Rev00 Hull structure 2022 04 21

Rev	Date	Description	Made by	Checked by
00	21-04-'22	- -	SL	AG

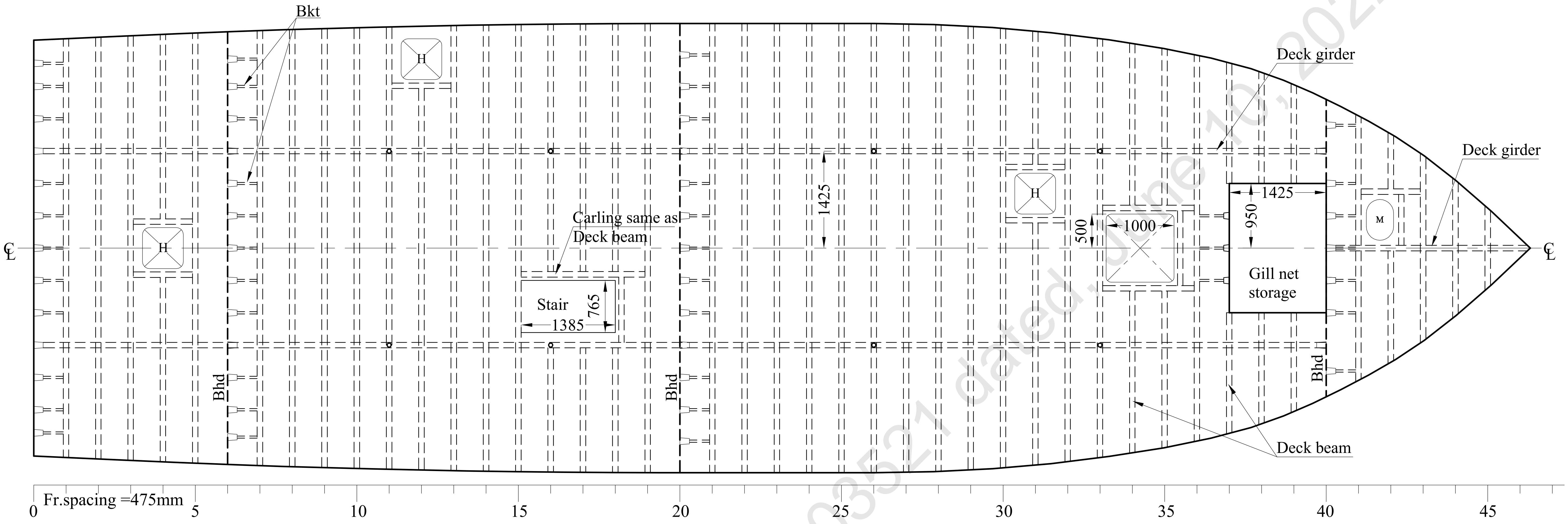
CLIENT
SAMUDRA SHIPYARD (P) LTD.

VVC INDUSTRIES RESEARCH & SERVICES PVT. LTD.
XXXV/194, Automobile Road
Palarivattom, Kochi-682 025.
(Formerly Industries Research & Services)

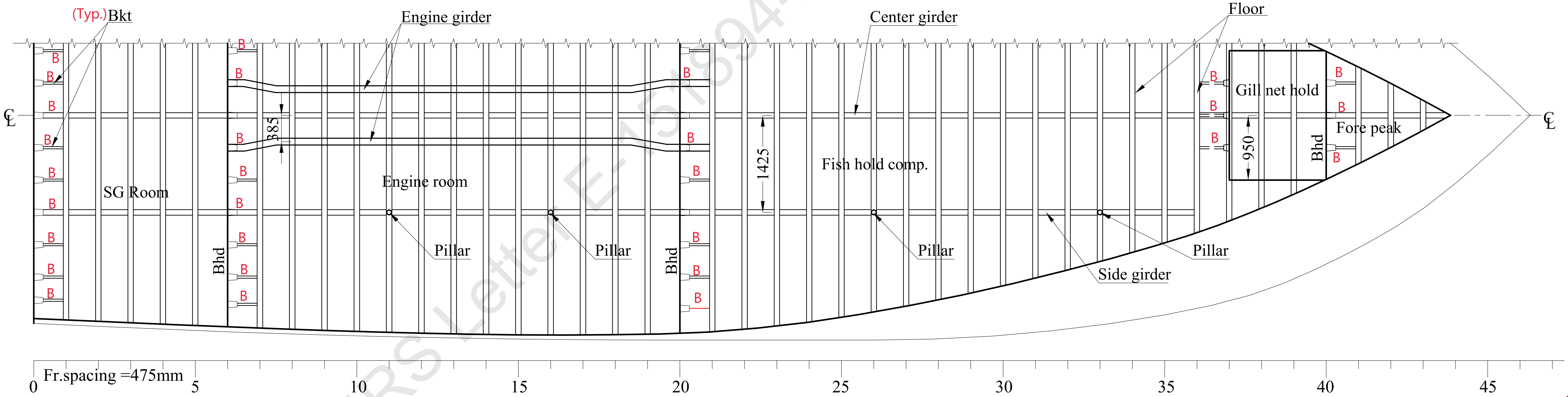
TITLE
HULL STRUCTURE

VESSEL NAME
22M FRP TUNA LONGLINER CUM GILLNETTER

Scale	Drawing No.	Sh.No.	Rev
As shown	11459-0302	1/6	00

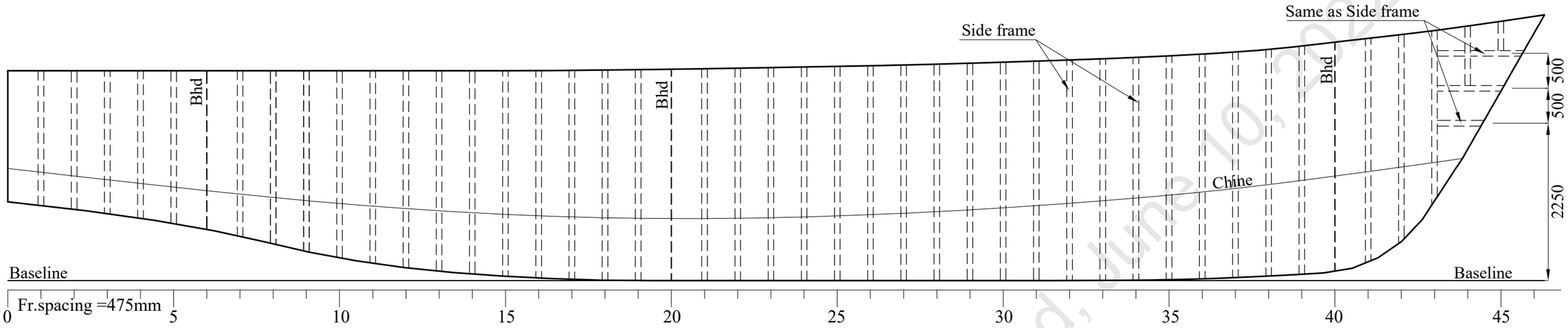


DECK PLAN

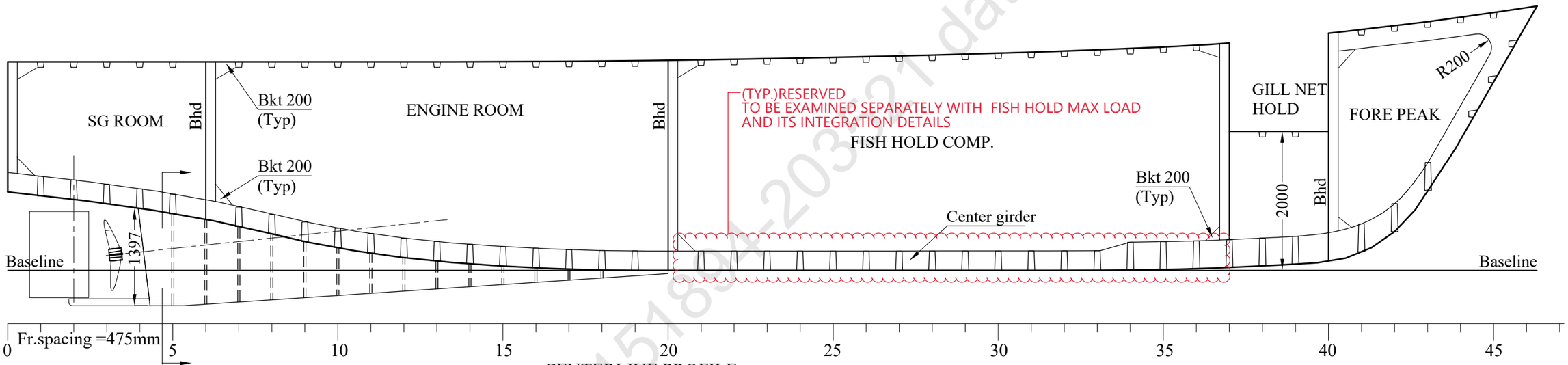


BOTTOM PLAN

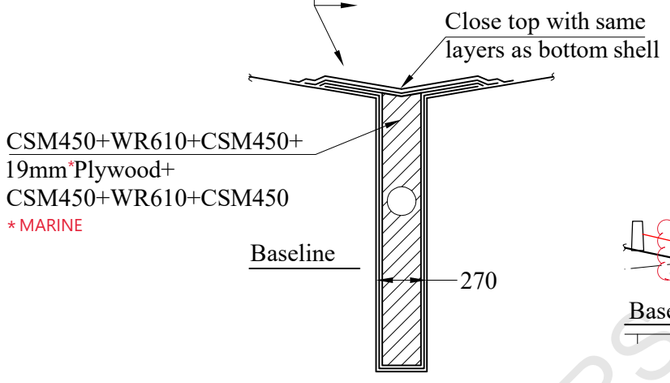
1:60	11459-0302	2/6	00
Scale	Drawing No.	Sh.No.	Rev

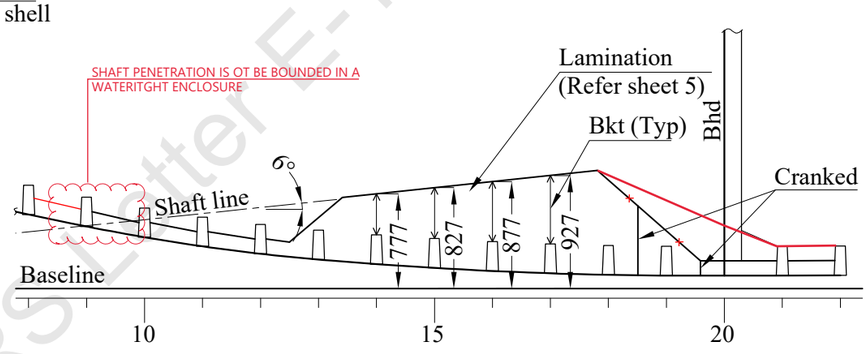


SIDE SHELL PROFILE



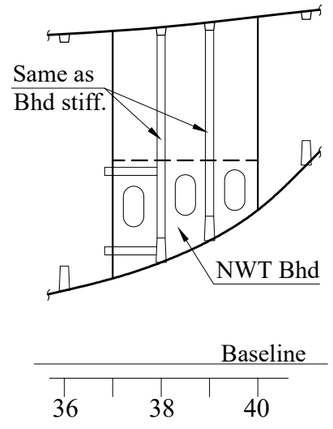
CENTERLINE PROFILE





PROFILE IN WAY OFF ENGINE GIRDER (385MM OFF CL)

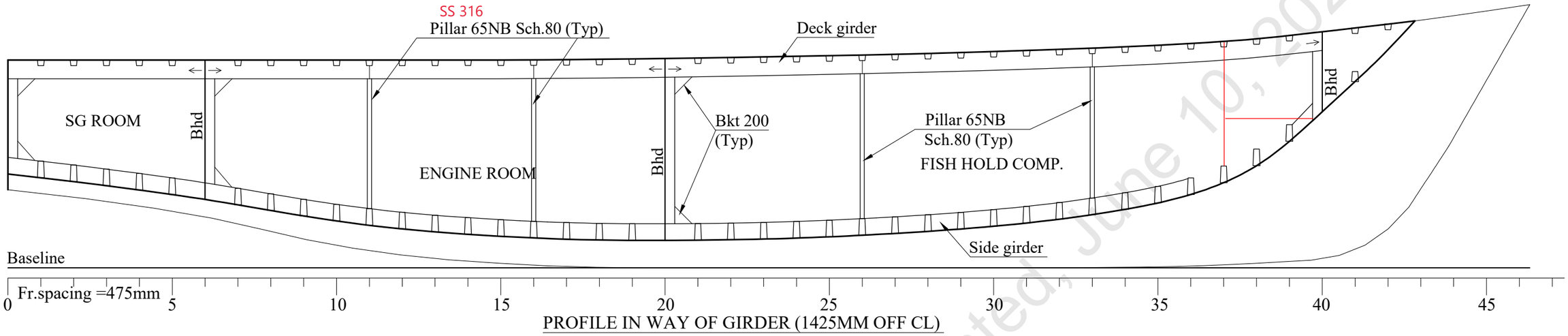
(Height of Girder is indicative. Height to be adjusted to suite final shaft alignment at site)



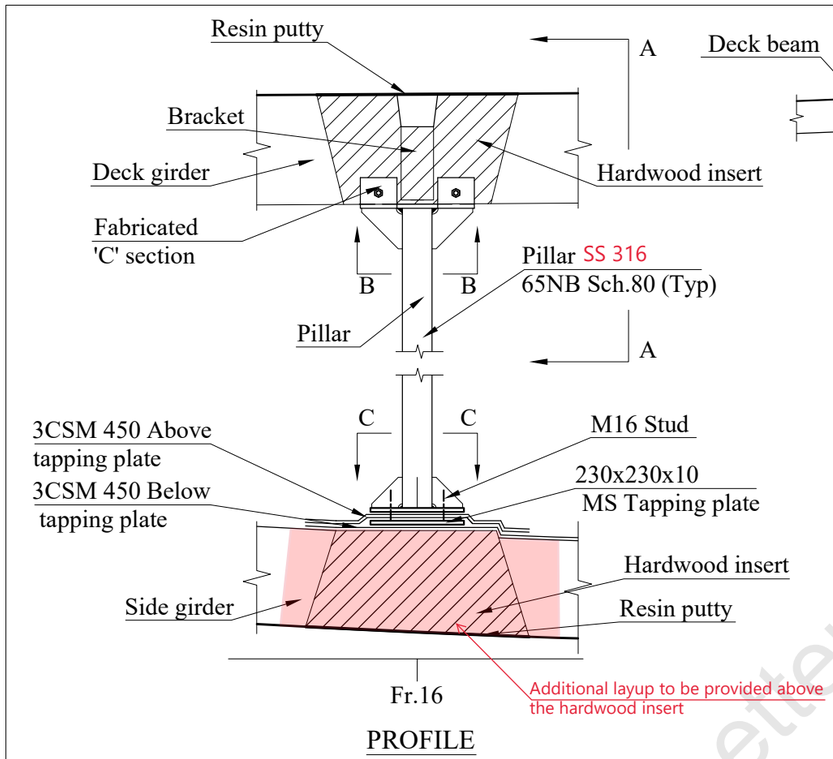
PROFILE IN WAY OFF GILL NET HOLD (950MM OFF CL)

10 Jun 2022

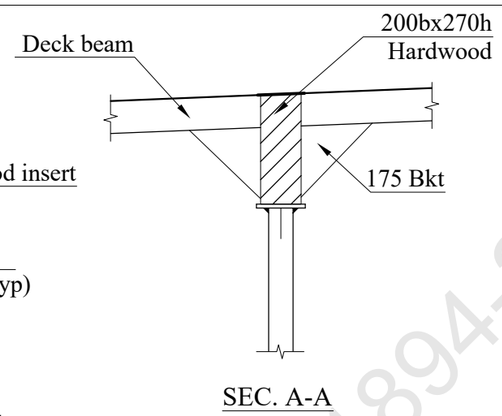
1:60	11459-0302	3/6	00
Scale	Drawing No.	Sh.No.	Rev



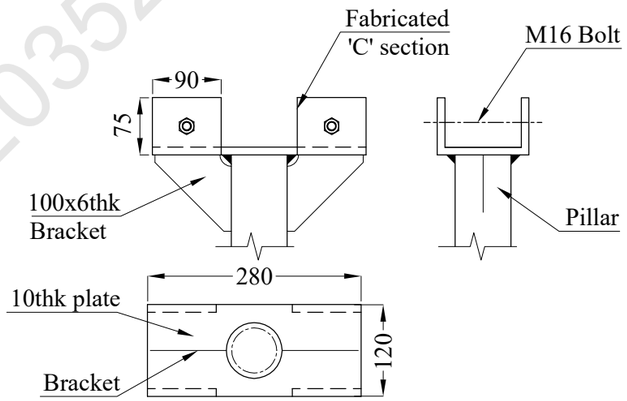
PROFILE IN WAY OF GIRDER (1425MM OFF CL)



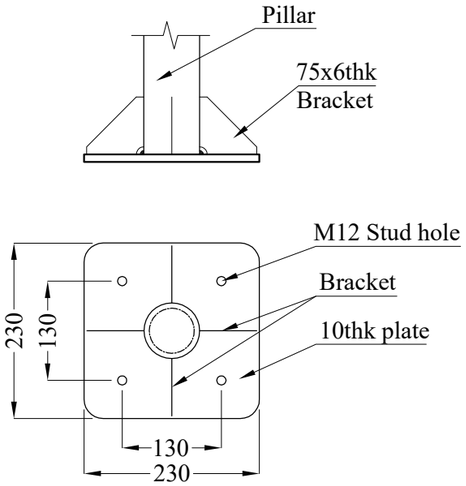
PROFILE



SEC. A-A



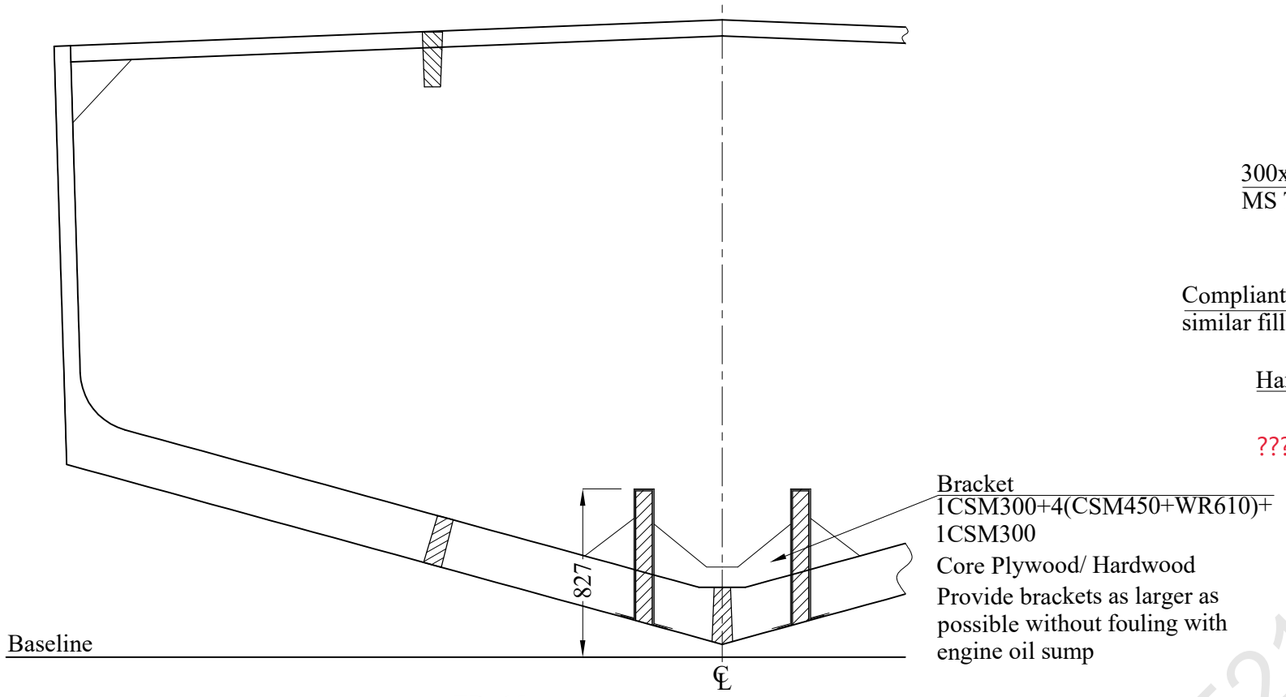
SEC. B-B



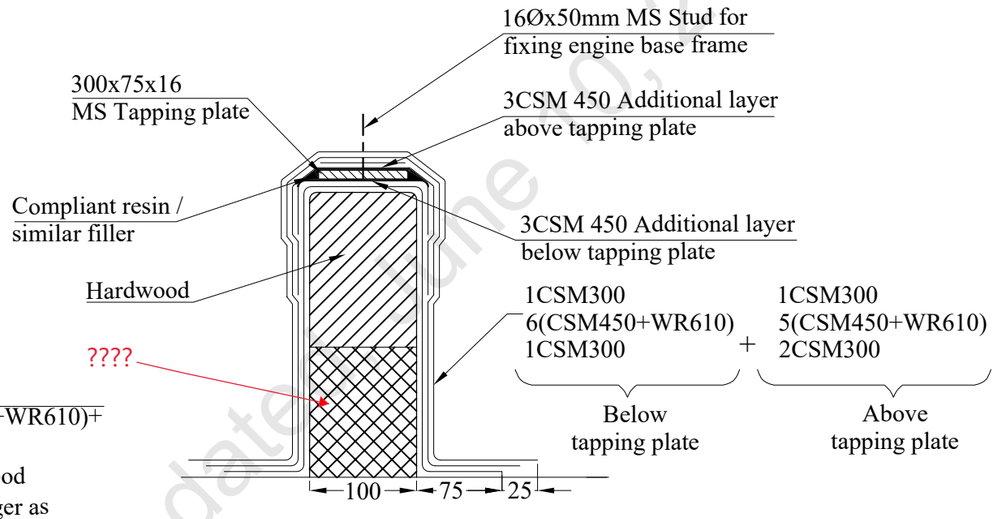
SEC. C-C

PILLAR CONNECTION DETAIL
(Typ.)

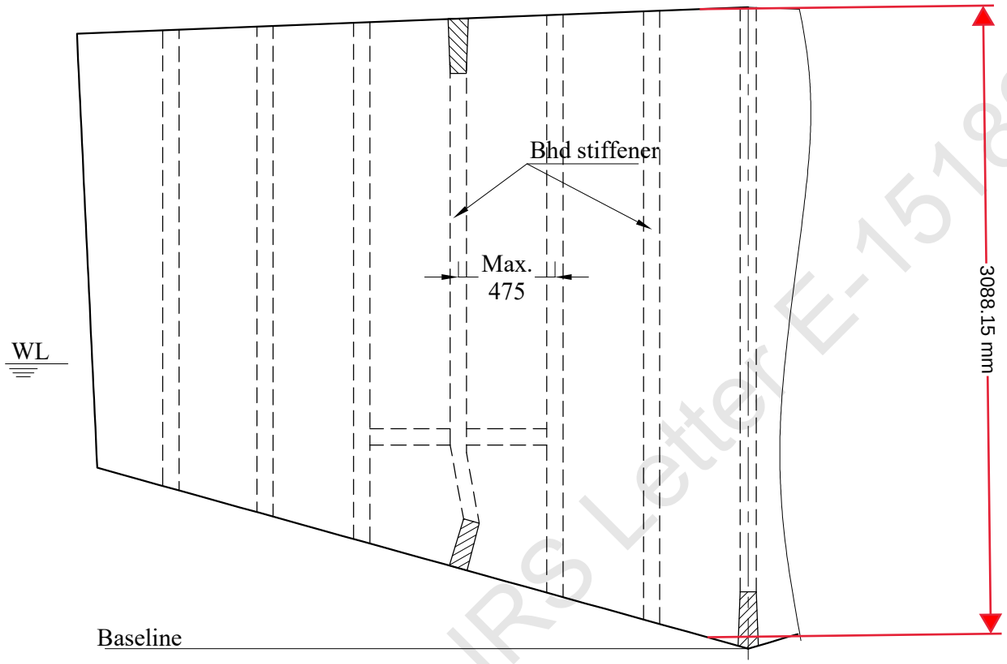
--	11459-0302	4/6	00
Scale	Drawing No.	Sh.No.	Rev



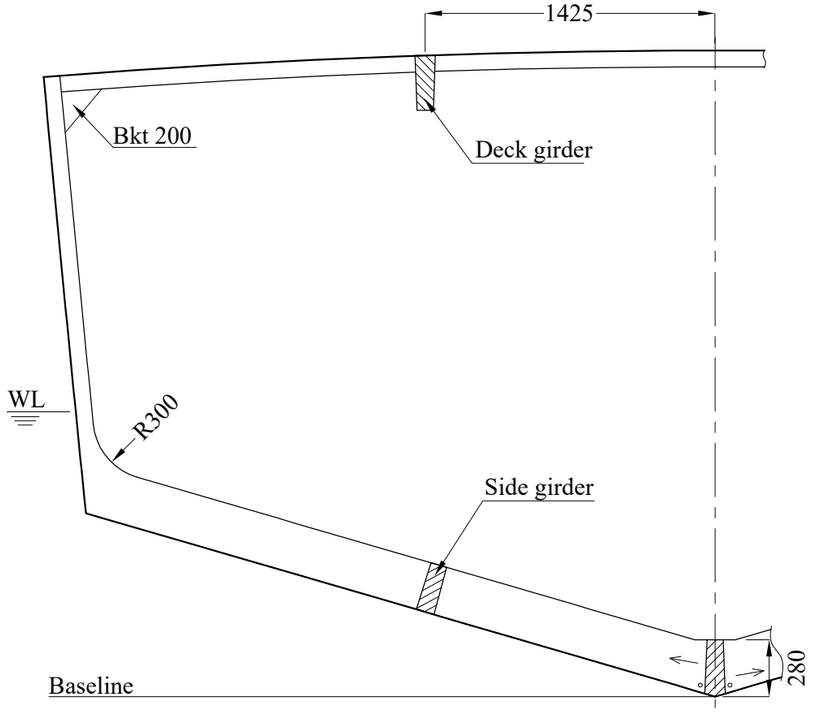
FR. 15



ENGINE GIRDER



BHD @ 20
(TYPICAL BHD)

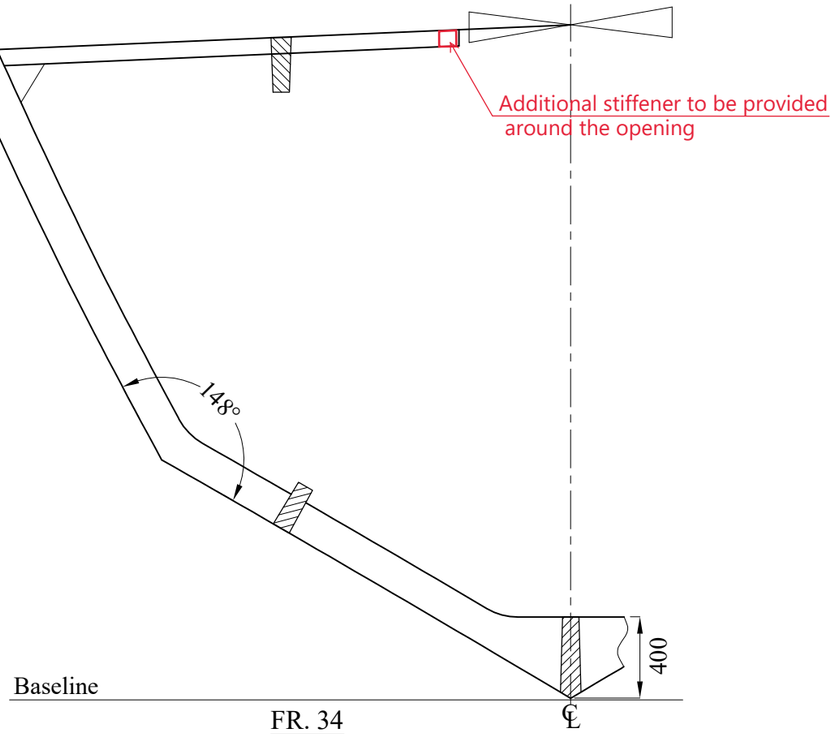


FR.22
(TYPICAL FRAME)

TRANSVERSE SECTIONS

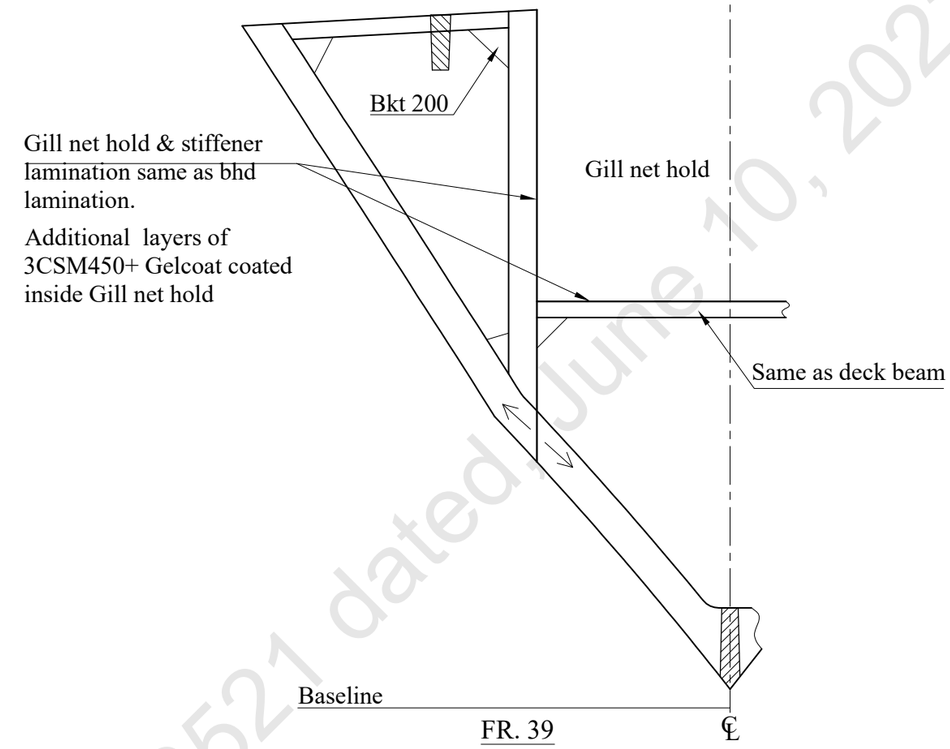
1:30	11459-0302	5/6	00
Scale	Drawing No.	Sh.No.	Rev

10 Jun 2022

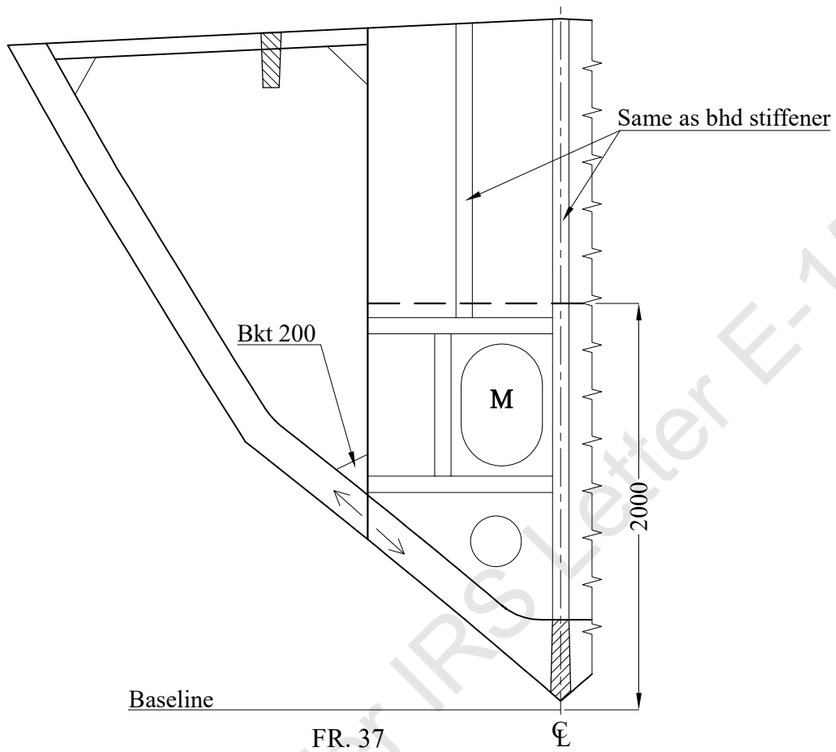


FR. 34

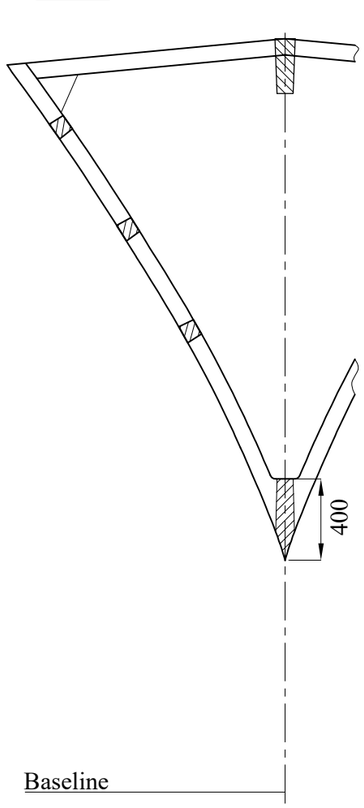
~~(Fr.34 to Fr.39 Similar)~~



FR. 39



FR. 37



FR.43 (Fore peak compartment to be filled with buoyancy foam)

TRANSVERSE SECTIONS

1:30	11459-0302	6⁄6	00
Scale	Drawing No.	Sh.No.	Rev

10 Jun 2022

CONTENTS:-

MAIN ENGINE AND GEARBOX ARE TO BE TYPE APPROVED AND UNIT CERTIFIED BY IRS.

PRINCIPAL PARTICULARS

LENGTH OVERALL	: 22.0 m
BREADTH	: 6.509 m
DEPTH (MOULDED)	: 3.037 m
DRAFT (HULL)	: 1.400 m
DISPLACEMENT	: 80.20 T
SPEED	: 8.0 knots
ENGINE	: 190hp @ 2000RPM
GB Ratio	: 4:1

~~Yard Nos.: 21/01 to 21/03~~

Rev	Date	Description	Made by	Checked by
00	13-05-'22	- -	SL	AG

CLIENT

SAMUDRA SHIPYARD (P) LTD.

VVC INDUSTRIES RESEARCH & SERVICES PVT. LTD.
XXXV/194, Automobile Road
Palarivattom, Kochi-682 025.
(Formerly Industries Research & Services)

TITLE

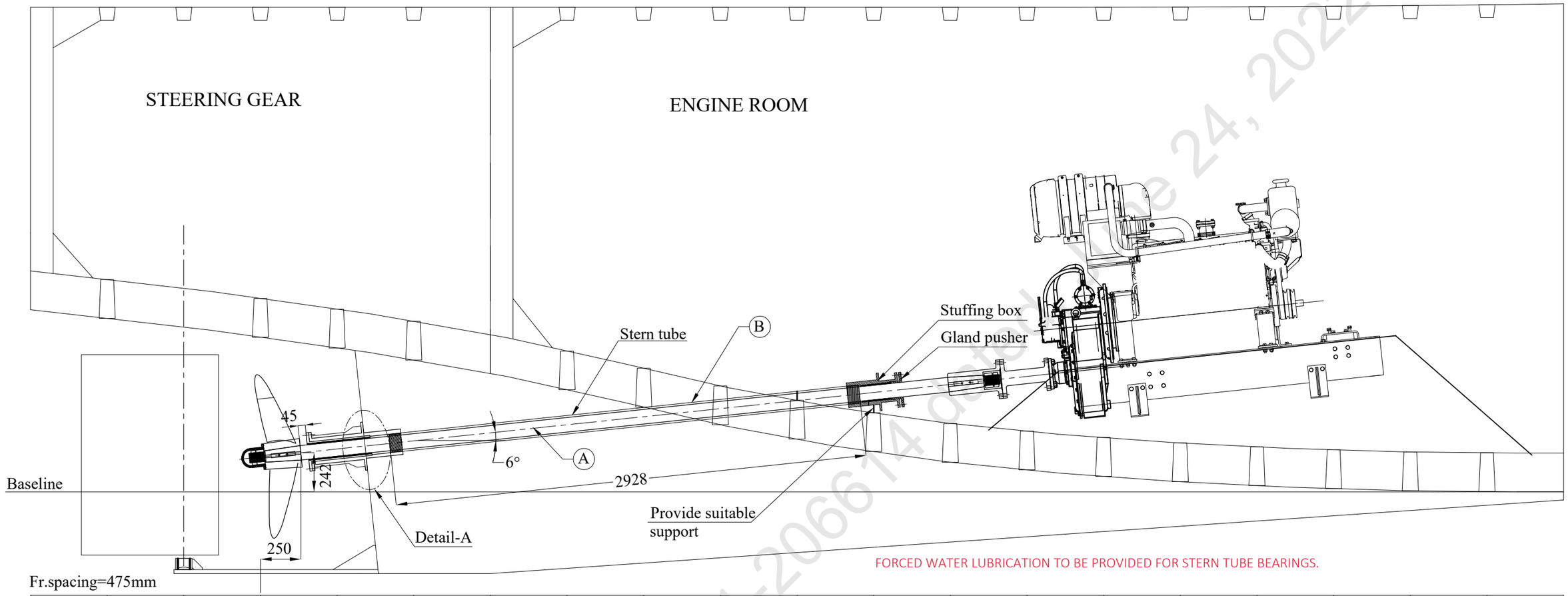
PROPELLER SHAFT ARRANGEMENT

VESSEL NAME

22M FRP TUNA LONGLINER CUM GILLNETTER

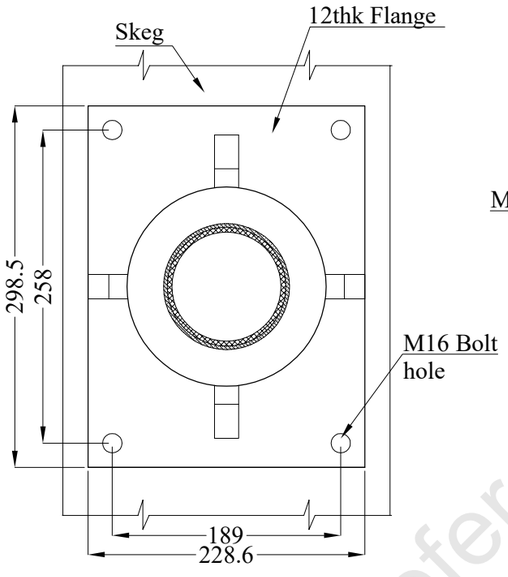
Scale	Drawing No.	Sh.No.	Rev
As shown	11459-0401	1 /3	00

File No: 11459-0401 Rev00 Propeller shaft arrangement 2022 05 13

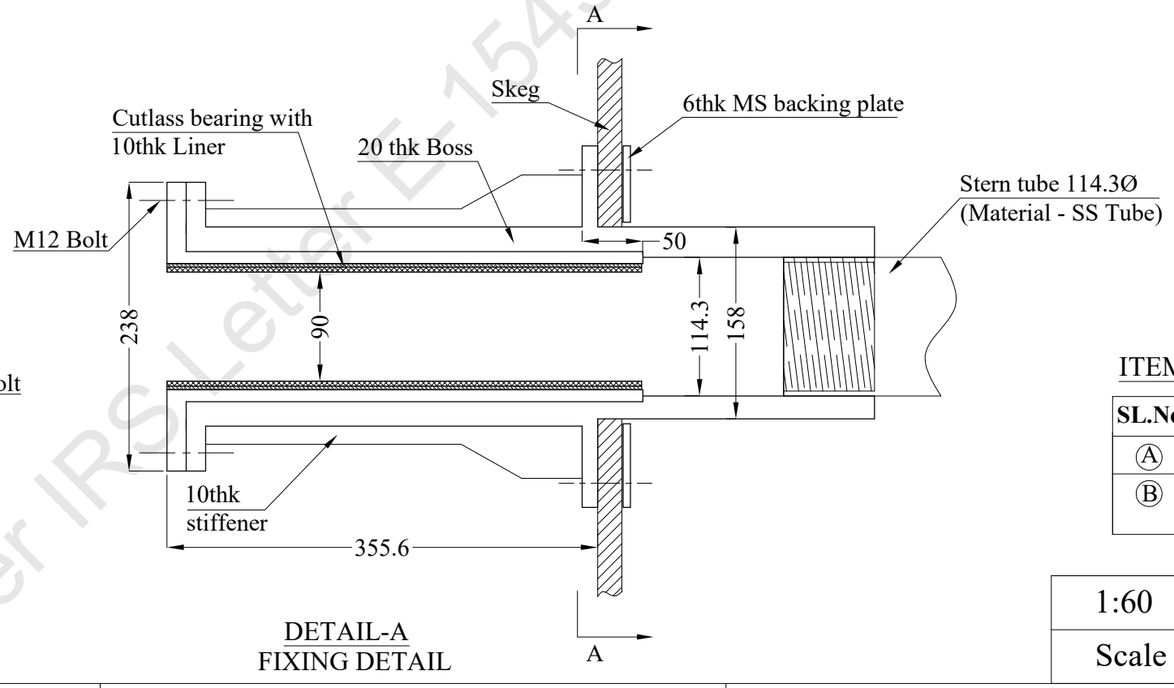


FORCED WATER LUBRICATION TO BE PROVIDED FOR STERN TUBE BEARINGS.

SHAFTING ARRANGEMENT



SEC. A-A

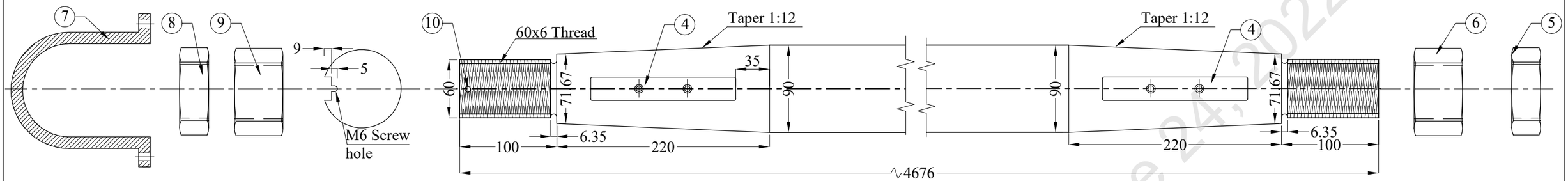


DETAIL-A
FIXING DETAIL

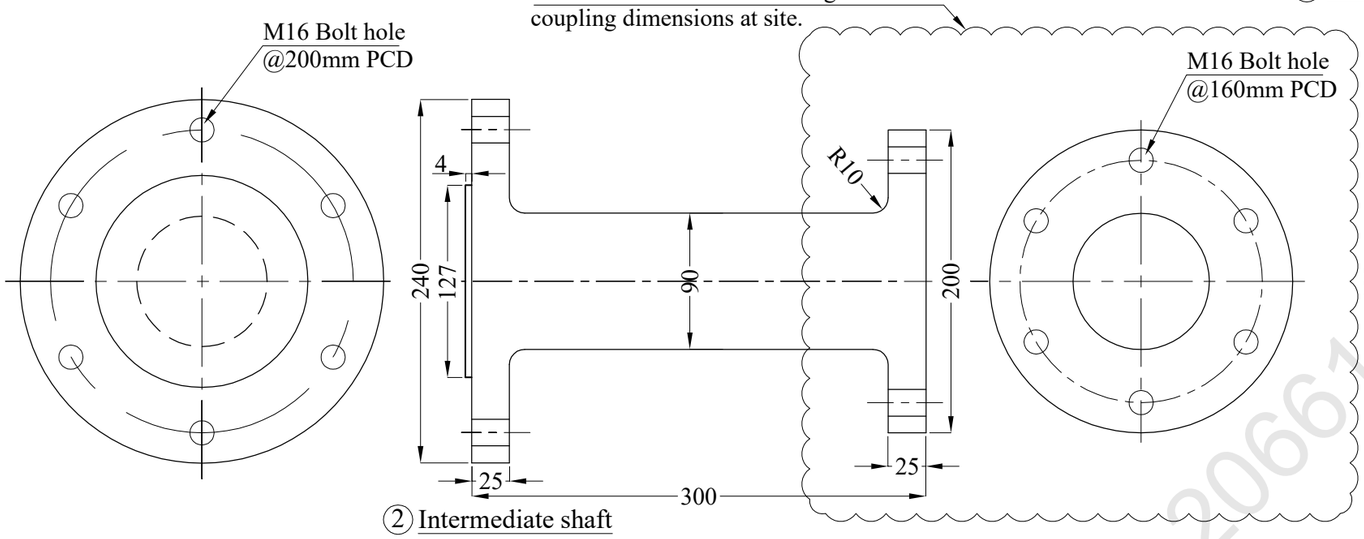
ITEM DESCRIPTION

SL.No.	ITEM DESCRIPTION	REMARKS
Ⓐ	Propeller shaft assembly	
Ⓑ	Stern tube assembly (Stern tube, Stuffing box & Gland pusher)	Saraswathi Metal's standard

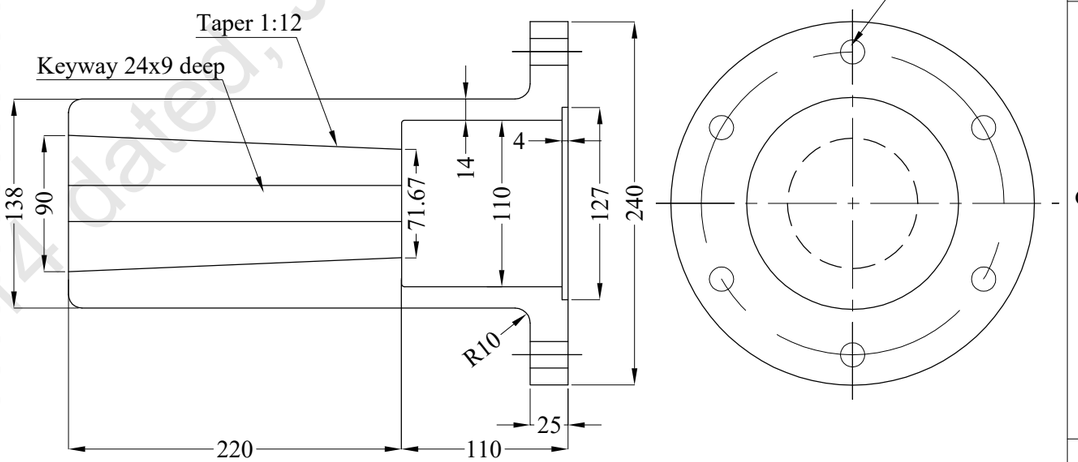
1:60	11459-0401	2/3	00
Scale	Drawing No.	Sh.No.	Rev



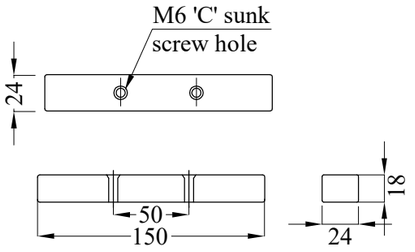
① Propeller shaft



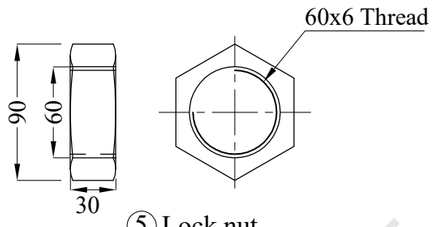
② Intermediate shaft



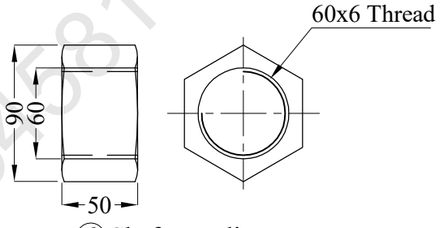
③ Propeller shaft coupling



④ Shaft key



⑤ Lock nut

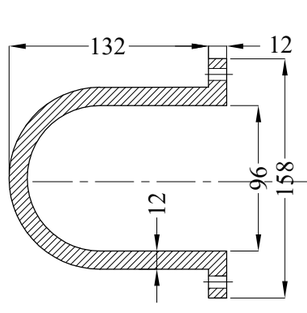


⑥ Shaft coupling nut

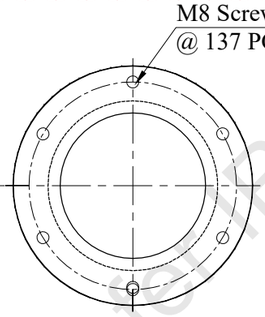
Keyway fillet radius -1.5mm

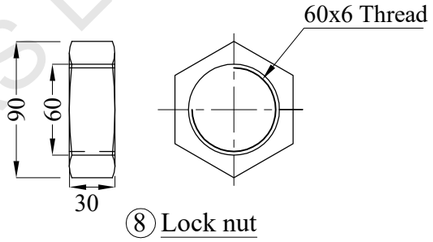
Depth of screw hole - 4.0mm

ROUND ENDED OR SLED-RUNNER ENDED KEYS WITH SMOOTH FILLET RADIUS AT BOTTO OF KEYWAY TO BE PROVIDED

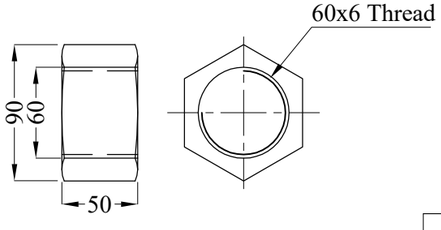


⑦ Cone





⑧ Lock nut



⑨ Propeller nut

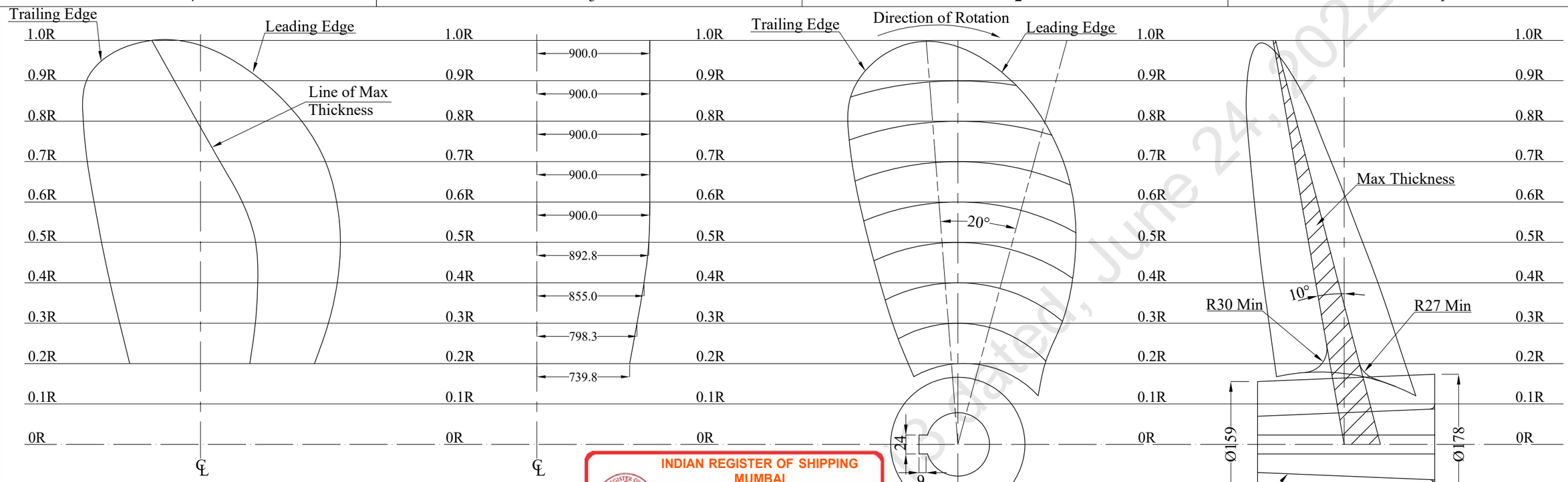
Ⓐ PROPELLER SHAFT ASSEMBLY

MATERIAL LIST

BOLT MATERIAL AND GRADE TO BE MENTIONED.

SL.No.	ITEM DESCRIPTION	QTY.	MATERIAL	REMARKS
1	PROPELLER SHAFT	1	SS 316	ASTM A182 GRADE F
2	INTERMEDIATE SHAFT	1	MS	FORGED STEEL
3	PROPELLER SHAFT COUPLING	1	MS	FORGED STEEL
4	SHAFT KEY	2	SS 316	
5	LOCK NUT	1	SS 316	
6	SHAFT COUPLING NUT	1	SS 316	
7	CONE	1	Mn.BRONZE	
8	LOCK NUT	1	SS 316	
9	PROPELLER NUT	1	SS 316	
10	6MM PIN	1	SS 316	

1:60	11459-0401	3/3	00
Scale	Drawing No.	Sh.No.	Rev



EXPANDED VIEW

PITCH DISTRIE

PROJECTED VIEW

Taper 1:12
(Bore & taper to suit shaft end.)

SIDE VIEW

INDIAN REGISTER OF SHIPPING
MUMBAI
DATE: 24 Jun 2022
REVIEWED

BLADE OFFSET TABLE

	r/R	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Length of blade sectons	From center line to trailing edge	89.93	102.69	114.96	125.68	135.36	143.87	149.02	144.85	62.07
	From center line to leading edge	144.55	162.24	173.58	177.52	172.84	158.42	128.37	78.13	-
	Total length C	234.48	264.93	288.54	303.21	308.20	302.28	277.38	222.98	-
Maximum blade thickness		37.52	33.21	28.91	24.60	20.30	15.99	11.69	7.38	3.08
Distance Max. thickness from leading edge		82.07	92.73	100.99	107.64	119.89	133.91	132.87	111.49	-

	From maximum thickness to trailing edge in %						From maximum thickness to leading edge in %						
r/R	100	80	60	40	20	0	20	40	60	80	90	95	100
	Ordinates for Back												
0.2	-	20.01	27.25	32.60	36.18	37.52	36.99	35.45	32.64	27.91	24.14	21.36	-
0.3	-	16.92	23.78	28.83	32.15	33.21	32.68	31.22	28.49	24.08	20.81	18.23	-
0.4	-	13.79	20.31	25.02	28.04	28.91	28.38	26.95	24.37	20.35	17.39	15.09	-
0.5	-	10.68	16.83	21.18	23.85	24.60	24.13	22.73	20.25	16.65	13.97	11.96	-
0.6	-	8.16	13.63	17.33	19.65	20.30	19.91	18.52	16.10	12.91	10.59	8.80	-
0.7	-	6.30	10.70	13.58	15.45	15.99	15.61	14.20	11.98	9.11	7.07	5.60	-
0.8	-	4.79	7.92	9.97	11.30	11.69	11.33	9.97	8.03	5.64	4.04	2.97	-
0.9	-	3.33	5.17	6.42	7.16	7.38	7.16	6.42	5.17	3.33	2.22	1.62	-
													-
	Ordinates for Face												
0.2	11.25	6.83	4.09	2.04	0.58		0.17	0.86	2.21	5.05	7.62	9.83	15.01
0.3	8.42	4.05	1.93	0.56	-	-	0.02	0.43	1.53	3.60	5.50	7.37	12.47
0.4	5.16	1.79	0.43	-	-	-	-	0.09	0.77	2.25	3.61	5.17	9.97
0.5	2.39	0.43	-	-	-	-	-	-	0.17	1.06	2.08	3.27	7.48
0.6	1.04	-	-	-	-	-	-	-	-	0.16	0.90	1.70	4.97
0.7	-	-	-	-	-	-	-	-	-	-	0.06	0.39	2.57
0.8	-	-	-	-	-	-	-	-	-	-	-	-	0.86

File No: 11459-0402 Rev00 Propeller 2022 05 13

Propeller -Right hand screw

PRINCIPAL PARTICULARS

Length overall	: 22.000 m
Breadth	: 6.509 m
Depth	: 3.037 m
Draft	: 1.400 m
Displacement	: 80.20 t
Speed	: 8knots
Engine	: 190hp @ 2000RPM
GB Ratio	: 4:1

PROPELLER DETAILS :-

Diameter	: 1025 mm
Pitch	: 900 mm
A_E/A_0	: 0.55
No. of blades	: 4
Type	: B SERIES
Material	: Mn. Bronze, Cu1
Weight	: 87.00 Kg

Yard Nos.: 21/01 to 21/03

Rev	Date	Description	Made by	Checked by
00	13-05-'22	- -	AG	SL

CLIENT
SAMUDRA SHIPYARD (P) LTD.

TITLE
PROPELLER

VESSEL NAME
22M FRP TUNA LONGLINER CUM GILLNETTER

VVC INDUSTRIES RESEARCH & SERVICES PVT. LTD.
XXXV/194, Automobile Road
Palarivattom, Kochi-682 025.
(Formerly Industries Research & Services)

Scale	Drawing No.	Sh.No.	Rev
--	11459-0402	1/1	00