

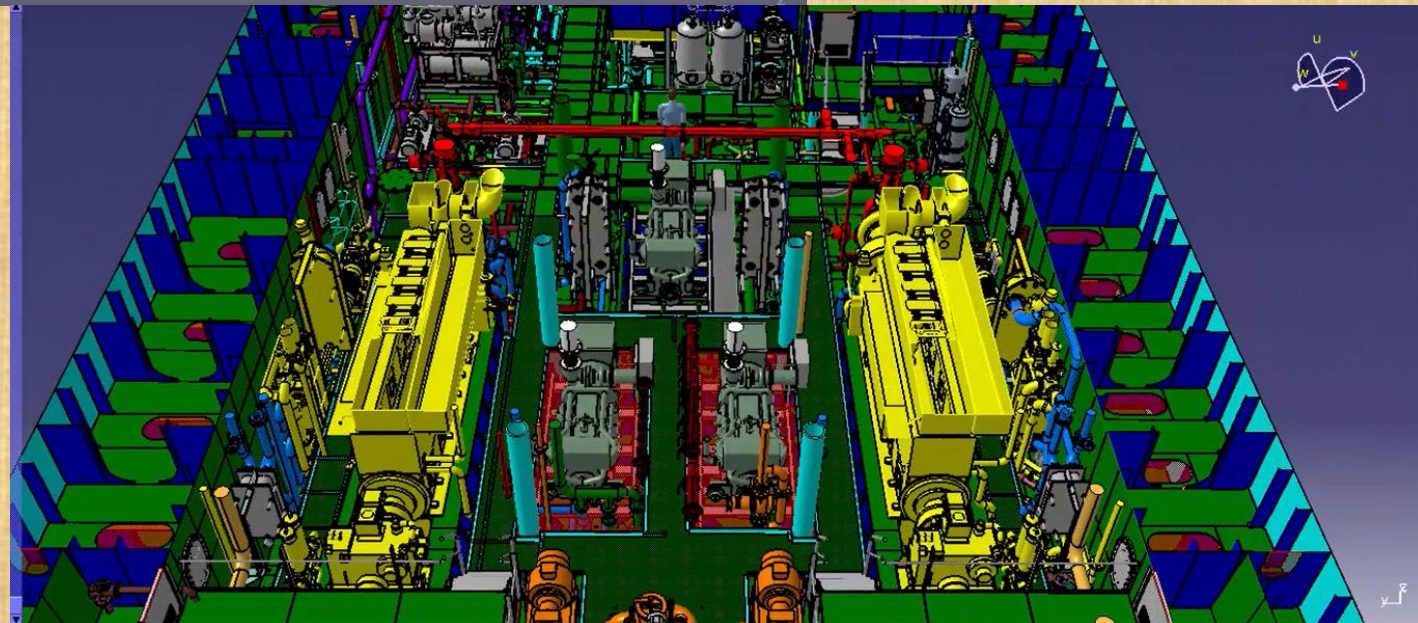
SAMPLE OF PRODUCTION ENGINEERING BY NAVNAUTIK PTE LTD, SINGAPORE



PROJECT:
50M OFFSHORE
UTILITY VESSEL

BASIC DESIGN BY:
OSD-IMT (DAMEN)

DETAIL & PRODUCTION
ENGG BY:
NAVNAUTIK PTE LTD,
SINGAPORE



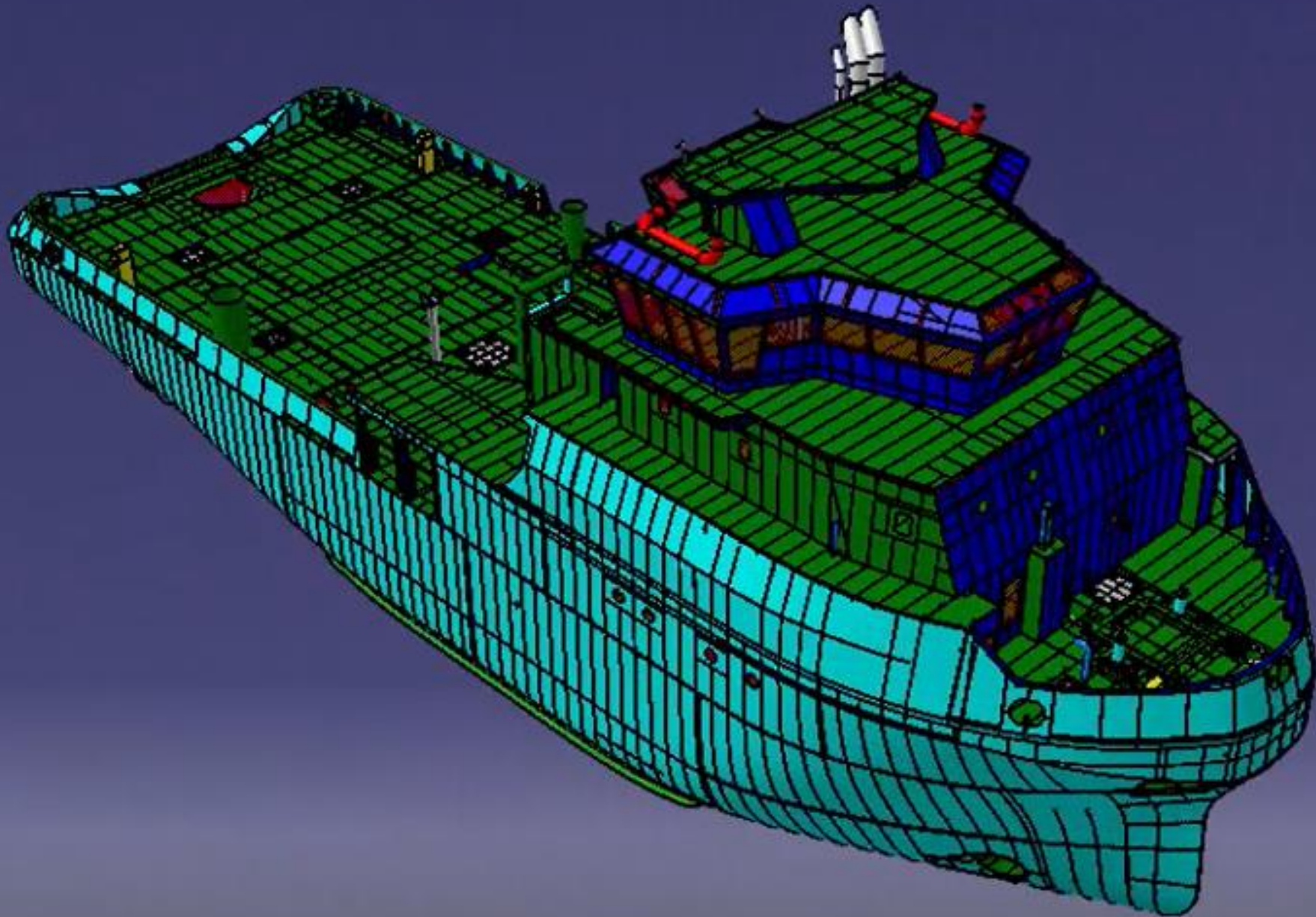
Scope for Production Engineering

1. Preparation of 3D model (structural & composite piping layout) based upon scantling inputs and other details from vendors.
2. Generation of isometric assembly drawings with BOM, 2D block drawings, stiffener data (profile plot & profile nesting), plate bending & pin jig data, CNC nesting files (in dxf / acad format) & pipe bending / spool data
3. Weight report for each block including structural and piping information
4. Painting area table for all tanks in each block (inside and outside)
5. Pipe system drawings will be needed for all pipes with OD more than 50mm only including 50mm dia.
6. Space allocation markings (powder marking) for HVAC and electrical cable tray penetrations (if sufficient info available from vendors) on nested plate panels.
7. Welding booklet for each block.
8. Outfit standards for manhole, staircase, vertical ladder, etc
9. All plate markings to be by powder marking
10. Manhole openings to be marked on plates
11. Door, window, staircase openings to be cut on plates with sufficient margin (margin value TBA later)
12. Isometric piping layout for each piping system to be provided in addition to the production engineering (pipe spool, etc which will be included in the respective blocks).
13. Equipment foundation to be based upon vendor's information & builder's requirement and these may/may not be part of related blocks.
14. Block building sequence and block division are subject to changes by Builder, if deemed necessary.

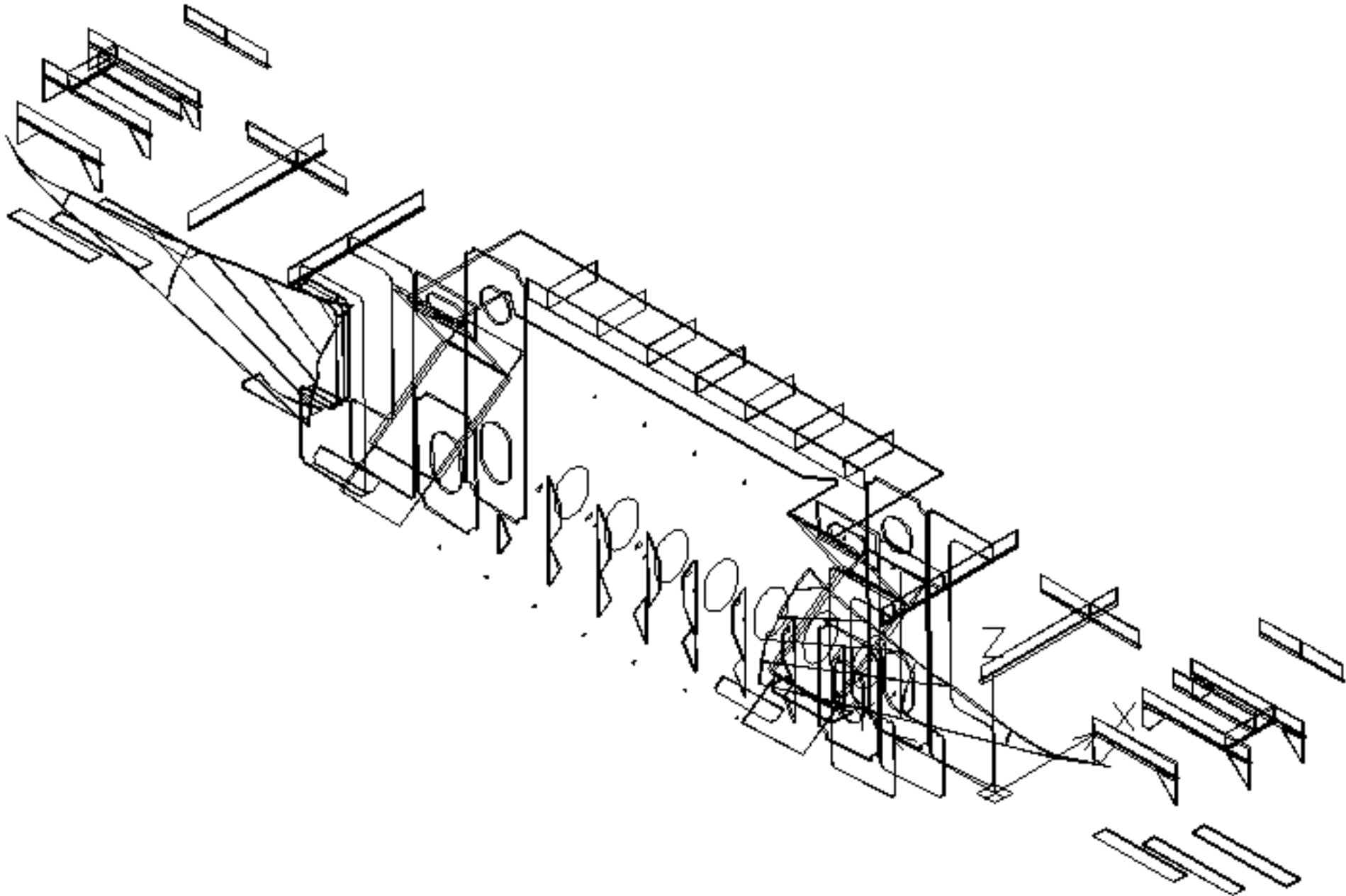
LIST OF DETAIL & PRODUCTION ENGINEERING PROJECTS

NO.	PROJECT REFERENCE	OWNER	SHIPYARD & COUNTRY	PROJECT DESCRIPTION	DETAILED ENGG (ACAD 2D DWGS)	PRODUCTION ENGG (SOFTWARE USED)
1	27/03	WIJSMULLER	ASL SHIPYARD, SINGAPORE	60 T BOLLARD PULL TUG (4 NOS.)	YES	YES (DEFCAR & LANTEK)
2	37/03	WIJSMULLER	ASL SHIPYARD, SINGAPORE	60 T BOLLARD PULL TUG (4 NOS.)	YES	YES (DEFCAR & LANTEK)
3	14/04	UNIWISE	UNITHAI, THAILAND	65T BP MOTT	YES	YES (DEFCAR & LANTEK)
4	41/05	SVITZER	UNITHAI, THAILAND	75 T BOLLARD PULL MOTT (2 NOS.)	YES	YES (DEFCAR & LANTEK)
5	24/06	RMK MARINE, TURKEY		60T BP ASD TUG (4 NOS.)	YES	NO
6	50/06	SVITZER	QINGDAO QIANJIN, CHINA	75T BP MSV (4 NOS.)	YES	NO
7	27/07	LEIVINGSTON CORP, USA	SAIGON SHIPYARD, VIETNAM	320 FEET LIFTBOAT (4 NOS.)	YES	YES (SHIPCONSTRUCTOR)
8	11/08	SVITZER	PIONEER SMITH, SINGAPORE	65 T BP ASD TUG (4 NOS.)	YES	YES (SHIPCONSTRUCTOR)
9	17/08	POET, SINGAPORE	JIANGSU SUYANG, CHINA	65 T BP ASD UOT (2 NOS.)	YES	NO
10	21/08	POET, SINGAPORE		65 T BP TUG (4 NOS.)	YES	NO
11	15/09	EMAS, SINGAPORE	SOFEL, VIETNAM	ULTRA DEEP WATER PIPE LAYING VESSEL	YES	ShipConstructor used for critical areas modelling
12	14/16	UNITHAI OFFSHORE, THAILAND	UNITHAI, THAILAND	50M UTILITY OFFSHORE VESSEL	YES	YES (CATIA)
13	17/18	DAMEN SHIPYARD	COASTAL WORKBOAT, SCOTLAND	17M LIGHT UTILITY VESSEL	YES	YES (CATIA)
14	06/19	WARTSILA	UNITHAI, THAILAND	BATTERY ENERGY STORAGE SYSTEMS BARGE	YES	NO
15	01/22	PAYRA PORT AUHTORITY	KHULNA SHIPYARD	37M 70T BP ASD TUG	YES	YES (CATIA)

COMPLETE 3D MODEL OF THE VESSEL

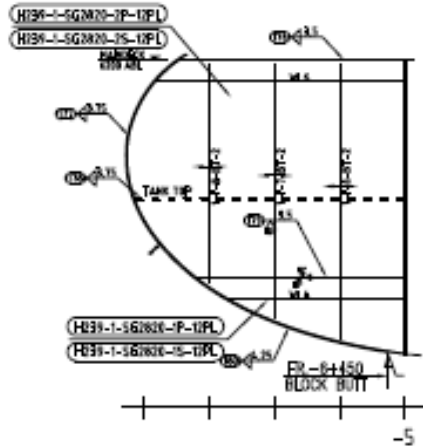


3D MODEL OF SAMPLE BLOCK (WITHOUT SHELL PLATES)

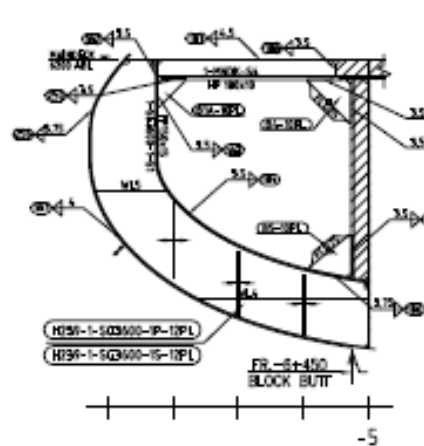


SAMPLE ASSEMBLY DRAWING WITH WELDING INFORMATION & PART NUMBERS

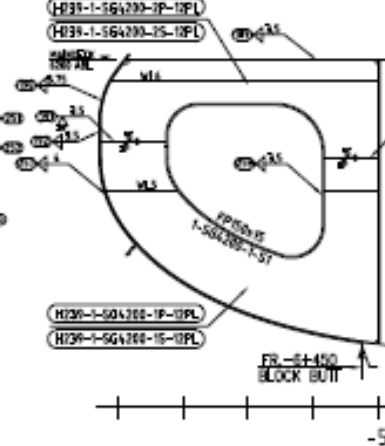
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LOOKING STBD



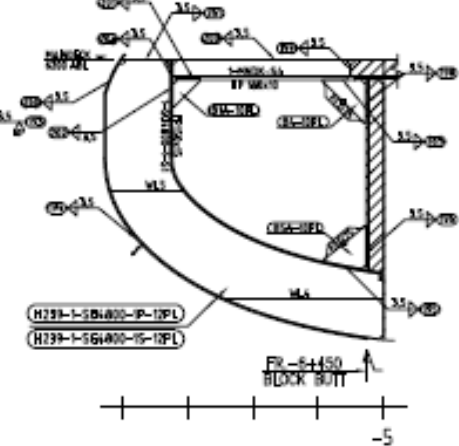
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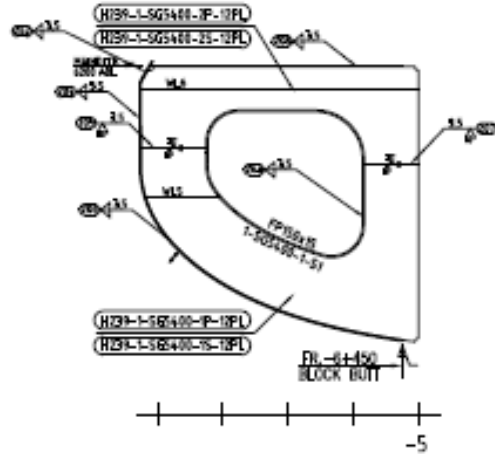
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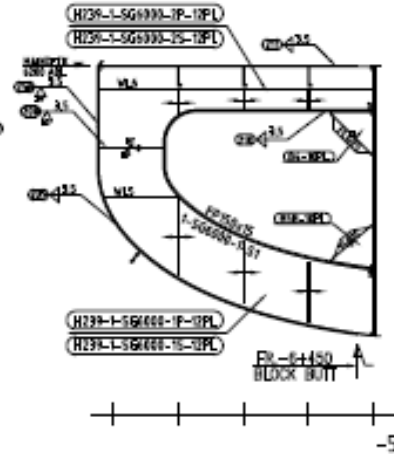
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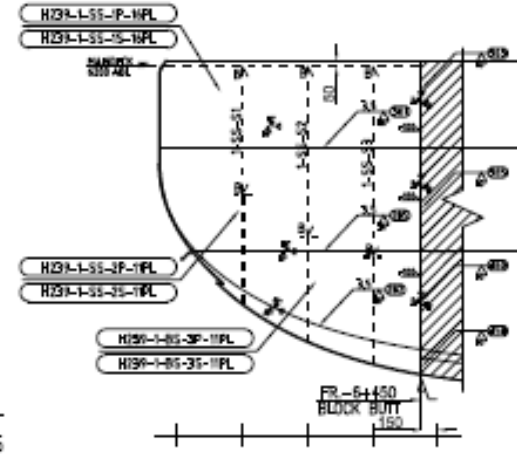
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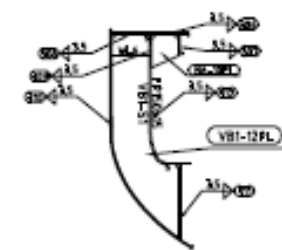
SECTION 6000 OCL
(P/S MIRROR SIMILAR)
LOOKING STBD



SIDE SHELL
(P/S MIRROR SIMILAR)
LOOKING STBD



SECTION "A-A"



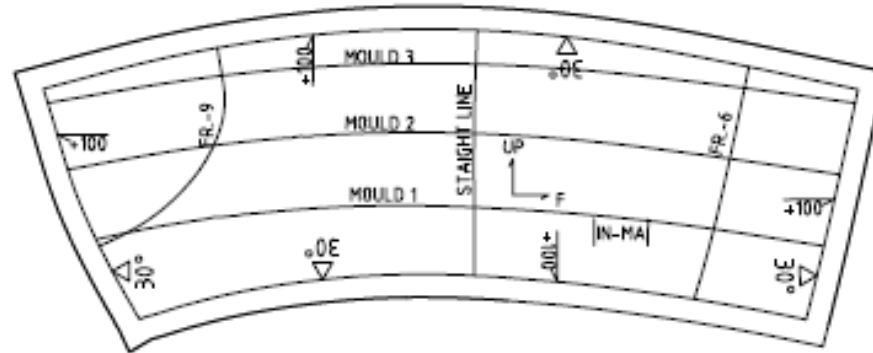
NO.	IDENTIFY IF ADOPTED	DATE	BY	IDENTIFY IF ADOPTED	DATE	BY

DESIGN :	SCALE :	PROJECT :	ISSUED :
REVISED :	REVISED :	WFL :	
DATE :			
APPROVED BY (NAME AND SIGN) :			

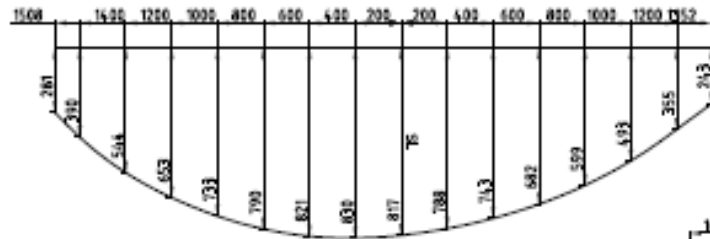
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SAMPLE PLATE BENDING INFORMATION

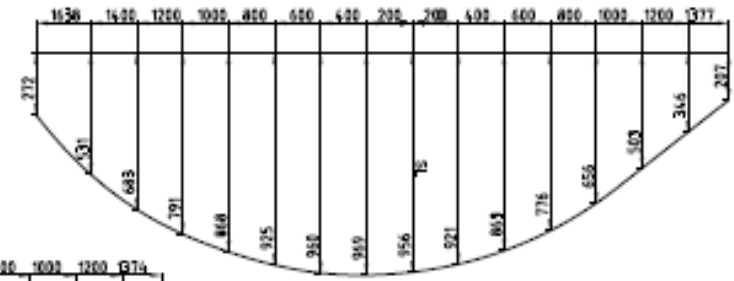
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IN-MA, Q=1



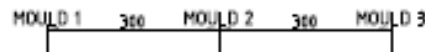
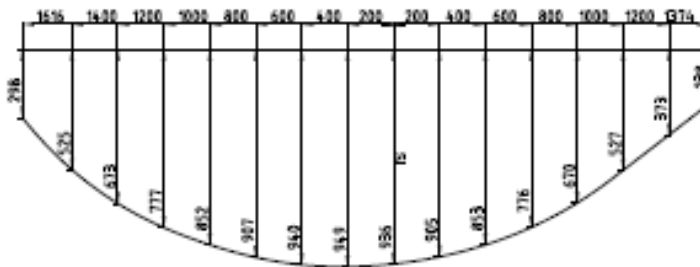
MOULD 1



MOULD 3



MOULD 2



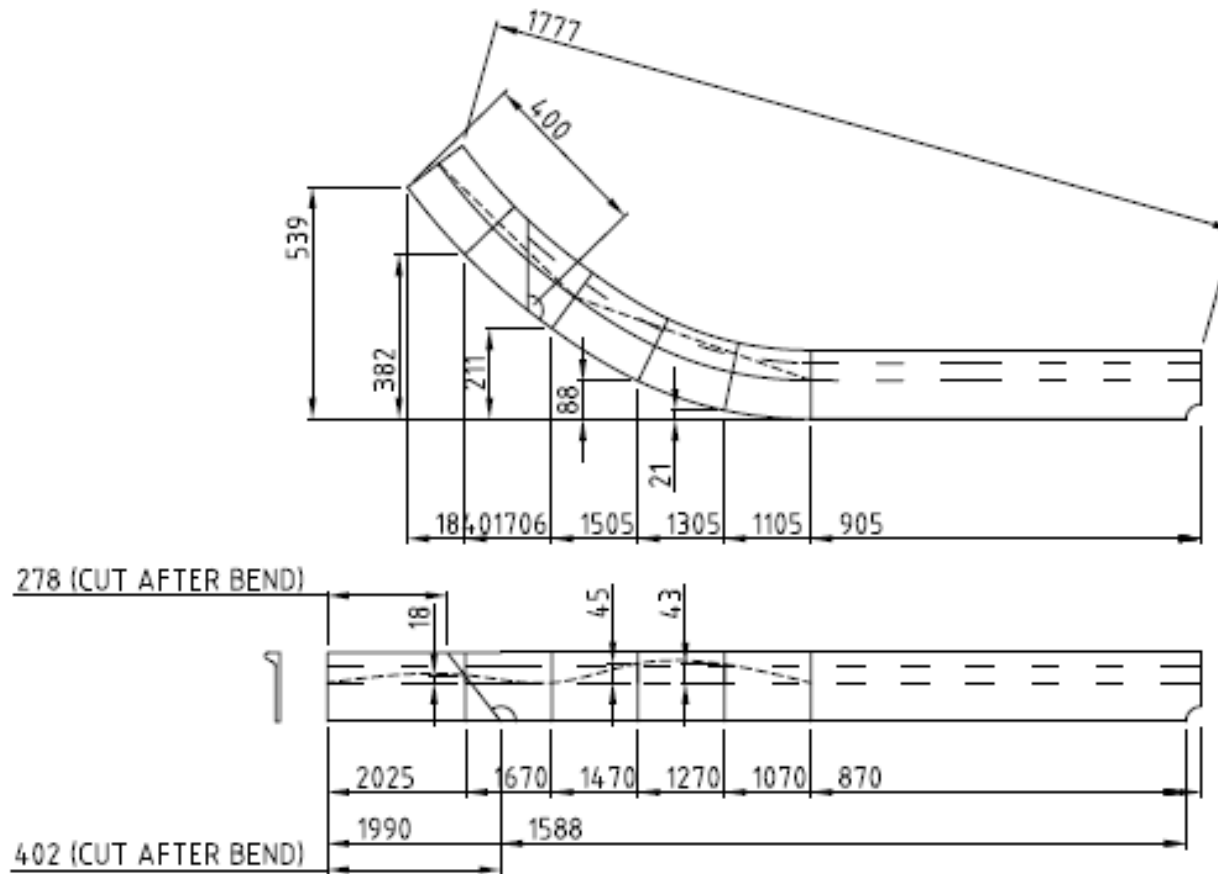
NO.	DESCRIPTION OF APPROVAL	DATE	BY	NO.	DESCRIPTION OF APPROVAL	DATE	BY

DESIGN :	SCALE :	PROJECT :	DRAWN :
CHECKED :	DATE :	TITLE :	NO. OF SHEETS :
DATE :		SUBJECT :	
APPROVED BY (DESIGNER) :		DATE :	
APPROVED BY (ENGR/ MGR) :			

ORGANIZATION: PTC LTD.
 UNIT: PLATE BENDING INFORMATION
 DRAWN: [Signature]
 DATE: [Date]
 NO. OF SHEETS: [Number]
 SHEET NO.: [Number]

SAMPLE STIFFENER BENDING INFORMATION

HP160x9
1-SS-1S-S2



NO.	NAME	MARGIN	LENGTH(mm)	QTY	TYPE
1	1-SS-1S-S2	400	2025	1	-

NO.	REVISION	DATE	BY	CHKD.

DESIGN :	SCALE :	PRICE :	APPROVED BY (SIGNATURE) : APPROVED BY (DATE) : DATE : 20-03-2025 SHEET NO. : 1 of 1
CHECKED :	DATE :	TYPE :	
QC :		FIELD :	
APPROVED BY (SIGNATURE) :		DATE :	

ASSEMBLY PART LIST WITH WELDING AND PAINTING INFORMATION

ASSEMBLY PART LIST																			
PROJECT NAME		UTILITY VESSEL																	
PROJECT NO		H238																	
BLOCK NO.		1																	
ITEM	PART NAME	STAGE	SIZE (mm)	QUANTITY				PIECE (mm ²)		PROFILE (mm)		WEIGHT (kg)		WELDING TABLE			PAINTING TABLE		
				P	C	S	TOTAL	AREA	AREA+MARGIN	LENGTH (mm)	LENGTH+MARGIN	PIECE (kg)	PROFILE	WELD LENGTH (mm)	JOIN TYPE	JOINT NUMBER	SURFACE AREA (m ²)		
				TANK NAME	IN-SIDE	OUT-SIDE													
		B	SUB ASSEMBLY																
		A	ASSEMBLY																
		E	ERECTION A H F																
FR - 6																			
PL	H230-1-F-8-BT-1P-12PL		12	1			1	550350	550350			51.84		2686	TEE	1		WATER BALLAST	1.101
STIFF	1-F-8-BT-1P-S1		FB150x15	1			1	2250		984	984	17.38		1368	TEE	4		WATER BALLAST	0.295
PL	H230-1-F-8-BT-2P-10PL		10	1			1	1028428	1028428			80.73		268	TEE	14		WATER BALLAST	2.057
														1400	TEE	15			
														4046	TEE	17			
														1398	TEE	22			
														1458	TEE	23			
STIFF	1-F-8-BT-2P-S1		FB150x15	1			1	2250		1940	1940	34.27		3880	TEE	16			0.582
PL	H230-1-F-8-BT-3P-25PL		25	1			1	600353	600353			117.82		1216	TEE	18			1.201
														1136	TEE	19			
														1274	TEE	20			
														1136	TEE	21			
PL	H230-1-F-8-BT-1S-12PL		12			1	1	550350	550350			51.84		2686	TEE	24		WATER BALLAST	1.101
STIFF	1-F-8-BT-1S-S1		FB150x15			1	1	2250		984	984	17.38		1368	TEE	27		WATER BALLAST	0.295
PL	H230-1-F-8-BT-2S-10PL		10			1	1	1028428	1028428			80.73		268	TEE	37		WATER BALLAST	2.057
														1400	TEE	38			
														4046	TEE	40			
														1398	TEE	45			
														1458	TEE	46			
STIFF	1-F-8-BT-2S-S1		FB150x15			1	1	2250		1940	1940	34.27		3880	TEE	39			0.582
PL	H230-1-F-8-BT-3S-25PL		25			1	1	600353	600353			117.82		1216	TEE	41			1.201
														1136	TEE	42			
														1274	TEE	43			
														1136	TEE	44			
FR - 7																			
PL	H230-1-F-7-BT-1P-12PL		12	1			1	485093	485093			45.78		2676	TEE	47		WATER BALLAST	0.972
STIFF	1-F-8-BT-1P-S1		FB150x15	1			1	2250		1081	1081	19.09		1142	TEE	50		WATER BALLAST	0.324
PL	H230-1-F-7-BT-2P-10PL		10	1			1	1038037	1038037			81.49		268	TEE	60		WATER BALLAST	2.078
														1400	TEE	61			
														4674	TEE	63			
														1398	TEE	68			
														1188	TEE	69			
STIFF	1-F-8-BT-2P-S1		FB150x15	1			1	2250		2376	2376	41.97		4752	TEE	62		WATER BALLAST	0.713
PL	H230-1-F-7-BT-3P-25PL		25	1			1	846193	846193			166.07		1844	TEE	64			1.602
														1136	TEE	65			

STEEL MTO FOR RELATED BLOCK

PROJECT NAME : **UTILITY VESSEL**
 OWNER : -
 TITLE : **MATERIAL TAKE BLOCK - 1**
 CLASIFICATION : HULL NUMBER : **H239**
 REVISION : **R - 0** DRAWING NUMBER :

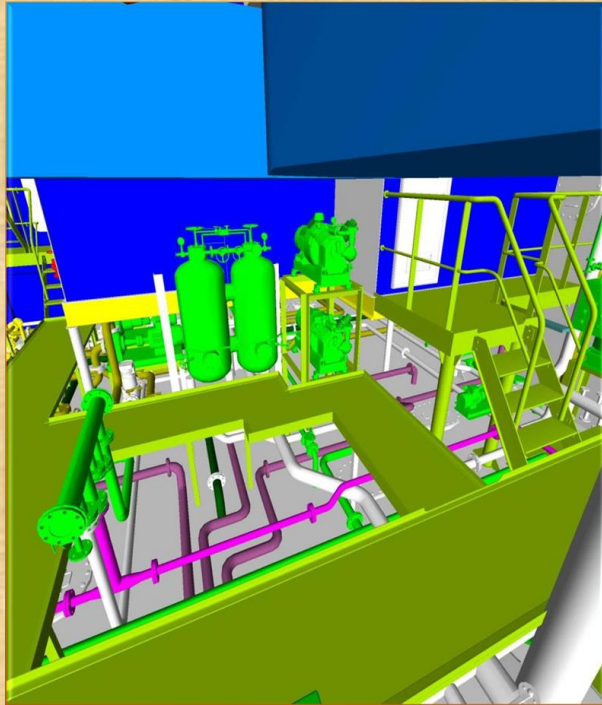
PROFILE

NO.	PROFILE	PROFILE QTY. (PCS)		NOTE
		6m	9m	
1	HP 180x10	-	2	
2	HP 160x9	-	3	

PLATE

NO.	THICK. PLATE (mm)	PLATE QTY. (PCS)		NOTE
		6096x1829mm	9144x2438 mm	
1	9PL	-	-	USE 1 REMNANT h239-ctp-8-gr_a-9-0001_01
2	10PL	-	2	
3	11PL	-	1	USE 1 REMNANT h239-ctp-2p-gr_a-11-0001_01
4	12PL	-	5	
5	14PL	-	3	
6	15PL	-	1	
7	16PL	-	1	
8	20PL	-	-	USE 1 REMNANT h239-ctp-0601-2001_01
9	25PL	-	1	

SCREENSHOTS FROM 3D MODELING SOFTWARE



- FULL ALL
- 17M LANDING UTILITY VESSEL 1608 (17M LANDING UTILITY VESSEL 1608.1)
- WHEELHOUSE.1 [WHEELHOUSE.CATPart]
- BOLLARD1.1 [BOLLARD1.CATPart]
- BOLLARD2.1 [BOLLARD2.CATPart]
- Symmetry of BOLLARD2.1.1 [BOLLARD2.CATPart]
- BOLLARD2.2 [BOLLARD2.CATPart]
- BOLLARD2.3 [BOLLARD2.CATPart]
- CHAINRAIL.1 [CHAINRAIL.CATPart]
- CHAINRAIL.2 [CHAINRAIL.CATPart]
- CHAINRAIL.3 [CHAINRAIL.CATPart]
- CHAINRAIL.4 [CHAINRAIL.CATPart]
- BOLLARD3.1 [BOLLARD3.CATPart]
- Symmetry of BOLLARD3.1.1 [BOLLARD3.CATPart]
- Design_Unit_003.1 [RUDDER LUV 1608_1.CATPart]
- Symmetry of Design_Unit_003.1.1 [RUDDER LUV 1608
- RAMPDOOR ASSEMBLY [RAMPDOOR.ASSEMBLY]
- Design_Unit_008 [Design_Unit_008.CATPart]
- Assembly features
- Applications

Measure Item

Definition

Selection 1 mode: Any geometry

Selection 2 mode: Any geometry

Other axis: No selection

Calculation mode: Exact else approximate

Results

Calculation mode: Approximate

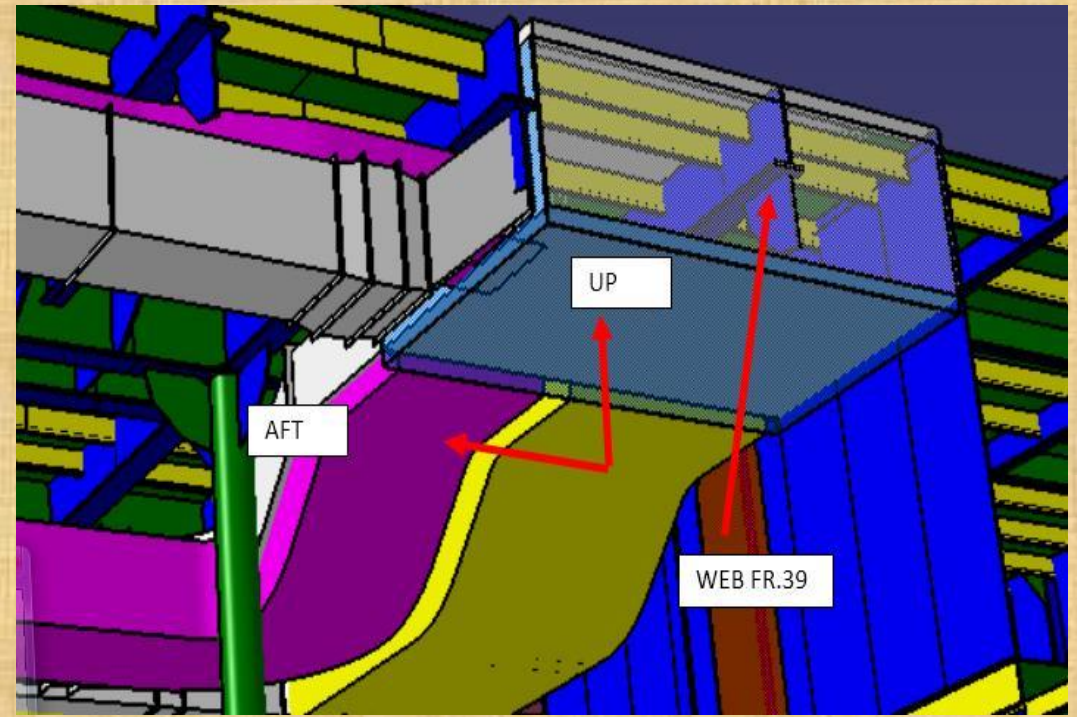
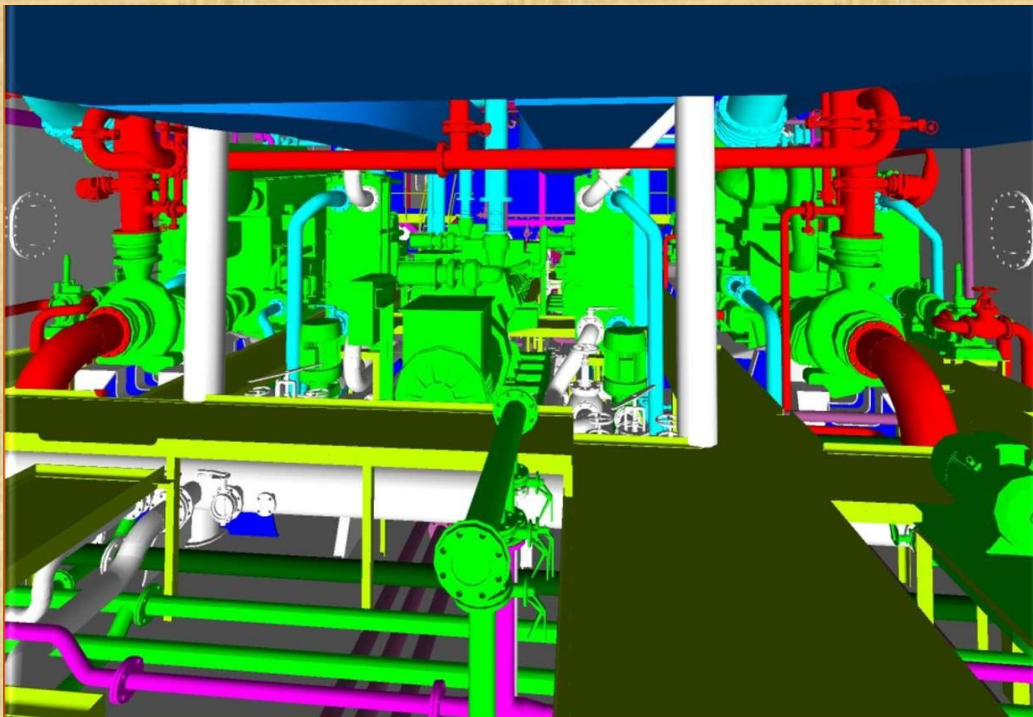
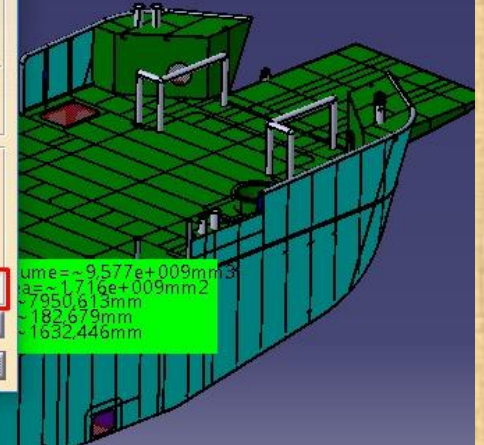
Selection: Volume in FULL ALL

Volume: 9,577e+009mm³

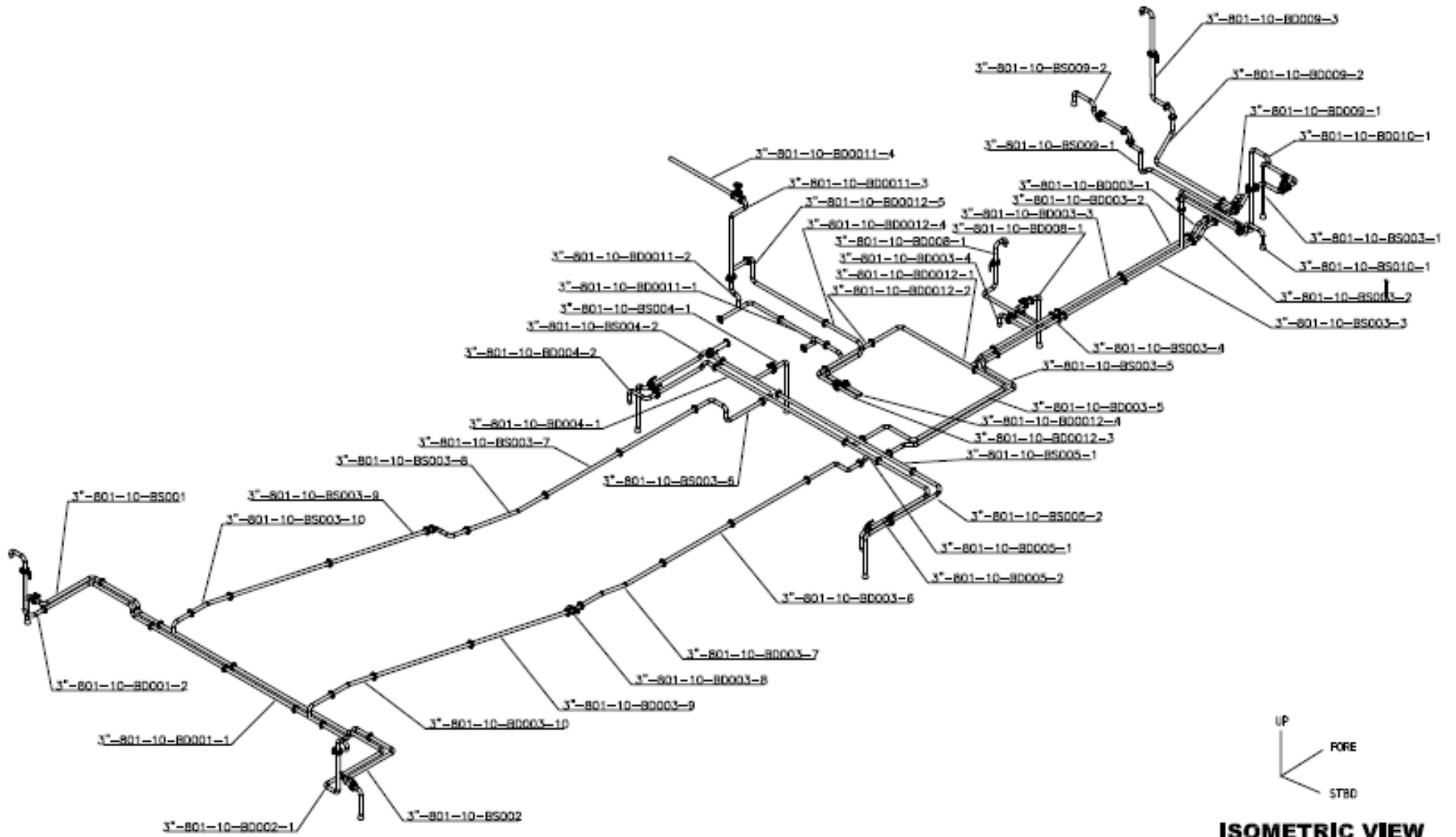
Surface area: 1,716e+009mm²

Center of gravity: X 7950,613mm Y 182,679mm Z 1632,446mm

Keep measure Create geometry Customize... OK Cancel



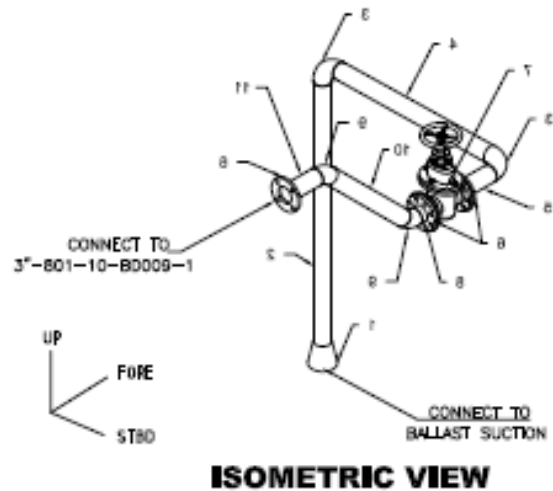
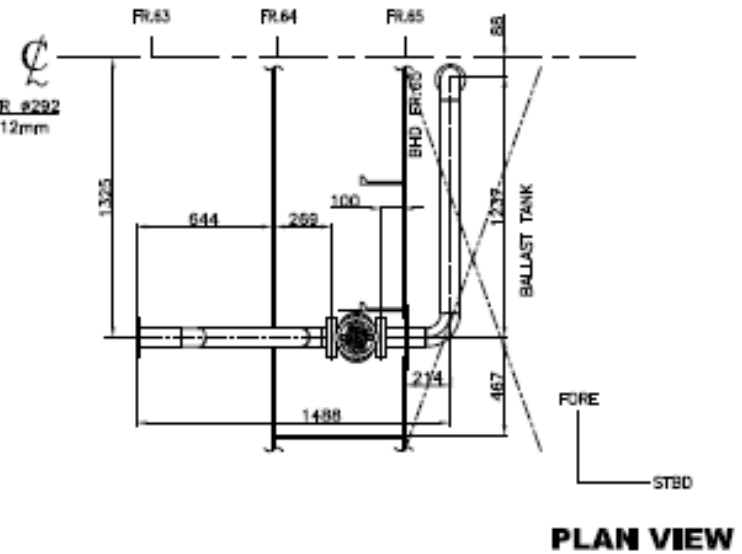
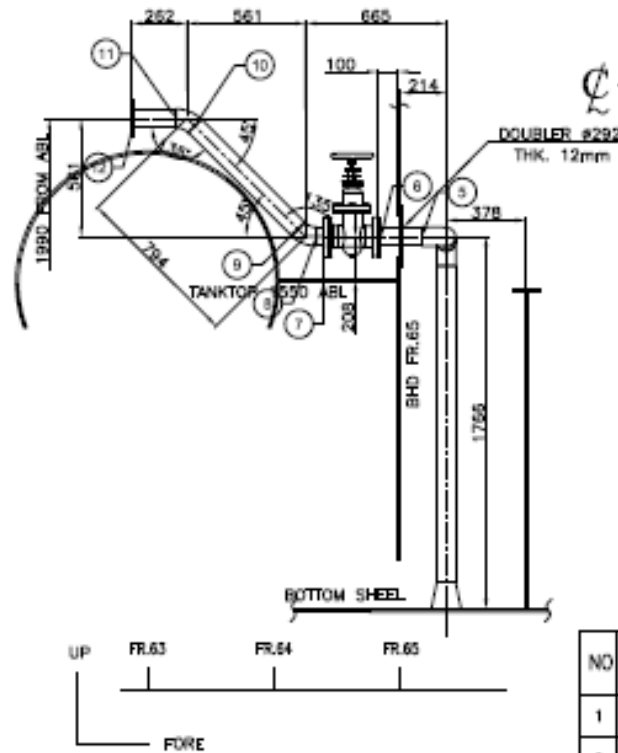
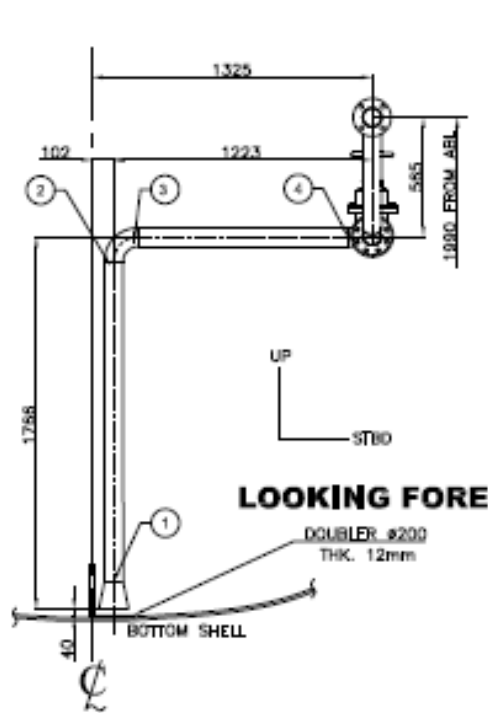
KEYPLAN OF SHIP'S BALLAST SYSTEM



ISOMETRIC VIEW

NO	DESCRIPTION OF WORK	DATE	BY	NO	DESCRIPTION OF WORK	DATE	BY	OWNER :	SCALE :	PROJECT :	DESIGN :
								SHIP	1:1	BALLAST SYSTEM	SHIP
								APPROVED BY CLASS OFFICER :	DESIGNER :		
								APPROVED BY SHIP OWNER :			

SAMPLE PIPE SPOOL OF BALLAST SYSTEM



LAST JOINT NUMBER : (12)

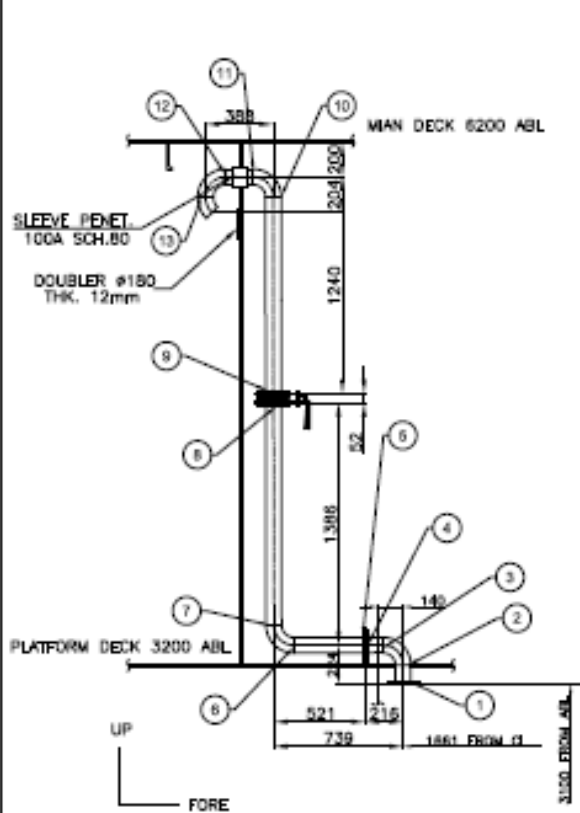
NO	DESCRIPTION	QTY. (PCS)	LENGTH (MM)	MTRL.NO	REMARK
1	CONC. REDUCER 125x80A SCH.80	1	127	ASTM A234	M.S. (DALY)
2	PIPE, 80A SCH.40	1	1503	ASTM A106 GR. B	M.S. (DALY)
3	ELBOW LR 90° 80A SCH.40	2	114.3	ASTM A234	M.S. (DALY)
4	PPE 80A SCH.40	1	1014	ASTM A106 GR. B	M.S. (DALY)
5	PPE, 80A SCH.40	1	207	ASTM A106 GR. B	M.S. (DALY)
6	FLANGE, SLIP ON, 80A 10K	3	18	AS B2220	
7	GATE VALVE DN80, 10K	1		AS F7351	BRONZE
8	PPE, 80A SCH.40	1	47	ASTM A106 GR. B	M.S. (DALY)
9	ELBOW LR 45° 80A SCH.40	2	50.8	ASTM A234	M.S. (DALY)
10	PPE, 80A SCH.40	1	692	ASTM A106 GR. B	M.S. (DALY)
11	PIPE, 80A SCH.40	1	206	ASTM A106 GR. B	M.S. (DALY)
13	BOLT NUT, M16 X 80	24			

NO	DESCRIPTION OF WORK	DATE	BY	NO	DESCRIPTION OF WORK	DATE	BY

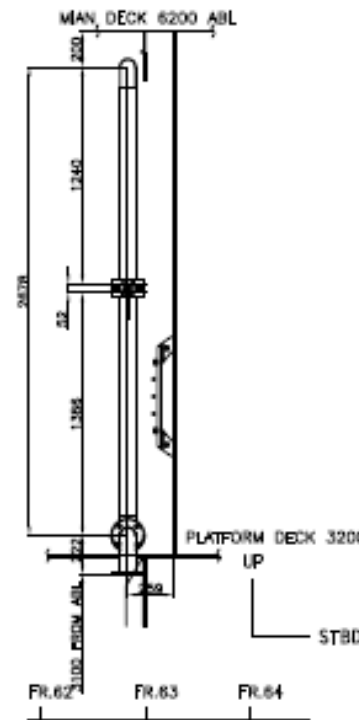
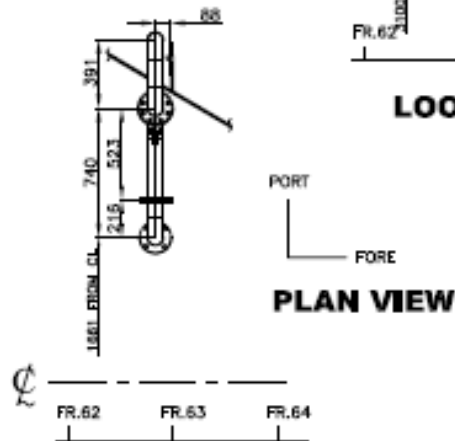
DESIGNED BY :	CHECKED BY :	APPROVED BY :	DATE :

DESIGNED BY :
 CHECKED BY :
 APPROVED BY :
 DATE :
 PROJECT :
 SHEET NO. :
 OF :
 10/10/2020

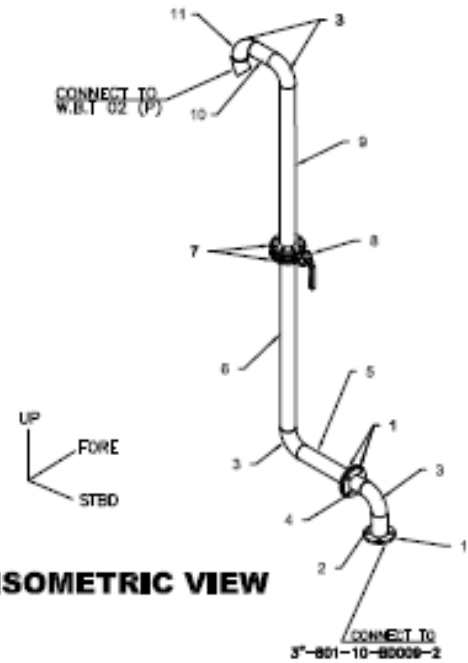
SAMPLE PIPE SPOOL OF BALLAST SYSTEM



LOOKING FORE



LOOKING PORT

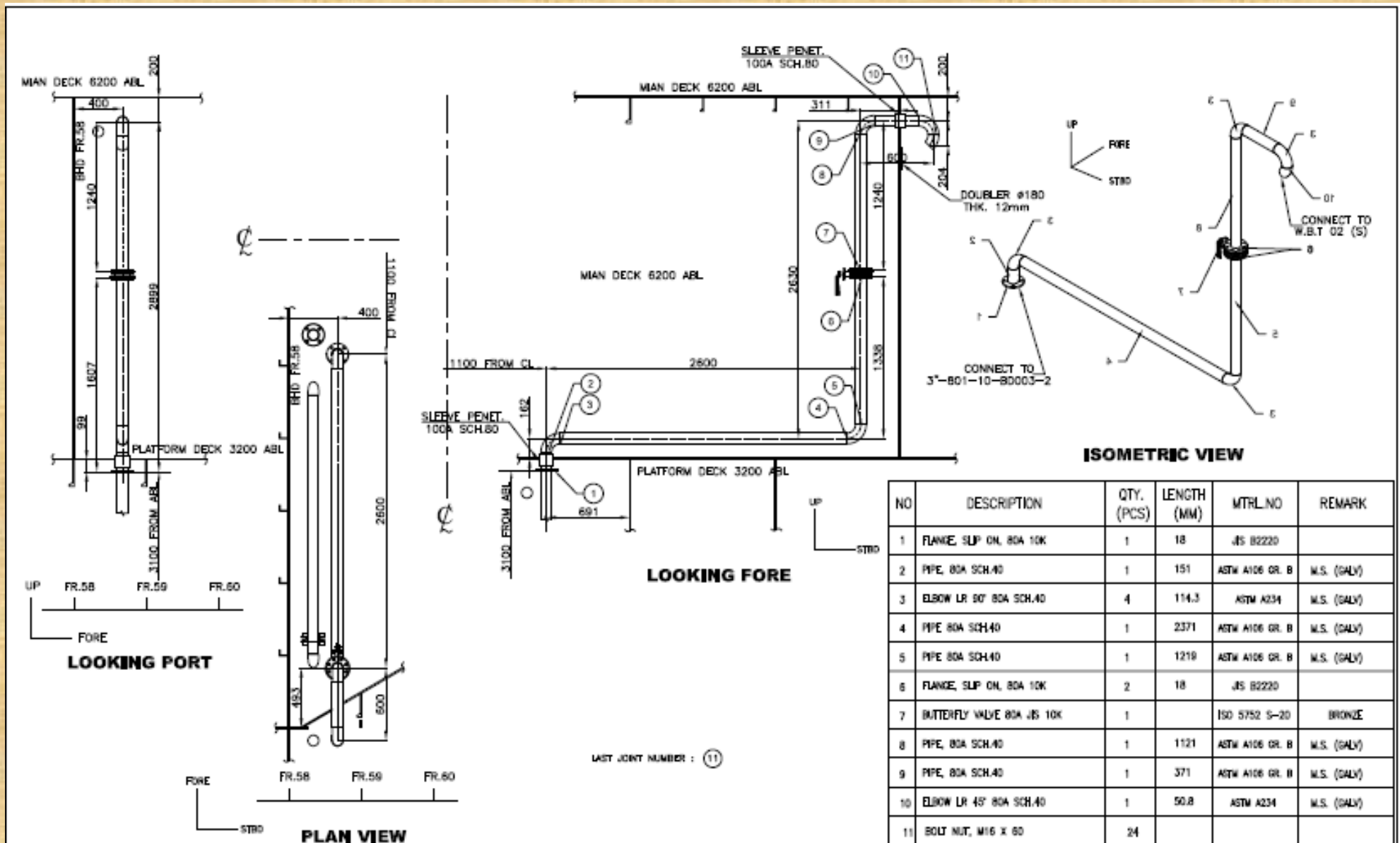


NO	DESCRIPTION	QTY. (PCS)	LENGTH (MM)	MTRL NO	REMARK
1	RANGE SUP CH. 80A 10K	3	18	JE 02220	
2	W/E 80A SCH.40	1	103	ATA 4106 OL 8	W.S. (SALY)
3	BLDN LR 90° 80A SCH.40	4	114.3	ATA 404	W.S. (SALY)
4	W/E 80A SCH.40	1	97	ATA 4106 OL 8	W.S. (SALY)
5	W/E 80A SCH.40	1	402	ATA 4106 OL 8	W.S. (SALY)
6	W/E 80A SCH.40	1	1287	ATA 4106 OL 8	W.S. (SALY)
7	RANGE SUP CH. 80A 10K	2	18	JE 02220	W.S. (SALY)
8	BUTTERFLY VALVE, 80A X 10K	1		BO 5152 5-20	BRONZE
9	W/E 80A SCH.40	1	1121	ATA 4106 OL 8	W.S. (SALY)
10	W/E 80A SCH.40	1	159	ATA 4106 OL 8	W.S. (SALY)
11	BLDN LR 45° 80A SCH.40	1	50.8	ATA 404	W.S. (SALY)
12	BOLT NUT, 15 X 80	40			

NO.	REV.	DATE	BY	CHKD.	APPD.

OWNER :	SCALE :	PROJECT :	ISSUED :
DRAWN :	DATE :	TYPE :	NO. OF SHEETS :
CHECK :	APPROVED BY :	DATE :	REV. NO. :
APPROVED BY :	APPROVED BY :	DATE :	REV. NO. :

SAMPLE PIPE SPOOL OF BALLAST SYSTEM



NO	DESCRIPTION OF APPROVAL	DATE	BY	NO	DESCRIPTION OF APPROVAL	DATE	BY

--	--	--	--	--	--

DESIGN :	SCALE :	PROJECT :
CHECKED :	DATE :	WELDER :
APPROVED BY (LAST NAME) :	APPROVED BY (NAME SURNAME) :	DATE :

COMPANY : PROJECT : SHEET NO. : TOTAL SHEETS :	DATE : TIME : BY : FOR :
---	-----------------------------------

PIPING MTO FOR BALLAST SYSTEM

MATERIAL TAKE OFF

PROJECT NAME : UTILITY VESSEL

BLOCK : -

SYSTEM : BALLAST SYSTEM

CLASIFICATION : BV

HULL NUMBER : H239 & H240

REVISION : R-0

DRAWING NUMBER : PD_H239-H240 M01-R0 BALLAST SYS.[801]

PIPE

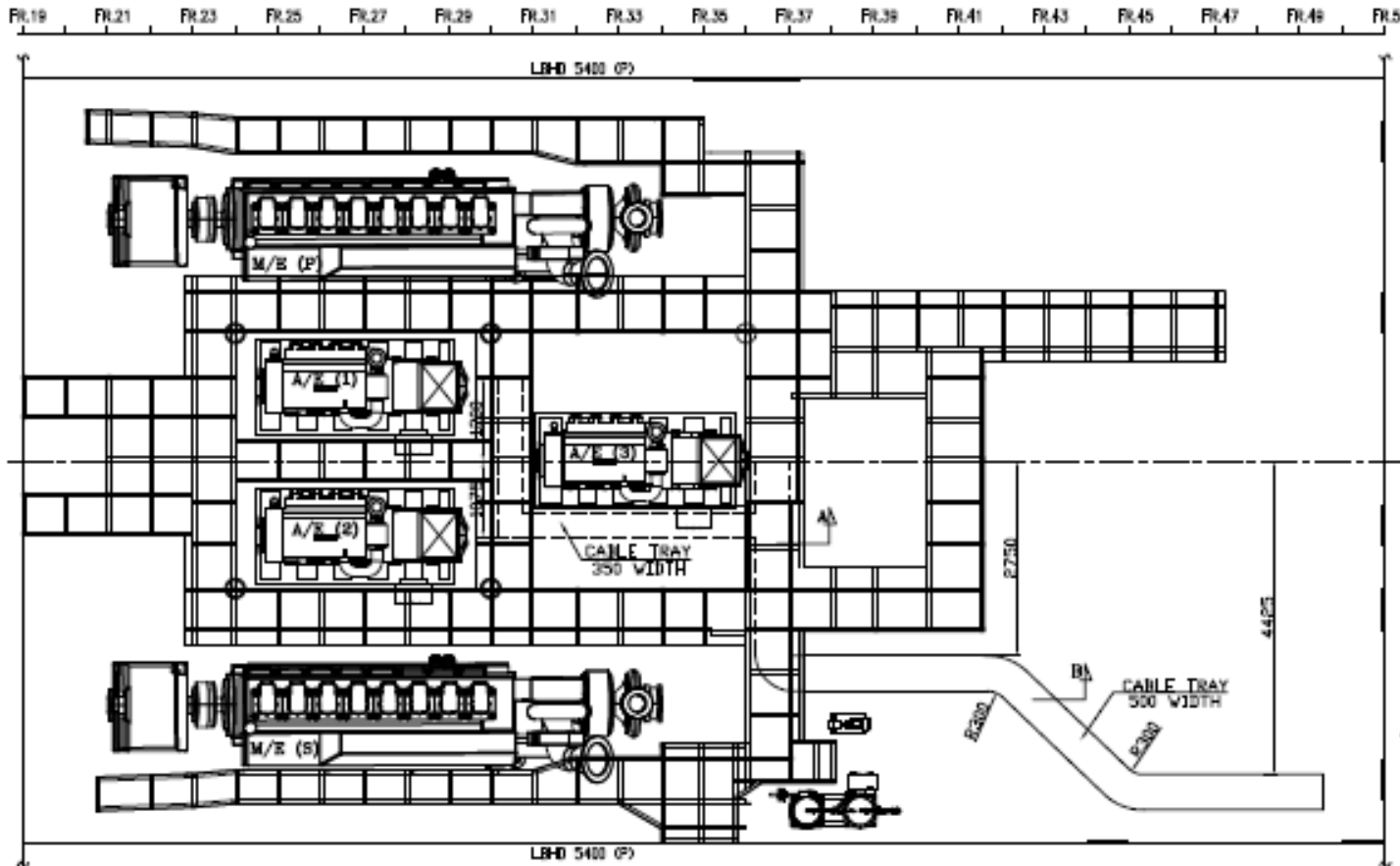
NO.	PIPE	QTY.		NOTE
		Length	length (8000 mm)	
1	PIPE 80A SCH.40	179084	29.85	MS. (GALV)
2	PIPE 80A SCH.80	11115	1.85	MS. (GALV)
3	PIPE 100A SCH.40	584	0.10	MS. (GALV)

FITTINGS AND VALVES

NO.	DESCRIPTION	QTY (PCS)	MTRL. NO	NOTE
1	CONC. REDUCER 125Ax80A, SCH 40	8	ASTM A106 GR. B	
3	FLANGE, BLEND ON, 100A 10K	2	JIS B2220	
4	FLANGE, SLIP ON, 80A 10K	189	JIS B2220	
5	ELBOW LR 90° 80A SCH.40	80	ASTM A234	
6	ELBOW LR 45° 80A SCH.40	50	ASTM A234	
7	ELBOW LR 45° 80A SCH.80	4	ASTM A234	
8	ELBOW LR 12° 80A SCH.40	2	ASTM A234	
9	ELBOW LR 10° 80A SCH.40	3	ASTM A234	
10	BUTTERFLY VALVE DN80, 10K	21	ISO 5752 S-20	
11	GATE VALVE DN80, 10K	1	JIS F7351	
12	SDNR GLOBE VALVE DN80, 10K	1	JIS F7375	C.I. BODY BRNZ TRIM
13	BOLT NUT M16 x 60	1336		

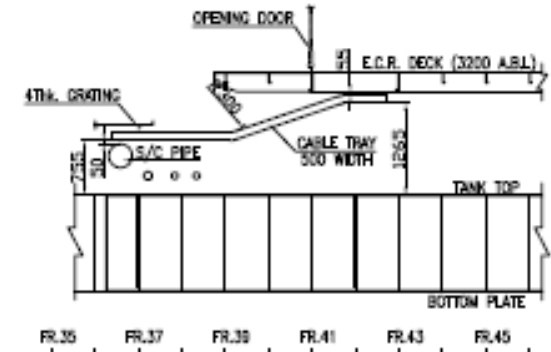
SAMPLE CABLE TRAY ARRANGEMENT

PLAN VIEW



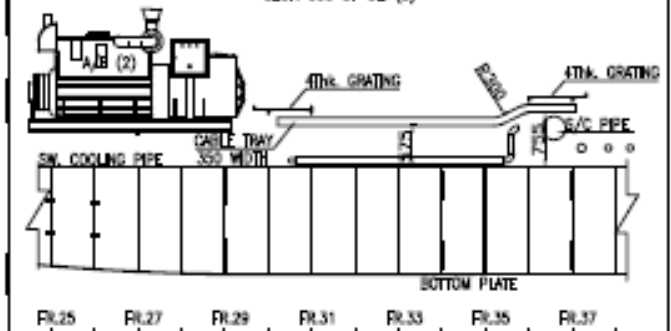
B-B SECTION

SECT. 3000 OF CL (S)

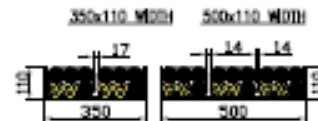


A-A SECTION

SECT. 900 OF CL (S)



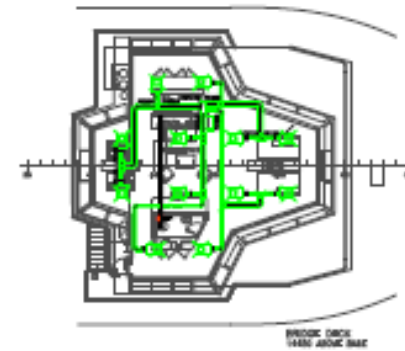
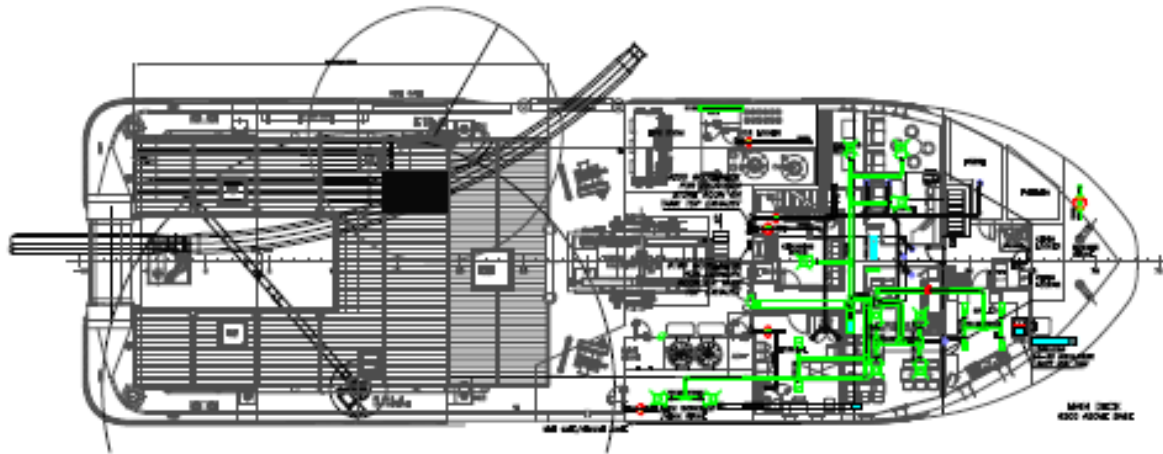
**CABLE LADDER
A/E TO MSB**



NO.	REVISION	DATE	BY	CHKD.

DESIGNED BY	CHKD.	PROJECT	
DRAWN BY	DATE	NO.	
CHECKED BY	DATE	SCALE	
APPROVED BY	DATE	REVISION	

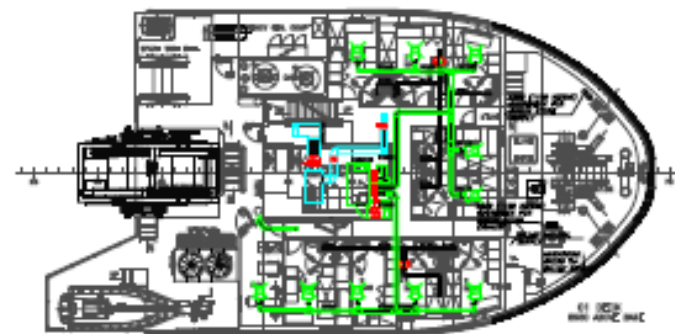
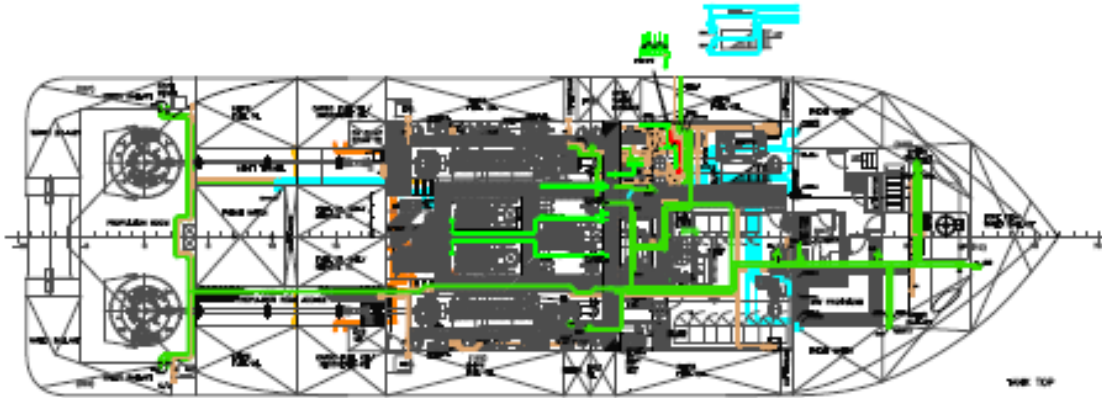
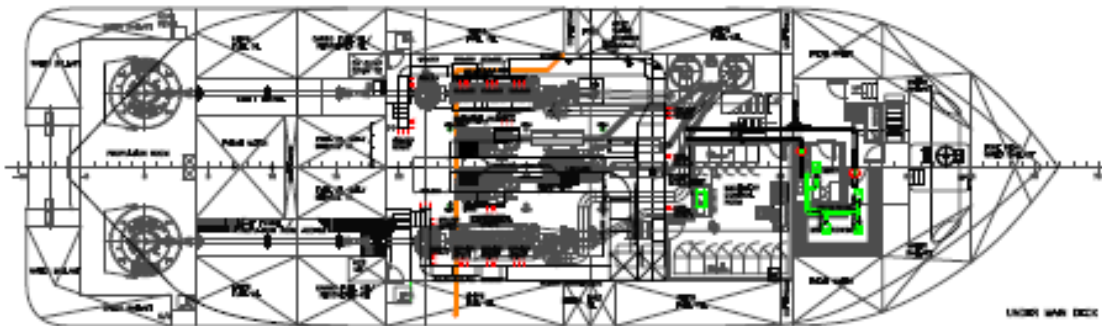
COMPOSITE PIPING ARRANGEMENT



PRINCIPAL DIMENSIONS
 LENGTH O.A. 49.98 mtr.
 LENGTH R.P. 43.35 mtr.
 BREADTH M.L.D. 15.00 mtr.
 DEPTH MAINDECK 8.20 mtr.
 DRAFT M.L.D. MUSHIP 5.00 mtr.
 DRAFT AFT (L. SKGG) 5.40 mtr.

CLASS NOTATION
 BUREAU VERITAS 1 + HULL + MACH
 (T)
 Anchor Handling Vessel
 Fire Fighting Ship 1 - Water Spray,
 Oil Recovery Ship - 2nd Line,
 8-meter Survey
 Unrestricted Navigation

PRINCIPAL PARAMETERS
 SPEED 13 kn. ahead
 BOLLARD PULL 80 tonne

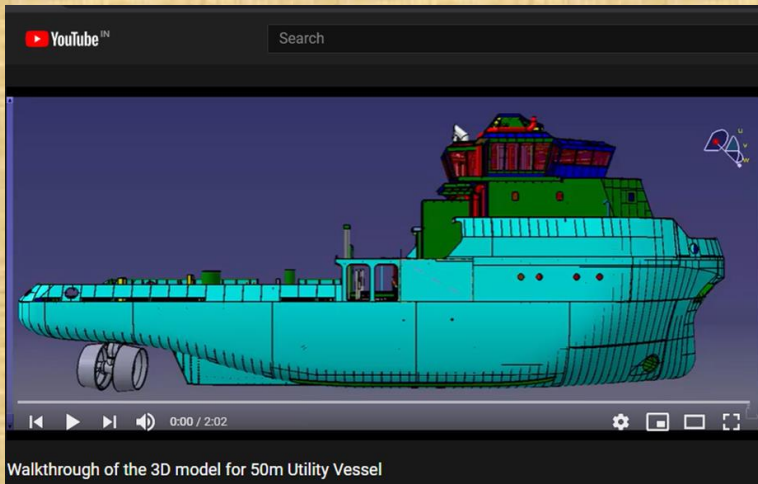


NO	DESCRIPTION OF A.D. DATE	INTC	BY	NO	DESCRIPTION OF A.D. DATE	INTC	BY

DESIGN :	SCALE :	TITLE :	DRAWN BY : CHECKED BY : DATE :
PROJECT :	DATE :	PROJECT :	
APPROVED BY CLASS ENTRY :	DATE :	APPROVED BY INCH (M&E) :	DATE :
DRAWN BY :		SCALE :	PROJECT :
CHECKED BY :		DATE :	PROJECT :
DATE :		PROJECT :	DATE :
APPROVED BY CLASS ENTRY :		DATE :	PROJECT :
APPROVED BY INCH (M&E) :		DATE :	PROJECT :

DESIGNED BY :
 SAIGON STEEL PIPING PTE. LTD.
 20/10/2024
 20/10/2024
 20/10/2024
 20/10/2024

VESSEL AT DELIVERY



For a walk-through of the vessel's 3D model, click on <https://youtu.be/Ng9HXPo7Xkw>

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+65-96390308
<http://www.navnautik.com>