



**SEE LETTER E-123939-180806**

**NOTED FOR INFORMATION**



**PLAN ENDORSED FOR IN-PRINCIPLE APPROVAL**

**13-SEP-2021**

**COCHIN SHIPYARD - CT3240  
40 T BOLLARD PULL ASD TUG -  
ELECTRICAL LOAD CALCULATION  
(Preliminary)**

*This design was developed by Cochin Shipyard Ltd. for Indian Ports Association as a part of ASTDS Package. CSL does not make any representation or warranties, express or implied as to the completeness, accuracy, suitability of the design and it shall be the responsibility of the respective builder/end-user to make its own assessment/evaluation of any such completeness, accuracy, suitability of the design prior to construction and any consequence thereof.*

Revision	Date	Description	Prepared	Checked	Approved
Rev.I	01-Sep-21	For Publishing on IPA website	ANJ	NFC	NFC

COCHIN SHIPYARD LTD  
 ASTDS  
 DESIGN NO: CT3240  
 ELECTRICAL LOAD CALCULATION-AC



Drawing no.: CT3240-850-001  
 Revision: Rev-I /01-09-2021

SFI.NO	CONSUMERS	LOAD DETAILS						SAILING		TUG OPERATION		FIRE FIGHTING MODE		HARBOUR (SHORE SUPPLY)	
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)	L.F.	D.F.	KW	D.F.	KW	D.F.	KW	D.F.	KW	
	<b>PUMP(WATER)</b>														
813.101.01	Fire /Bilge Pump	1	415	8.0	8.0	0.8	0.2	1.3	0.2	1.3	0.2	1.3	0.2	1.3	
813.101.02	Fire /Bilge Pump-Stand-by	1	415	8.0	8.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
813.101.03	Fire pump	1	415	10.0	10.0	0.8	0.2	1.6	0.2	1.6	0.2	1.6	0.2	1.6	
581.103.01	F.W Hydrophore Pump - Working	1	415	2.0	2.0	0.8	0.5	0.8	0.3	0.5	0.3	0.5	0.5	0.8	
581.103.02	F.W Hydrophore Pump - Stand by	1	415	2.0	2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
581.101.01	S.W Hydrophore Pump - Working	1	415	2.0	2.0	0.8	0.5	0.8	0.3	0.5	0.3	0.5	0.5	0.8	
581.101.02	S.W Hydrophore Pump - Stand by	1	415	2.0	2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
581.106.01	Hot Water Circulation Pump	1	415	1.5	1.5	0.8	0.6	0.7	0.2	0.2	0.2	0.2	0.6	0.7	
TBD	Sea Water Cooling pump-1 (Working)	1	415	5.0	5.0	0.8	1.0	4.0	1.0	4.0	1.0	4.0	1.0	4.0	
TBD	Sea Water Cooling pump-2 (Stand-by)	1	415	5.0	5.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	<b>PUMPS (OIL)</b>														
585.101.01	Sewage Transfer Pump	1	415	2.2	2.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	
489.101.01	Oil Dispersant Pump	1	415	4.0	4.0	0.8	0.0	0.0	0.0	0.0	0.8	2.6	0.0	0.0	
701.101.01	FO Transfer Pump	1	415	2.5	2.5	0.8	0.2	0.4	0.0	0.0	0.0	0.0	0.2	0.4	

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SFI.NO	CONSUMERS	LOAD DETAILS						SAILING		TUG OPERATION		FIRE FIGHTING MODE		HARBOUR (SHORE SUPPLY)	
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)	L.F.	D.F.	KW	D.F.	KW	D.F.	KW	D.F.	KW	
701.102.01	Sludge Pump	1	415	2.2	2.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	
	<b>AUXILIARY EQUIPMENT</b>														
571.01	Air Conditioning System for Accom.	1	415	15.0	15.0	0.8	0.7	8.4	0.7	8.4	0.7	8.4	0.5	6.0	
571.02	Air Conditioning System for W/H(Air Cooled)	1	230	2.7	2.7	0.9	0.6	1.4	0.6	1.4	0.6	1.4	0.6	1.4	
571.03	Air Conditioning System for MSB(water Cooled)	1	415	3.0	3.0	0.9	0.7	1.9	0.7	1.9	0.7	1.9	0.7	1.9	
581	Fresh Water Calorifier	1	415	3.0	3.0	0.8	0.4	1.0	0.4	1.0	0.4	1.0	0.4	1.0	
803.101.02	Oily Bilge Separator	1	415	2.5	2.5	0.8	0.2	0.4	0.2	0.4	0.2	0.4	0.0	0.0	
585.101.01	Sewage Treatment Plant	1	415	2.0	2.0	0.8	0.5	0.8	0.5	0.8	0.4	0.6	0.4	0.6	
	<b>COMPRESSORS &amp; RESERVOIRS</b>														
730	Air Compressor-1	1	415	8.0	8.0	0.8	0.3	1.9	0.3	1.9	0.0	0.0	0.2	1.3	
730	Air Compressor-2	1	415	8.0	8.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Refer IRS Letter E-123929-1898

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SFI.NO	CONSUMERS	LOAD DETAILS						SAILING		TUG OPERATION		FIRE FIGHTING MODE		HARBOUR (SHORE SUPPLY)	
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)	L.F.	D.F.	KW	D.F.	KW	D.F.	KW	D.F.	KW	
	<b>VENTILATION FANS</b>														
574	Engine Room Ventilation Fan-1	1	415	12.0	12.0	0.9	1.0	10.8	1.0	10.8	1.0	10.8	0.6	6.5	
574	Engine Room Ventilation Fan-2	1	415	12.0	12.0	0.9	1.0	10.8	1.0	10.8	1.0	10.8	0.6	6.5	
574.1	Galley Supply fan	1	415	0.4	0.4	0.9	1.0	0.3	1.0	0.3	1.0	0.3	0.6	0.2	
TBD	Galley Exhaust fan	1	415	0.4	0.4	0.9	1.0	0.3	1.0	0.3	1.0	0.3	0.6	0.2	
574.2	Sanitary space Exhaust fan-Main Deck	1	415	0.2	0.2	0.8	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1	
574.3	Battery room fan	1	415	0.7	0.7	0.9	1.0	0.6	1.0	0.6	1.0	0.6	0.0	0.0	
574.4	Thruster Room Vent Fan	1	415	0.8	0.8	0.9	0.8	0.5	0.8	0.5	0.2	0.1	0.2	0.1	
574.4	Workshop Vent Fan	1	415	0.8	0.8	0.9	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	
TBD	CO2 Room Supply Fan	1	230	0.2	0.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
TBD	Bosun Store Supply Fan	1	230	0.4	0.4	0.9	0.0	0.0	0.5	0.2	0.5	0.2	0.3	0.1	
TBD	Sanitary space Exhaust fan-Lower Accom.	1	230	0.2	0.2	0.8	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1	

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SFI.NO	CONSUMERS	LOAD DETAILS						SAILING		TUG OPERATION		FIRE FIGHTING MODE		HARBOUR (SHORE SUPPLY)	
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)	L.F.	D.F.	KW	D.F.	KW	D.F.	KW	D.F.	KW	
	<b>NAVIGATION EQUIPMENT</b>														
411	X - Band ARPA radar - Main Supply	1	230	1.6	1.6	0.8	0.7	0.9	0.7	0.9	0.7	0.9	0.0	0.0	
414.2	Echo Sounder - Main Supply	1	230	0.2	0.2	0.8	0.8	0.1	0.8	0.1	0.8	0.1	0.0	0.0	
412	GPS - Main Supply	1	230	0.0	0.0	1.0	0.7	0.0	0.7	0.0	0.7	0.0	0.7	0.0	
414.1	Speed Log - Main Supply	1	230	0.1	0.1	1.0	0.7	0.0	0.7	0.0	0.7	0.0	0.0	0.0	
	<b>METEOROLOGICAL INSTRUMENTS</b>														
417	AIS - Main Supply	1	230	0.2	0.2	0.6	1.0	0.1	1.0	0.1	0.2	0.0	0.0	0.0	
254	Window Wipers	1	230	2.0	2.0	0.8	0.3	0.5	0.3	0.5	0.3	0.5	0.0	0.0	
	<b>MOORING AND ANCHORING FITTINGS</b>														
434	Anchor & Mooring capstain	1	415	72.0	72.0	0.8	0.0	0.0	0.6	34.6	0.0	0.0	0.0	0.0	
	<b>CRANE &amp; DAVITS</b>														
	Boat Davit Winch	1	415	15.0	15.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
331	Crane Power Unit	1	415	48.0	48.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
420	<b>COMMUNICATION</b>														

Refer IRS Letter No. 12/2019 dated September 13, 2021

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SFI.NO	CONSUMERS	LOAD DETAILS						SAILING		TUG OPERATION		FIRE FIGHTING MODE		HARBOUR (SHORE SUPPLY)	
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)	L.F.	D.F.	KW	D.F.	KW	D.F.	KW	D.F.	KW	
	<b>GMDSS Equipment</b>														
420.1	VHF Radio telephone with built - DSC - Main Supply	1	230	0.1	0.1	1.0	0.8	0.1	0.8	0.1	0.8	0.1	0.0	0.0	
420.4	NAVTEX Receiver - Main Supply	1	230	0.0	0.0	1.0	0.8	0.0	0.8	0.0	0.8	0.0	0.8	0.0	
420.5	MF/HF Radio Equipment with DSC - Main Supply	1	415	0.1	0.1	1.0	0.8	0.1	0.8	0.1	0.8	0.1	0.0	0.0	
420.6	Handheld VHF Radio - Charging Station	3	415	0.2	0.6	1.0	0.8	0.5	0.8	0.5	0.8	0.5	0.4	0.2	
420.7	Other Nav & Communication equipments	1	230	1.0	1.0	1.0	0.8	0.8	0.8	0.8	0.6	0.6	0.5	0.5	
	<b>MISCELLANEOUS</b>														
816.101.02	Fire Monitor System	1	230	10.0	10.0	0.8	0.0	0.0	0.0	0.0	0.6	4.8	0.0	0.0	
816.101.03	Monitor	2	230	2.0	4.0	0.8	0.0	0.0	0.0	0.0	0.6	1.9	0.0	0.0	
793	ME 1 Control Supply - Main	1	230	0.2	0.2	0.9	0.8	0.1	0.8	0.1	0.8	0.1	0.0	0.0	
793	ME 2 Control Supply - Main	1	230	0.2	0.2	0.9	0.8	0.1	0.8	0.1	0.8	0.1	0.0	0.0	
793	Thruster Control - Main	2	230	0.1	0.7	0.9	0.8	0.5	0.8	0.5	0.8	0.5	0.0	0.0	
	Workshop Equipment	1	415	1.0	1.0	1.0	0.2	0.2	0.0	0.0	0.2	0.2	0.4	0.4	
551	<b>GALLEY , LAUNDRY&amp; PANTRY</b>														
551.1	Refrigerator	2	230	0.3	0.6	0.8	0.5	0.2	0.5	0.2	0.5	0.2	0.5	0.2	
551.2	Water Cooler	1	230	0.3	0.3	0.8	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1	

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SFI.NO	CONSUMERS	LOAD DETAILS						SAILING		TUG OPERATION		FIRE FIGHTING MODE		HARBOUR (SHORE SUPPLY)	
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)	L.F.	D.F.	KW	D.F.	KW	D.F.	KW	D.F.	KW	
551.3	microwave oven	1	230	0.8	0.8	0.8	0.2	0.1	0.2	0.1	0.2	0.1	0.4	0.3	
551.4	water purifier	1	230	0.1	0.1	0.8	0.5	0.0	0.5	0.0	0.5	0.0	0.5	0.0	
551.6	Garbage disposal units/ Plastic compactors	1	230	1.5	1.5	0.8	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.4	
551.7	Cooking Range	1	415	15.5	15.5	0.8	0.6	7.4	0.6	7.4	0.2	2.5	0.2	2.5	
551.8	Electric Kettle 1 Ltr	1	230	1.5	1.5	0.8	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.0	
552.1	Deep Freezer	1	230	0.5	0.5	0.8	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	
552.2	washing machine with Dryer	2	230	0.5	1.0	0.8	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.3	
552.3	Misc Equipment	1	415	2.0	2.0	0.8	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	
552.4	Misc Equipment	1	230	3.0	3.0	0.8	0.4	1.0	0.4	1.0	0.4	1.0	0.4	1.0	
427	<b>LIGHTS &amp; OTHER EQUIPMENTS</b>														
427.1	General Lighting	1	230	12.0	12.0	1.0	0.6	7.2	0.6	7.2	0.5	6.0	0.2	2.4	

Refer IRS Letter E-13923-1808 dated September 13, 2021

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SFI.NO	CONSUMERS	LOAD DETAILS						SAILING		TUG OPERATION		FIRE FIGHTING MODE		HARBOUR (SHORE SUPPLY)	
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)	L.F.	D.F.	KW	D.F.	KW	D.F.	KW	D.F.	KW	
427.2	Flood Lights	4	230	0.5	2.0	1.0	0.8	1.6	0.8	1.6	1.0	2.0	0.4	0.8	
427.3	Fire and General Alarm System	1	230	0.1	0.1	1.0	0.8	0.1	0.8	0.1	0.8	0.1	0.8	0.1	
427.4	ICCP	1	230	2.2	2.2	1.0	0.8	1.8	0.8	1.8	0.8	1.8	0.8	1.8	
427.5	Search Light	2	230	2.0	4.0	1.0	0.2	0.8	0.2	0.8	0.2	0.8	0.0	0.0	
TBD	Trans-Rectifier cum Battery charger	1	230	1.0	1.0	0.9	0.4	0.3	0.4	0.3	0.4	0.3	0.4	0.3	
								<b>KW</b>		<b>KW</b>		<b>KW</b>		<b>KW</b>	
	<b>TOTAL LOAD:</b>						(A)	75.7	(A)	108.7	(A)	75.1	(A)	48.7	
	DESIGN MARGIN 5%						(B)	3.8	(B)	5.4	(B)	3.8	(B)	2.4	
	GROWTH MARGIN-5%						(C)	3.8	(C)	5.4	(C)	3.8	(C)	2.4	
	<b>TOTAL POWER CONSUMPTION=(A)+(B)+(C)</b>							<b>83.2</b>		<b>119.5</b>		<b>82.6</b>		<b>53.6</b>	

BUS BAR LOADS															
Load Connected To 415V Bus								KW	56.5		89.4		50.1		38.6
Load Connected To 230V Bus								KW	18.8		19.0		24.6		9.7

Refer IRS Letter E-12393-1808 dated September 13, 2021

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SFI.NO	CONSUMERS	LOAD DETAILS				L.F.	D.F	SAILING	D.F	TUG OPERATION	D.F.	FIRE FIGHTING MODE	D.F.	HARBOUR (SHORE SUPPLY)
		QUANTITY	VOLT	POWER (kW)	TOTAL POWER (KW)			KW		KW		KW		KW
	Design Margin 5%						3.8		5.4		3.8		2.4	
	Growth Margin-5%						3.8		5.4		3.8		2.4	
	<b>Total Consumption</b>						<b>82.9</b>		<b>119.2</b>		<b>82.2</b>		<b>53.2</b>	
	Main Generator No. 1 - 175kVA			140 kW			82.9 KW		119.2 KW		82.2 KW		53.2	
	Load on Generator						59.2 %		85.1 %		58.7 %		38.0	
							OR		OR		OR		OR	
	Main Generator No. 2 - 175kVA			140 kW			82.9 KW		119.2 KW		82.2 KW		53.2	
	Load on Generator						59.2 %		85.1 %		58.7 %		38.0	
	415/230V Transformer-1-40kVA Delta/Delta			40/32 kVA/kW			18.8 KW		19.0 KW		24.6 KW		9.7	
	Load on Transformer						58.8 %		59.3 %		77.0 %		30.5	
							OR		OR		OR		OR	
	415/230V Transformer-2-40kVA Delta/Delta			40/32 kVA/kW			18.8 KW		19.0 KW		24.6 KW		9.7	
	Load on Transformer						58.8 %		59.3 %		77.0 %		30.5	

Refer IRS Letter E-123939-1808r dated September 13, 2021



SI No	CONSUMERS	LOAD DETAILS			L.F.	D.F	NORMAL CONDITION		EMERGENCY CONDITION
		QUANTITY	POWER (WATTS)	TOTAL POWER (WATTS)			W	D.F	W
1	AIS-BACK UP SUPPLY	1	30	30	0.5	0.0	0.0	0.7	10.5
2	VHF WITH DSC BACK UP SUPPLY	1	80	80	0.5	0.0	0.0	0.7	28
3	MF/HF RADIO EQUIPMENT - BACK UP SUPPLY	1	80	80	0.5	0.0	0.0	0.7	28
4	NAVTEX RECEIVER - BACK UP SUPPLY	1	12	12	0.6	1.0	7.2	0.7	5.04
5	GPS - BACK UP SUPPLY	1	4	4	0.5	1.0	2.0	0.8	1.6
6	MAGNETIC COMPASS	1	30	30	0.7	0.6	12.6	1.0	21
7	RUDDER ANGLE INDICATOR	1	24	24	0.6	1.0	14.4	1.0	14.4
8	EMERGENCY LIGHT 24VDC: MACHINERY AREA	1	45	45	1.0	0.0	0.0	1.0	45
9	EMERGENCY LIGHT 24VDC: ACCOM AREA	1	72	72	1.0	0.0	0.0	1.0	72
10	ECHOSOUNDER-BACK UP SUPPLY	1	30	30	0.5	0.0	0.0	0.8	12
11	SPEED LOG - BACK UP SUPPLY	1	60	60	0.6	0.7	25.2	0.8	28.8
12	NAVIGATION LIGHTS (13Nosx25W) BACK UP SUPPLY	1	325	325	0.7	0.0	0.0	1.0	227.5
13	RADAR BACK UP SUPPLY	1	20	20	0.8	0.0	0.0	1.0	16
14	ME 1 CONTROL SUPPLY (BACK UP)	1	200	200	0.8	0.0	0.0	1.0	160
15	ME 2 CONTROL SUPPLY (BACK UP)	1	200	200	0.8	0.0	0.0	1.0	160
16	DG1 CONTROL SUPPLY	1	100	100	0.9	0.0	0.0	0.0	0
17	DG2 CONTROL SUPPLY	1	100	100	0.9	0.0	0.0	0.0	0
18	MAIN SWITCHBOARD CONTROL SUPPLY	1	80	80	0.8	1.0	64.0	0.8	51.2
19	THRUSTER CONTROL - BACK UP SUPPLY	2	100	200	0.8	0.0	0.0	1.0	160
20	ELECTRIC SIREN (BACK UP)	1	125	125	0.2	0.0	0.0	0.5	12.5
21	PA/COMMAND SYSTEM (BACK UP)	1	100	100	0.5	0.0	0.0	0.8	40
22	FIRE DETECTION AND ALARM SYSTEM	1	100	100	0.9	0.0	0.0	0.8	72
<b>LOAD CONNECTED TO EMERGENCY SWITCHBOARD (Watts)</b>			<b>WATTS</b>	<b>2017.0</b>			<b>125.4</b>		<b>1165.5</b>

BATTERY CAPACITY CALCULATION	
LOAD CONNECTED TO EMERGENCY SWITCHBOARD (Watts)	1165.5
LOAD ON BATTERY(AMP)	48.56
TOTAL HOURS BACK UP REQUIRED	12
TOTAL AH REQUIRED	582.8
TIME RATE FACTOR	0.7
USAGE FACTOR	0.9
NEW CAPACITY (AH)	925
<b>BATTERY CAPACITY SELECTED(AH),24V</b>	<b>1000</b>

<b>BATTERY CHARGER CALCULATION</b>	
NORMAL POWER REQUIRED(WATTS)	125.4
CURRENT CONSUMPTION(AMP)	5.23
CHARGING CURRENT REQUIRED TO CHARGE THE BATTERY 80% OF CAPCITY IN 10 HRS	80
TOTAL CURRENT REQUIRED	85.23
<b>BATTREY CHARGER RATING(AMP) SELECTED@24V DC</b>	<b>120</b>

Note- Load indicated in the load calculation is preliminary. Load calculation and Battery and battery charger rating to be updated by ship yard/designer while constructing the vessel.

Refer IRS Letter E-123939-180806 dated, September 13, 2021