23,3 m Longliner

SHIP INFORMATION HANDBOOK

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RECORD OF CHANGE

Rev	Detailed subject of modification	Date	Author
A	First issue	26/03/2014	B. Renouf
B	Pages 13 à 15, 37, 63, 94, 103, 122, 123, 142, 143, 149, 150 modified	20/05/2014	C. Revert

FOREWORD

PURPOSE

This document presents the Ship Information Handbook for the 23.3 m New Generation Longliner. It identifies the ship equipment, the operational instructions and the main maintenance operations.
This manual describes a 23.3 m longliner designed by Constructions Mécaniques de Normandie (CMN).

MANUAL ORGANIZATION

This maintenance book is structured in seven sections as follows:

SECTION 1 : GENERAL

SECTION 2 : GENERAL ARRANGEMENTS

SECTION 3 : SHIP EQUIPMENT LIST

SECTION 4 : SYSTEMS FUNCTIONAL DESCRIPTION

SECTION 5 : OPERATING INSTRUCTIONS

SECTION 6 : MAINTENANCE SCHEDULE

SECTION 7 : SCHEMATIC SYSTEMS DIAGRAMS

HOW TO USE THIS MANUAL

The Ship Information Handbook should be used in day-to-day operations and crew familiarization of the Longliner to locate and identify both general areas of the ship and specific equipment and systems.

- Use Section 1 for an overview of the ship.
- Use Section 2 to identify leading characteristics.
- Use Section 3 to identify equipment and systems throughout the ship and to find manufacturer's information and model types of system components.
- Use Section 4 for functional descriptions of specific equipment and systems.
- Use Section 5 for pre-operational checks and required procedures to operate and secure major equipment on the ship.
- Use Section 6 to find maintenance schedule of equipment on the ship.
- Use Section 7 schematic system diagrams to identify fluids and lubricants recommandations (i.e. hydraulic fluid, seawater, and potable water).

LIMITATIONS OF LIABILITY

The present Ship Information Book applies to CMN 23,3m Longliner.

The information supplied in the Ship Information Book is valid at the time of issuing.

Although great care has been taken to provide the best possible information, errors or omissions cannot be excluded.

If you have any doubt or suggestion, please contact CMN.

LIST OF ACRONYMS/ABBREVIATION USED

AC	Alternating Current
A/C	Air Conditioning
ADF	Automatic Direction Finder
Ah	Ampere/Hour
AIS	Automatic Identification System
BNWAS	Bridge Navigational Watch Alarm System
CD	Compact Disc
CPM	Control Panel Module
CPP	Controllable Pitch Propeller
DGPS	Differential Global Position System
DC	Direct Current
DN	Diameter Nominal
DVD	Digital Video Disk
ECDIS	Electronic Charting Digital Information System
EOS	Electro-Optical System
EPIRB	Emergency Position Indicator Radio Beacon
FM	Frequency Modulated
FPP	Fixed Pitch Propeller
Fwd	Forward
GMDSS	Global Maritime Distress and Safety System
GP	Generator Panel
GPS	Ground Positioning System
HF/SSB	High Frequency / Single Side Band
HP	Horsepower
HVAC	Heating, Ventilating and Air Conditioning
Hz	Hertz
IMM	International Maritime Mobil
kG	Kilogram
kvA	Kilovolt Ampere
kW	Kilowatt
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
m	Meter
ME	Main Engine

MECS	Modular Electronic Control System
MEP	24 VDC Main Engine Panel
MF BLU	Moyenne Fréquence / Bande Laterale Unique
mm	Millimeter
NA	Not Applicable
NC	Not Codified
NiCad	Nickel Cadmium
NMEA	National Marine Electronics association
NUC	Not Under Command
OEM	Original Equipment Manufacturer
PH	Pilothouse
PMM	Maintenance Manual
Port	Portside
psi	Pounds per square inch
PTO	Power Take Off
RAM	Restricted Ability to Maneuver
RHIB	Rigid Hull Inflatable Boat
RPM	Revolutions per Minute
SART	Search And Rescue Radar Transponder
SEL	Ship Equipment List
SOLAS	Safety Of Life At Sea
Stbd	Starboard Side
SW	Sea Water
TBD	To be determined
V	Volt
VAC	Volts Alternating Current
VCR	Video Cassette Recorder
VDC	Volts Direct Current
VHF	Very High Frequency
VMS	Virtual Memory system
W	Watt

LIST OF FIGURES

LIST OF MANUFACTURER'S DOCUMENTATION

N°	EQUIPMENT DESCRIPTION	ORIGINAL SUPPLIER	DOCUMENTATION TYPE	DOCUMENTATION REFERENCE	CD
1	Centrifugal Water Separator Unit 760l/h	Alfa Laval	Separator Manual MIB 303S-13/33	9001834-02 Rev.2	1
			Spare Parts Catalogue MIB 303S-13/33	9001946-02 Rev.1	
			System manual MIB 303 Separation System, AC Module	9001928-02	
2	Main Propulsion Diesel Engine	Enéria	Operation & Maintenance Manual C32 Marine Engine (Caterpillar)	SEBU8773-02 October 2013	1
3			Parts Manual C32 Marine Engine (Caterpillar)	SEBP6147 November 2012	
4	Generator Set AC400V-50Hz	Enéria	Operation & Maintenance Manual C4.4 (Mech) Marine Generator Set MCS-3 (Caterpillar)	SEBU8607-01 March 2013	1
5			Parts Manual C4.4 - Marine Gen Set (Caterpillar)	SEBP4152 June 2009	
6	Generator Set AC400V-50Hz	Enéria	Alternator LSA 43.2/44.2-4 poles - Installation & Maintenance	3434 en-2011.06/j	1
			Alternator LS R438 A.V.R.- Installation & Maintenance	3971 en-2010.11/f	
			Alternator LS Generals recommandations for storing & installing alternators	2261 - 2008.10/d	
			Deap Sea Electronics Pic - Model 520 - Remote Start Engine Management System - Ooperators Manual	DES 520 / ISSUE 4 KT	
	Engine Control Station (Analog Control Head)	Enéria	Twin Disc - Marine Control System Model EC300 System Operation & Maintenance Manual	1024421	
	Reverse & Reduction Gear Box	Enéria	Twin Disc - Marine Transmission MG & MGX-5222DC/5225DC- Service Manual	1023375 1/3	
	Fuel Oil/Water Static Duplex Separator - for Main Engine	Enéria	7590MAX & 751000MAX Marine Fuel Filter/Water Separators	Instruction part Number 19536 Rev A June 2010	
	Fuel Oil Sedimenter / Water - for Genset	Enéria	7240 (kit) Parts List	02/02/7273	
	Fire Detection Panel	Marinelec	DI09 - Installation & User Manual	DI09_MANUAL_GB REV2	
			DI09 - Product Specifications	DI09 FP GB REV 0.doc	
			Accessories Conventionale Fire Detection - PG01 Product Data Sheet	FP DETECTEURS CONV GB REV 1	
	Navigation Lights Monitoring & Control Panel	Marinelec	NORMA - Product Specifications PG 3	NORMA FP GB REV 1.doc	
			NORMA CP - Installation & User Manual	NORMA_CP_MANU GB rev1	
			NORMA CPU - Installation & User Manual	NORMA_CPU_MANU GB rev3	
	Automatic Sound Signals Sequencer	Marinelec	CAPELLA V2 - Monitoring of sound signals	MANUAL CAPELLA V2 INDICE B.doc	
			CAPELLA V2 - Automatic Sound Signals Sequencer	CAPELLA_V2 FP GB A	
	Bilge Alarm Panel	Marinelec	ALTAIR V2 - Faullt Detection	NFALTAIRV2GB B	
			ALTAIR 8 V2 - Faullt Detection Panel	ALTAIR V2 FP GB C	
	Bilge Alarm Acquisition Box	Marinelec	ALTOR4/ALTOR8 - Installation & User Manual	ALTOR8 ALTOR4 MANUEL_GB_rev_0 17/04/2014	
			ALTOR8 - PG 07 Product Specifications	FP ALTOR8 GB REV H.doc	

N°	EQUIPMENT DESCRIPTION	ORIGINAL SUPPLIER	DOCUMENTATION TYPE	DOCUMENTATION REFERENCE	CD
6	Bridge Navigational Watch Alarm Box	Marinelec	LYNX V3S - Installation & User Manual	LYNX_V3S_MANU_GB_rev0.doc	1
			LYNX V3S - Product Specifications	FP LYNX V3S FR REV D.doc	
	Battery Master Switch	Reya	Tehcnical Data Sheet Double pole main switch with auxiliary circuit and manual control	20110907	
	Windlass	Tripomet	Electric Station for Control Electric Winch - Technical Manual	TEVM400V/3KW-24 Rev 0	
			Wire Anchor Winch - Technical Book	DWG.AW13-E-00;00-813FD	
	CO2 Extinguishing system	Tyco	Technical document	REF TM659048	
	Heating - Ventilation & Air Conditioning System	Webasto	Marine Self-Contained Air-Conditioning Systems - Installation instructions Blue Cool S Series	WBLC010535A - 11/12	
	Sea Water E-Pump 1,3m3/h	Webasto	Technical Data Sheet	01ACP202 GW_ST 22/07/13	
			GIANNESCHI Pumps & Blowers "CP20G"	CP20G 04/2010	
			GIANNESCHI Pumps & Blowers First Start Instruction	-	
	Relay Box - SW E-Pump	Webasto	Installation instruction relay boxes BlueCool, several units, one sea water pump	WBCL010572A 7/13	
7	Steering Gear	Fluidmecanica	Manual Instructions & General Maintenance	LBI003053	1
8	Internal & External Communication System	Marelec	Operator & Installation Manual	From AIS to RAD	1
9				From RD33 to VMS	
10	Refrigeration Plant for Fish Hold & Freezing Tunnel	Paumier	Technical Manual Longliner	04.111.02	1
11	Gel batteries	Seimi	Technical Support	Version 0 date : December 12th 2013	1
	Lighting				
	Searchlights				
	Navigation Lights				
	Ship's Whistle				
	Windscreen Wipers				
	AGM Batteries				

N°	EQUIPMENT DESCRIPTION	ORIGINAL SUPPLIER	DOCUMENTATION TYPE	DOCUMENTATION REFERENCE	CD
12	Inflatable Liferaft Flat 8 Men Pack B	Arimar	Deep Sea SOLAS Liferafts-Installation, use & Maintenance Manual	MC 610895 - 10/10/2005	1
	Hydrostatic Release Unit	Arimar	Hammar H20 Manual - Mounting Instructions	Art.no.HT-0019/03	
	Fishing Equipment	Bopp	Longliner Deck Equipment	A13036	
	Fan Unit, Helicoïd - Air Exhaust	Enag	Tropicalized Exhaust Fan - Maintenance Guide	20097DAA	
	Converter, Static - AC230V/DC24V 60A	Enag	Utilisation Manual	CDS3-3M-DED	
	GMDSS Power Supply Box	Enag	Utilisation Manual	06715DAC	
	Shafting Line and Fixed Pitch Propeller (FPP)	France Hélices	Assembly Instructions	CMN Palangrier 450 - 16/01/14	
			Handbook & Operating Instructions	Specification 07/2001 Rev 0	
	Radio-Buoy with GPS for Longline Fishing	Isifish	M2P Buoy User's Manual	-	
			M2P Monitoring System Longline Fishing MSB-PALANGRE	-	
			M2P Monitoring System Longline Fishing MSB-CACEA	-	
	Electric Winch AC220V 500kg	Magi	TRBoxter 250 à 500 kg - Instruction Manual	188-178.12/1	
	Fan Unit, Centrifugal 100/400m3/h	Ouest Isol	Assembly Instruction - Tube Fan (metal)	mrm_pb_08_k10031 print 23.01.2013	
	Sea Water Centrifugal Selfpriming E-Pump 10m3/h 20m	Semim	Operation & Instruction Manual - Centrifugal Selfpriming Pumps	CA 05/12	
	Fresh Water Pressure Centrifugal E-Pump Unit 2,5m3/h 31,5m + 20 litre Receiver	Semim	Instruction Manual - Centrifugal Pumps Series CP	CPANLN 05/11	
	Sea Water Centrifugal Selfpriming Main Firefighting E-Pump 25m3/h 30m	Semim	Instruction Manual - Side Channel mustistage selprimming Pumps Series SP	sp 1/12	
13	AC 400V - 50Hz Electrical Network	SA2I	Technical Documentation	-	1

PAINT SCHEDULE

PRODUCTS

Manufacturer : International Paints

Product	Paint Type	Product Code	Colour	Thinner
Intergard 269	Epoxy Primer/Tie Coat	EGA088/EGA089	Red	GTA220
Intergard 7600	Pure Epoxy Primer Universal	KUA763/KUA764	Grey	GTA220
Interline 925	Epoxy Coating for Tank	THA125/THA127	White RAL 9016	NA
Interprime 539	Without Chromate Etch Primer	VTA538	Yellow	GTA220
Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	GTA220
Intershield 300	Abrasion Resistant Aluminium Pure Epoxy	ENA301/ENA303	Aluminium	GTA220
Intershield 300	Abrasion Resistant Aluminium Pure Epoxy	ENA300/ENA303	Bronze	GTA220
Intersleek 737	Intermediate Elastomer Type	BXA736/BXA738/BXA739	Pink	GTA007
Intersleek 757	Anti-Adhesive Elastomer Paint	BXA755/BXA758/BXA759	Black	GTA007
Interthane 990	Polyurethane Finish	PHB000/PHA046	White RAL 9016	GTA056, GTA713, GTA733
Interthane 990	Polyurethane Finish	PHB953/PHA046	Blue RAL 5005	GTA056, GTA713, GTA733
Interthane 990	Polyurethane Finish	PHZ651/PHA046	Grey RAL 7040	GTA056, GTA713, GTA733
Interthane 990	Polyurethane Finish		Grey RAL 7035	GTA056, GTA713, GTA733

PAINT SYSTEMS

Product	Paint Type	Product Code	Colour	Dry Thickness Microns
Underwater Areas and Sea Chests – Area : 248 m²				
Intershield 300	Abrasion Resistant Aluminium Pure Epoxy	ENA301/ENA303	Aluminium	125
Intershield 300	Abrasion Resistant Aluminium Pure Epoxy	ENA300/ENA303	Bronze	125
Intersleek 737	Intermediate Elastomer Type	BXA736/BXA738 /BXA739	Pink	100
Intersleek 757	Anti-Adhesive Elastomer Paint	BXA755/BXA758 /BXA759	Black	150
Topsides Area & Stern Gantry - Area : 113 m²				
Intershield 300	Abrasion Resistant Aluminium Pure Epoxy	ENA301/ENA303	Aluminium	200
Interthane 990	Polyurethane Finish	PHB000/PHA046	White RAL 9016	50
Interthane 990	Polyurethane Finish	PHB000/PHA046	White RAL 9016	50
Topsides Area (Blue Area) - Area : 35 m²				
Interthane 990	Polyurethane Finish	PHB953/PHA046	Blue RAL 5005	50
Interthane 990	Polyurethane Finish	PHB953/PHA046	Blue RAL 5005	50
Open Decks - Area : 103 m²				
Intergard 7600	Pure Epoxy Primer Universal	KUA763/KUA764	Grey	200
Interthane 990	Polyurethane Finish	PHZ651/PHA046	Grey RAL 7040	50
Interthane 990	Polyurethane Finish	PHZ651/PHA046	Grey RAL 7040	50
Deck Gear & Radome - Area : 92 m²				
Intergard 7600	Pure Epoxy Primer Universal	KUA763/KUA764	Grey	200
Interthane 990	Polyurethane Finish	PHB000/PHA046	White RAL 9016	50
Interthane 990	Polyurethane Finish	PHB000/PHA046	White RAL 9016	50
Aluminium Superstructures & Mast - Area : 79 m²				
Intergard 269	Epoxy Primer/Tie Coat	EGA088/EGA089	Red	50
Intergard 7600	Pure Epoxy Primer Universal	KUA763/KUA764	Grey	100
Interthane 990	Polyurethane Finish	PHB000/PHA046	White RAL 9016	50
Interthane 990	Polyurethane Finish	PHB000/PHA046	White RAL 9016	50
Aluminium Superstructures (Blue Area) – Area : 5 m²				
Interthane 990	Polyurethane Finish	PHB953/PHA046	Blue RAL 5005	50
Interthane 990	Polyurethane Finish	PHB953/PHA046	Blue RAL 5005	50
Main working area, bulwark, walls and ceiling - Area : 209 m²				
Intergard 7600	Pure Epoxy Primer Universal	KUA763/KUA764	Grey	200
Interthane 990	Polyurethane Finish		Grey RAL 7035	50
Interthane 990	Polyurethane Finish		Grey RAL 7035	50

Main working Deck - Area : 92 m²

Product	Paint Type	Product Code	Colour	Dry Thickness Microns
Intergard 7600	Pure Epoxy Primer Universal	KUA763/KUA764	Grey	200
Interthane 990	Polyurethane Finish	PHZ651/PHA046	Grey RAL 7040	50
Interthane 990	Polyurethane Finish	PHZ651/PHA046	Grey RAL 7040	50

Nobel Clad Weld - Area : 9 m²

Intergard 7600	Pure Epoxy Primer Universal	KUA763/KUA764	Grey	100

Steering Gear Area - Area : 170 m²

Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	150

Engine Room - Area : 394 m²

Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	150

Fish Hold under insulation & under Floor - Area : 300 m²

Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	125

Accomodations, Wals, Floors & Ceilings - Area : 269 m²

Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	125

Ventilation Galvanized Ducts - Area : 31 m²

Interprime 539	Without Chromate Etch Primer	VTA538	Yellow	15
Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	125

Stell Pedestal and Pipes - Area : 185 m²

Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	125

Aluminium Pedestal and Pipes - Area : 60 m²

Intergard 269	Epoxy Primer/Tie Coat	EGA088/EGA089	Red	

Tweendeck Fore Peak - Area : 117 m²

Interseal 670 HS	Surface Tolerant Epoxy	EGD704/EGA247	Grey	125

Fresh Water Tank - Area : 14 m²

Interline 925	Epoxy Coating for Tank	THA125/THA127	White RAL 9016	300

SAFETY INFORMATION

GENERAL SAFETY NOTICES

The following general safety notices supplement specific warnings and cautions appearing in manufacturers and suppliers manuals.
General precautions must be understood and applied during operation and maintenance.
The following general safety notices supplement specific warnings and cautions appearing elsewhere is this manual. General precautions must be understood and applied during operation and maintenance. The Captain or other authority will issue orders as deemed necessary for any situation not covered in the general and specific safety precautions.

FIRST AID

An injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

EQUIPMENT LOCKOUT/TAGOUT

Operating personnel shall turn off and disconnect the machinery or equipment from its energy source before performing service or maintenance and the authorized personnel either lock or tag the energy-isolating device to prevent the release of hazardous energy and take steps to verify that the energy has been isolated effectively.

DO NOT REPAIR OR ADJUST ALONE

Under no circumstance should any person reach into or enter equipment enclosures for the purpose of servicing or adjusting equipment except in the presence of personnel capable of rendering aid.

HIGH VOLTAGE PREVENTION

Never work alone with high voltage. Have a partner who knows how to disconnect the power and who knows Cardio Pulmonary Resuscitation. A healthy person can be easily restarted after electrocution. High voltages may not kill, but can cause dangerous currents to flow.
Rule of thumb: 1 mA (milli-Ampere, or 0.001 Amps) is startling, 10 mA is painful, 100 mA can cause the heart to go into fibrillation or stop. An old electrician's trick to avoid accidental passage of electricity through the heart is to work with one hand and keep the other hand in a pocket.

IN CASE OF ELECTROCUTION REMOVE THE POWER! Don't become an additional victim

Turn off or disconnect power source. If unable to reach a switch or plug, use an insulated tool such as a wooden broom handle or rolled up paper to separate the victim from the power source. If extremely high voltages are present, use only the best insulators, like a clean, dry PVC pipe. Check if the victim is conscious. If victim is unconscious check for breathing and pulse, administer Standard CPR if needed. Once consciousness is restored, check for burns. Administer Standard First Aid for burns.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must observe all safety regulations at all times. Do not replace components, make adjustments or perform internal equipment maintenance without first securing electrical power.
Potentially dangerous current may still exist when the electrical power is in the "OFF" position because of charges retained by capacitors.
Before touching, always secure electrical power and discharge the circuit by shorting through a load to ground with a shorting probe.

ENERGIZED EQUIPMENT

Before working on energized equipment obtain Captain approval. Ensure personnel protective measures are taken to prevent grounding.
Energized equipment can be considered any component that has electrical, hydraulic or fluid power energy contained within, as well as, a high potential to transfer that energy from the component to another object.
Replacement or repair of components should be done only after the affected circuit has been secured, locked out and tagged out.
Replacement or repair of components with the circuit still energized may result in serious injury or death.
Take great care when working around energized electrical equipment.
Contact between unprotected body parts and electrical conductors can cause serious injury or death.
Do not wear jewelry or other conductive items while servicing energized electrical equipment.
Failure to comply with these precautions can cause serious injury or death.
Never work alone.

ROTATING AND RADIATING EQUIPMENT

Secure all rotating and radiating equipment prior to personnel going aloft to perform related maintenance items.
A safety watch shall be posted if equipment must be repaired/adjusted while in motion.
The safety watch must have a full view of the repair/adjustment operation and immediate access to controls that can stop the equipment in motion.

FUEL HANDLING

Fuel vapors are explosive.
Fuel is flammable.

Before fueling the tanks or transferring fuel, ensure that firefighting equipment is immediately available for use in case of fire emergency.
Do not smoke or allow smoking, or any other open flame in the vicinity of the fueling operation.
Wipe clean any fuel spillage and dispose of spilled fuel in accordance with the appropriate regulations.
Failure to comply can result in death or serious injury.

BATTERIES

Batteries are filled with a sulfuric acid based electrolyte.
This electrolyte is extremely corrosive to human tissues and many other materials.
If spilled electrolyte comes in contact with clothing or other material, wash the affected area with large volumes of fresh water.
If the electrolyte comes in contact with the skin, flush the area with large volumes of fresh water.
If the electrolyte comes in contact with the eyes, flush them with large volumes of fresh water.
Acids can be neutralized with SodiumBicarbonate, $NaHCO_3$, beware of possible violent chemical reaction.
Mixing strong acids and alkalis can cause violent chemical reactions.
Continue flushing the affected area until medical assistance arrives.
Failure to comply can result in death or serious injury.
Batteries produce hydrogen gas which is explosive.
Keep the work area free of sparks, open flame, and excessive heat.

OILS AND CLEANING SOLVENT

Do not allow hydraulic fluid, engine oil or cleaning solvents to come in contact with unprotected skin or eyes.
Prolonged skin contact can cause illness or injury.
Eye contact can cause serious injury.
Always wear chemical protective gloves and goggles when handling hydraulic fluid, engine oil and cleaning solvents.
Failure to comply can result in death or serious injury.
Cleaning solvents are flammable and their vapor is potentially combustible or explosive.
Do not use cleaning solvents in the vicinity of sparks, open flame or excessive heat.
Do not use cleaning solvents in unventilated spaces.
Failure to comply can result in death or serious injury.

CHAPTER 1 – SHIP CHARACTERISTICS

1-1. INTRODUCTION

1-1-1. Ship type and brief description

The ship is mainly used as a longliner.
The rate of use is about 290 days per year for catching capacity of 960t tuna per year.
Each campaign lasts approximately 10 days.
The boat is designed and life saving appliances provided for in accordance with the requirements of the French Flag Authorities for operations in 2nd category of navigation (up to 200 miles from safe heaven and with maximum voyage distance of 600 miles).
The propulsive power is 559 kW.
The gross tonnage of the longliner is about 164 UMS.

1-1-2. Hull shape

Hard-chine displacement hull.
The hull shape is designed to reduce the resistance and so the fuel consumption: a bulb improves the resistance (decreases the resistance) and pitch damping.
Two bilge keels are welded to the hull to reduce rolling amplitude.
Zinc anodes are located on the hull below the waterline to protect the underwater hull of electrolytic corrosion.

1-2. SHIP CHARACTERISTICS

The characteristics mentioned in this document can be slightly modified to allow possible improvements in the performances, the capacities or the construction of the ship.

1-2-1. Main Characteristics

Length overall	: 23.3 m
Length between perpendiculars	: 21.9 m
Breadth at deck level	: 8.0 m
Depth midships	: 4.0 m
Draught midships (approx.)	: 3.2 m
Maximum draught (stern draught)	: 3.5 m

1-2-2. Crew

Captain : 1
Crew : 7
Total : 8 men

1-2-3. Capacities

Fuel oil : 33000 l
Fresh water : 3000 l
Provisions : 12 days
Fish hold : 30 tonnes

1-2-4. Speed

The maximum free running speed of the ship is approximately 9.5 knots and is achieved in the following conditions:

- With medium load
- Full crew
- 50% of fuel oil and new lube oil
- 100% of water (fresh water)
- 50 % of fish in fish hold (12 t)
- Deep sea
- Sea state 2
- Wind speed < 10 knots
- Ambient temperature : 35°C
- Sea water temperature : 26°C

The propulsion is optimized for needed longlining speed, for long line deployment and recovery.

1-2-5. Range

The range is 10 days (with provisions for 12 days).

1-2-6. Manœuvrability

One rudder with hydraulic steering gear.

1-3. RULES AND STANDARDS

1-3-1. Rules

The ship is compliant with the following rules:

- More particularly its divisions 110, 211, 214, 217, 219 & 226; as far as Rule in appendix to the French Flag Authority Decree dated 23/11/1987 and practicable for this type of ship
- IMO Global Maritime Distress Safety System (GMDSS A1 +A2)
- International Tonnage measurement regulations (1969)
- The ship is marked according to COLREG regulations

The structure is designed according to Bureau Veritas classification society rules.

1-3-2. Certificates

Magnetic compass deviation curve.
Stability and load line certificates.

1-3-3. Stability

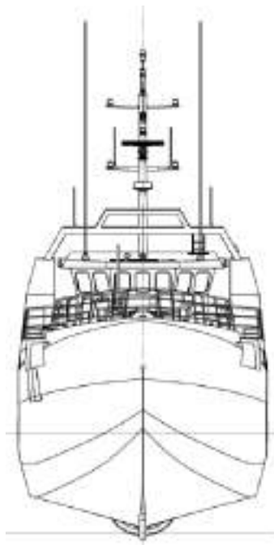
The ship is divided in 5 watertight compartments (4 watertight bulkheads).

1-3-4. Applicable standards

All the equipments and the materials are in accordance with the applicable standards for this type of ship.

1-3-5. Quality insurance

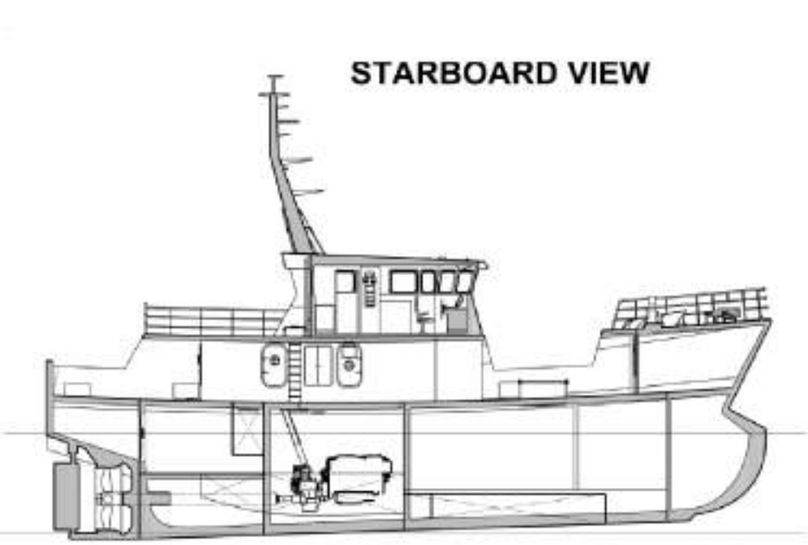
CMN is certified ISO 9001 (V 2008) by the Bureau Veritas Quality International (BVQI).



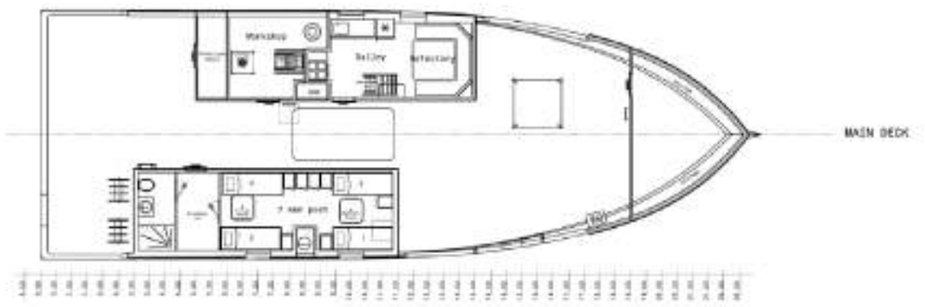
FRONT VIEW

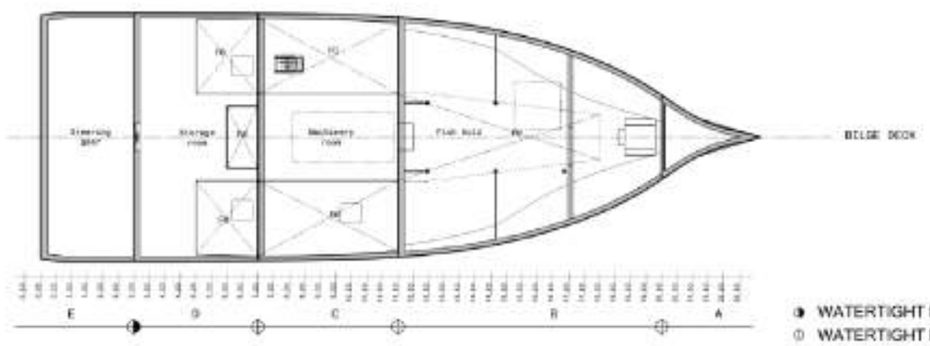
STARBOARD VIEW

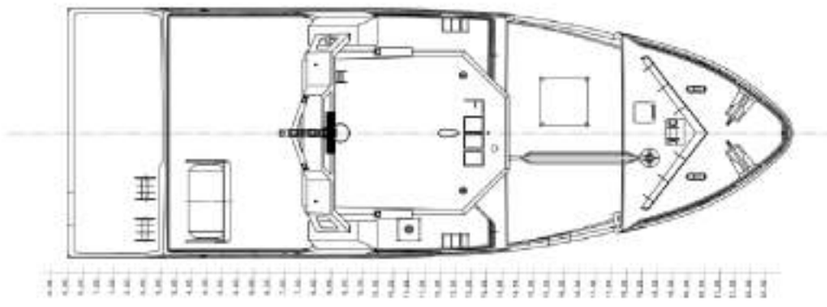
AFT VIEW

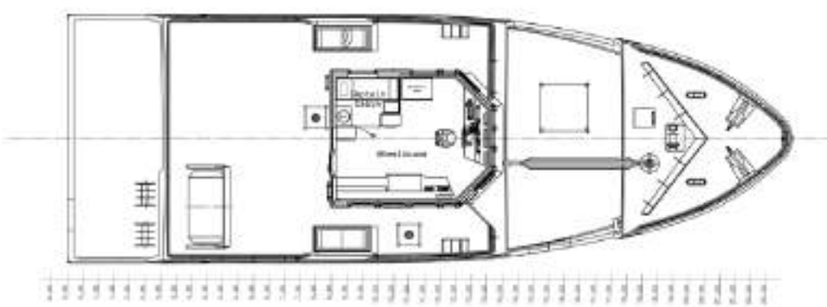


STARBOARD VIEW





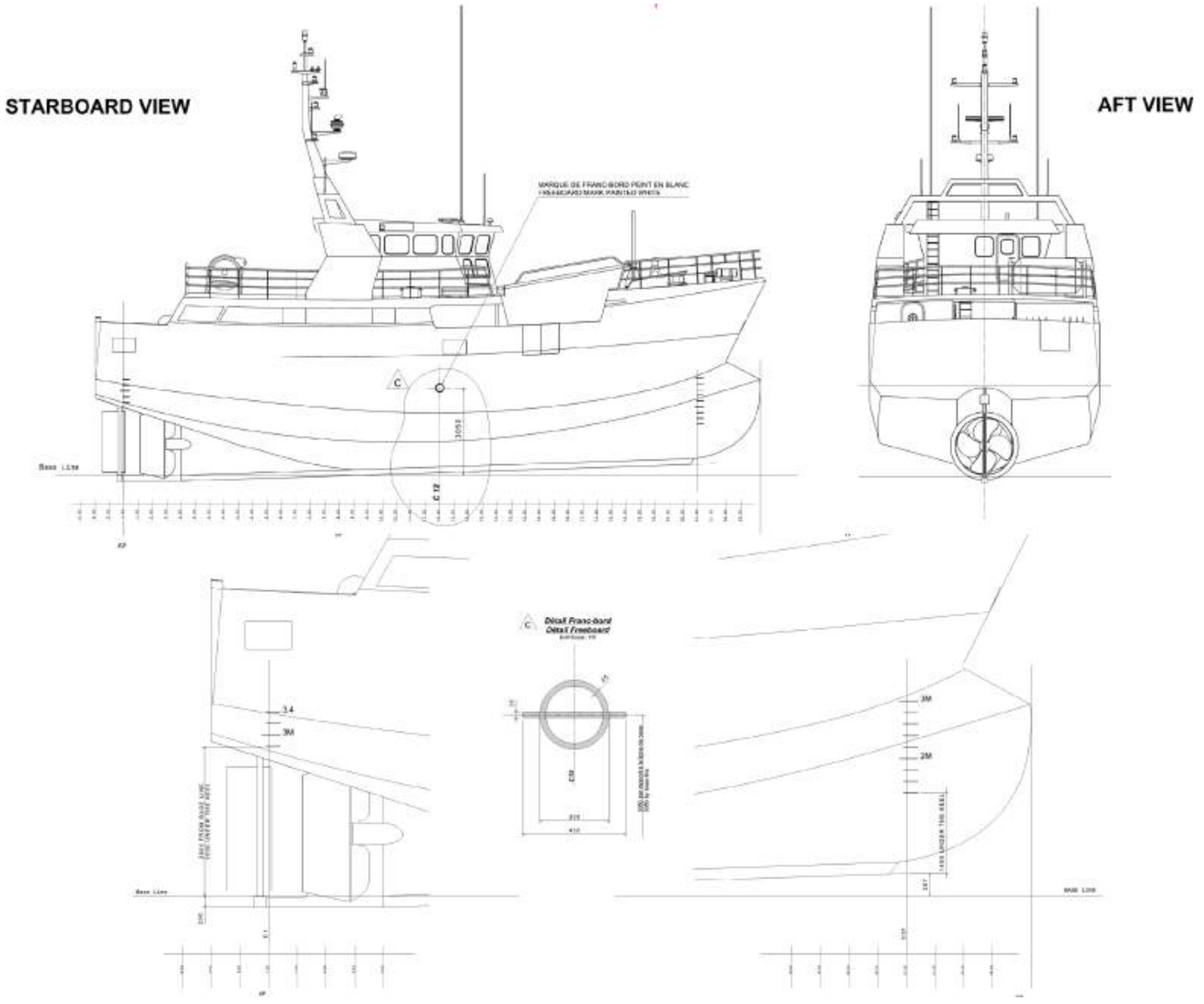




◑ WATERTIGHT BULKHEAD WITH DOOR
⓪ WATERTIGHT BULKHEAD

Length overall:	23.3 m
Length between perpendiculars:	21.9 m
Maximun breadth:	8.0 m
Depth midships:	4.0 m

Figure 1-1 General Arrangement



Doc. Title	Ship Information Handbook	CMN	26 / 205
Doc. Reference	23,3 m Longliner		
Doc. Revision & Date	B - 20/05/14		

Figure 1-2 - Draught Marks

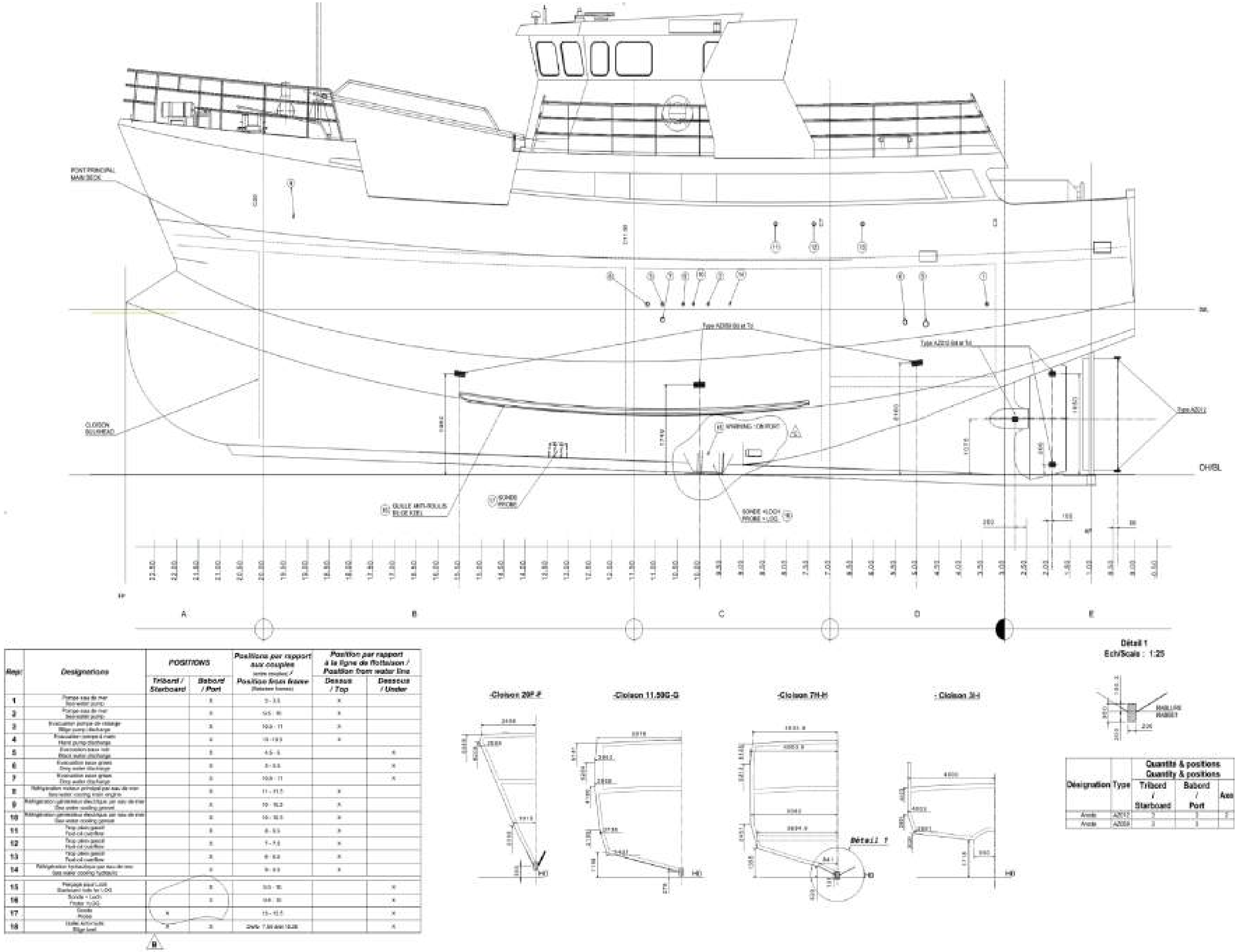
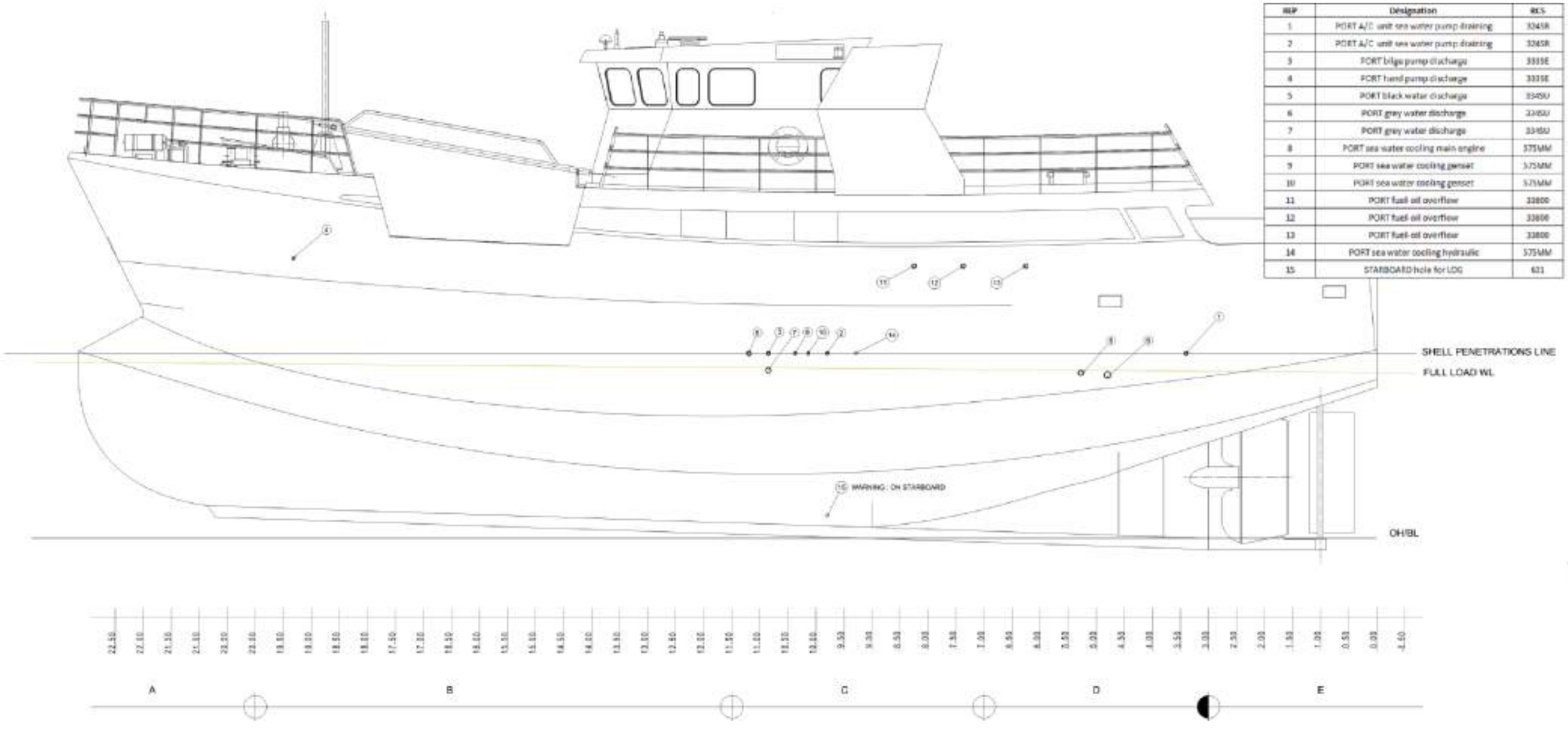


Figure 1-3 Docking Plan

Doc. Title	Ship Information Handbook		27 / 205
Doc. Reference	23,3 m Longliner		
Doc. Revision & Date	B - 20/05/14		



REP	Designation	REF.
1	PORT A/C unit sea water pump draining	3245R
2	PORT A/C unit sea water pump draining	3245R
3	PORT bilge pump discharge	3335E
4	PORT hand pump discharge	3335E
5	PORT black water discharge	3345U
6	PORT grey water discharge	3345U
7	PORT grey water discharge	3345U
8	PORT sea water cooling main engine	575MM
9	PORT sea water cooling genset	575MM
10	PORT sea water cooling genset	575MM
11	PORT fuel oil overflow	33800
12	PORT fuel oil overflow	33800
13	PORT fuel oil overflow	33800
14	PORT sea water cooling hydraulic	575MM
15	STARBOARD hole for LOG	621

Figure 1-4 Shell Penetrations

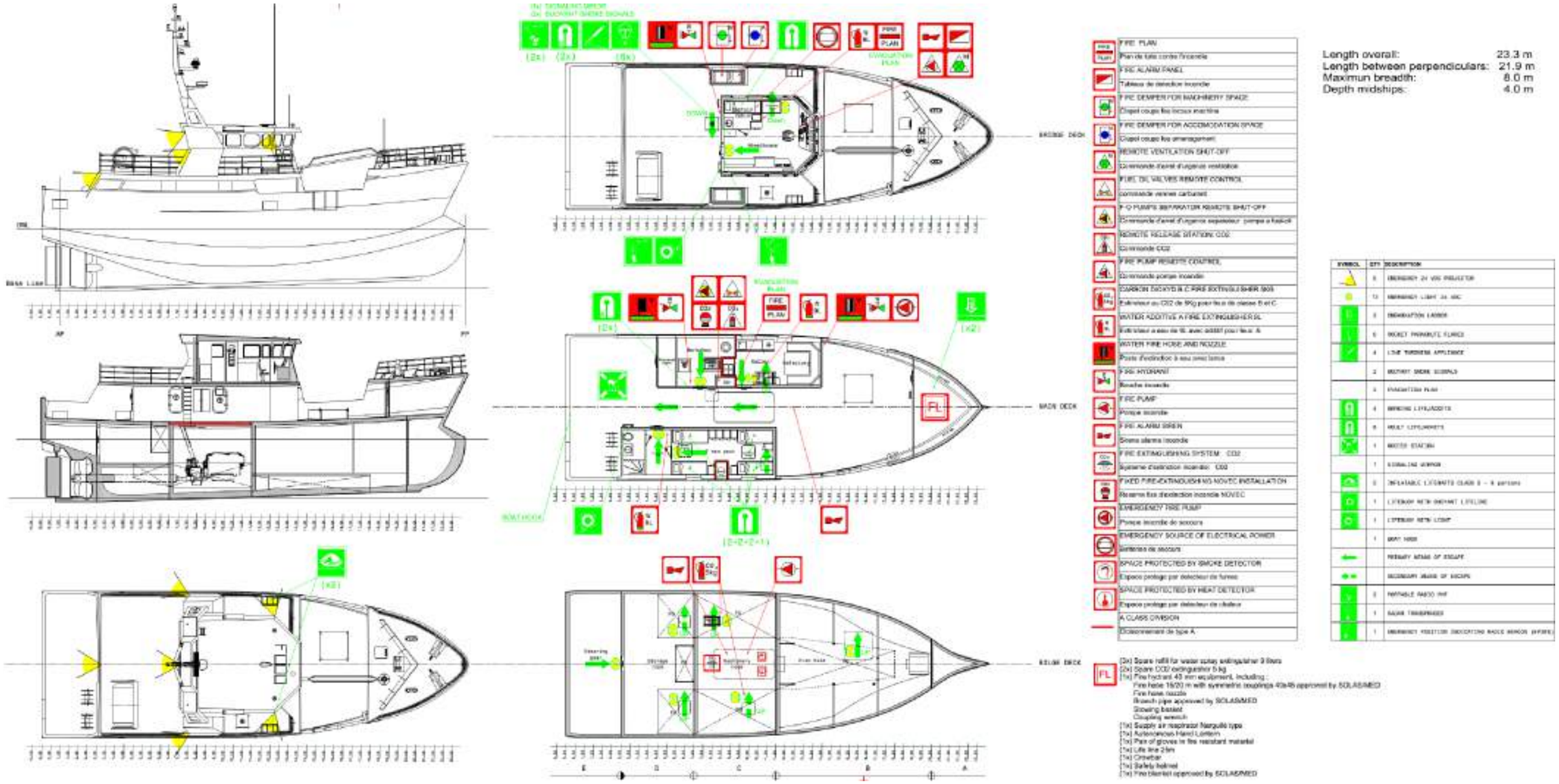
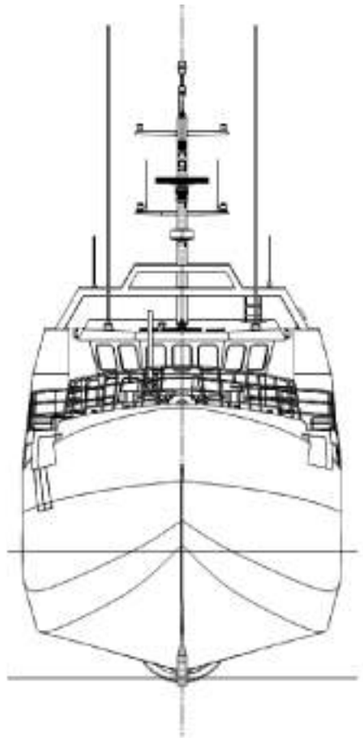
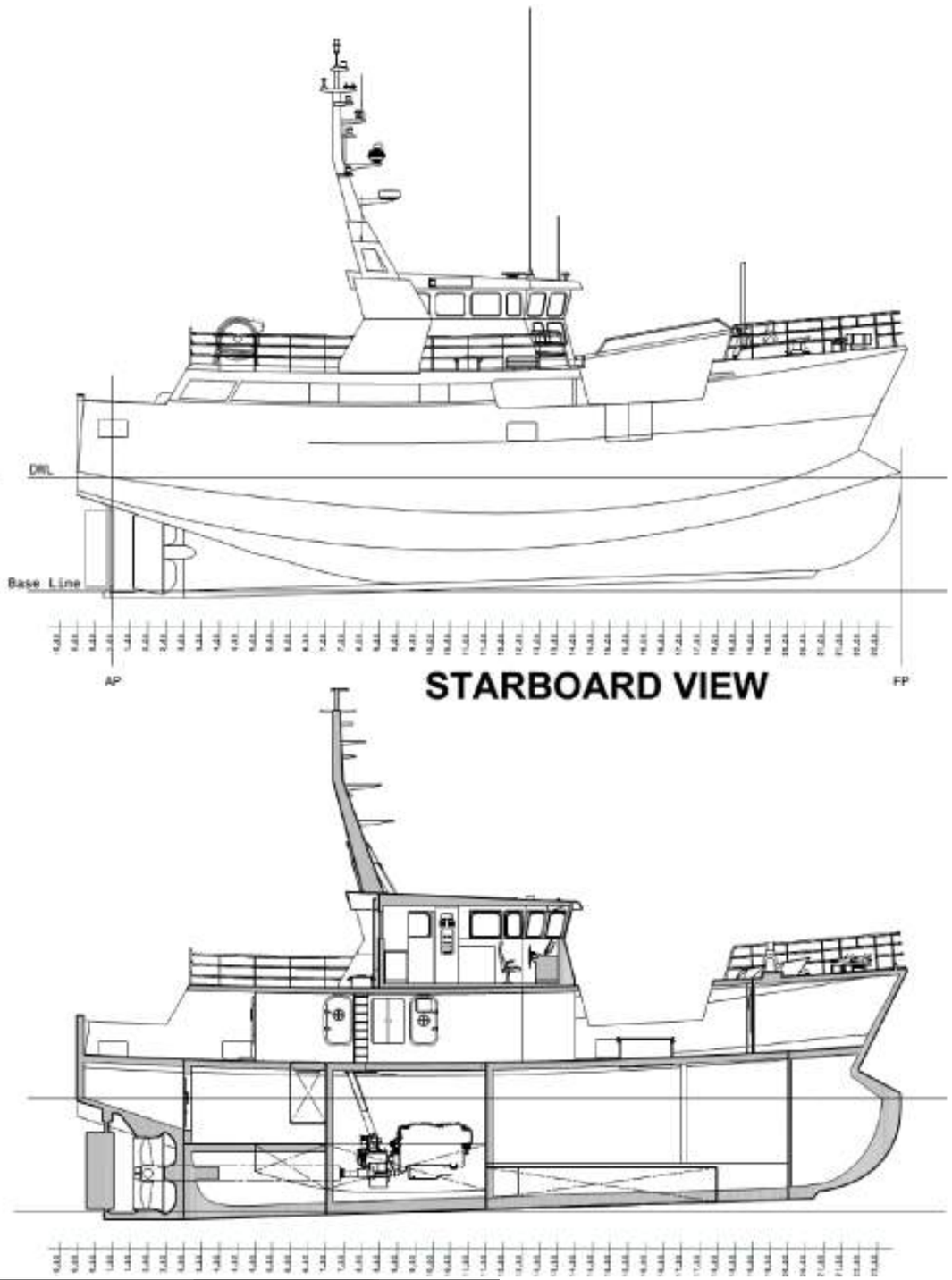


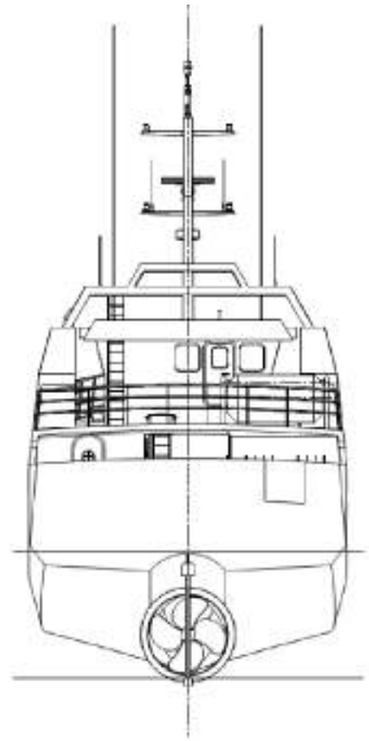
Figure 1-5 Life Saving



FRONT VIEW



STARBOARD VIEW



AFT VIEW

Length overall:	23.3 m
Length between perpendiculars:	21.9 m
Maximun breadth:	8.0 m
Depth midships:	4.0 m

Figure 1-6 Outboard & Inboard Profiles

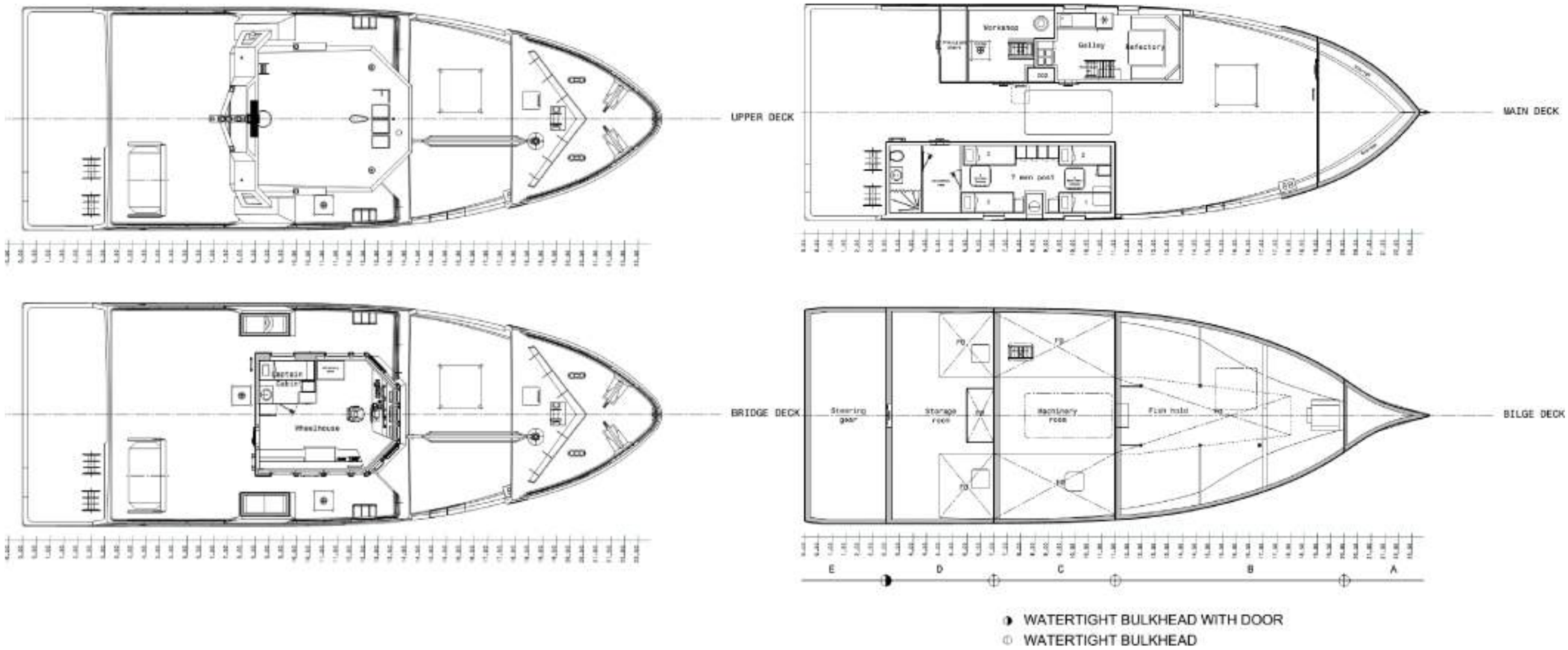


Figure 1-7 Outboard & Inboard Decks

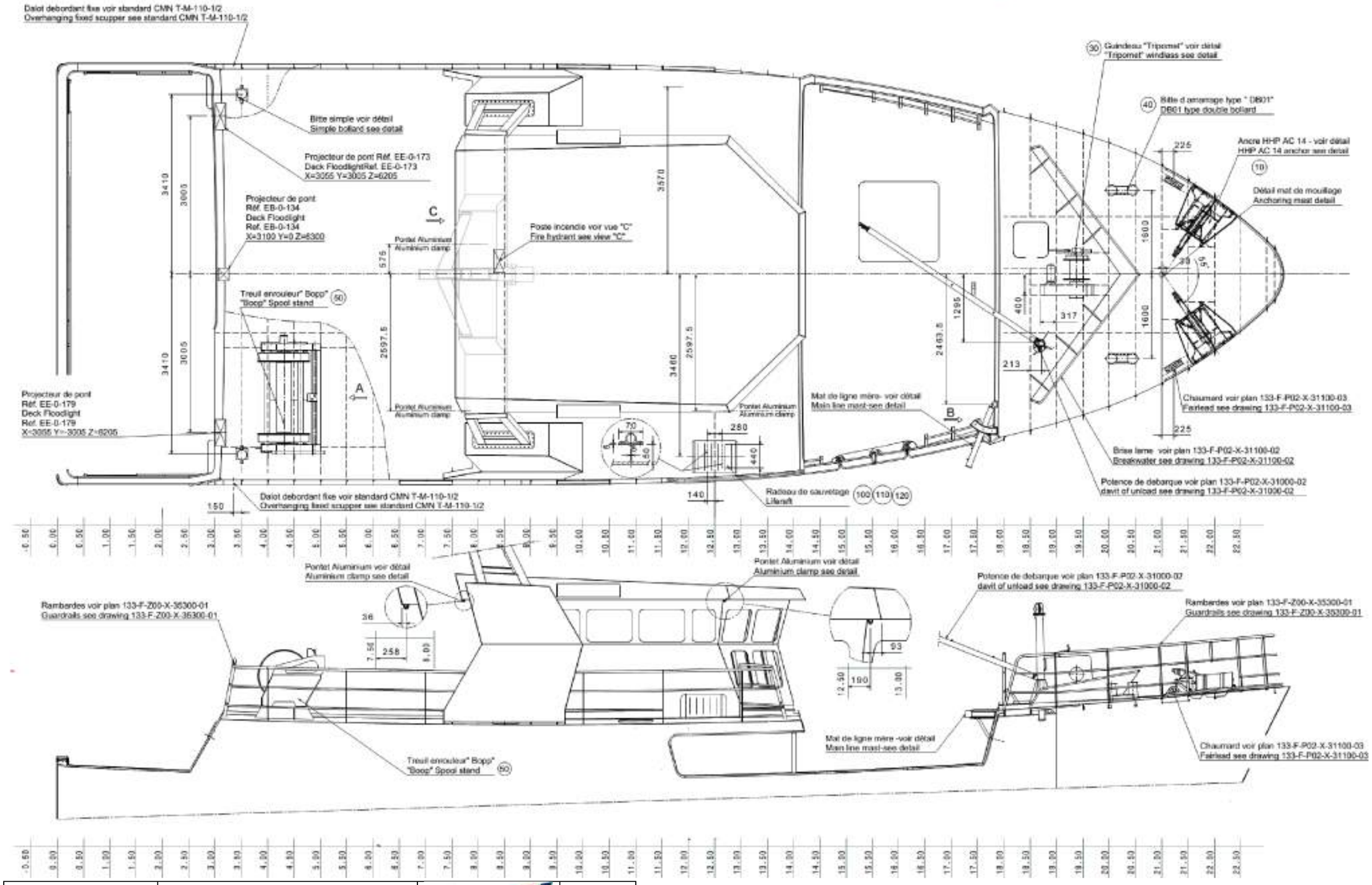


Figure 1-8 Upper Decks Arrangement

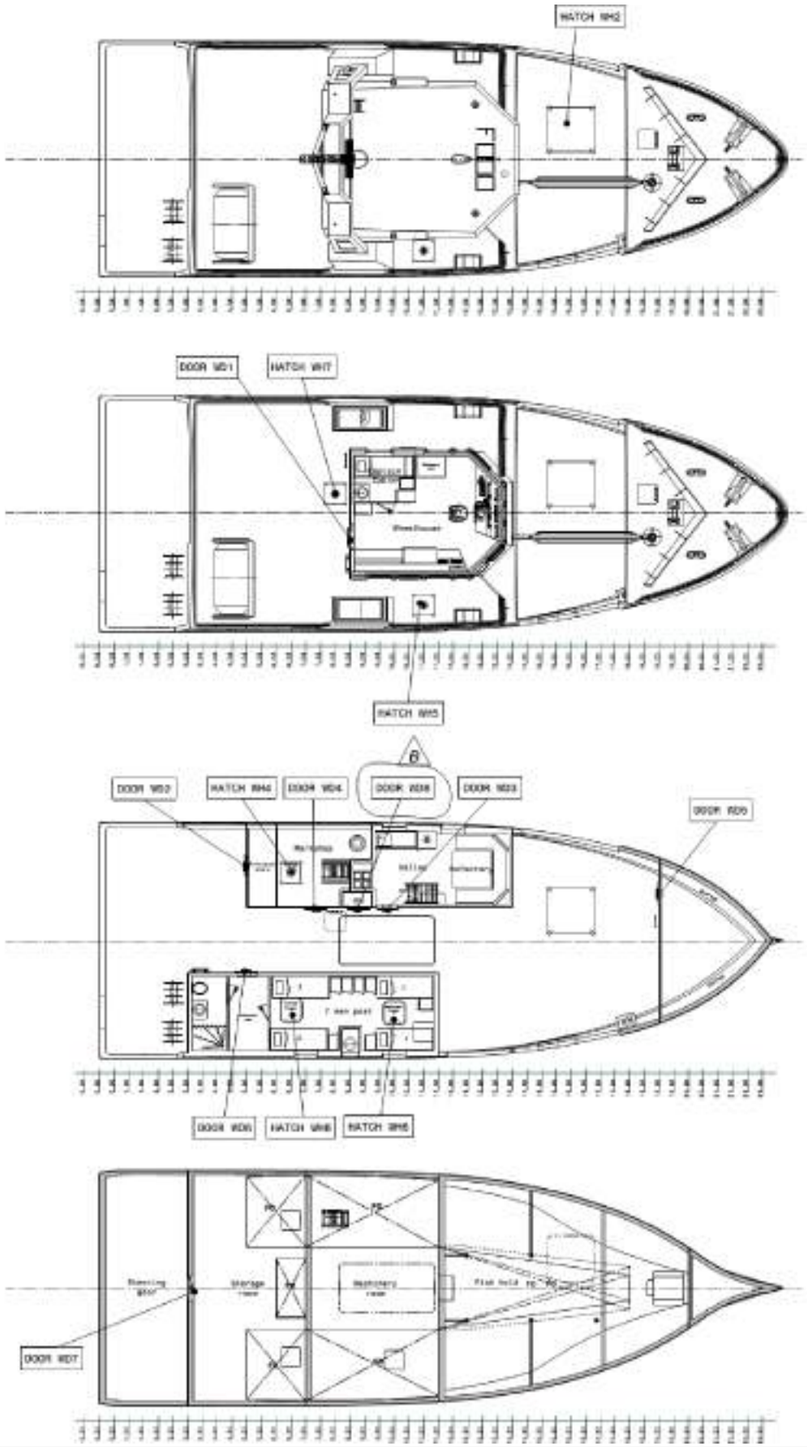


Tableau de description des portes / Door description table

Numéro des portes / Door ref.	Etanchéité / Tightness		Clair d'ouverture / Clear opening (mm)	Dimension de découpe / Bulkhead opening (mm)	Surbau / Coaming (mm)	Forme / Shape		Matériaux / Material				Ouverture / Opening						Isolation / Insulation		Tôle de doublage / Lining plate	Hublot / Vision panel	Tape sur hublot / Blind cover	Loquet / Door latch (20)
	Etanche à l'eau / Watertight	Etanche sans interruption / Weathertight				Rectangle / Rectangular	Arrondie / Rounded	Porte / Door		Dormant / Frame		Montage / Mounting		Joint anti-feu / Fire seal	Charnières / Hinges		Coulis / Stiffing	Matériau / Powered	Classement feu / Fire classification	Isolation thermique / Thermal insulation				
								Acier / Steel	Alu. Al/. Alloy	Acier / Steel	Alu Al/. Alloy	Soudé / Welded	Boulonné / Bolted		Gauche / Left	Droite / Right								
WD1		X	650 x 1200	700 x 1350 R125	300	X			X		X	X				X				X	X	X 400 x 500		X
WD2		X	650 x 1250	700 x 1300 R125	600	X		X		X		X				X								X
WD3		X	650 x 1250	700 x 1300 R125	600	X		X		X		X			X					X	X	X 310 x 400		X
WD6		X	650 x 1250	700 x 1300 R125	600	X		X		X		X				X								X
WD9		X	650 x 1250	700 x 1300 R125	600	X		X		X		X				X								X
WD6		X	650 x 1250	700 x 1300 R125	600	X		X		X		X			X					X	X	X 550 x 400		X
WD7	X		650 x 1350	700 x 1400 R125	300	X		X		X		X			X									X
WD8		X	650 x 1250	700 x 1300 R125	600	X		X		X		X			X									X

Sens d'ouverture des portes / Doors opening direction

Droite / Right

La charnière est à droite lorsque l'on pousse la porte.
The hinge is on the right when pushing the door.

Gauche / Left

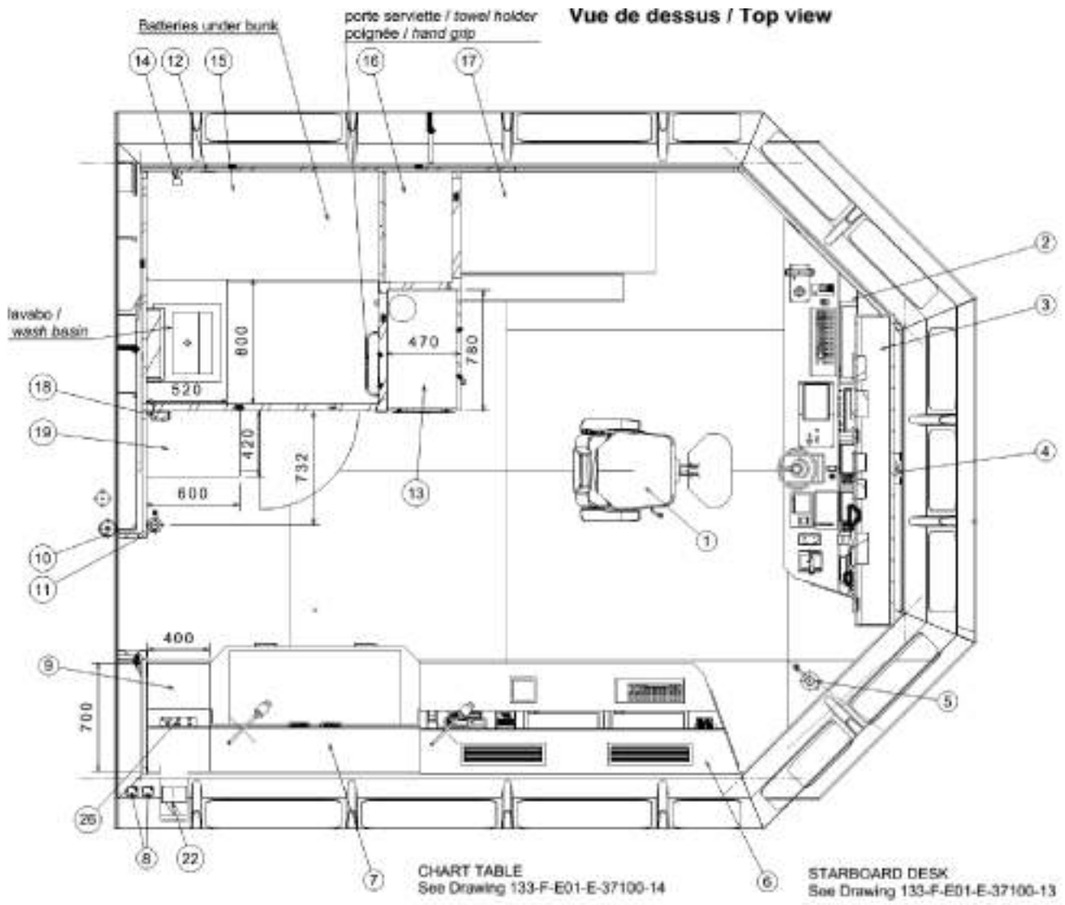
La charnière est à gauche lorsque l'on pousse la porte.
The hinge is on the left when pushing the door.

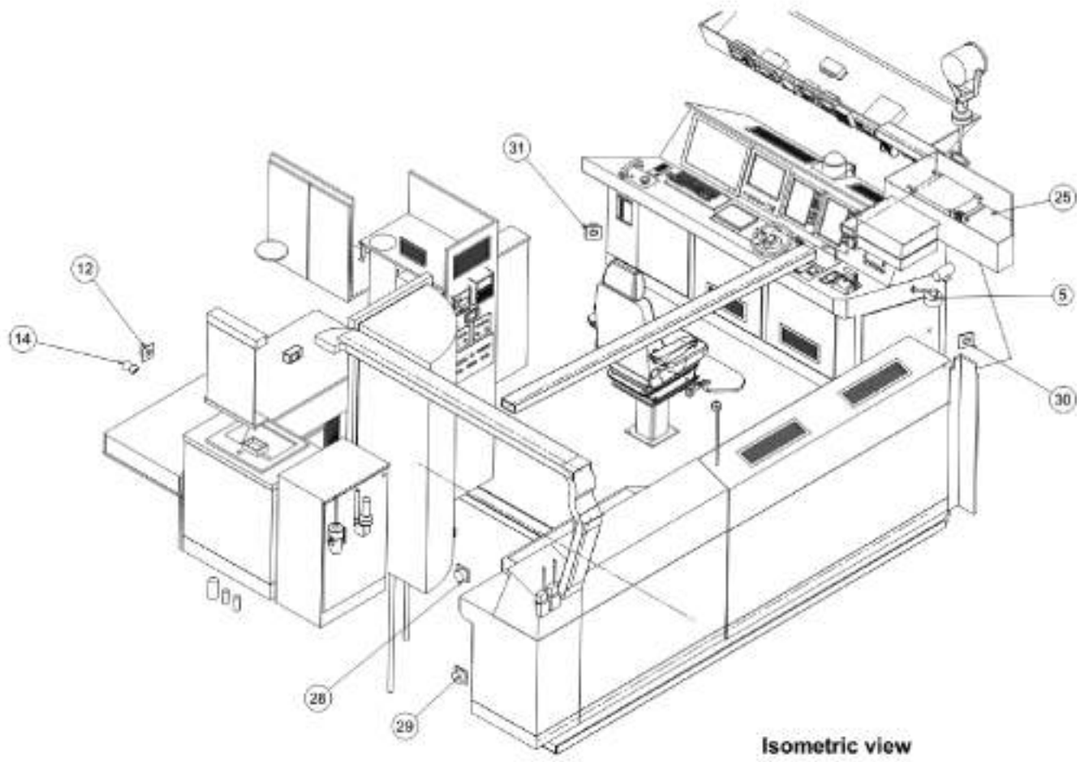
Tableau de description des panneaux / Hatches description table

Numéro des panneaux / Hatch ref.	Surbau / Coaming (mm) Sur pont / sous pont / Above deck + under deck	Clair d'ouverture / Clear opening (mm)	Dimension de découpe / Size of cup (mm)	Forme / Shape			Matériaux / Material				Ouverture / Opening									Classement feu / Fire classification	Isolation thermique / Thermal insulation	Tôle de doublage / Lining plate	Mentions de cadenas / Padlock clip	Support de capteur de position / Position sensor stand
				Carré / Square	Rectangle / Rectangular	Circulaire / Circular	Panneau / Hatch		Surbau / Coaming		Assistance					Commande taquets / Latches operation			Arrêtoir / Blocking device					
							Acier / Steel	Alu / Al/. Alloy	Acier / Steel	Alu / Al/. Alloy	Ressort inox / Stainless steel spring	Contre poids / Counter weight	Vérin pneuma. / Gas spring	Vérin hydraul. / Hydraulic ram cylinder	Autres / Others	Commande individuelle / Individually clipped	Coinçonnée par levier / Quick acting lever	Coinçonnée par volant / Quick acting handwheel					
WH2	600 +50	1510 x 1510	1550 x 1550 R125	X			X		X							In / Out								
WH4	300 +50	650 x 650	650 x 650 R125	X			X		X							In / Out								
WH5	300 +50	650 x 650	650 x 650 R125	X			X		X							In / Out					X	X		
WH6	Flush	650 x 650	750 x 750 R 150	X			X		X												A60	X		
WH7	300 +50	650 x 650	650 x 650 R125	X			X		X							In / Out								
WH8	Flush	650 x 650	750 x 750 R 150	X			X		X															

Figure 1-9 Watertight Doors and Hatches Arrangement

Figure 1-10 Engine Room Arrangement

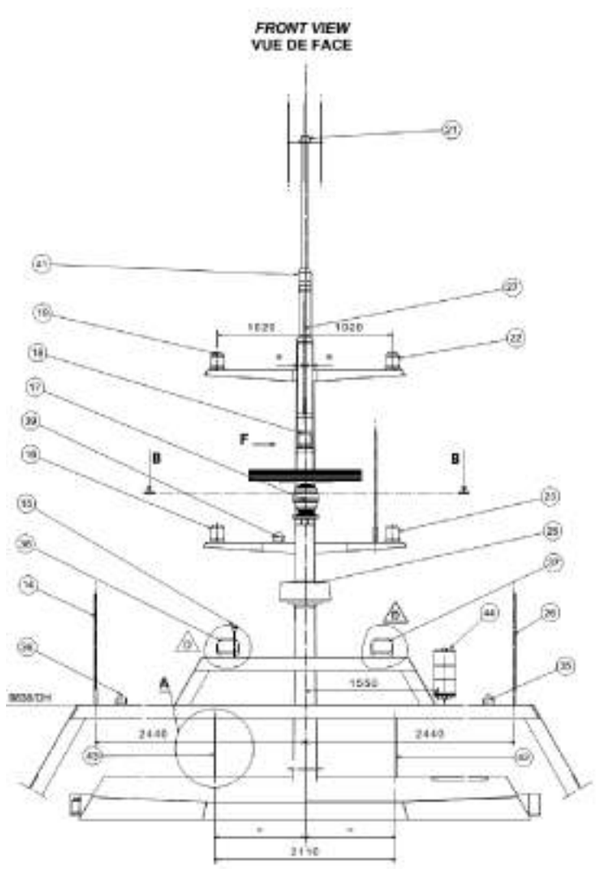


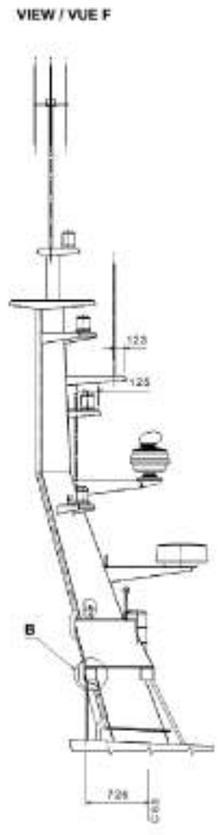


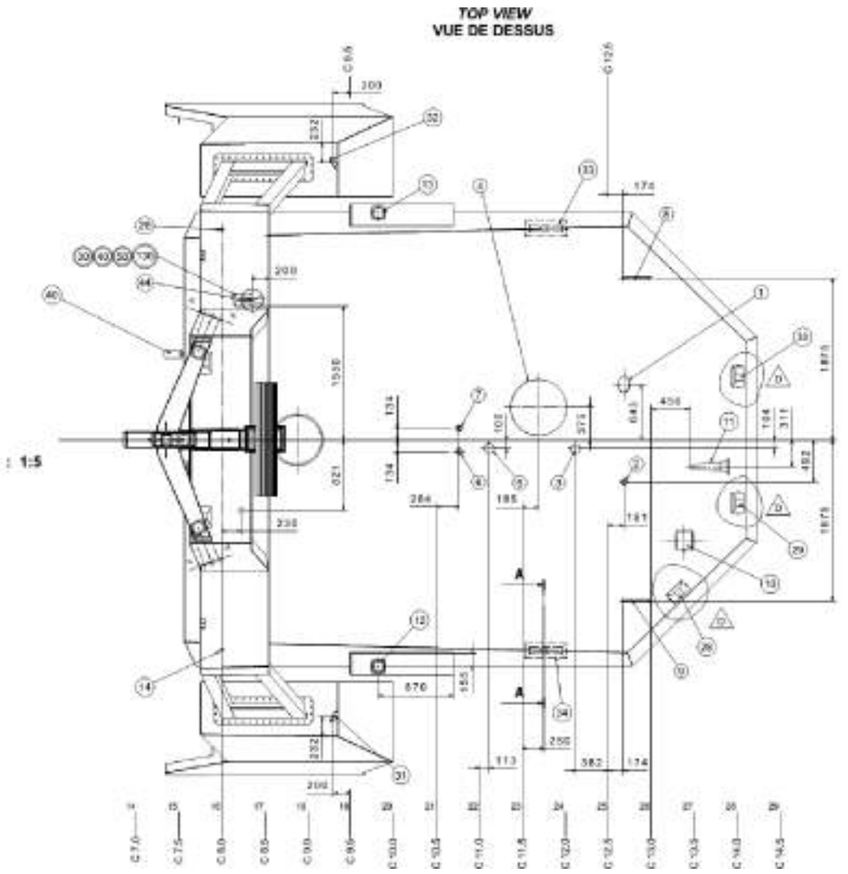
ID	DESIGNATION	NUMBER
1	HELSMAN SEAT	-
2	FORE MAIN DESK	-
3	OVERHEAD	-
4	MAGNETIC COMPAS	NL-0-003
5	TILLER STEERING GEAR	QB-0-005
6	STARBOARD DESK	-
7	CHART TABLE	-
8	2 VHF PORTABLE	-
9	FURNITURE	-
10	EPIRB	-
11	RADAR TRANSPONDER	-
12	230V SOCKET	EE-0-194
13	MISC EQUIPEMENT SWITCHBOARD	-
14	BEDSIDE LIGHT	EE-0-135
15	BUNK WITH DRAWERS	-
16	HIGH STORAGE	-

17	STAIRS	-
18	VMS JUNCTION BOX	NL-0-060
19	FURNITURE	-
20	LED LIGHTS	EB-0-130
21	EMERGENCY LIGHTS	EB-0-111
22	CABLES TRAYS	-
23	TRANSCEIVER UNIT	NL-0-064
24	ANTENNA COUPLER	NL-0-065
25	FARADAY CAGE	-
26	WINCH PANEL	EF-0-006
27	FOG HORN COMPRESSOR	ES-0-004
28	LIGHT SWITCH	EE-0-131
29	230V SOCKET	EE-0-191/3
30	230V SOCKET	EE-0-191/2
31	230V SOCKET	EE-0-191/1

Figure 1-11 Wheelhouse Arrangement







ID	DESIGNATION	NUMBER	SEATINGS DRAWING
1	VMS BEACOM	NL-0-061	133-F-Z00-U-22700-11
2	NAVTEX ANTENNA	NL-0-045	133-F-Z00-U-22700-03
3	AIS GPS ANTENNA	NL-0-031	133-F-Z00-U-22700-03
4	COMPASS SC-50 ANTENNA	NL-0-073	133-F-Z00-U-22700-09
5	MIR 2000	NL-0-093	133-F-Z00-U-22700-04
6	GPS ANTENNA (SB)	NL-0-043	133-F-Z00-U-22700-03
7	GPS ANTENNA (PS)	NL-0-046	133-F-Z00-U-22700-03
8	HF/MF BLU ANTENNA (PS)	NL-0-028	133-F-Z00-U-22700-08
9	HF/MF BLU E/R ANTENNA (SB)	NL-0-029	133-F-Z00-U-22700-08
10	SEARCH LIGHT	EE-0-162	133-F-Z00-U-22700-10
11	FOGHORN MARCO	ES-0-004	133-F-Z00-U-22700-07
12	NAVIGATION LIGHT GREEN (SB)	ES-0-024	133-F-Z00-U-22700-15
13	NAVIGATION LIGHT RED (PS)	ES-0-021	133-F-Z00-U-22700-15
14	VHF/MM FU8903 ANTENNA	NL-0-038	133-F-Z00-U-22700-02
15	WIND SENSOR ROW IND 133	NL-0-010	133-F-Z00-U-22700-16
16	NAVIGATION LIGHT RED	ES-0-007	133-F-Z00-U-22700-15
17	M1945 RADAR	NL-0-042	133-F-Z00-U-22700-01
18	NAVIGATION LIGHT WHITE	ES-0-016	133-F-Z00-U-22700-15
19	NAVIGATION LIGHT RED	ES-0-008	133-F-Z00-U-22700-15
~~20~~	~~NAVIGATION LIGHT WHITE~~	~~ES-0-005~~	~~133-F-Z00-U-22700-15~~
21	VHF ADDF ANTENNA	NL-0-050	133-F-Z00-U-22700-05
22	NAVIGATION LIGHT GREEN	ES-0-006	133-F-Z00-U-22700-15
23	NAVIGATION LIGHT WHITE	ES-0-009	133-F-Z00-U-22700-15
24	VHF/MM FU8903 CH70 ANTENNA	NL-0-037	133-F-Z00-U-22700-02
25	M1835 RADAR	NL-0-044	133-F-Z00-U-22700-01
26	BASIC VHF ANTENNA	NL-0-027	133-F-Z00-U-22700-02
27	AIS VHF ANTENNA	NL-0-032	133-F-Z00-U-22700-02
28	PROJECTOR 750 W	EE-0-163	133-F-Z00-U-22700-06
29	PROJECTOR 750W	EE-0-161	133-F-Z00-U-22700-06
30	PROJECTOR 750W	EE-0-162	133-F-Z00-U-22700-06
31	PROJECTOR 80W	EB-0-129	133-F-Z00-U-22700-14
32	PROJECTOR 80W	EB-0-132	133-F-Z00-U-22700-14
33	LED DOWNLIGHT	EE-0-160	STANDARD S-P-167
34	LED DOWNLIGHT	EE-0-162	STANDARD S-P-167
35	PROJECTOR 80W	EB-0-130	133-F-Z00-U-22700-14
36	PROJECTOR 80W	EB-0-131	133-F-Z00-U-22700-14
37	PROJECTOR 750W	EE-0-178	133-F-Z00-U-22700-06
38	PROJECTOR 750W	EE-0-177	133-F-Z00-U-22700-06
39	PROJECTOR 80W	EB-0-135	133-F-Z00-U-22700-14
40	CAMERA	TS-0-001	133-F-Z00-U-22700-13
41	NAVIGATION LIGHT WHITE	ES-0-005	133-F-Z00-U-22700-15
42	HALYARD (PS)	———	———
43	HALYARD (SB)	———	———
44	RADAR REFLECTOR	———	———

Figure 1-12– Mast Arrangement

CHAPTER 2 – GENERAL ARRANGEMENT

2-1. GENERAL

The general arrangement of the ship is optimized for:

- The ergonomics at work for long lining activity
- Comfort (access to living areas)
- Security (the crew work station is located on the fishing deck)
- Hygiene of the product
- The arrangement of the living area is optimized with regards to the movements of the Ship while respecting safety regulations

The 23,3-Meter Longliner is divided into five below deck compartments, one main deck, and an upper level wheelhouse. The below deck areas are arranged as follows: (1) forepeak; (2) the fish hold room; (3) the engine room; (4) the storage room; (5) the steering gear room.

The main deck houses, the crew quarters and sanitary at stbd side and the galley, mess, workshop and provisions store at portside.

The crew workstation is located on the central part of main deck (here under referred as “fishing deck”), reducing the risks for the crew in case of emergency situations.
The upper bridge includes a steering and main engine remote control console complete with necessary navigation and communication equipment.

The mast is built in aluminium alloy and receives aerials and navigation lights according to the COLREG regulations for a longliner under 24 m in length.

2-2. STEERING GEAR ROOM

The steering gear room houses ilcludes mainly the following equipment:

- Steering gear
- One power pack and oil tank for steering

2-3. STORAGE ROOM

The storage room houses includes mainly the following equipment:

- One fish hold and tunnel freezer refrigerating unit
- Fwd stern tube of the propeller shaft
- One water heater for crew cabin

2-4. ENGINE ROOM

The engine room houses includes mainly the following equipment:

- One main propulsion engine
- One reverse and reduction gearbox
- Two Generators
- One fire pump
- Two sea water cooling pumps for fish hold and tunnel freezer refrigerating unit
- One hydraulic power pack and oil tank for fishing winches
- New and polluted oil tank
- Two bilge pumps
- Two sea water strainers
- One oily water tank
- One fuel oil separator
- One fuel oil transfer pump
- One fuel oil service tank
- One main electric switchboard
- One secondary switchboard
- One battery bank for ME starting
- One battery bank for Gensets

2-5. FISH HOLD AND TUNNEL FREEZER

The fish hold and tunnel freezer room houses includes mainly the following equipment:

- Two evaporator serpentines for fish hold
- One refrigerator for tunnel freezer

2-6. SANITARY ROOM

The sanitary room houses includes mainly the following equipment:

- One gravity toilet
- One wash basin
- One shower tray

2-7. GALLEY / MESS

The galley houses mainly includes the following equipment:

- One sink
- One hot plate
- One cooker
- One fridge
- One hood
- One water heater

2-8. CREW'S QUARTERS

The Crew's Quarters mainly includes the following equipment:

- Seven bunks equipped with drawers
- Seven berths

2-9. WORKSHOP

The workshop includes mainly the following equipment:

- Lub. oil tank of stern tube
- One secondary switchboard
- One Remote control panel for fire pump

2-10. CO2 LOCKER

The CO2 locker includes mainly the following equipment:

- Two CO2 Bottles
- One manual Release
- One pneumatic release
- Two FO quick closing valves actuators

2-11. FORE PEAK

The fore peak includes mainly the following equipment:

- Windlass electrical starter

2-12. WHEELHOUSE

The wheelhouse mainly the following equipment:

- One pilot console including mainly:
  - Steering wheel
  - Engine control station
  - Engine remote control panel
  - Autopilot panel
  - ECDIS monitor
  - Echosounder monitor
  - Two radar displays
  - Magnetic compass
- One headband including mainly:
  - Satellite compass monitor
  - AIS transponder
  - Two rudder angle indicator
  - GPS
- One starboardside console including mainly:
  - Chart table
  - Two cartography monitors
  - Alarm panels
  - Navigation lights panel
- One portside panel including mainly:
  - Steering gear remote control panel
  - Generator remote control panels
  - Fire detection panel
- One steering control tiller
- One winch control panel
- Searchlight control handle
- One pilot seat

2-13. CAPTAIN CABIN

The Captain Cabin mainly the following equipment:

- One bunk equipped with drawers
- One berth
- One cupboard

2-14. AFT DECK

The aft deck includes mainly the following equipment:

- Line setter
- Two manual line drums
- Winch deck control panel
- Twop navigation lights

2-15. FORE DECK

The fore deck includes mainly the following equipment:

- One electric winch for hoisting mast
- One fish working table
- Fish hold access hatch
- Winch desk contro panel

2-16. BRIDGE DECK

The forward deck includes mainly the following equipment:

- Two Anchors of 255kg secured on cradles
- One anchoring line
- One electric windlass
- One hoisting mast

2-17. UPPER DECK

The upper deck includes mainly the following equipment:

- Long line winch
- Two liferafts

2-18. WHEELHOUSE HOOD

The wheelhouse hood includes mainly the following equipment:

- Searchlight
- Fog horn
- Compass antenna
- VMS beacon

- AIS antenna
- GPS antennaes
- MIR 2000 antenna
- Port and Stbd navigation lights

2-19. MAST

The mast includes mainly the following equipment:

- Two radar antennaes
- VHF ADDF antenna
- Two floodlights 750W
- Three floddlights 80W
- Navigation lights

Figure 2-1 The mast

Figure 2-2 Fwd peak

Figure 2-3 Fwd_Peak - Windlass Starter Panel

Figure 2-4 Fwd Deck

Figure 2-5 Stbd Aft Deck – Manual Line Drum

Figure 2-6 Aft deck - Line Setter

Figure 2-7 Main and Upper Decks – Fishing Equipment

Figure 2-8 Port Upper Deck- Liferaft

Figure 2-9 Wheelhouse External View

Figure 2-10 Wheelhouse - Fwd Console

Figure 2-11 Wheelhouse - Stbd Console

Figure 2-12 Wheelhouse - Port Console

Figure 2-13 Captain Cabin

Figure 2-14 Galley - Sink and Refrigerator

Figugre 2-15 Galley - Cooker and Sink

Figugre 2-16 Mess

Figugre 2-17 CO2 Locker

Figure 2-18 Workshop - Exhaust Silencer and Engine Room Ladder

Figure 2-19 Workshop - Storage Room Hatch

Figure 2-20 Workshop – Stern Tube Lub. Oil Tank

Figure 2-21 Provisions Store

Figure 2-22 Crew Quarters - 7 Men Cabin

Figure 2-23 Crew Quarters - Sanitary

Figure 2-24 Steering Room

Figure 2-25 Steering Room - Hydraulic Power Unit Water Tank

Figure 26 Steering Room - Rudder Stock

Figure 27 Storage Room - Fresh

Figure 2-28 Storage_Room - Fish Hold refrigeration Plant

Figure 2-29 Storage Room - Stern Tube

Figure 2-30 Engine Room - Main Engine

Figure 2-31 Engine Main - Main Engine

Figure 2-32 Engine Room - Gear Box

Figure 2-33 Engine Room - Port Generator

Figure 2-34 Engine Room - FO Manifold

Figure 2-35 Engine Room - Port Fwd Bulkhead

Figure 2-36 Engine Room - Stbd Fwd Bulkhead

Figure 2-37 Engine Room - Port Bulkhead

Figure 2-38 Engine Room - Stbd Side

Figure 2-39

Engine Room - Stbd Side

Figure 2-40 Port Bulkhead Fish Hold

Figure 2-41 Stbd Bulkhead Fish Hold

CHAPTER 3 – SHIP EQUIPMENT LIST

3-1. GENERAL INFORMATION

- The identification of the Maintenance Schedule is elaborated from the Ship Equipment List (SEL) which is the key data to properly use this maintenance manual.
- Both SEL and Maintenance Schedule are detailed following the four disciplines shown below:
  - Communication & Navigation
  - Electrical
  - Ancillaries of Hull (Fuel oil, Air Conditioning...)
  - Mechanical

- The content of the SEL details all equipment fitted on board with the useful information described below:
  - A single Ship Index by equipment, in order to have a good traceability in case of replacement
  - The description of the equipment
  - The name of the OEM
  - The name of the original supplier
  - The model, type or designation
  - The quantity fitted onboard

- Each system can be composed of only one part or several parts.

- The list of the different systems fitted onboard the craft is described below:
  - 210-00 Hull Cathodic Protection System
  - 310-00 Main Deck Arrangement
  - 311-00 Mooring
  - 312-00 Steering Gear
  - 314-00 Lifesaving
  - 322-00 Heating - Ventilation & Air Conditioning System (HVAC)
  - 324-00 A/C Sea Water Cooling System
  - 331-00 Fresh Water System
  - 332-00 Firemain System
  - 333-00 Bilge System

- 334-00 Sewage & Sanitary System
- 335-00 Marine Fuel Oil System
- 336-00 Lubricating Oil system
- 341-00 Fire Detection system
- 341-10 CO2 Extinguishing system
- 342-00 Non Structural Tanks
- 350-00 Hatches / Doors & Windows
- 365-00 Galley
- 368-00 Refrigeration Plant for Fish Hold & Freezing Tunnel
- 371-00 Accommodation, Wheelhouse & Technical Rooms
- 410-00 AC 400V - 50Hz Electrical Network
- 412-00 Generator Set AC400V - 50Hz
- 420-00 DC 24V Electrical Network
- 440-00 Lighting System
- 448-00 Navigation Lights & Windscreen Wipers
- 470-00 Alarms & Safety
- 541-00 Propulsion Plant
- 543A00 Exhaust Plant
- 572A00 Shafting Line and Fixed Pitch Propeller (FPP)
- 575-00 Sea Water Cooling System
- 577-00 Propulsion & Gensets Remote Control & Monitoring Systems
- 610-00 Internal Communication System
- 620-00 External Communication System
- 630-00 Navigation System
- 900-00 Fishing Equipment

3-2. SHIP EQUIPMENT LIST DETAIL

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
210-00		**Hull**				
210-01	NC	Zinc Anode 1,2kg - Hull	Nochet	Nochet	AZ012	8
210-02	NC	Zinc Anode 5,9kg - Hull			AZ059	6
210-03	NC	Zinc Anode --kg, Sea Chests			133-F-M01-P-210MM-01	2
310-00		**Main Deck Arrangement**				
310-02	NC	Hoisting Mast	CMN	TSI	133-F-P02-X-31000-02	1
310-03	EE-0-200	Electric Winch AC220V 500kg	Huchez	Magi	TRC501CD9	1
310-04	NC	Bollard, Double	CMN	TSE	DB01	2
310-05	NC	Fairlead	CMN	TSI	133-F-P02-X-31100-03	2
310-06	EF-0-100	Windlass	Tripomet	Tripomet	AW13-E-00.00-813FD	1
310-07	EF-0-010	Windlass - Starter Panel	Tripomet	Tripomet		1
310-08	EF-0-101	Windlass - Local Control Panel	Tripomet	Tripomet		1
310-09	NC	Anchor AC14 255kg	Marit	Marit	AC14-255KG	2
310-10	NC	Anchoring Line	Marit	Marit		1
312-00		**Steering Gear**				
312-01	NC	Steering Unit	Fluidmecanica	Fluidmecanica	ST-1500-CS-P-35	1
312-02	NC	Power Pack	Fluidmecanica	Fluidmecanica	9125	2
312-03	NC	Oil Tank, Double with Emergency Manual Pump	Fluidmecanica	Fluidmecanica	9891	1
312-06	QB-0-006	Tiller, Control, Steering Wheel	Kobelt	Fluidmecanica	MT-500-X	1
312-07	QB-0-005	Tiller, Control, Handle	Fluidmecanica	Fluidmecanica	9860	1
312-08	QB-0-001 QB-0-002	Starter, Electric	Fluidmecanica	Fluidmecanica	75CE721A	2
312-09	QB-0-003	Steering Remote Control Panel	Fluidmecanica	Fluidmecanica	980814A	1
312-10	NC	Rudder Stock	Fluidmecanica	Fluidmecanica	22163	1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
314-00		**Lifesaving**				
314-01	NC	Inflatable Liferaft Flat 8 Men Pack B	Arimar	Arimar	8P-FLAT-PACK-B	2
314-02	NC	Hydrostatic Release Unit	Hammar	Arimar	H20	2
322-00		**Heating - Ventilation & Air Conditioning System**				
322-01	SC-0-014	Fan Unit, Helicoïd - Air Exhaust	Enag	Enag	SEEM020097-VA167-50	1
322-02	SC-0-020 SC-0-023	Air Conditioning Unit 4,7kw	Webasto	Webasto	WBCL120004B	2
322-03	SC-0-026	Air Conditioning Unit 5,9kw	Webasto	Webasto	WBCL120005B	1
322-04	NC	Air Conditioning Units - Electrical Control Box	Webasto	Webasto	SS6S2-4	3
322-05	SC-0-010 SC-0-011	Fan Unit, Centrifugal 100/400m3/h	ATC	Ouest Isol	BCA160M	2
324-00		**A/C Sea Water Cooling System**				
324A01	SR-0-001 SR-0-002	Sea Water Centrifugal Selfpriming E-Pump 10m3/h 20m	Azcue	SEMIM	CA-50/2A	2
324-02	SR-0-003	Sea Water E-Pump 1,2m3/h	Gianneschi	Webasto	WBCL001092A	1
324-03	SR-0-004	Sea Water E-Pump 1,2m3/h	Gianneschi	Webasto	WBCL001092A	1
324-04	SC-0-030	Relay Box - SW E-Pump	Webasto	Webasto	WBCL001127C	2
331-00		**Fresh Water System**				
331-01	SD-0-001	Fresh Water Pressure Centrifugal E-Pump Unit 2,5m3/h 31,5m + 20 litre Receiver	Azcue	SEMIM	CP-25/160+	1
331-02	SD-0-002 SD-0-003	Electrical Water Heater 7,5kw - AC400V	Dafi	E-Citizen	7-5KW-AC400V	2
331-03	NC	Basket Filter DN40		Aquiro	600B-40	1
331-04	NC	Basket Filter DN25		Aquiro	600B-25	1
332-00		**Firemain System**				
332-01	SM-0-001	Sea Water Centrifugal Selfpriming Main Firefighting E-Pump 25m3/h 30m	Azcue	SEMIM	CA-50/7A	1
332-02	SM-0-010	Remote Control Box - Fire Pump	SA2EI	SA2EI	133-F-M01-E-410EE-10	1
332-03	SM-0-002	Sea Water Pressure E-Pump Unit 2m3/h 22m + 20 litre Receiver	Azcue	SEMIM	MA-80+	1
332-04	NC	Emergency Hand Pump	Japy	Aquiro	BP3	1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
333-00		**Bilge System**				
333-01	SE-0-001 SE-0-002	Bilge E-Pump 15m3/h 28m		SEMIM	CA-50/3A	2
333-02	SE-0-010 SE-0-020	Remote Control Box - Bilge Pump	SA2EI	SA2EI	133-F-M01-E-410EE-10	2
333-03	NC	Bilge Hand Pump	Japy	Aquiro	BP2	1
333-04	NC	Mud Box DN50		Aquiro	7017-50	2
333-05	NC	Mud Box DN65		Aquiro	7017-65	1
333-06	NC	Mud Box DN80		Aquiro	7017-80	1
334-00		**Sewage & Sanitary System**				
334-01	NC	Gravity Toilet	Prezioso	Mabille		1
335-00		**Marine Fuel Oil System**				
335-01	SG-0-001	Fuel Oil Centrifugal Selfpriming Transfer E-Pump 10m3/h 20m	Japy	SEMIM		1
335-02	SG-0-010	Remote Control Box - Fuel Oil Transfer Pump	SA2I	SA2I	133-F-M01-E-410EE-10	1
335-03	SG-0-002	Centrifugal Water Separator Unit 760l/h	Alfa Laval	Alfa Laval	MIB 303S-13/33	1
335-04	NC	Emergency Hand Pump	Japy	Aquiro	HT 226	1
335-05	NC	Fuel Oil/Water Static Duplex Separator – for main		Enéria	751000MAX	1
335-06	NC	Basket Filter DN50		Aquiro	601X50	1
335-07	NC	Basket Filter DN20		Aquiro	601X20	1
335-08	NC	Basket Filter DN65		Aquiro	601X65	1
335-09	NC	Hydraulic Pump Unit Station, Double for Quick Closing Valves	Aquiro	Aquiro	26-01-102	1
335-10	NC	Fuel Oil Sedimenter / Water - for Genset	Caterpillar	Enéria	36146	2
336-00		**Lub Oil System**				
336-01	NC	Transfer Hand Pump	Japy	Aquiro	HT1	1
336-02	NC	Basket Filter DN40		Aquiro		1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
338-00		**Air Vents, Sounding & Overflow**				
338-01	NC	Aseptic Filter		Interfiltre	601X40	3
341-00		**Fire Detection system**				
341-01	SI-0-006	Converter AC230V/ DC24V		Technitronic	LAMBDA	1
341-02	SI-0-001	Fire Detection Panel	Marinelec	Marinelec	DI09	1
341-03	SI-0-002 SI-0-003	Heat / Smoke Sensor	Marinelec	Marinelec	TMCA+EMBCAO+ KITSEAP	2
341-04	SI-0-004	Siren & Flashlight	Marinelec	Marinelec		1
341-05	SI-0-005	Siren	Marinelec	Marinelec	SIRENE24VDC107DBBP	1
341-10		**CO2 Extinguishing system**				
341-11	NC	Cylinder 50 litre with 33kg CO2 Charge	Tyco	Tyco	13 052 121 8	2
341-12	NC	Cylinder Valve Manual / Pneumatic	Tyco	Tyco	CO-2011	2
341-13	NC	Audible / Visual Alarm	Fulleon	Tyco	20-118	2
342-00		**Non Structural Tanks**				
342-01	NC	New & Waste Lub Oil Tank	CMN	CMN	133-F-M01-T-34200-01	1
342-02	NC	Hydraulic Oil Tank	CMN	CMN	133-F-M01-T-34200-03	1
342-03	NC	Marine Fuel Oil Service Tank	CMN	CMN	133-F-M01-T-34200-04	1
342-04	NC	Oily Water Tank	CMN	CMN	133-F-M01-T-34200-05	1
350-00		**Hatches / Doors & Windows**				
350-01	NC	Engine Removal Hatch	CMN	CMN	133-F-Z00-S-35000-01	1
350-02	NC	Watertight Access Hatch 1510x1510mm	Libra Plast	Libra Plast	WH2	1
350-03	NC	Watertight Access Hatch 630x630mm	Libra Plast	Libra Plast	WH4	1
350-04	NC	Watertight Access Hatch 630x630mm	Libra Plast	Libra Plast	WH5	1
350-05	NC	Watertight Access Hatch 650x650mm	Libra Plast	Libra Plast	WH6	1
350-06	NC	Watertight Access Hatch 630x630mm	Libra Plast	Libra Plast	WH7	1
350-07	NC	Watertight Access Hatch 650x650mm	Libra Plast	Libra Plast	WH8	1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
350-08	NC	Watertight Access Aluminium Door 650x650mm	Libra Plast	Libra Plast	WD1	1
350-09	NC	Watertight Access Steel Door 650x1250mm	Libra Plast	Libra Plast	WD2	1
350-10	NC	Watertight Access Steel Door 650x1250mm with Porthole	Libra Plast	Libra Plast	WD3	1
350-11	NC	Watertight Access Steel Door 650x1250mm	Libra Plast	Libra Plast	WD4	1
350-12	NC	Watertight Access Steel Door 650x1250mm	Libra Plast	Libra Plast	WD5	1
350-13	NC	Watertight Access Steel Door 650x1250mm with Porthole	Libra Plast	Libra Plast	WD6	1
350-14	NC	Watertight Access Hatch 650x1350mm	Libra Plast	Libra Plast	WD7	1
350-15	NC	Watertight Access Steel Door 650x1250mm	Libra Plast	Libra Plast	WD8	1
350-16	NC	Porthole 350/400mm	La Auxiliar Naval	La Auxiliar Naval	SC 1-2-3-4	4
350-17	NC	Window 510x710mm - Heating AC230V	La Auxiliar Naval	La Auxiliar Naval	GA 1-2-3	3
350-18	NC	Window 660x710mm - Heating AC230V	La Auxiliar Naval	La Auxiliar Naval	GB 1-2-3	3
350-19	NC	Window 660x710mm	La Auxiliar Naval	La Auxiliar Naval	GB 2	1
350-20	NC	Window 660x710mm - Heating AC230V	La Auxiliar Naval	La Auxiliar Naval	GB 5	1
350-21	NC	Window 435x710mm - Heating AC230V	La Auxiliar Naval	La Auxiliar Naval	GB 6	1
350-22	NC	Window 435x710mm	La Auxiliar Naval	La Auxiliar Naval	GC 1-2	2
350-23	NC	Window 860x710mm	La Auxiliar Naval	La Auxiliar Naval	GD 1-2-3-4-5	5
350-24	NC	Window 660x685mm - Heating AC230V	La Auxiliar Naval	La Auxiliar Naval	GE 1-2	2

365-00 Galley

365-01	QC-0-003	Hot Plates	Electrolux	Mabille	EHS6940HOX	1
365-02	QC-0-001	Cooker	Faure	Mabille	FOP27901XB	1
365-03	QC-0-002	Fridge	Bosch	Mabille	KDV33VL30	1
365-04		Hood	Faure	Mabille	FHT6141X	1

368A00 Refrigeration Plant for Fish Hold & Freezing Tunnel

368A01	NC	Fish Hold Chiller - Reciprocating Compressor	Bitzer	Paumier	4DES-5Y-40S	1
368A02	NC	Fish Hold Chiller - Condenser	Bitzer	Paumier	K283HB	1
368A03	QV-0-100	Fish Hold Chiller - Electrical Control Cabinet	Paumier	Paumier	04.111.02.EL001	1
368A04	NC	Freezing Tunnel - Reciprocating Compressor	Bitzer	Paumier	6GE-34Y-40P	1
368A05	NC	Freezing Tunnel - Condenser	Bitzer	Paumier	K813HB	1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
368A06	QV-0-100	Freezing Tunnel - Electrical Control Cabinet	Paumier	Paumier	04.111.02.EL001	1
368A07	NC	Tank 20 litre	Bitzer	Paumier	F202H	1
368A08	NC	Fish Hold - Serpentine 1	Paumier	Paumier		1
368A09	NC	Fish Hold - Serpentine 2	Paumier	Paumier		1
368A10	NC	Tunnel Freezer - Air Cooler	Alfa Laval	Paumier	C52-E2-FS2	1

371-00 Accommodation, Wheelhouse & Technical Rooms

371-01	NC	Seat	Atout Pique	Atout Pique	NAUTIC CLASSIC	1

410-00 AC 400V - 50Hz Electrical Network

410-01	EF-0-001	Main Electrical Switchboard	SA2EI	CMN	133-F-M01-E-410EE-10	1
410-02	EE-0-001	Distribution Panel AC230V Machinery Room	SA2EI	CMN	133-F-M01-E-440EE-10	1
410-03	EE-0-002	Distribution Frame AC230V Wheelhouse	SA2EI	CMN	133-F-E01-E-440EE-20	1
410-04	EE-0-003	Distribution Panel AC230V Workshop	SA2EI	CMN	133-F-E02-E-440EE-30	1
410-05		Converter AC230V/ DC24V		Technitronic	LAMBDA	1
410-06	EF-0-002	Shore Socket 90A	Marechal	Rexel	31 64 017 677 + 31 6A 053	1

412-00 Generator Set AC400V - 50Hz

412-01	ED-0-001 ED-0-002	Generator Set - AC400V-50Hz - 47kva	Caterpillar	Enéria	C4.4 DINA	2
412-02	NC	Diesel Engine	Caterpillar	Enéria	C4.4	2
412-03	NC	Alternator AC400V-50Hz - 47kva	Leroy Somer	Enéria	LSAM 43.2 S35 C6/4	2
412-04	NC	Remote Start Engine Management System	Deep Sea Electronics	Enéria	Model 520	2
412-05	ED-0-10 ED-0-120	Remote Control Panel	Caterpillar	Enéria	271-2727	2

420-00 DC 24V Electrical Network

420-01	EB-0-001	Battery Charger - AC230V/DC24V 60A	Enag	Enag	SEEL010309 (CDS3-24V60A)	1
420-02	EB-0-002	GMDSS Power Supply Box	Enag	Enag	SEEL006715	1
420-03	EB-0-005	Gel Battery 12V 165Ah	Energie Mobile	Seimi	GEL12-165	2
420-04	EB-0-007	Distribution Frame DC24V Wheelhouse	SA2EI	CMN	133-F-E01-E-420EB-20	1
420-05	EB-0-003 EB-0-013	Battery Master Switch	Reya	Reya	EM196SM	2

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
440-00		**Lighting System**				
440-01	ES-0-002	Converter 230VAC / 24VCC	Technitronic	Technitronic	DPP480-24-1	1
440-02	EE-0-108	External Lighting Panel	VDO	Kent Marine	AD241	1
440-03	NA	Light Waterproof LED 2x18W 230V + LED 24V	Seimi	Seimi	FLED282202PE	37
440-04	NA	Light Berth 230V 1x8W	Seimi	Seimi		8
440-05	NA	Light Mirror 230V 15W	Seimi	Seimi	TL1458108SSC	2
440-06	NA	Light Waterproof Recessed LED 230V 15W		Rexel	ISTRES	12
440-07	EE-0-163 EE-0-173 EE-0-177 EE-0-178 EE-0-179 EE-0-181 EE-0-192	Floodlight 230V 750W	Seimi	Seimi	PPI1000	7
440-08	EE-0-182	Searchlight 230V 1000W	DHR	Seimi	210CS220CMN	1
440-09	NA	Light Waterproof LED 2x18W 230V + LED 24V (-40°c)	Seimi	Seimi	FLED282202PE	2
440-10	EB-0-114	Chart Table LED 24V	Seimi	Seimi	GLENAN	1
440-12	NA	Downlight LED 24V 15W	Seimi	Seimi	01073	6
440-13	EB-0-129 EB-0-130 EB-0-131 EB-0-132 EB-0-134 EB-0-135	Floodlight LED 24V 80W	Seimi	Seimi	01259	6
448-00		**Navigation Lights & Windscreen Wipers**				
448-01	ES-0-001	Navigation Lights Monitoring & Control Panel	Marinelec	Marinelec	NORMA14CPDC	1
448-02	ES-0-003	Automatic Sound Signals Sequencer	Marinelec	Marinelec	CAPELLA V2	1
448-03	ES-0-016	Navigation Light - Masthead (White 225°)	DHR	Seimi	55VROUTE	1
448-04	ES-0-011	Navigation Light - Towed (Yellow 135°)	DHR	Seimi	55VRJ	1
448-05	ES-0-024	Navigation Light - Starboard (Green 112,5°)	DHR	Seimi	55VTD	1
448-06	ES-0-021	Navigation Light - Port (Red 112,5°)	DHR	Seimi	55VBD	1
448-07	ES-0-005	Navigation Light - Anchor (White 360°)	DHR	Seimi	55VTHBC	1
448-08	ES-0-010	Navigation Light - Stern (White 135°)	DHR	Seimi	55VPOUPE	1
448-09	ES-0-007	Navigation Light - Not Under Command (Red 360°)	DHR	Seimi	55VTHR	2
448-10	ES-0-008	Navigation Light - Fishing (Green 360°)	DHR	Seimi	55VHV	1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
448-11	ES-0-009	Navigation Light - Fishing (White 360°)	DHR	Seimi	55VTHBC	1
448-12	ES-0-004	Ship's Whistle - Pneumatic Compressor DC24V	Marco	Seimi	05403	1
448-13	ES-0-030 ES-0-031	Windscreen Wiper E-Motor Unit - DC24V - Wall Thickness 40 to 65mm - Adjustable Wiping Angle 50°	Nautic	Seimi	NAUTI2460	2
448-14	NC	Wiper Pantograph Arm - Lengt 500mm	Nautic	Seimi	BPNAUTI500	2
448-15	NC	Wiper Pantograph Arm - Lengt 500mm	Nautic	Seimi	REGNAUTI500	2
448-16	ES-0-040	Control Panel - Windscreen Wipers	Nautic	Seimi	CT42	1
448-17	ES-0-036	Windscreen Wipers E-Valve DC24V	Nautic	Seimi	EVA24	1
448-18	ES-0-039	Windscreen Wipers Switch	Nautic	Seimi	EVA24	1

470-00 Alarms & Safety

470-01	MO-0-001	Bilge Alarm Panel	Marinelec	Marinelec	ALTAIR-16V2	1
470-02	MO-0-002	Bilge Alarm Acquisition Box	Marinelec	Marinelec	ALTOR-8-CAB	1
470-03	MO-0-003	General Alarm Panel	Marinelec	Marinelec	ALTOR-8-CA	1
470-04	EB-0-138	Watch Alarm Box	Marinelec	Marinelec	LYNX V3S	1
470-05	MO-0-010 to 015	Bilge Level Switch	Marinelec	Marinelec	DVES01SBV1	6
470-06	MO-0-008	Siren & Flashlight	Marinelec	Marinelec	FLASHROUGE+SIRENEM	1
470-07	MO-0-007	Siren	Marinelec	Marinelec	SIRENE24VDC107DBBP	1
470-08	MO-0-004	Converter 230VAC / 24VCC		Technitronic		1

541-00 Propulsion Plant

541-01	NC	Main Propulsion Diesel Engine	Caterpillar	Enéria	C32 ACERT Phase 3	1
541A02	NC	Reverse & Reduction Gear Box	Twin Disc	Enéria	MGX5225DC	1

543A00 Exhaust Plant - Longliner

543A01	NC	Exhaust Pipes Assy, Main Engine	CMN	CMN		1
543A02	NC	Exhaust Muffler, Main Engine	SM25P	IAC Accoustics		1
543A03	NC	Exhaust Compensator DN250, Main Engine	Stenflex	Stenflex		1
543A04	NC	Exhaust Pipes Assy, 2x Gensets	CMN	CMN		1
543A05	NC	Exhaust Muffler, Genset		Enéria		2
543A06	NC	Exhaust Compensator DN80, Genset	Stenflex	Stenflex		2

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
572A00		**Shafting Line and Fixed Pitch Propeller (FPP) - Longliner**				
572A01	NC	Propeller Shaft	France Hélices	France Hélices	119309	1
572A02	NC	Bulkhead Seal	Profilseal	France Hélices		1
572A03	NC	Coupling	France Hélices	France Hélices	119310	1
572A04	NC	Earthing Assy	Wilson Walton	France Hélices	AM1041	1
572A05	NC	Transmission Lock	France Hélices	France Hélices	119321	1
572A06	NC	Propeller	France Hélices	France Hélices	119300	1
572A07	NC	Propeller Nut	France Hélices	France Hélices	119311	1
572A08	NC	Stern Sealing Assy	France Hélices	France Hélices		1
572A09	NC	Fore Sealing Assy	France Hélices	France Hélices		1
572A10	NC	Tank, Lub Oil	France Hélices	France Hélices		1
575-00		**Sea Water Cooling System**				
575-01	NC	Sea Water Strainer DN125		Aquiro	1283	2
575A02	MM-0-001	Sea Water Centrifugal Selfpriming E-Pump 3m3/h 20m	Ascue	SEMIM	CA-50/2A	1
577-00		**Propulsion & Gensets Remote Control & Monitoring Systems**				
577-01	MO-0-110 MO-0-120	Remote Control Panel, Genset	Caterpillar	Enéria		2
577-02	MO-0-100	Remote Control Panel, Main Engine	Caterpillar	Enéria		1
577-03	MO-0-102	Engine Control Station (Analog Control Head)	Twin Disc	Enéria		1
577-04	MO-0-103	Controler	Twin Disc	Enéria	EC-300-Analog-Control Head	1
577-05	MO-0-101	Engine Control Panel	Caterpillar	Enéria	MECP-1	1
577-06	EB-0-010	AGM Battery 12V 320Ah	Energie Mobile	Seimi	AGM12-320	2
577-07	EB-0-011 EB-0-012	AGM Battery 12V 110Ah	Energie Mobile	Seimi	AGM12-110	4
610-00		**Internal Communication System**				
610-01	TI-0-010	Public Adress System - Central Unit	Vingtor	Marelec	ETB-5	1
610-02	TI-0-005	Amplified Batteryless Telephone system - Main Station	Vingtor	Marelec	VSP-211-L	1
610-03	TI-0-006	Amplified Batteryless Telephone system - Main Station	Vingtor	Marelec	VSP-223-L	1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
610-04	TI-0-011 to 014	Public Adress System - Substation	Vingtor	Marelec	STB-1	4
610-05	TI-0-015	Public Adress System - Substation	Vingtor	Marelec	STB-2	1
610-06	TI-0-016	Public Adress System - Loudspeaker	Vingtor	Marelec	VML-1520	1
610-07	TI-0-008	Amplified Batteryless Telephone system - Connection Box	Vingtor	Marelec	CD-4	1
610-08	TI-0-007	Amplified Batteryless Telephone system - Flashing Light	AE&T	AE&T	EHS24	3
610-09	TI-0-009	Amplified Batteryless Telephone system - Headset	Vingtor	Marelec	VSP-36-PELP	1
610-10	TI-0-001 TI-0-002 TI-0-003 TI-0-004	Video Camera		Marelec	ST-CAMIR30S	4
610-11	TI-0-100	CCTV Screen Display	IM-MON	Marelec	IM-MON-07	1
620-00		**External Communication System**				
620-01	NL-0-036	VHF/IMM Radiotelephone	Furuno	Marelec	FM8900S	1
620-02	NL-0-068	VHF/IMM Radiotelephone - Handset		Marelec	FM8900S-HANDSET	1
620-03	NL-0-051	VHF/IMM Radiotelephone - Loudspeaker	Furuno	Marelec	SEM-21Q	1
620-04	NL-0-037 NL-0-038	VHF/IMM Radiotelephone - Antenna	Jeaybeam	Marelec	MAT270/15	2
620-05	NL-0-026	VHF Marine Radiotelephone	Furuno	Marelec	FM4721	1
620-06	NL-0-071	VHF Marine Radiotelephone - Handset		Marelec	FM4721-HANDSET	1
620-07	NL-0-027	VHF Marine Radiotelephone - Antenna	Jeaybeam	Marelec	MAT270/15	1
620-08	NL-0-064	HF/MF BLU Radiotelephone	Furuno	Marelec	FS1575	1
620-09	NL-0-025	HF/MF BLU Radiotelephone - Control Unit	Furuno	Marelec	FS1575-CU	1
620-10	NL-0-028 NL-0-029	HF/MF BLU Radiotelephone - Antenna	Furuno	Marelec	7,25m	2
620-11	NL-0-065	HF/MF BLU Radiotelephone - Antenna Coupler	Furuno	Marelec	AT-1575	1
620-12	NL-0-063	HF/MF BLU Radiotelephone - Handset	Furuno	Marelec	FS1575-HANDSET	1
620-13	NL-0-052	MF/HF BLU Loudspeaker	Furuno	Marelec	SEM-21Q	1
620-14	NL-0-072	Navtex Receiver	Furuno	Marelec	NX-700DPROA	1
620-15	NL-0-045	Navtex Antenna	Furuno	Marelec	NX-700DPROA-ANTENNA	1
620-16	NL-0-024	Navtex Monitor	Furuno	Marelec	NX-700DPROA-MONITOR	1
620-17	NL-0-030	AIS Transponder Class A	Transas	Marelec	AIS M-3	1
620-18	NL-0-031	AIS GPS Antenna	Transas	Marelec	AIS M-3-ANTENNA	1
620-19	NL-0-032	AIS VHF Antenna	Jeaybeam	Marelec	MAT270/15	1
620-20	NC	VHF GMDSS Handheld Radiotelephone	Ocean Signal	Marelec	V100B	1
620-21	NC	EPIRB	Ocean Signal	Marelec	E100G/ARH100	2

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
620-22	NC	SART	Ocean Signal	Marelec	S100	1

630-00 Navigation System

630-01	NL-0-001	Echosounder - Color LCD	Simrad	Marelec	FCV-1150	1
630-02	NL-0-074	Echosounder, Fish Finding	Simrad	Marelec	ES70-38/200KHZ	1
630-03	NL-0-018	Transducer 38/200khz	Simrad	Marelec	ES70-38/200KHZ	1
630-05	NL-0-033	Transducer 50khz	Furuno	Marelec	50B-9B 1KW	1
630-06	NL-0-034	Transducer 38khz	Furuno	Marelec	38BL-9HR 2KW	1
630-07	NL-0-035	Transducer Bronze Speed	Furuno	Marelec	ST02MSB	1
630-08	NL-0-070	VHF Direction Finder	Taiyo	Marelec	TD-L1550A	1
630-09	NL-0-049	ADDF	Taiyo	Marelec	TD-L1550A-ADDF	1
630-10	NL-0-050	VHF/ADDF Antenna	Taiyo	Marelec	TD-L1550A-ANTENNA	1
630-11	NL-0-044	36Nm X Band Marine Radar Antenna	Furuno	Marelec	M1835-ANTENNA	1
630-12	NL-0-004	36Nm X Band Marine Radar Display	Furuno	Marelec	M1835-DISPLAY	1
630-13	NL-0-042	48Nm X Band Marine Radar Antenna	Furuno	Marelec	M1945-ANTENNA	1
630-14	NL-0-005	48Nm X Band Marine Radar Display	Furuno	Marelec	M1945-DISPLAY	1
630-15	NL-0-090	Satellite Compass - Monitor	Furuno	Marelec	SC-502	1
630-16	NL-0-016	Satellite Compass - Processor Unit	Furuno	Marelec	SC-501	1
630-17	NL-0-073	Satellite Compass - GPS Antenna	Furuno	Marelec	SC-303	1
630-18	NL-0-002	GPS Display	Furuno	Marelec	GP-33	1
630-19	NL-0-043	GPS Antenna	Furuno	Marelec	GPA-017	1
630-20	NL-0-006	GPS Navigator	Furuno	Marelec	GP-33	1
630-21	NL-0-046	GPS Antenna	Furuno	Marelec	GPA-017	1
630-22	NC	Marine Software	Maxsea	Marelec	Pack Timezero Plot	1
630-23	NC	East Affrica Charts	Maxsea	Marelec	MM3-V42-P00	1
630-24	NL-0-007	ECDIS - Personal Computer	MC-Marine	Marelec	PC NISE 3140	1
630-25	NL-0-022	ECDIS - Monitor 22' 12V	Neovo	Marelec	22-12V	1
630-26	NL-0-076	Weather Station	Radio Ocean	Marelec	ROWINDHOB2000	1
630-27	NL-0-010	Wind Sensor	Radio Ocean	Marelec		1
630-28	NL-0-008 NL-0-009	Display, Remote	Furuno	Marelec	RD33	2
630-29	NL-0-012	Autopilot Calculator	Simrad	Marelec	AP70	1

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
630-30	NL-0-015	Autopilot Display		Marelec	AP70	1
630-31	NL-0-013	Compass Mini-Gyro	Simrad	Marelec	RC42N	1
630-32	NL-0-003	Magnetic Compass	Autonautic Inst.	Marelec	CHEE77	1
630-33	NL-0-014 NL-0-023	Rudder Angle Indicator	Simrad	Marelec	IS40	2
630-34	NL-0-062	Rudder Feed Back	Simrad	Marelec	RF300	1
630-35	NL-0-020 NL-0-021	NMEA 0183 Buffer	Actisence	Marelec	NBF-2	2
630-36	NL-0-060	VMS	CLS	Marelec	LEO	1
630-37	NL-0-061	VMS Beacon	CLS	Marelec	LEO	1
630-38	NL-0-059	Power Supply DC24/24V	Alfatronic	Marelec	DDI-24-24-072	1
630-39	NL-0-017	Computer		Marelec	ES70	1
630-40	NL-0-069	Display 22' 220V	Neovo	Marelec	22-220V	1
630-41	NL-0-019	Software & East Africa Charts	Ixblue	Marelec	SEAXPERT/2D-3D/ CHARTS/PC	1
630-42	NL-0-011 NL-0-040 NL-0-041 NL-0-039 NL-0-066	Converter DC24V/DC12V	Alfatronic	Marelec	KC021	5
630-43	EB-0-006	Gel Battery 12V 90Ah	Energie Mobile	Seimi	GEL12-90	2
630-44	NC	SOLAS Radar Reflector	Navimo	Marelec	ECHO 230	1
630-45	EB-0-004	Battery Master Switch	Reya	Reya	EM196SM	1

900A00 **Fishing Equipment - Longliner**

900A01	NC	Longline Winch Hydraulic Power Pack	Bopp	Bopp	FA.BOPPTR0004	1
900A02	EF-0-004	Longline Winch Hydraulic Power Cabinet	Brévini	Bopp	567911	1
900A03	EF-0-006	Longline Winch Wheelhouse Control Panel	Bopp	Bopp	BE10647	1
900A04	EF-0-005	Longline Winch Fore Deck Panel 1	Bopp	Bopp	BE10671	1
900A05	EF-0-007	Longline Winch Aft Deck Panel 2	Bopp	Bopp	BE10648	1
900A06	NC	Winch Drum Longline	Bopp	Bopp	BE4603	1
900A07	EB-0-141	Line Setter	Bopp	Bopp	BE4598	1
900A08	NC	Pulley Longline	Bopp	Bopp	BE10653	4
900A09	NC	Manual Line Drum	Bopp	Bopp	BE10652	2

SHIP INDEX	EQUIP. INDEX	EQUIPMENT DESCRIPTION	MAKER	ORIGINAL SUPPLIER	MODEL / TYPE / DESIGNATION	NB OF UNITS
900A10	NC	Radio-Buoy with GPS for Longline Fishing	Marine Instruments	Isifish	M2P	1
900A11	NL-0-093	Charger - 4x Radio-Buoys	Marine Instruments	Isifish	MIP-C	1
900A12	NC	Radio-Buoy Reception System	Marine Instruments	Isifish	MIR-2200	1
900A13	NL-0-092	GPS Antenna	Marine Instruments	Isifish		1

CHAPTER 4 – SYSTEMS FUNCTIONAL DESCRIPTION

4-1. HULL CORROSION PROTECTION SYSTEM

Cathodic protection of the underwater hull is ensured by sacrificial zinc anodes bolted to the hull and the rudder of the ship.
Cathodic protection of seawater circuits is provided by rod zinc anodes judiciously arranged.

4-2. ANCHORING AND MOORING SYSTEM

The anchoring and mooring equipment includes:

- Two anchors of 255kg stowed on fore bridge deck
- One electrically driven windlass located on fore bridge deck

Anchors are deployed using the windlass.

Characteristics of windlass:

- Diameter of steel rope : 16 mm
- Diameter of anchor chain : 17,5 mm
- Nominal Pull (first layer) : 13 kN
- Traction speed (first layer) : min./9 m/min
- Drum Storage Capacity : 104m +12,5 m

4-3. STEERING SYSTEM

The longliner is equipped with one rudder operated by a hydraulic steering gear.

Characteristics of steering gear:

- Nominal Torque : 1520 kg.m
- Design Torque : 1900 kg.m
- Rotation Angle : 35°
- Manœuvre Time with one Pump : 28 sec. Port/Stbd
- Manœuvre Time with two Pumps : 14 sec. Port/Stbd
- Manœuvre Time Auxiliary : 60 sec. Port/Stbd

The remote control, located in the bridge desk, includes the following equipment:

- One steering wheel
- One control tiller
- One manual / automatic selector
- Two rudder angle indicators
- One emergency hand pump

The steering system is interfaced with auto-pilot.

4-4. HEATING, VENTILATION AND AIR CONDITIONING

The ship is equipped with a mechanical ventilation system and electrical heaters.
An air conditioning system is fitted in the crew accommodation and in the wheelhouse.
The galley is equipped with independent mechanical hood ventilation.
The engine room is mechanically ventilated with one 12000 m3/h capacity air.

4-5. SEA WATER COOLING SYSTEM FOR HVAC & FISHING REFRIGERATION PLANT

The Sea Water Cooling System for HVAC & Fishing Refrigeration Plant includes:

- Two electro-pumps of 15 m3/h – 20 m for Fish Hold and Tunnel Freezing Refrigerating Units
- One electro-pump of 1,2 m3/h for Crew Accomodations & Galley Air Conditionning Units
- One electro-pump of 1,2 m3/h for Wheelhouse and Captain Cabin Air Conditionning Unit

The cooling system takes the sea water in the engine room SW crossover.

4-6. FRESH WATER SYSTEM

Fresh water will be supplied by a water pressure set of 2.5 m3/h – 25 m.
Hot water is provided from 2 instantaneous electric water heaters of 7 kW each.

Fresh Water Capacities:

- Tank : 3m3 (Storage Room)
- Tank for Windscreen Wipers

Fresh water tank is fitted with level switch and low level alarm (30% tank capacity) that is monitored by the general alarm panel.
Two vent lines connected to the top of tank allow the air vent with aseptic filter to the main deck level.

4-7. FIREMAIN SYSTEM

The fire fighting and washing system includes:

- One electro-pump of 25 m3/h – 30 m (fire and deck washing purpose)
- One electro-pump of 2 m3/h - 25 m (sea water for toilet flushing)
- One hand pump for emergency (fwd deck)
- Three fire hydrants

The ship is fitted with a not pressurised firemain system.
The primary purpose of firemain system is to provide the supply of sea water throughout the ship by the main fire pump to:

- One fire hydrant in the aft bridge deck
- One fire hydrant and whashunit in the Fwd deck
- One fire hydrant in the Workshop
- One deckwash unit and washunit in aft deck

In the event of trouble of the main fire E-pump, an emergency hand pump is to provide the supply of sea water to a fire hydrant in the Fwd deck.
A washing system maintained to 2,5 bar pressure by a sea water pump is to provide the sea water to the toilet unit.

4-8. BILGE SYSTEM

The system includes:

- Two electro-pumps 15 m3/h – 20 m
- One hand pump 2m3/h

The ship is fitted with three methods of extracting bilge water from the ship:

- One mud box directly connected to the bilge pumps allows the draining/dewatering of the engine room
- One suction manifold allows the selection of the compartment to be drained/dewatered
- One emergency draining/dewatering of the engine room by the sea water cooling pump of the main engine or by the fire pump through the sea water crossover

An oily water tank collecting oily water from drip trays of the engine room and fuel oil separator. An output connection located on main deck allows the drainage of tank.
The dewatering of forepeak is operated by handpump.

4-9. SEWAGE AND SANITARY SYSTEM

Grey waters from galley sink, showers and hand-basins are drained overboard.
The toilet is flushed with sea water of the washing system.
Black waters from toilet are drained overboard.

4-10. FUEL TRANSFER OIL SYSTEM

The system includes:

- One centrifugal fuel separator
- One transfer electro pump of 10 m3/h – 20 m
- One transfer hand pump
- Five storage tanks
- One service tank
- One manifold allowing the transfer of the fuel from any storage tank to any other storage tank or to the service tank throught the separator

The storage tanks and the service tank are equipped with a remote control quick closing valve from the CO2 room.
Filling by bunker station on main deck (max flow rate: 30m³/h) through the filter.
Discharge of fuel oil to shore by transfer pump.
Every fuel oil tank is equipped with a water draining suction pipe with self-closing valve operated from engine room.
The filling line overflow is discharged in the N°4 tank.
Via air vent and overflow system:

- The overflow of N°2 tank is discharged in the N°4 tank
- The overflow of N°1 and N°5 tanks are discharged in the N°3 tank

The fuel oil separator takes suction from any storage tank and discharges in the service tank.
The fuel oil separator takes suction from any storage tank and discharges in the service tank.
The main engine and the generating set supply lines are connected to the service tank and fitted with prefilters.
Fuel oil samples and water draining of fuel tanks is aided by connections and self closing valves.
Vent lines connected to the top of all tanks allow the air vent with flame arrester to the main deck level.

Fuel Oil capacities:

- Storage Tank N°1 (D T1) : 3,3m3 (Stbd Storage Room)
- Storage Tank N°2 (D T2) : 3,3m3 (Port Storage Room)
- Storage Tank N°3 (C T1) : 10m3 (Stbd Engine Room)
- Storage & Overflow Tank N°4 (C T2) : 10m3 (Port Engine Room)
- Storage Tank N°5 (B T10) : 9,27m3 (Fish Hold Room)
- Service Tank (C R2) : 1 m3

Storage fuel oil tanks (N°1), (N°2), (N°5) and fuel oil service tank are fitted with level switch and low level alarm (30% tank capacity) that is monitored by the general alarm panel.
Storage fuel oil tanks (N°3) and (N°4) are fitted with level switch, low level alarm (30% tank capacity) and very high level alarm (97% tank capacity) that is monitored by the general alarm panel.
Storage tanks located in storage and engine room are fitted with local sounding gauge.
Storage tank (N°5) located under the fish hold are fitted with a level glass gauge visible from engine room.

4-11. LUBRICATING OIL TRANSFER SYSTEM

The lubricating oil system includes:

- One new oil filling station
- One new oil tank (C R1) capacity 0.7m3
- One polluted oil tank (C R3) capacity 0.3m3
- One polluted oil discharge hand pump 4.3m3/h
- One polluted oil discharge station

The lubricating oil is embarked by gravity to the new oil tank.
New oil is manually transferred to the main engine and gensets.
Polluted oil stored in the polluted oil tank is removed from the main engine and gensets by their own hand pumps.
Polluted oil is discharged to the shore facilities through a deck draining station located to the bridge deck.
Vent lines connected to the top of tanks allow the air vent with flame arrester to the main deck level.
New and polluted oil tanks are fitted with a level glass gauge.

4-12. REFRIGERATION PLANT FOR FISH AND FREEZING TUNNEL

The ship is equipped with a refrigeration plant to maintain:

- One fish hold of 80m3 at -20°C
- One freezing tunnel of 1 ton of fish per day to be frozen at -40°C in 12 hours

The fish Hold 80m at -20°C refrigeration unit includes:

- One semi-hermetic reciprocating compressor of 4,5kW at -35°C / +36°C
- One sea water cooled condenser (sea water flow 2,63m3/h)
- Operating with R404A gas refrigerant

- Two galvanised steel coils of 3m length at direct expansion
- Four galvanised steel coils of 2m length at direct expansion

The freezing tunnel -40°C refrigeration unit includes:

- One semi-hermetic reciprocating compressor of 28kW at -45°C / +36°C
- One sea water cooled condenser (sea water flow 7,3m3/h)
- Operating with R404A gas refrigerant
- One evaporator 14kW at direct expansion

4-13. CO2 FIRE EXTINGUISHING SYSTEM

The engine room and workshop are protected by a CO2 inert gaz fixed.
The CO2 battery includes two bottles with capacity 50 litres charged with 33kg of CO2.
The CO2 battery is located in CO2 room at the main deck alleyway level.
CO2 discharge is activated locally by a mechanical release lever.

Volume of Rooms:

- Engine Room : 76m³
- Workshop : 13m³

4-14. AC 400 V-3-50 Hz NETWORK

The main power network is AC400V–50 Hz–3 phases with neutral insulated and not distributed.
The electrical production is made by two 50kVA generating sets and by a shore connection when the longliner is alongside.
The generating sets and the shore connection are connected to the main switchboard located in the engine room.
The main switchboard is composed of one production cell and one distribution cell.
The protections of the generating and of the shore connection set are made by circuit breakers mounted in the production cell of the main switchboard.

The distribution panel supplies the following equipment:

- Hydraulic Power Pack for Steering Gear
- Refrigerating Units for Fish Hold
- Windlass
- Engine Room Ventilation Fans
- Fuel Oil Transfer Pump

- Hydraulic Power Pack for Long Line Winch
- Water Heaters
- Fire pump
- Bilge pumps
- Electric Cooker
- Washing Pressure Pump (Toilet)
- Fresh Water Pressure Pump
- Long Line Winch Cooling Pump

Outputs from the distribution panels are identified by labels and protected by circuit breakers calibrated in accordance to the consumer power requirement. All the metallic parts are connected to the ship's hull by way of a earth pole link (dedicated Green/Yellow conductor or braid).

4-15. AC 400 V-3-50 Hz GENERATORS

The electrical power generation is accomplished by two three-phase AC synchronous constant-voltage generators with an output of 42,7kW each at 400V voltage and 50Hz frequency.
Each generator is drove by a four-cylinder in-line, four-stroke diesel engine mounted on the same skid.

Characteristics of the diesel engine:

- Naturally aspirated
- Displacement 4,4 litre
- Rotation Counterclockwise
- Sea water cooled
- Electric starter
- Starting battery
- DC24V Charging alternator

4-16. AC 230 V-1-50 Hz LIGHTING NETWORK

The AC230V-50Hz lighting network is suplied by AC400V busbars and distributed from the main switchboard.
Each output is clearly identified and protected by way of a circuit breaker (differential protection for sockets).
The network is distributed in two and three phases, with the earth pole connected to the Ship's hull.
All technical areas are lighted by fluorescent lights.

The fishing deck is lighted by two independent fluo light networks to achieve two levels of lighting and enhance the working conditions of the crew.
The aft part of the main deck located under the net drums is lighted with LED flood lights.
The wheelhouse and accommodation spaces are lighted by LED lights.
The exterior decks are fitted with LED lights.

4-17. DC24V NETWORK

The longliner is provided with two independant DC24V networks:

- One general service network supplying navigation equipment, fire detection system, fire extinguishing system, internal communications, emergency lighting…, including:
  - One DC24V distribution panel
  - One battery charger AC230V-1-50Hz/DC24V 60A
  - Two 12V 165Ah gel batteries

In case of a failure of the main power network (AC100V-1-50Hz), the supply of the DC24V equipment is automatically switched on the corresponding battery.

- One GMDSS network supplying the VHF equipment, the BLU HF equipment and NAVTEX equipment, including:
  - One GMDSS Power Supply Box AC230V-1-50Hz/DC24V 30A
  - Two 12V 90Ah gel batteries

In addition to the two here above networks, the ship is equipped with:

- Two 12V 320 Ah AGM batteries dedicated to the start of the main engine
- Two 12V 110 Ah AGM batteries dedicated to the start of each genset

4-18. PROPULSION SYSTEM

The longliner is provided with a propulsion plant composed of:

- One caterpillar C32 diesel engine (559 kW at 1600 rpm) Rating A
- One twin Disc MGX5225DC reverse and reduction gearbox (reduction ratio 5.04:1)
- One France Helices fixed pitch propeller 1.80m diameter (5 blades) with fixed nozzle
- One twin Disc EC300 electronic remote control system

4-19. MAIN PROPULSION ENGINE

The Caterpillar C32 marine diesel engine has the following characteristics:

- Four-stroke cycle
- Twelve cylinders V block
- Direct fuel injection
- Twin turbocharged aftercooled aspiration
- Displacement 32 litre
- Rotation Counterclockwise
- Sea water cooled
- Electric starter
- Starting battery
- DC24V Charging alternator

4-20. SHAFTING LINE AND FIXED PITCH PROPELLER

The shaft line is composed of:

- One propeller shaft
- One bulkhead seal
- One earthing assembly
- One transmission lock
- One propeller
- One fixed nozzle
- One stern sealing assembly
- One fore sealing assembly
- One lubricating oil tank

Characteristics of the shaft:

- Approximate length : 6,5m
- Diameter : 150mm
- Material : 42CD4 steel

The shaft line is lubricated with bio oil in order to reduce the impact on environment.

Characteristics of the fixed nozzle:

- Exterior diameter : 2200mm
- Interior diameter : 1830mm

It enhances propeller thrust at low ship speed.

Characteristics of the fixed pitch propeller:

- Diameter : 1800mm
- Number of blades : 5
- Material : BS1400AB2
- Standard ISO : 484/2 Class 1
- Static balancing

4-21. EXHAUST SYSTEM

The exhaust gases of the main engine and the generator sets are ducted to the funnel.
The main engine and the generators are equipped with a dry exhaust system composed of:

- One steel compensator mounted on the engine
- One set of steel exhaust pipes
- One silencer

4-22. SEA WATER COOLING SYSTEM

The sea water cooling system is composed of:

- Two sea chests at engine room port and starboard side
- Two main sea water strainers
- One main manifold in engine room (crossover)

The following equipment takes sea water from the main manifold in the Engine Room:

- Main Engine Cooling
- Starboard and Port Gensets Cooling
- Refrigeration Plant for Fish Hold & Freezing Tunnel Cooling
- Fire Fighting & Washing Pumps
- Emergency Fire Fighting Hand Pump
- Sea Water Cooling System for HVAC & Fishing Refrigeration Plant
- Sea Water Pump for Winches Hydraulic Power Pack

A bilge mud box is connected to the main manifold in order to allow in case of emergency the dewatering of the engine room by the sea water cooling pump of the main engine and by the fire pump.

4-23. MONITORING AND REMOTE CONTROL SYSTEM

The monitoring and remote control, located in the bridge desk, include the following equipment:

- One engine remote control panel
- One EC300 analog control system

The EC300 analog control system coordinates both engine and marine transmission functions.

4-24. INTERNAL COMMUNICATION SYSTEM

One intercom subsystem, Vingtor, is fitted with 5 terminals, providing the following functions:

- Point to point communication
- Intercommunication/conference
- General broadcast
- Alarms

The main station is located in the wheelhouse.

4-25. EXTERNAL COMMUNICATION SYSTEM

The GMDSS (Global Maritime Distress Safety System) covers navigation in A1+A2 area up to 100 nautical miles of the coast.

The GMDSS is compliant to the SOLAS convention.

It includes:

- One VHF/IMM FURUNO-FM8900S transceivers with associated digital selective call controller. This transceiver will be connected to the GPS, in order to transmit ship position in case of distress
- One MF FURUNO-FM1570 transceiver associated with an MF DSC controller (associated with two 7.25m long whip antennas)
- Two VHF Ocean Signal V100B watertight portable transceivers, GMDSS compliant
- One emergency Position Indication Radio Beacon (EPIRB) Ocean Signal E100G /ARH100 type
- One radar transponder (SART) FURUNO S100 type
- One Navtex FURUNO NX700 Prob with printer

GMDSS network is supplied by DC24V emergency supplies.

A reserve of energy will be provided to supply radio installations, for the purpose of conducting distress and safety radio communications, in the event of failure of the ship's main and emergency sources of electrical power.

One AIS transponder (Automatic Identification System), TRANSAS Class A type, is fitted.

4-26. NAVIGATION SYSTEM

The navigation equipment is compliant to the future SOLAS convention, applicable to fishing ships of less than 24m.
It includes:

- One integrated log/echo Sounder FURUNO FCV1150 type including:
  - One central unit with integrated control panel
  - One flush mounted hull sensor
- Two GPS FURUNO GP 33 type. The 4.3 inches control panel is integrated to wheelhouse console
- The secundary GPS allows securing GPS function
- One magnetic compass fitted in the wheelhouse
- One X Band Radar (36Nm) FURUNO M1835 type used as main radar on the ship or as a secondary one
  Radar characteristics:
  - Maximum detection range : 36 Nautical Miles
  - Power : 4 kw
  - Antenna : 24 inches
  - Screen : 10 inches
- One X Band Radar (48Nm) FURUNO M1945 type used as main radar on the ship or as a secondary one
  Radar characteristics:
  - Maximum detection range : 48 Nautical Miles
  - Power : 4 kw
  - Antenna : 40 inches
  - Screen : 10 inches
- One FURUNO SC-30 type satellite compass allows displaying ship heading true or magnetic and GPS data, and to distribute this information to others subsystems (Auto pilot, radar, ECDIS and Echo sounder)
  Satellite Compass characteristics:
  - Heading accuracy : 0,5°
  - Heading Resolution : 0,1°
  - Follow up rate : 45°/s
- One ECDIS (nautical charts)

This system allows displaying Nautical charts on PC screen.
It is based on Max sea Time zero Pro software.

This software manages and display following data:

- Ship GPS Positioning
- Weather Forecast
- Tidal current
- Waypoint and routes

More over, a module allows recording one echo sounding point per second (through a connection between GPS and echo sounder) and created an accurate 3D chart of the ocean floor.
All the tracks, marking can be recorded, as well in 2D or 3D mode.

One weather station RADIO OCEAN Rowind 33 including:

- One static sensor allowing measurement of the following parameters:
  - Relative speed and true wind
  - Wind direction
  - Air temperature
  - One display on the wheelhouse
- One video system CCTV 4 video cameras
- A main station in the wheelhouse is connected to 4 video cameras, in order to enhance safety on board
- One VHF radio receiver direction finder TAIYO TDL1550 A type able to detect Radio transmission from ships or coastal station
- The direction of the transmission and its level is displayed
- The system is able to scan VHF channels, 16 channel and aero distress 121.5 frequency
- One Autopilot SIMRAD AP70 type, including a gyro compass RC 25 type
  The autopilot is interfaced with the steering gear.
  It is connected to a rudder angle indicator SIMRAD RI35 (45° Starboard, 45° portside).
- One IXBlue system Multibeam sounder, data base

This system is based around a WASSP Multi beam sounder, allowing carrying out a very powerful probe on 120° under the ship.
Associated with dedicated software, it can reconstitute a 3D display of the ocean floor and the fishing resources.
A data base of the catches, according to geographical position of the ship and sounder data can be managed.
The 3D display allows a particularly effective work on wreck.
Information available allows a reduction in the fuel oil costs and a better resources management.

4-27. FISHING EQUIPMENT

The longliner is equipped with the following fishing equipment:

- One hydraulic line spool
- One hydraulic line setter
- One long line pulley
- One manual line drum

The remote control includes the following equipment:

- One wheelhouse control panel
- Two deck control panels (one with line counter)

CHAPTER 5 – OPERATING INSTRUCTIONS

5-1 GENERAL INFORMATION

This chapter details the operating procedures applicable to this 23,3m Longliner.
The pre-operational checks and required procedures necessaries to make the Longliner ready for operation are described in the check list in order to assure that all preparatory procedures are completed.
The main requirements for placing each major equipment in operation and for shutting down or securing are also outlined.
Reference to onboard Maker's and Supplier's technical manuals is given when applicable.

5-2. PRE-OPERATIONAL CHECKLIST

The following pre-operational checks should be performed prior to operation of the Longliner in order to verify that the ship is seaworthy.

5-2-1. Lifesaving Equipment

CHECK	REQUIREMENT
Verify the life saving and safety equipment is installed and operational.	- Lifebuoys and floating lines (2), - Light marker (1).
Ensure the presence of two liferafts. Ensure that the hydrostatic releases are correctly installed.	Ensure the containers are stopped correctly on to its cradles.
Ensure the presence of portable lifesaving equipment.	- Life-throwing apparatus (4) wheelhouse, - Life Jackets (2) wheelhouse, (2) workshop, (8) under each berth, - Red distress flares (6) whelhouse, - Self-activating buoyant smoke signal (2) wheehouse, - Portable signalling lamp (1) wheelhouse.
Ensure the presence and opening of following portable communication equipment. Check the specified expiry date of batteries.	- VHF portable GMDSS, - EPIRB

5-2-2. Firefighting Equipment

CHECK	REQUIREMENT
Verify that sea water firemain system is operational.	
Verify that the CO2 firefighting system is operational.	As per outline in Tyco Operation and Maintenance Manual.
Ensure the presence of portable firefighting equipment.	- Water Spray Extinguishers (3), - CO2 Extinguishers (2), - Fire hose and nozzles (4), - Supply Air Breather (1).
Verify that fire detection system is operational	As per outline in Marinelec DI-09 Operation and Maintenance Manual.

5-2-3. Machinery Equipment

Fuel Oil System

CHECK	REQUIREMENT
Drain sludge and decantation water from the five Fuel Oil Storage Tanks and Service Tank.	Empty sludges and condensate water in the Oily Water Tank.
Check fuel level in storage Fuel Oil Tanks. Fill as necessary for mission. Tank capacities: Storage Tank 1 (Stbd Storage Room) : 3.300 litre Storage Tank 2 (Port Storage Room) : 3.300 litre Storage / Overflow Tank 3 (Stbd Engine Room) : 10.000 litre Storage / Overflow Tank 4 (Port Engine Room) : 10.000 litre Storage Tank 5 (Fish Hold Room) : 9.270 litre	Know the capacity of your fuel tanks and be aware of how much spare capacity. Be able to reconcile the quantity of fuel that goes in with the capacity of the tank. Fill as required with MARINE DIESEL FUEL OIL ONLY as indicated by fuel level indications located in the wheelhouse. The filling line overflows are discharged in the N°3 and N°4 tanks. Before refuelling, ensure that you have the correct fire-fighting equipment on board, that it is in good working order, that it is easily accessible and that you know how to use it. Make sure you know where is stored the hydrocarbon spill kit.
Verify that all Fuel Oil System valves are correctly positioned.	In accordance with § 5-3-6.
Test Quick Closing Remote Control Valves and release all tank valves in OPEN position. Check oil level for each independant remote control handle.	Remote Control System is located on the Main Deck Alleyway. Maintain the oil level to the full mark on the sight glass. Use ONLY designated HYDRAULIC OIL in respect to Lubricants Schedule.
Select the Storage Tank for supply the fuel oil separator and open the corresponding suction valve.	

Lubricating Oil System

CHECK	REQUIREMENT
Check oil level in storage Tank.	As required, complete tank with Rimula R4L 15W-40 oil ONLY, in respect to Lubricants Schedule. Know the capacity of your oil tank and be aware of the reserve capacity.

Sea Water Cooling System (Main propulsion engine and Gensets)

CHECK	REQUIREMENT
Remove and clean the sea chest strainer, clean thoroughly body and basket and reinstall.	Working on each strainer one after another. Isolate the filter (close inlet and outlet valves) and drain internal pressure before removing the cover.
Operate all valves and ensure that they are correctly positioned.	In accordance with § 5-3-13.

Shafting Line

CHECK	REQUIREMENT
Check lubricating oil Tank level. Add lubricating oil as required.	Maintain the oil level to the full mark on the level gauge. Use ONLY designated LUBRICATING OIL in respect to Lubricants Schedule.
Check the stern tube area for leaks and free rotation of shaft.	
Inspect and ensure that the earthing brushes are not loose or corroded.	

Main Propulsion System

CHECK	REQUIREMENT
Ensure that main propulsion engine is free of all maintenance operations.	
Check oil levels main propulsion engine and gearbox oil levels. Add lubricating oil as required.	Maintain the oil level to the full mark on the level gauge. Use ONLY designated LUBRICATING OIL in respect to Lubricants Schedule.
Check Coolant level of main propulsion engine.	Maintain the coolant level to the full mark on the tank. Use ONLY designated COOLANT in respect to Lubricants Schedule.
Verify starting DC24V power is available.	
Inspect the alternator belt.	Remove the belt guard.
Perform main propulsion engine pre-operational checks, to include alarms.	As per outline in Caterpillar Operation and Maintenance Manual.

Genset 1 and Genset 2

CHECK	REQUIREMENT
Ensure that the both gensets are free of all maintenance operations.	
Check oil levels of Genset engines. Add lubricating oil as required.	Maintain the oil level to the full mark on the level gauge. Use ONLY designated LUBRICATING OIL in respect to Lubricants Schedule.
Check Coolant level in the coolant expansion tank of engines.	Maintain the coolant level to the full mark on the tank. Use ONLY designated COOLANT in respect to Lubricants Schedule.
Verify starting DC24V power is available.	
Perform gensets engines pre-operational checks, to include alarms.	As per outline in Caterpillar Operation and Maintenance Manual.

Long Line Winch Hydraulic Power Pack

CHECK	REQUIREMENT
Check oil Tank level. Add hydraulic oil as required.	Maintain the oil level to the full mark on the sight glass. Use ONLY designated HYDRAULIC OIL in respect to Lubricants Schedule.

5-2-4. Auxiliary Equipment

Main Deck arrangement

CHECK	REQUIREMENT
Check oil level of windlass. Add lubricating oil as required.	Use ONLY designated LUBRICATING OIL in respect to Lubricants Schedule.
Ensure the anchors are strapped correctly onto its cradles.	
Ensure loading mast is securely locked.	

Steering Gear-Hydraulic Power Pack

CHECK	REQUIREMENT
Check oil Tank level. Add hydraulic oil as required.	Maintain the oil level to the full mark on the sight glass. Use ONLY designated HYDRAULIC OIL in respect to Lubricants Schedule.
Ensure that the rudder stock and jacks are free of movement.	
Verify that the steering system is operational.	As per outline in Fluidmecanica Operation and Maintenance Manual.

Sea Water Cooling System for HVAC & Fishing Refrigeration Plant

CHECK	REQUIREMENT
Operate all valves and ensure that they are correctly positioned.	In accordance with § 5-3-1.

Fresh Water System

CHECK	REQUIREMENT
Check the residual Fresh Water tank level (3000 litre capacity). Fill as necessary for mission.	Fill tank using designated POTABLE WATER ONLY until tank overflow.
Verify that the water heaters are operational.	

Firemain System

CHECK	REQUIREMENT
Operate all valves and ensure that they are correctly positionned.	In accordance with § 5-3

Bilge System

CHECK	REQUIREMENT
Verify that bilge system is operational.	

Refrigeration Plant for Fish Hold and Freezing Tunnel

CHECK	REQUIREMENT
Check oil levels of reciprocating compressors.	If the oil level drops; seek skilled refrigeration personnel. Use ONLY designated LUBRICATING OIL in respect to Lubricants Schedule.
Check view finder indicator on liquid line.	Green: The refrigerant is dry. Yellow: the refrigerant is too wet; call skilled refrigeration personnel.

5-2-5. Electrical

CHECK	REQUIREMENT
Ensure that all navigation lights are operational.	
Verify all searchlights are operational.	Test each light individually.
Verify the navigational horn is operational.	

5-2-6. Communications - Navigation

CHECK	REQUIREMENT
Ensure that all electronic equipment is operational.	

5-2-7. Other

CHECK	REQUIREMENT
Verify items stored in various storerooms and storage areas are secured for sea.	Check each storeroom and storage area. Secure items as required.
Verify the watertight hatch covers and watertight doors are closed and dogged tightly and all weathertight doors operate freely.	Check each hatch and door individually. Close and dog tightly as required.

5-3. OPERATING OF THE SYSTEMS

5-3-1. Steering Gear

5-3-1-1. Monitoring and Control System

The monitoring and control system includes in steering room:

- One rudder Angle Transmitter
- One emergency Hand Wheel
- One electrical starter PUMP 2
- One electrical starter PUMP 1

and in wheelhouse:

- Two rudder Angle Indicator
- One Control tiller
- One "AUTO/MANUAL" Selector
- One bridge Remote Control Monitoring and Alarm Panel
- One steering Wheel

The starting of hydraulic plant (Pump 1 & Pump 2) can be started locally or remotely.
The Bridge Remote Control Monitoring and Alarm Panel enable the operator to control the starting of one or two hydraulic pumps.
Moreover, if one power pack (Pump 1) is in standby position, any failure in the other power pack (Pump 2) involves the automatic starting of the power pack (Pump 1).
An Emergency Hand operated pump driven by a wood wheel allows to control the locally steering gear .
One "AUTO/MANUAL" Selector allows the manual steering by the wheel or the tiller (MANUAL Mode) or by the autopilot signals (AUTO Mode).

5-3-1-2. Starting of Hydraulic Power Pack

The ship is considered electrically self powered.
Before starting, ensure that pre-operational checks on the power pack are performed; mainly for oil level.
Do not start any engine if there is a warning tag attached to the starter panels.

Fig5-1 Steering Gear - Electrical Starters HPU1 & 2

Fig5-2 Bridge Remote Control Monitoring and Alarm Panel

Figure 5-3 Steering Wheel

Figure 5-4 Control Tiller

Figure 5-5 Auto-Manual Steering Selector

Starting Power Pack from Wheelhouse

Electrical starters (Steering Room)

- Turn the selectors of "PUMP 1" and "PUMP 2" on the "REMOTE" position.

Bridge Remote Control Monitoring and Alarm Panel

- Turn the selector of "PUMP 1" on the "ON" position and the selector of "PUMP 2" on the "STANDBY" position (or inversely).

=> The Pump 1 starts.

=> In case of any failure of Pump 1, the Pump 2 starts automatically.

Starting Power Pack from Steering Room

Electrical starters (Steering Room)

- Turn the selector of "PUMP 1" on the "ON" position and the selector of "PUMP 2" on the "0" position (or inversely).

5-3-1-3. Stopping of Hydraulic Power Pack

Depending on where was made the start, set the switch to "0" or "OFF".

5-3-1-4. Selection of steering mode (Main Bridge Desk)

Turn the Steering Gear "AUTO/MANUAL" selector to the "AUTO" position for automatic steering by Autopilot.
Turn the Steering Gear "AUTO/MANUAL" selector to the "MANUAL" position for steering by wheel or tiller.

5-3-2. Sea Water Cooling System for HVAC & Fishing Refrigeration Plant

The following table shows the valves position to be set to operate the sea water cooling system when the ship is in normal operation and no firefighting is operated:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SR-0-501	Captain Cabin & Wheelhouse AC Condenser - Inlet	Wheelhouse	OPEN
SR-0-502	Galley AC Condenser - Inlet	Galley	OPEN
SR-0-503	Crew Cabin AC Condenser - Inlet	Crew Cabin	OPEN
SR-0-507	Fish Hold Refrigerating Condenser - Inlet	Stbd Storage Room	OPEN
SR-0-508	Fish Hold Refrigerating Condenser - Outlet	Stbd Storage Room	OPEN
SR-0-509	Fish Hold Refrigerating Sea Water Pump SR-0-001 - Suction	Stbd Engine Room	OPEN
SR-0-510	Fish Hold Refrigerating Sea Water Pump SR-0-001 - Discharge	Stbd Engine Room	OPEN
SR-0-511	Wheelhouse AC Condenser Sea Water Pump SR-0-003 - Suction	Stbd Engine Room	OPEN
SR-0-512	Wheelhouse AC Condenser Sea Water Pump SR-0-003 - Discharge	Stbd Engine Room	OPEN
SR-0-513	Galley & Crew Cabin AC Condenser Sea Water Pump SR-0-004 - Suction	Stbd Engine Room	OPEN
SR-0-514	Galley & Crew Cabin AC Condenser Sea Water Pump SR-0-004 - Discharge	Stbd Engine Room	OPEN
SR-0-515	Accomodations AC Condensers - Overboard Discharge	Port Engine Room	OPEN
SR-0-517	Fish Hold & Tunnel Freezing Refrigerating Condensers - Overboard Discharge	Port Storage Room	OPEN
SR-0-518	Freezing Tunnel Refrigerating Condenser - Outlet	Stbd Storage Room	OPEN
SR-0-522	Freezing Tunnel Refrigerating Condenser - Inlet	Stbd Storage Room	OPEN
SR-0-524	Fish Hold & Tunnel Freezing Refrigerating Condensers - Sea Water Suction	Stbd Engine Room	OPEN
SR-0-525	Accomodations AC Condensers - Sea Water Suction	Stbd Engine Room	OPEN
SR-0-527	Fish Hold Refrigerating Sea Water Pump SR-0-002 - Suction	Stbd Engine Room	OPEN
SR-0-528	Fish Hold Refrigerating Sea Water Pump SR-0-002 - Discharge	Stbd Engine Room	OPEN

Close the circuit breaker D32 in the Main Switchboard EF-0-001 to supply the AC cooling pumps.
The starting and stopping of SW pumps are operated automatically by the air conditionning system.

Figure 5-6 SW Pumps

5-3-3. Fresh Water System

The following table shows the valves position to be set to operate the fresh water system when the ship is in normal operation and no fresh water replenishment is to be operated:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SD-0-501	Freshwater Storage Tank - Suction	Aft Engine Room	OPEN
SD-0-502	Fresh Water Filter - Inlet	Stbd Engine Room	OPEN
SD-0-505	Fresh Water Filter - Outlet	Stbd Engine Room	OPEN
SD-0-506	Fuel Oil Separator - Fresh Water Supply	Port Engine Room	OPEN
SD-0-507	Fresh Water Pressure Pump - Discharge	Stbd Engine Room	OPEN
SD-0-509	Crew Sanitary Water Heater - Supply	Crew Sanitary	OPEN
SD-0-512	FW Tank Shore Filling Line - Supply	Aft Engine Room	SHUT
SD-0-513	Crew Sanitary Water Heater - Outlet	Crew Sanitary	OPEN
SD-0-515	Fresh Water Supply Storage Tank - Supply	Aft Engine Room	OPEN
SD-0-516	Galley & Captain Cabin Water Heater - Outlet	Galley	OPEN
SD-0-518	Galley & Captain Cabin Water Heater - Supply	Galley	OPEN
SD-0-526	Sample Tanking Cock	Aft Engine Room	SHUT

5-3-3-1. Fresh Water Filling from Deck

To replenish fresh water tank from the Deck connection (Stbd Side) it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SD-0-512	FW Tank Shore Filling Line - Supply	Aft Engine Room	OPEN

Figure 5-7 FW Pressure Pump

5-3-3-2. Operating of fresh water pressure pump

Close the circuit breaker D29 in the main switchboard EF-0-001 to support the FW pump. The starting and stopping of FW pressure pump are operated automatically by the pressure of fresh water system.

5-3-3-3. Operating of water heaters

Close the circuit breakers D10 and D11 in the Main Switchboard EF-0-001.

5-3-4. Firemain System

The following table shows the valves position to be set to operate the firemain system when the ship and machinery equipment are in normal operation and no firefighting is to be operated:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SM-0-501	Upper Deck - Fire Hydrant	Bridge Deck	SHUT
SM-0-502	Aft Deck Wash - Sea Water Supply	Aft Fishing Deck	SHUT
SM-0-503	Emergency Fire Hand Pump - Sea Water Suction	Fwd Engine Room	OPEN
SM-0-504	Aft Washunit - Sea Water Supply	Aft Fishing Deck	SHUT
SM-0-505	Fwd Washunit - Sea Water Supply	Fwd Fishing Deck	SHUT
SM-0-506	Workshop - Fire Hydrant	Workshop	SHUT
SM-0-507	Fore Deck - Fire Hydrant	Fwd Fishing Deck	SHUT
SM-0-508	Gravity Toilet - Isolating Valve	Crew Sanitary	OPEN
SM-0-509	Emergency Fire Hand Pump - Isolating Valve	Fwd Fishing Deck	OPEN
SM-0-510	Fore Deck - Emergency Fire Hydrant	Fwd Fishing Deck	SHUT

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SM-0-514	Main Fire Pump - Discharge	Stbd Engine Room	OPEN
SM-0-515	Main Fire Pump - Sea Water Suction	Stbd Engine Room	OPEN
SM-0-517	Sea Water Pressure Pump - Discharge	Stbd Engine Room	OPEN
SM-0-518	Sea Water Pressure Pump - Suction	Stbd Engine Room	OPEN

Figure 5-8 Fire Pump

Figure 5-9 Main Switchboard - Fire Pump Control

Figure 5-10_Fire Pump Remote Control

5-3-4-1. Operating of sea water pressure pump

Close the circuit breaker D25 in the Main Switchboard EF-0-001.

The starting and stopping of SW pressure pump are operated automatically by the pressure of sea water flushing system.

5-3-4-2. Operating of fire pump from main switchboard EF-0-001 or from the Remote Control Box located in workshop

Close the circuit breaker D12 in the Main Switchboard EF-0-001.
Press the green push-button to start the pump.
Press the red push-button to stop the pump normally.
In the event of any problem, press the "Emergency stop button" to stop and lock the Fire pump. The Fire pump will not re-start when the button is locked. To unlock, turn the button clockwise in order to reset.

5-3-5. Bilge System

The following table shows the valves position to be set to operate the bilge system when the ship and machinery equipment are in normal operation and no bilge draining is to be operated:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SE-0-501	Bilge Pumps - Overboard Discharge	Port Engine Room	OPEN
SE-0-502	Bilge Pump SE-0-001 - Discharge	Stbd Engine Room	OPEN
SE-0-503	Bilge Pump SE-0-002 - Discharge	Stbd Engine Room	OPEN
SE-0-505	Bilge Pump SE-0-001 - Suction	Stbd Engine Room	OPEN
SE-0-507	Bilge Pump SE-0-002 - Suction	Stbd Engine Room	OPEN
SE-0-509	Bilge Fwd Engine Room - Bilge draining	Stbd Engine Room	SHUT
SE-0-511	Bilge Engine Room - Emergency Bilge Draining	Fwd Engine Room	SHUT
SE-0-514	Bilge Fish Hold Room - Bilge Draining	Fwd Engine Room	OPEN
SE-0-515	Bilge Stbd Fish Hold Room - Bilge Draining	Fwd Engine Room	SHUT
SE-0-516	Bilge Fish Hold Room - Bilge Draining	Fwd Engine Room	SHUT
SE-0-517	Bilge Steering Gear Room - Bilge Draining	Aft Engine Room	SHUT
SE-0-518	Bilge Storage Room - Bilge Draining	Aft Engine Room	SHUT
SE-0-519	Bilge Aft Engine Room - Bilge Draining	Aft Engine Room	SHUT
SE-0-527	Bilge Port Fish Hold Room - Bilge Draining	Fwd Engine Room	SHUT
SE-0-528	Bilge Hand Pump - Discharge Overboard	Port Fwd Peak	OPEN
SE-0-530	Bilge Hand Pump Discharge - Isolating Valve	Fwd Peak	OPEN
SE-0-531	Bilge Hand Pump - Suction	Fwd Peak	OPEN

5-3-5-1. Main Bilge Operation

To operate the bilge system by one or two bilge E-pumps, it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
Dewatering of Steering Gear Room			
SE-0-517	Bilge Steering Gear Room - Bilge Draining	Aft Engine Room	OPEN
Dewatering of Storage Room			
SE-0-518	Bilge Storage Room - Bilge Draining	Aft Engine Room	OPEN
Dewatering of Engine Room in direct line			
SE-0-509	Bilge Fwd Engine Room - Bilge draining	Fwd Engine Room	OPEN
Or /and			
SE-0-519	Bilge Aft Engine Room - Bilge Draining	Aft Engine Room	OPEN

Dewatering of Fish Hold Room

SE-0-516	Bilge Fish Hold Room - Bilge Draining	Fwd Engine Room	OPEN
SE-0-515	Bilge Stbd Fish Hold Room - Bilge Draining	Fwd Engine Room	OPEN

Or /and via the Bilge Manifold

SE-0-516	Bilge Fish Hold Room - Bilge Draining	Fwd Engine Room	OPEN
SE-0-527	Bilge Port Fish Hold Room - Bilge Draining	Fwd Engine Room	OPEN

5-3-5-2. Emergency dewatering of the engine room by the sea water cooling pump of the main engine

To operate the emergency dewatering the sea water cooling pump of the main engine, it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SE-0-511	Bilge Engine Room - Emergency Bilge Draining	Fwd Engine Room	OPEN

5-3-5-3. Emergency dewatering of the engine room by the fire pump

Refer to the Operating of Sea Water Cooling System

Figure 5-11 Bilge Pumps

Figure 5-12 Bilge Manifold

Figure 5-13 Main Switchboard - Bilge Pumps Control

Figure 5-14 Bilge Pumps Remote Control Panels

5-3-5-4. Operating of bilge pumps N°1 and N°2 from the Main Switchboard or from the Remote Control Box, both located in engine room.

Close the circuit breakers D13 an D14 in the Main Switchboard EF-0-00.
Press the green push-button to start the pump.
Press the red push-button to stop the pump normally.
In the event of any problem, press the "Emergency stop button" to stop and lock the bilge pump. The bilge pump will not re-start when the button is locked. To unlock, turn the button clockwise in order to reset.

5-3-6. Sewage & Sanitary System

The following table shows the valves position to be set to operate the sewage and sanitary system when the ship is in normal operation:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SU-0-501	Crew Quarters Wash Basin, Shower & ACU Condensates - Overboard Discharge	Port Storage Room	OPEN
SU-0-504	Captain Cabin Wash Basin, Sink Galley & ACU Condensates - Overboard Discharge	Port Engine Room	OPEN
SU-0-506	Gravity Toilet - Overboard Discharge	Port Storage Room	OPEN

5-3-7. Fuel Transfer Oil System

The following table shows the valves position to be set to operate the fuel oil transfer system when the ship and the machinery equipment are in normal operation and no fuel oil transfer is to be operated:

In the below table, the storage tank N°4 is selected for supply the fuel oil separator.

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SG-0-501	Fuel Oil Filling	Port Engine Room	SHUT
SG-0-502	Fuel Oil Discharge Filter - Isolating Valve	Port Engine Room	SHUT
SG-0-503	Fuel Oil Suction Filter - Isolating Valve	Port Engine Room	SHUT
SG-0-506	Fuel Oil Filling Line Sample Cock	Port Engine Room	SHUT
SG-0-507	FO Separator Suction - Isolating Valve	Port Engine Room	OPEN
SG-0-509	FO Separator Discharge Filter - Isolating Valve	Port Engine Room	OPEN
SG-0-510	FO Transfer Pumps Suction Filter - Isolating Valve	Port Engine Room	OPEN
SG-0-512	FO Transfer Pumps Discharge Filter - Isolating Valve	Port Engine Room	OPEN
SG-0-513	FO Transfer E-Pump Suction - Isolating Valve	Port Engine Room	OPEN
SG-0-514	FO Transfer E-Pump Discharge - Isolating Valve	Port Engine Room	SHUT
SG-0-516	FO Transfer E-Pump Discharge - Isolating Valve	Port Engine Room	OPEN
SG-0-517	Transfer Line Sample Cock	Port Engine Room	SHUT
SG-0-518	FO Transfer Hand Pump Discharge - Isolating Valve	Port Engine Room	SHUT
SG-0-520	Stbd Storage Room FO Tank 1 - Suction	Port Engine Room	SHUT
SG-0-521	Stbd Storage Room FO Tank 1 - Filling	Port Engine Room	SHUT
SG-0-522	Stbd Engine Room FO Tank 3 - Suction	Port Engine Room	SHUT
SG-0-523	Stbd Engine Room FO Tank 3 - Filling	Port Engine Room	SHUT

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SG-0-524	Fishing Hold Room FO Tank 5 - Suction	Port Engine Room	SHUT
SG-0-525	Fishing Hold Room FO Tank 5 - Filling	Port Engine Room	SHUT
SG-0-526	Port Engine Room FO Tank 4 - Suction	Port Engine Room	OPEN
SG-0-527	Port Engine Room FO Tank 4 - Filling	Port Engine Room	SHUT
SG-0-528	FO Service Tank 6 - Suction	Port Engine Room	SHUT
SG-0-529	FO Service Tank 6 - Filling	Port Engine Room	SHUT
SG-0-530	Port Storage Room FO Tank 2 - Suction	Port Engine Room	SHUT
SG-0-531	Port Storage Room FO Tank 2 - Filling	Port Engine Room	SHUT
SG-0-532	Port Engine Room FO Tank Filling / Suction - Quick Closing (Remote Controlled)	Port Engine Room	OPEN
SG-0-533	Port Engine Room FO Tank - Water Draining	Port Engine Room	SHUT
SG-0-534	Stbd Engine Room FO Tank Filling / Suction - Quick Closing (Remote Controlled)	Stbd Engine Room	OPEN
SG-0-535	Stbd Engine Room FO Tank - Water Draining	Stbd Engine Room	SHUT
SG-0-536	Stbd Genset FO Return - Discharge	Port Engine Room	OPEN
SG-0-537	Port Genset FO Return - Discharge	Port Engine Room	OPEN
SG-0-539	FO Service Tank Feeding - Quick Closing (Remote Controlled)	Port Engine Room	OPEN
SG-0-540	FO Service Tank - Water Draining	Port Engine Room	SHUT
SG-0-542	FO Service Tank Filling / Suction - Quick Closing (Remote Controlled)	Port Engine Room	OPEN
SG-0-543	FO Separator - Discharge	Port Engine Room	OPEN
SG-0-544	Dual Static FO Main Engine Filter - Isolating Valve	Engine Room	OPEN
SG-0-545	FO Supply to Main Engine Dual Static Filter / Quick Connection	Engine Room	To Static Filter
SG-0-546	FO Return from Main Engine to FO Service Tank / Quick Connection	Engine Room	To Serv. Tank
SG-0-547	Port Single Static FO Genset Filter - Isolating Valve	Port Engine Room	OPEN
SG-0-548	Port Storage Room FO Tank Filling / Suction - Quick Closing (Remote Controlled)	Port Engine Room	OPEN
SG-0-549	Port Storage Room FO Tank - Water Draining	Port Engine Room	SHUT
SG-0-550	Stbd Storage Room FO Tank - Water Draining	Stbd Engine Room	SHUT
SG-0-551	Stbd Storage Room FO Tank Filling / Suction - Quick Closing (Remote Controlled)	Stbd Engine Room	OPEN
SG-0-552	Stbd Single Static FO Genset Filter - Isolating Valve	Engine Room	OPEN
SG-0-553	Fish Hold Room FO Tank Filling / Suction - Quick Closing (Remote Controlled)	Fwd Engine Room	OPEN
SG-0-554	Fishing Hold Room FO Tank - Water Draining	Fwd Engine Room	SHUT
SG-0-555	Main Engine FO Return - Discharge	Port Engine Room	OPEN

5-3-7-1. Storage Tanks filling

To replenish fuel oil tanks from the deck connection (Stbd Side) it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SG-0-502	Fuel Oil Discharge Filter - Isolating Valve	Port Engine Room	OPEN
SG-0-503	Fuel Oil Suction Filter - Isolating Valve	Port Engine Room	OPEN
SG-0-531	Port Storage Room FO Tank 2 - Filling	Port Engine Room	OPEN
SG-0-525	Fishing Hold Room FO Tank 5 - Filling	Port Engine Room	OPEN
SG-0-523	Stbd Engine Room FO Tank 3 - Filling	Port Engine Room	OPEN
SG-0-521	Stbd Storage Room FO Tank 1 - Filling	Port Engine Room	OPEN

5-3-7-2. Transfer N°5 Storage Tank to N°4 Storage Tank (for example)

To replenish fuel oil storage tanks N°4 from fuel oil storage tanks N°5, it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SG-0-524	Fishing Hold Room FO Tank 5 - Suction	Port Engine Room	OPEN
SG-0-528	FO Service Tank 6 - Suction	Port Engine Room	OPEN

Figure 5-15 FO Transfer Pump and Separator Panel

Figure 5-16 Main Switchboard - FO Transfer Pump Control

Figure 5-17 FO Transfer Pump Remote Control Panel

5-3-7-3. Operating of FO transfer pump from the Main Switchboard or from the Remote Control Box, both located in engine room

Close the circuit breaker D07 in the Main Switchboard EF-0-001.

Press the red push-button to stop the pump normally.

In the event of any problem, press the "Emergency stop button" to stop and lock the FO pump. The FO pump will not re-start when the button is locked. To unlock, turn the button clockwise in order to reset.

Figure 5-18 FO Quick Closing Valves

5-3-7-4. Operating of FO centrifugal separator

Close the circuit breaker D28 in the Main Switchboard EF-0-001 to sypply the separator.
On the control panel of separator, press the push-button (keep the button pressed 3 - 4 seconds) to start the separator.

5-3-8. Lubricating Oil Transfer System

The following table show the valves position to be set to operate the lubricating oil system when the machinery equipment are in normal operation and no lub.oil transfer is to be operated:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SL-0-502	Polluted Oil Tank - Discharge	Engine Room	SHUT
SL-0-503	Polluted Oil Tank - Suction	Engine Room	OPEN
SL-0-504	Polluted Oil Tank - Discharge	Engine Room	SHUT
SL-0-506	Polluted Oil Tank - Funnel Discharge	Engine Room	SHUT
SL-0-507	Polluted Oil Tank - Filling	Engine Room	OPEN
SL-0-508	New Lub. Oil Tank - Tapping cock	Engine Room	SHUT
SL-0-509	Lub. Oil Filling Station - Discharge (Inlet Filter)	Engine Room	SHUT
SL-0-511	Lub. Oil Filling Station - Discharge (Outlet Filter)	Engine Room	OPEN
SL-0-512	Polluted Hand Pump - Suction	Engine Room	SHUT
SL-0-514	Condensate Trap - Discharge	Main Deck	OPEN
SL-0-516	Port Genset Polluted Oil - Discharge	Port Engine Room	SHUT
SL-0-517	Stbd Genset Polluted Oil - Discharge	Port Engine Room	SHUT

5-3-8-1. Storage new oil tank filling from Deck

To replenish lubricating oil tank from the deck connection (Stbd Side) it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SL-0-509	Lub. Oil Filling Station - Discharge (Inlet Filter)	Engine Room	OPEN

5-3-8-2. Draining of Gensets Polluted Oil

To drain polluted oil from Genset 1 it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SL-0-516	Port Genset Polluted Oil - Discharge	Port Engine Room	OPEN

Or from Genset 2

SL-0-517	Stbd Genset Polluted Oil - Discharge	Port Engine Room	OPEN

5-3-8-3. Polluted oil tank discharge

To drain polluted oil from polluted oil tank it is necessary to operate the valves as indicated in the table below:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
SL-0-502	Polluted Oil Tank - Discharge	Engine Room	OPEN

All transferring operations are performed by hand pumps.

Figure 5-19 Lubricating oil Transfer Hand Pump

5-3-9. CO2 Firefighting System

5-3-9-1. CO2 Firefighting System

The CO2 Firefighting System is located in the CO2 Storage Room in the main deck alleway.
The CO2 Firefighting System protects the engine room and workshop.

The CO2 Firefighting system includes mainly:

- Two pressurized gas cylinders of 50 litre each equipped with manual / pneumatic valve. The cylinder 1, equipped with a mechanical release lever allows the release of the cylinder 2 by CO2 pressure
- One pressure meter
- One isolating valve
- One pressure switch fitted on a closed manifold and connected to ship alarm monitoring system to detect CO2 cylinders leaking
- Two visual and audible alarms

The opening of CO2 Storage Room door causes tripping of visual and audible alarms in engine room and workshop.

Figure 5-20 CO2 Cylinders 1 and 2

Figure 5-21 Mechanical Release Lever (Cylinder 1) and Pneumatic Release (Cylinder 2)

Figure 5-22 CO2 Isolating Valve

5-3-9-2. Standby Operation

The both cylinders are charged with 50kg CO2.
The mechanical release lever is armed and secured by pin.
The isolation valve is shut.
The CO2 manifold is closed at 0 bar pressure.
In case of cylinder leaks in closed manifold, alarm is activated in wheelhouse.

5-3-9-3. Firefighting Operation (in the event of engine fire)

Open the door of the CO2 storage room.
=> Alarms are activated in engine room and workshop,
=> Ventilation is shutdown in engine room and workshop,
=> "CO2 DOOR OPENED" alarm on the wheelhouse monitoring panel is activated,
Actuate the both FO quick closing valves.
Ensure that engine room and workshop are clear of personnel.
Close all the openings; engine room air intake included.
Wait approximately 30 seconds.
Open manually the CO2 isolating valve (top of CO2 cylinder 1).
Remove pin of Pilot Cylinder Valve.
Actuate manually the CO2 Pilot Cylinder Valve by sharply pulling the lever on top of the valve.
=> The pressure of pilot cylinder activates the CO2 cylinder 2.
=> CO2 of both cylinders is discharged ion the machinery space.
THE CO2 CONCENTRATION MUST BE RETAINED WITHIN THE MACHINERY SPACE DURIN 20 MINUTES FOR MINIMUM.
DO NOT RE-ENTER THE AREA AS IT IS NOT CONSIDERED TO BE SURE.

5-3-10. AC 400V-3-50Hz Production Network

The 400V electrical outputs of the two generators and shore socket are supplied via Motor Controlled Circuit Breakers (MCCB) to individual busbar sections of the Main Switchboard EF-0-001 located in Engine Room.

Main Electrical Switchboard EF-0-001 - AC 400V Supply Cell

Circuit Breaker	Nb. of Poles	Rating (Amps)	Supplier	Consumer Index	Location
CB1	4	80A	Stbd Generator Set 1 - Output	ED-0-001	Engine Room
CB2	4	80A	Port Generator Set 2 - Output	ED-0-002	Engine Room
CB3	4	80A	Shore Supply Socket - Output	EF-0-002	Main Deck Alleyway
Q1	4	6A	Genset 1 - Multi-measurement	ED-0-001	Engine Room
Q2	4	6A	Genset 2 - Multi-measurement	ED-0-002	Engine Room

5-3-10-1. General

The Gensets are started manually, either locally or from the whellhouse.
In semi-automatic mode, the load balancing and frequency control are performed automatically by the load sharing unit.
In navigation, the operating with a generator is possible.
In fishing, it is advisable to couple the two Gensets.
In case of overload, an automatic load shedding is performed.

5-3-10-2. Semi Automatic Mode

In normal operation, the management system of the power plant provides the following functions:
- Semi automatic coupling of generators
- The distribution of load and control of the frequency
- Limitation of the rated power output
- Selection of dock mode / open road

5-3-10-3. Manual Mode

In manual operation, the following functions are provided:

- The manual coupling of generators
- The frequency control
- The speed control

Figure 5-23 Main Electrical Switchboard - Production Cell

5-3-11. AC 400V-3-50Hz Distribution Network

All 440V supplies to ship services are provided by a switchboard distribution section located on the right of the main switchboard EF-0-001 located in the engine room.
Electrical distribution of AC400V is realized according to the following electrical distribution table:

Main Electrical Switchboard EF-0-001 - AC 400V Distribution Cell

Circuit Breaker	Nb. of Poles	Rating (Amps)	Consumer	Consumer Index	Location
D01	3	10A	Steering Gear Starter Panel - Pump 1	QB-0-001	Steering Gear Room
D02	3	10A	Steering Gear Starter Panel - Pump 2	QB-0-002	Steering Gear Room
D03	3	80A	Fish Hold Refrigeration Electrical Control Cabinet	QV-0-100	Storage Room
D04	3	10A	Windlass Starter Panel	EF-0-010	Fwd Peak
D05	3	10A	Engine Room Exhaust Fan - High Speed	SC-0-014	Stbd Mast Foot
D06	3	16A	Engine Room Exhaust Fan - Low Speed	SC-0-014	Stbd Mast Foot
D07	3	10A	Fuel, Oil Transfer Pump	SG-0-001	Eng. Room
D08	3	32A	Long Line Hydraulic Power Pack	EF-0-004	Eng. Room
D09			Index Not attributed		
D10	3	16A	Water Heater 1	SD-0-002	Galley
D11	3	16A	Water Heater 2	SD-0-003	Storage Room

Circuit Breaker	Nb. of Poles	Rating (Amps)	Consumer	Consumer Index	Location
D12	3	10A	Fire Pump	SM-0-001	Eng. Room
D13	3	10A	Bilge Pump 1	SE-0-001	Eng. Room
D14	3	10A	Bilge Pump 2	SE-0-002	Eng. Room
D15	3	16A	Electric Cooker	QC-0-001	Galley
D16	3	20A	Spare		
D17	3	16A	Spare		
D18	4	25A	Wheelhouse Distribution Frame	EE-0-002	Wheelhouse
D19	4	20A	Workshop Distribution Panel	EE-0-003	Workshop
D20	4	16A	Engine Room Distribution Panel	EE-0-001	Engine Room
D21	2	16A	Fans Junction Box	SC-2-016	Engine Room
D22	2	16A	AC Crew Quarters	SC-0-020	Crew Quarters
D23	2	16A	AC Galley	SC-0-023	Galley
D24	3	2A	Winches Hydraulic Power Pack - Cooling Pump	EF-0-003	Eng. Room
D25	3	2A	Washing Pressure Pump (Toilet)	SM-0-002	Eng. Room
D26	2	10A	Refrigerator	QC-0-002	Galley
D27	2	10A	Loading Mast Junction Box	EE-2-200	Fwd Peak
D28	2	10A	Fuel Oil separator	SG-0-002	Engine Room
D29	3	2A	Fresh Water Pressure Pump	SD-0-001	Eng. Room
D30	2	2A	Genset 1 - Anti Condensation Heater	ED-0-001	Engine Room
D31	2	2A	Genset 2 - Anti Condensation Heater	ED-0-002	Engine Room
D32	2	2A	AC Sea Water Pump Relay Box	SC-0-030	Engine Room
D33	2	10A	DC24V Battery Charger	EB-0-001	Engine Room
D34	2	10A	Spare		
D35	2	16A	ACU Wheelhouse	SC-0-026	Wheelhouse
D36	2	16A	Spare		

5-3-12. AC 230 Distribution Network

All 230V supplies to ship services are provided by:
- A switchboard distribution section located on the centre of the main switchboard EF-0-001,
- An engine room distribution panel EE-0-001
- A wheelhouse distribution frame EE-0-002
- A workshop distribution panel EE-0-003

Electrical distribution of AC230V is realized according to the following electrical distribution tables:

Main Electrical Switchboard EF-0-001 - AC 230V Distribution Cell

Circuit Breaker	Nb. of Poles	Rating (Amps)	Consumer	Consumer Index	Location
D18	4	25A	Wheelhouse AC230V Distribution Frame	EE-0-002	Wheelhouse
			Wheelhouse DC24V Distribution Frame	EB-0-007	Wheelhouse
D19	4	20A	Main Deck AC230V Distribution Panel	EE-0-003	Main Deck
			Wheelhouse DC24V Distribution Frame	EB-0-007	Wheelhouse
D20	4	16A	Lower Deck AC230V Distribution Panel	EE-0-001	Lower Deck
			Wheelhouse DC24V Distribution Frame	EB-0-007	Wheelhouse
D21	2	16A	Sanitary & Provision Store Ventilation Fans - Junction Box	SC-2-016	Engine Room

Circuit Breaker	Nb. of Poles	Rating (Amps)	Consumer	**Consumer Index**	Location
D22	2	16A	ACU - Crew Accomodations	SC-0-020	Crew Quarters
D23	2	16A	ACU - Galley	SC-0-023	Galley
D26	2	10A	Refrigerator	QC-0-002	Galley
D27	2	10A	Loading Mast	EE-0-200	Fwd Fishing Deck
D28	3	6,3/10A	FO Separator	SG-0-002	Engine Room
D30	2	2A	Genset 1 - Heater	ED-0-001	Engine Room
D31	2	2A	Genset 2 - Heater	ED-0-002	Engine Room
D32	3	1,5/2,5A	AC Sea Water Cooling Pump - Relay Box	SC-0-030	Engine Room
D33	2	10A	DC24V Battery Charger	EB-0-001	Wheelhouse
D34	3	6,3/10A	Fish Hold Refrigeration Electrical Control Cabinet - SW Cooling Pumps	SC-0-029	Engine Room
D35	2	16A	ACU - Wheelhouse & Captain Cabin	SC-0-026	Wheelhouse
D36	2	16A	Spare		

Engine Room Distribution Panel EE-0-001

Circuit Breaker	**Nb. of Poles**	**Rating (Amps)**	**Consumer**	**Consumer Index**	**Location**
D01	2	10A	Steering Room Lighting - Junction Box	EE-2-120	Steering Room
D02	2	10A	Storage Room Lighting - Junction Box	EE-2-119	Storage Room
D03	2	10A	Engine Room Lighting - Junction Box	EE-2-117	Engine Room
D04	2	10A	Fishing Area Lighting - Junction Box	EE-2-102	Aft Fishing Deck
D05	2	16A	Engine Room Socket	EE-0-197	Engine Room
D06	2	16A	Engine Room Socket	EE-0-199	Engine Room
D07	2	10A	Spare		

Wheelhouse Distribution Frame EE-0-002

Circuit Breaker	**Nb. of Poles**	**Rating (Amps)**	**Consumer**	**Consumer Index**	**Location**
D01	2	10A	Wheelhouse Lighting - Junction Box	EE-2-101	Wheelhouse
D02	2	10A	Captain Cabin Lighting - Junction Box	EE-2-104	Captain Cabin
D03	4	16A	External Lightning Panel	EE-0-108	Wheelhouse
D04	2	16A	Sockets - Junction Box	EE-2-190	Wheelhouse
D05	2	10A	Spare		
D06	2	1A	Bridge Alarm Panel - Converter	MO-0-004	Wheelhouse
D07	2	16A	Window Heaters - Junction Box	EE-2-116	Wheelhouse
D08	2	4A	Navigation Lights Panel - converter	ES-0-002	Wheelhouse
D09	2	1A	Fire Detection Panel- Converter	SI-0-006	Wheelhouse
D10	2	6A	GMDSS Battery Charger	EB-0-002	Wheelhouse
D11	2	6A	M2P System - Socket	EE-0-209	Wheelhouse

Workshop Distribution Panel EE-0-003

Circuit Breaker	**Nb. of Poles**	**Rating (Amps)**	**Consumer**	**Consumer Index**	**Location**
D01	2	10A	Alleyway Lighting - Junction Box	EE-2-109	Main Deck Alleyway
D02	2	10A	Alleyway Lighting - Junction Box	EE-2-110	Main Deck Alleyway
D03	2	10A	Provision Store Lighting - Junction Box	EE-2-146	Provision Store
D04	2	10A	Workshop Lighting - Junction Box	EE-2-106	Workshop
D05	2	10A	Galley Lighting - Junction Box	EE-2-107	Galley
D06	2	10A	Fore Peak Lighting - Junction Box	EE-2-111	Fore Peak
D07	2	10A	Crew Quarters Lighting - Junction Box	EE-2-193	Crew Quarters
D08	2	10A	Sanitary Lighting - Junction Box	EE-2-112	Sanitary

Circuit Breaker	Nb. of Poles	Rating (Amps)	Consumer	Consumer Index	Location
D09	2	16A	Allayway Sockets	EE-0-196	Main Deck Alleyway
D10	2	16A	Workshop Sockets	EE-0-185	Workshop
D11	2	16A	Galley Sockets - Junction Box	EE-2-187	Galley
D12	2	16A	Crew Quarters Sockets - Junction Box	EE-2-193	Crew Quarters
D13	2	6A	MIR Charger	EE-0-220	Workshop
D14	2	10A	Spare		

5-3-13. DC 24V Distribution Network

All DC24V supplies to ship services are provided by the wheelhouse distribution frame EB-0-007.

Electrical distribution of DC24V is realized according to the following electrical distribution table:

Wheelhouse Distribution Frame EB-0-007

Circuit Breaker	Nb. of Poles	Rating (Amps)	Consumer	Consumer Index	Location
D01	2	25A	GMDSS Battery Charger	EB-0-002	Stbd Bridge Desk
D02	2	4A	Lower Deck Emergency Lighting - Junction Box	EB-2-106	Storage Room
D03	2	4A	Main Deck Emergency Lighting - Junction Box	EB-2-105	Main Deck Alleyway
D04	2	25A	Upper Deck Emergency Lighting - Junction Box	EB-2-101	Wheelhouse
D05	2	1A	AIS Transponder	NL-0-030	Main Bridge Desk
D06	2	4A	Public Adress System	TI-0-010	Main Bridge Desk
D07	2	1A	Magnetic Compass	NL-0-003	Main Bridge Desk
D08	2	1A	Satellite Compass	NL-0-106	Wheelhouse
D09	2	1A	GPS	NL-0-006	Wheelhouse
D10	2	4A	Echo Sounder	NL-0-001	Main Bridge Desk
D11	2	6A	48Nm X Band Marine Radar	NL-0-005	Main Bridge Desk
D12	2	4A	36Nm X Band Marine Radar	NL-0-004	Main Bridge Desk
D13	2	10A	ECDIS - Personal Computer	NL-0-007	Wheelhouse
			Power Supply DC24/24V	NL-0-039	Wheelhouse
D14	2	1A	Auto Pilot Calculator	NL-0-012	Main Bridge Desk
D15	2	1A	Remote Display	NL-0-008	Over Head Bridge Desk
			Remote Display	NL-0-009	Over Head Bridge Desk
D16	2	10A	Windscreen Wipers - Terminal Block	ES-0-039	Main Bridge Desk
D17	2	2A	CO2 Fire Extinction System - Junction Box	MO-2-005	Eng. Room
D18	2	2A	Fire Detection Panel	SI-0-001	Wheelhouse
D19	2	6A	CCTV Screen Display	TI-0-100	Main Bridge Desk
			CCTV Camera - Junction Box	TI-2-200	Workshop
D20	2	2A	Bilge Alarm Acquisition Box	MO-0-002	Stbd Bridge Desk
D21	2	2A	General Alarm Panel	MO-0-003	Stbd Bridge Desk
D22	2	10A	Computer IX Blue	NL-0-017	Stbd Bridge Desk
			Power Supply DC24/24V	NL-0-040	Stbd Bridge Desk
D23	2	20A	Navigation Lights Panel	ES-0-001	Stbd Bridge Desk
D24	2	1A	Chart Table Light - Junction Box	EB-2-104	Wheelhouse
D25	2	1A	Navtex Receiver	NL-0-024	Stbd Bridge Desk
D26	2	1A	Buffer NMEA	NL-0-021	Main Bridge Desk
D27	2	10A	Main Switchboard	EF-0-001	Eng. Room
D28	2	10A	Horm Control Panel	ES-0-003	Main Bridge Desk
			Horm Air Compressor	ES-0-004	Wheelhouse

Circuit Breaker	Nb. of Poles	Rating (Amps)	Consumer	Consumer Index	Location
D29	2	1A	Bridge Navigational Watch Alarm System	EB-0-138	Main Bridge Desk
D30	2	4A	SC70 Calculator - Converter	NL-0-075	Stbd Bridge Desk
D31	2	1A	Auto Pilot Display	NL-0-015	Main Bridge Desk
D32	2	4A	Weather Station	NL-0-076	Main Bridge Desk
D33	2	4A	VMS Transformer	NL-0-059	Main Bridge Desk
D34	2	1A	Rudder Angle Repetitor - Converter	NL-0-011	Main Bridge Desk
D35	2	4A	Steering Control Panel	QB-0-003	Wheelhouse
D36	2	4A	VHF Marine Radiotelephone - Converter	NL-0-041	Main Bridge Desk
D37	2	4A	Amplified Batteryless Telephone system - Main Station	TI-0-006	Engine Room
D38	2	6A	Line Ejector	EB-0-141	Fore Fishing Deck
D39	2	10A	Spare		

5-3-14. Electrical Plant

5-3-14-1. Starting of the Gensets

The starting operation is described for GENSET 1. Replicate these operations for GENSET 2 as required.
The ship is considered electrically powered by shore socket.
Before starting, ensure that pre-operational checks on the generators and generator engines are performed, mainly for:

- Sea Water Cooling System
- Fuel Oil supply
- Oil and Coolant levels

Do not start any engine if there is a warning tag attached to the start panel.

Start single or both Gensets as follows:

Main electrical Switchboard EF-0-001

- Verify the switch "SWITCHBOARD LIGHTING" is on the "ON" position. The facade of the switchboard will remain lighted during the blackout
- Verify the switch "MANUAL COUPLING" is on the "0" position
- Verify the switch "GENSETS 1 & 2" is on the "AUTO" position
- Verify the switch "GENSET 1" is on the "OFF" position
- Minimize electrical load before starting

Starting Genset from Engine Room

- GENSET 1 Remote Control Panel
  - Verify the START knob of GENSET 1 is on the "STOP" position

- GENSET 1 Control Panel
  - Switch the battery master key to the "ON" position
  - Turn the START knob to "RUN" position. The engine do not starts when knob is on "AUTO" position

  => The engine starts

Starting from Wheelhouse

- GENSET 1 Control Panel
  - Switch the battery master key to the "ON" position
  - Turn the START knob to "AUTO" position

- GENSET 1 Remote Control Panel
  - Turn the knob to the "RUN" position

  => The engine starts

Figure 5-24 Main Electrical Switchboard - Production Cell

Figure 5-25 Genset Battery Master Key

Figure 5-26 Genset Control Panel

Figure 5-27_Genset Remote Control Panel

After starting engine

- Check that engine parameters are nominals
- Run the engine at no load before connect the generator with the main switchboard until the coolant temperature warms up
- Check for any fluid leaks and air leaks at idle rpm and at one-half full rpm before operating the engine under load

5-3-14-2. Stopping of the Gensets

The stopping operation is described for GENSET 1. Replicate this operations for GENSET 2 as required. Emergency shutoff controls are for emergency use ONLY. Do not use emergency shutoff devices or controls for normal stopping procedure.

Main electrical Switchboard EF-0-001

- Remove the load from the Genset 1

Normal Stopping Genset from Engine Room

- GENSET 1 Control Panel
  - Turn the START knob to "AUTO" position

  => The engine stops

Normal Stopping Genset from Wheelhouse

- GENSET 1 Remote Control Panel
  - Turn the START knob to "STOP" position

  => The engine stops

Emergency Stopping of Genset

- Emergency Stopping from GENSET 1 Control Panel
  - Press the RED emergency "STOP" pushbutton

  => Alarm sounds and lights on both control panels

  => The engine stops
  - Inhibit sounds with mute switch

  The engine will not re-start when the button is locked. Turn the button clockwise in order to reset.

- Emergency Stopping from GENSET 1 Remote Control Panel
  - Press the RED emergency "STOP" pushbutton

  => Alarm sounds and lights on both control panels

  => The engine stops
  - Inhibit sounds with mute switch

  The engine will not re-start when the button is locked. Turn the button clockwise in order to reset.

5-3-14-3. Connection to main switchboard in semi-automatic mode

Main electrical Switchboard EF-0-001

- Call warning of black-out to connect the onboard power supply
- Open the shore circuit breaker by pressing the black push button "OPENING CIRCUIT BREAKER SHORE SOCKET"

=> The ship loses momentarily AC400V and AC230V power
- Turn the switch "GENSET 1" or "GENSET 2" corresponding to the genset started to the "ON" position

=> The generator supply the busbar of the main switchboard
=> The speed and frequency are automatically provided by the management system

If a second Genset to be operated in parallel, repeat the starting operation for the second Genset.
- Turn the switch "GENSET 1" or "GENSET 2" corresponding to the second genset started to the "ON" position

=> The second generator supply the busbar of the main switchboard
=> Both gensets are synchronized and coupled automatically
=> The distribution of load and control of the frequency of the both Gensets are provided by the management system

5-3-14-4. Connection to main switchboard in manual mode

Main electrical Switchboard EF-0-001

- Call warning of black-out to connect the onboard power supply
- Open the shore circuit breaker by pressing the black push button "OPENING CIRCUIT BREAKER SHORE SOCKET"
- Turn the switch "MANUAL COUPLING" to the "GE1" or "GE2" position corresponding to the genset started

=> The generator supply the busbar of the main switchboard
- Manage manually the speed and frequency by pressing on black push buttons "SPEED+" or"SPEED-" of the corresponding Genset to equilibrate 50Hz frequency

If a second Genset to be operated in parallel, repeat the starting operation for the second Genset.
- Manage manually the speed and frequency by pressing on black push buttons "SPEED+" or"SPEED-" of the corresponding Genset to equilibrate the frequency of the operating Genset
- Turn the switch "MANUAL COUPLING" to the "GE1" or "GE2" position corresponding to the second genset started

=> The second generator supply the busbar of the main switchboard
=> Both gensets are synchronized and coupled
=> The distribution of load and control of the frequency of the both Gensets must provide manually as requested

5-3-14-5. Overload Situation

If such situation occurs despite the automatic downloading of certain consumers, it is necessary to minimize the electrical load and remake the start cycle of Gensets.

5-3-14-6. Normal Stopping Procedure and Switching to Shore Supply Power

- Connect shore cable
- Call warning of black-out to connect the onboard power supply

Main electrical Switchboard EF-0-001

- Remove or minimize the load from the Genset
- Turn the switch "GENSET 1" on "OFF"position

=> The ship loses momentarily AC400V and AC230V power

- Press the black push button "CLOSING CIRCUIT BREAKER SHORE SOCKET"

=> The shore supply the busbar of the main switchboard

- Stop the Genset (§ 2)

5-3-15. Ship's Alarms & Monitoring Devices

The alarms & monitoring devices includes:
- One bilge Alarm Panel MO-0-001 located on the stbd bridge desk
- One general Alarm Panel MO-0-003 located on the stbd bridge desk
- One bridge Navigational Watch Alarm Box EB-0-138 located on the main bridge desk
- One navigation Lights Monitoring & Control Panel ES-0-001 located on the stbd bridge desk
- One fire Detection Panel SI-0-001 located
- One rudder Angle Indicators NL-0-014 & NL-0-023 located on the main bridge desk

5-3-15-1. Bilge Alarm Panel MO-0-001 - Marinelec ALTOR 8

The ALTOR 8 is equipment designed to monitor the status of 8 flooding level sensors and to generate an audible and visual alarm when the sensor changes state.
In order to dispense with intemperstives alarms, a timer is programmable on all channels.

Figure 5-28 Bilge Alarm Panel

ALTOR 8 Alarm Configuration

Channel 1	Flooding Water Level - Fore Peak	HIGH BILGE - FISH HOLD
Channel 2	Flooding Water Level - Fish Hold Room	HIGH BILGE - FORE PEAK
Channel 3	Flooding Water Level - Fore Engine Room	HIGH BILGE - MACHINERY ROOM AFT
Channel 4	Flooding Water Level - Aft Engine Room	HIGH BILGE - MACHINERY ROOM FORE
Channel 5	Flooding Water Level - Storage Room	HIGH BILGE - STEERING GEAR ROOM
Channel 6	Flooding Water Level - Steering Gear Room	HIGH BILGE - STORAGE ROOM
Channel 7	Not programmed	
Channel 8	Not programmed	

5-3-15-2. General Alarm Panel MO-0-003 - Marinelec ALTAÏR 16V2 type

The ALTAÏR 16V2 is equipment designed to monitor the status of 16 dry sensors and to generate an audible and visual alarm when the sensor changes state.

Figure 5-29 General Alarm Panel

ALTAÏR 16V2 Alarm Configuration

Channel	Function	Alarm Message
Channel 1	Low Level - Fuel Oil Storage Tank DT2 (Port Storage Room)	LAL - FO TANK PORT
Channel 2	Low Level - Fuel Oil Storage Tank DT1 (Stbd Storage Room)	LAL - FO TANK STBD
Channel 3	High Level - Fuel Oil Storage / Overflow Tank C T2 (Port Engine	LAH - FO / OVERFLOW TANK PORT
Channel 4	Low Level - Fuel Oil Storage / Overflow Tank C T2 (Port Engine	LAL - FO / OVERFLOW TANK PORT
Channel 5	High Level - Fuel Oil Service Tank C R1 (Port Engine Room)	LAH - FO / SERVICE TANK
Channel 6	High Level - Fuel Oil Storage / Overflow Tank C T1 (Stbd Engine	LAH - FO / OVERFLOW TANK STBD
Channel 7	Low Level - Fuel Oil Storage / Overflow Tank C T1 (Stbd Engine	LAL - FO / OVERFLOW TANK STBD
Channel 8	Low Level - Fuel Oil Storage Tank B T10 (Fish Hold Room)	LAL - FO TANK FORE
Channel 9	Not programmed	
Channel 10	Low Level Fresh Water Tank D T10 (Fwd Storage Room)	LAL - FRESH WATER TANK AFT
Channel 11	Insulation Fault - Main Switchboard EF-0-001	INSULATION FAULT - EF-0-001
Channel 12	Insulation Fault - Distribution Frame DC24V Wheelhouse EB-0-007	INSULATION FAULT - EB-0-007
Channel 13	Troubleshooting - Main Battery Charger EB-0-001	MAIN BATTERY CHARGER FAULT
Channel 14	Low Level Stern Tube Lubricating Oil Tank (Workshop)	LAL - STERN TUBE LUBE OIL TANK
Channel 15	Low Pressure in CO2 Bottles	CO2 LEAK ON BOTTLE
Channel 16	CO2 Room Door Switch	CO2 DOOR OPENED

Notes: LAL => Low Alarm Level at 30% Tank Capacity
LAH => High Alarm Level at 90% Tank Capacity

Figure 5-30 Bridge Navigational Watch Alarm

5-3-15-3. Bridge Navigational Watch Alarm Box EB-0-138 - Marinelec LYNX V3S

The Bridge Navigational Watch Alarm System (BNWAS) detects the operator disability.
The BNWAS has to be reset periodically with a push button.

5-3-15-4. Navigation Lights Monitoring & Control Panel ES-0-001 - Marinelec NORMA 14CPDC

The NORMA 14CPDC is a navigation lights control and alarm system.
It allows monitoring and controlling 14 navigation lights rated.
Navigation Lights are controlled from a remote control panel.

NORMA 14CPDC Alarm Configuration

Alarm	Function
Red LED	Navigation Light Failure
Yellow LED	NORMA System Failure

Figure 5-31 Navigation Lights Monitoring & Control Panel

5-3-16. Main propulsion Engine

5-3-16-1. Monitoring and Control System

The monitoring and control system includes in engine room:

- One Caterpillar MECP-1 Engine Control Panel
- One Twin Disc EC-300 Controller

and in wheelhouse:

- One Caterpillar Engine Remote Control Panel
- One Twin Disc EC-300 Remote Control Station (Analog Control Head)

Figure 5-32 MECP-1 Engine Control Panel

Figure 5-33 Engine Remote Control Panel

Figure 5-34 EC-300 Remote Control Station

Figure 5-35 EC300 Controller & MECP-1 Eng. Control Panel

Figure 5-36 ME Battery Master Key

5-3-16-2. Starting of the Main Propulsion Engines

Before starting, ensure that pre-operational checks on the main engine, reverse / reduction gearbox and shafting line are performed, mainly for:

- Sea Water Cooling System
- Fuel Oil supply
- Oil and Coolant levels for main engine
- Oil levels for gearbox and stern tube

Ensure that valves of fuel oil and sea water cooling systems are correctly operated.
Do not start main engine if there is a warning tag attached to the start panel.

The main engine can be started locally (engine room) or remotely from wheelhouse.
To allow starting up from the wheelhouse, place the selector of the MECP-1 engine room panel in "Remote" position.
On the engine remote control panel (wheelhouse), the selector "SHUTDOWN OVERRIDE" prevents the automatic engine shutdown in event of alarm.

Start main propulsion engine as follows:

Local Starting

- Switch the battery master key to the "ON" position

EC-300 Remote Control Station (Analog Control Head)

- Ensure that control lever is at NEUTRAL position

MECP-1 Engine Control Panel

- Ensure that the "OFF/MANUAL/REMOTE" switch is on the "STOP" position
- Select the "OFF/MANUAL/REMOTE" switch to the "MANUAL" position
- Push the green "START" button to start the engine

=> The engine starts

Starting from Wheelhouse

- Switch the battery master key to the "ON" position

MECP-1 Engine Control Panel

- Select the "OFF/MANUAL/REMOTE" switch to the "REMOTE" position

EC-300 Remote Control Station (Analog Control Head)

- Ensure that control lever is at NEUTRAL position

Engine Remote Control Panel

- Turn the Key Switch in the "START" position to start the engine.

=> The engine starts

After starting engine

- Run the engine at no load to warm-up during five minuts approximately
- Check that engine parameters are nominals
- During warm-up phase, check for any fluid leaks and air leaks at idle rpm
- Observe the water discharge at the sea water outlet. If water discharge is not visible or the water flow is restricted, stop the engine immediately and inspect sea water cooling system

5-3-16-3. Stopping of the Main Propulsion Engines

Emergency shutoff controls are for emergency use ONLY. Do not use emergency shutoff devices or controls for normal stopping procedure.
Stopping the engine immediately after it has been working under load can result in over heating and accelerated wear of the engine components.
If the engine has been operating at high rpm and/or high loads, run at low idle for least three minutes to reduce and stabilize internal engine temperature before stopping the engine.
Avoiding hot engine shutdowns will maximize turbo-charger shaft and bearing life.

Normal Local Stopping

From the EC-300 Remote Control Station

- Reduce the engine rpm to low idle
- Shift the marine transmission to the neutral position and secure the ship

From MECP-1 Engine Control Panel

- Increase the engine rpm to no more than 50 percent of the rated rpm for 3 to 5 minutes in order to cool the engine
- Reduce the engine rpm to low idle
- Push the "STOP" red button to stop the engine

=> The engine stops

Emergency Stopping from Wheelhouse Engine Remote Control Panel

- Push the "STOP" red button to stop the engine

5-3-16-4. C32 Engine and C4.4 Genset Engine – Event Codes

The Electronic Control Module (ECM) monitors the operating parameters of the engine.
The ECM will generate an event code if a specific engine parameter exceeds an acceptable range that is defined by the engine monitoring system.
For information on the engine monitoring system, refer to Troubleshooting of Caterpillar Operation and Maintenance Manuals of C32 and C4.4 engines, "Engine Monitoring System".

Event codes are generated when abnormal operating conditions exist.
The table is a list of the event codes for the engine.
The event codes are cross-referenced with the appropriate procedure that can be used to troubleshoot the code.

Code	Warning Category Indicator	SPN-FMI Code	Description	Troubleshooting Procedure	Default
1-5		651-5	Cylinder #1 Injector Current Above Normal	Troubleshooting, "Injector Solenoïd - Test"	
1-6		651-6	Cylinder #1 Injector Current Below Normal	Troubleshooting, "Injector Solenoïd - Test"	
2-5		652-5	Cylinder #2 Injector Current Above Normal	Troubleshooting, "Injector Solenoïd - Test"	
2-6		652-6	Cylinder #2 Injector Current Below Normal	Troubleshooting, "Injector Solenoïd - Test"	
3-5		653-5	Cylinder #3 Injector Current Above Normal	Troubleshooting, "Injector Solenoïd - Test"	
3-6		653-6	Cylinder #3 Injector Current Below Normal	Troubleshooting, "Injector Solenoïd - Test"	
4-5		654-5	Cylinder #4 Injector Current Above Normal	Troubleshooting, "Injector Solenoïd - Test"	
4-6		654-6	Cylinder #4 Injector Current Below Normal	Troubleshooting, "Injector Solenoïd - Test"	
5-5		655-5	Cylinder #5 Injector Current Above Normal	Troubleshooting, "Injector Solenoïd - Test"	
5-6		655-6	Cylinder #5 Injector Current Below Normal	Troubleshooting, "Injector Solenoïd - Test"	
6-5		656-5	Cylinder #6 Injector Current Above Normal	Troubleshooting, "Injector Solenoïd - Test"	
6-6		656-6	Cylinder #6 Injector Current Below Normal	Troubleshooting, "Injector Solenoïd - Test"	
E015	(2)	110-16	Engine Coolant Temperature Derate	Troubleshooting, "Coolant Temperature is High"	
E017	(1)	110-15	Engine Coolant Temperature Warning	Troubleshooting, "Coolant Temperature is High"	
E025	(2)	172-16	High Inlet Air Temperature Derate	Troubleshooting, "Inlet Air Temperature is High"	
E027	(1)	172-15	High Inlet Air Temperature Warning	Troubleshooting, "Inlet Air Temperature is High"	
E030	(1)	177-15	High Transmission Oil Temperaturte Warning	Troubleshooting, "Transmission Oil Temperature is High"	
E039	(2)	100-18	Low Engine Oil Pressure Derate	Troubleshooting, "Oil Pressure Is Low"	
41-38		678-3	Volt DC Supply Voltage Above Normal	Troubleshooting, "Sensor Supply - Test"	
41-48		678-4	Volt DC Supply Voltage Above Normal	Troubleshooting, "Sensor Supply - Test"	
E053	(1)	94-17	Low Fuel Pressure Warning	Troubleshooting, "Fuel Pressure Is Low"	
E056	(1)	174-15	High Fuel Temperature Warning	Troubleshooting, "Fuel Pressure Is High"	
E057	(1)	111-18	Low Engine Coolant Level Derate	Troubleshooting, "Coolant Level is Low"	
E059	(1)	111-17	Low Engine Coolant Level Warning	Troubleshooting, "Coolant Level is Low"	
91-8		91-8	Throttle Position Sensor Abnormal Frequency, Pulse Width, or Period	Troubleshooting, "Speed Control - Test"	
91-13		91-13	Throttle Position Sensor Calibration Required	Troubleshooting, "Throttle Position Sensor - Calibrate"	
94-3		94-3	Fuel Delivery Pressure Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	

Code	Warning Category Indicator	SPN-FMI Code	Description	Troubleshooting Procedure	Default
94-4		94-4	Fuel Delivery Pressure Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
E096	(1)	94-0	High Fuel Pressure	Troubleshooting, "Fuel Pressure Is High"	865 kPa
96-3		96-3	Fuel Level Sensor Voltage Above Normal	Troubleshooting, "Fuel Level - Test"	
96-4		96-4	Fuel Level Sensor Voltage Below Normal	Troubleshooting, "Fuel Level - Test"	
E098	(1)		Engine Pre-lube Override	The keyswitch has been cycled from the ON position to the OFF position back to the ON position in one second or less. The prelube cycle has been overridden.	
E113	(1)	127-15	High Transmission Oil Pressure	Troubleshooting, "Transmission Oil Pressure is High"	
E100	(1)	100-17	Low Engine Oil Pressure Warning	Troubleshooting, "Oil Pressure Is Low"	
100-3		100-3	Engine Oil Pressure Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
100-4		100-4	Engine Oil Pressure Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
100-10		100-10	Engine Oil Pressure Sensor Abnormal Rate of Change	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
110-3		110-3	Engine Coolant Temperature Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
110-4		110-4	Engine Coolant Temperature Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
E119	(1)	96-17	Low Fuel Level	Add fuel to the fuel tank. Refer to the literature that is provided by the OEM of the ship for the correct procedure.	
127-3		127-3	Transmission Oil Pressure Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
127-4		127-4	Transmission Oil Pressure Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
168-0	(3)	168-0	Electrical System Voltage High	Troubleshooting, "Electrical Power Supply - Test"	
168-1	(3)	168-1	Electrical System Voltage Low	Troubleshooting, "Electrical Power Supply - Test"	
168-2		168-2	Electrical System Voltage Erratic, Intermitent or Incorrect	Troubleshooting, "Electrical Power Supply - Test"	
E172	(1)		High Air Filter Restriction	Troubleshooting, "Inlet Air is restricted"	
E172	(2)		High Air Filter Restriction	Troubleshooting, "Inlet Air is restricted"	
172-3		105-3	Intake Manifold Air Temperature Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
172-4		105-4	Intake Manifold Air Temperature Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
E173	(1)	173-15	High Exhaust Temperature Warning	Troubleshooting, "Exhaust Temperature is High"	
174-3		174-3	Fuel Temperature Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
174-4		174-4	Fuel Temperature Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Passive) - Test"	
177-3		177-3	Transmission Oil Temperature Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
177-4		177-4	Transmission Oil Temperature Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
190-8		190-8	Engine Speed Sensor Abnormal Frequency, Pulse Width or Period	Troubleshooting, "Speed / Timing - Test"	
E190	(1)		Engine Overspeed Warning	Troubleshooting, "Engine Overspeed"	
E194	(1)		High Exhaust Temperature	Troubleshooting, "Exhaust Temperature is High"	
E233	(1)		Low Engine Pre-Lube Pressure	The oil pressure must be equal to the pressure that is set in the software. If the oil pressure is less than the oil pressure in the software and the prelube timer out, the code will be generated.	

Code	Warning Category Indicator	SPN-FMI Code	Description	Troubleshooting Procedure	Default
261-11			Engine Timing Offset Fault	Troubleshooting, "Timing Calibrate"	
261-13		228-13	Engine Timing Calibration Required	Troubleshooting, "Timing Calibrate"	
262-35		620-3	Volt Sensor DC Power Supply Voltage Above Normal	Troubleshooting, "Sensor Supply - Test"	
262-45		620-4	Volt Sensor DC Power Supply Voltage Below Normal	Troubleshooting, "Sensor Supply - Test"	
E265	(1)		User Defined Shutdown	Troubleshooting, "Shutdown Test"	
E268	(1)	1383-11	Unexpected Engine Shutdown	Troubleshooting, "Engine Shutdown Occurence"	
268-2		1111-2	Programmed Parameter Fault Erratic, Intermittent or Incorrect	Troubleshooting, "Configuration Parameters"	
342-8		723-8	Secondary Engine Speed Sensor Abnormal Frequency, Pulse Width or Period	Troubleshooting, "Speed / Timing - Test"	
E360	(3)		Low Engine Oil Pressure	Troubleshooting, "Oil Pressure Is Low"	
E361	(2)		High Engine Coolant Temperature	Troubleshooting, "Coolant Temperature is High"	110°C
E361	(3)		High Engine Coolant Temperature	Troubleshooting, "Coolant Temperature is High"	115°C
E362	(2)		Engine Overspeed	Troubleshooting, "Engine Overspeed"	2300 rpm
E362	(3)		Engine Overspeed	Troubleshooting, "Engine Overspeed"	3150 rpm
E363	(1)		High Fuel Supply Temperature	Troubleshooting, "Fuel Temperature is High"	90°C
E390	(1)		Fuel Filter Restriction	Troubleshooting, "Fuel Filter is Restricted"	
535-8		173-08	Exhaust Temperature Sensor Abnormal Frequency, Pulse Width or Period	Troubleshooting, "Sensor Signal (PWM) - Test"	
E540	(1)		Low Engine Oil Refill Tank Level	Troubleshooting, "Oil level - Test"	
E563	(1)		Low Engine Coolant Flow	Troubleshooting, "Coolant Flow - Test"	
E1001	(1)		High Right Intake Manifold Air Temperature	Troubleshooting, "Inlet Air Temperature is High"	82°C
E1001	(2)		High Right Intake Manifold Air Temperature	Troubleshooting, "Inlet Air Temperature is High"	86°C
1249-8		59-8	Secondary Throttle Position Signal Abnormal	Troubleshooting, "Speed Control - Test"	
1249-13		29-13	Secondary Throttle Position Calibration Required	Troubleshooting, "Throttle Position Sensor - Calibrate"	
1785-3		102-3	Intake Manifold Pressure Sensor Voltage Below Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
1785-4		102-4	Intake Manifold Pressure Sensor Voltage Above Normal	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
1785-10		102-10	Intake Manifold Pressure Sensor Abnormal Rate of Change	Troubleshooting, "Sensor Signal (Analog, Active) - Test"	
E2089	(1)		Oil Renewal Sytem cannot Operate	Troubleshooting, "Oil Renewal - Test"	

Warning Category Indicator	
Category	Severity
(1)	Least Severe
(2)	Moderate Severity
(3)	Most Severe

5-3-17. Sea Water Cooling System

The engine and the gensets sea water system valves should be in the open position as indicated in the following table:

VALVE N°	VALVE DESCRIPTION	VALVE LOCATION	VALVE POSITION
MM-0-501	Stbd Sea Chest - Sea Water Cooling Intake (Remote Controlled)	Stbd Engine Room	OPEN
MM-0-502	Port Sea Chest - Sea Water Cooling Intake (Remote Controlled)	Port Engine Room	OPEN
MM-0-505	Stbd Sea Water Cooling Strainer - Outlet	Stbd Engine Room	OPEN
MM-0-506	Port Sea Water Cooling Strainer - Outlet	Port Engine Room	OPEN
MM-0-507	Stbd Sea Chest - Air Vent (Remote Controlled)	Stbd Engine Room	OPEN
MM-0-508	Port Sea Chest - Air Vent (Remote Controlled)	Port Engine Room	OPEN
MM-0-509	Stbd Genset Sea Water Cooling - Overboard Discharge	Port Engine Room	OPEN
MM-0-511	Main Engine Sea Water Cooling - Overboard Discharge	Port Engine Room	OPEN
MM-0-513	Main Engine Sea Water Cooling - Suction	Engine Room	OPEN
MM-0-515	Port Genset Sea Water Cooling - Suction	Engine Room	OPEN
MM-0-517	Stbd Genset Sea Water Cooling - Suction	Engine Room	OPEN
MM-0-519	Port Genset Sea Water Cooling - Overboard Discharge	Port Engine Room	OPEN
MM-0-522	Winches Hydraulic Power Pack Sea Water Cooling - Overboard Discharge	Engine Room	OPEN
MM-0-523	Winches Hydraulic Power Pack Sea water Cooling Pump - Suction	Engine Room	OPEN
MM-0-524	Winches Hydraulic Power Pack Sea water Cooling Pump - Discharge	Engine Room	OPEN

Figure 5-37 SW Cooling Pumps

Figure 5-38 SW Strainer

5-3-17-1. Starting of winches HPU sea water cooling pump

Close the circuit breaker D24 in the Main Switchboard EF-0-001.

5-3-18. Operating Procedure of Marine Transmission

5-3-18-1. Monitoring and Control System

The monitoring and control system includes in engine room:

- One Caterpillar MECP-1 Engine Control Panel
- One Twin Disc EC-300 Controller

and in wheelhouse:

- One Caterpillar Engine Remote Control Panel
- One Twin Disc EC-300 Remote Control Station (Analog Control Head)

5-3-18-2. EC-300 Remote Control Station

The control system coordinates both engine and marine transmission functions.
One lever, a station select button and a mode select switch enable the operator to control the operation of the system and the installed options.
The lever controls gear selection and throttle for one engine / gear set.
The red station select LED verifies that the control head is active when continuously illuminated.
When the station select LED is flashing or off, the control head is not active.

The select mode switch up to the following operating modes:

- Cruise Mode
- Express Mode
- Troll Mode

Lever Function in Cruise Mode

Selecting Forward (Ahead)

- Move the lever toward the bow of the ship to the forward detent position in order to select the forward ship direction
- At this position, the transmission shifts into the forward gear
- The remaining lever travel after the forward detent position controls the engine throttle

Selecting Reverse (Astern)

- Move the lever toward the stern of the ship to the reverse detent position in order to select the reverse ship direction
- At this position, the transmission shifts into the reverse gear
- The remaining lever travel after the forward detent position controls the engine throttle

Direction Reversal

- Reversal of direction can be made at any time
- An automatic timed sequence forces the throttle to idle while the ship slows before engaging the clutch for the opposite direction
- This is followed by the return of the engine throttle to the position called for by the lever

Lever Function in Express Mode

This mode allows the operator to acheive very low ship speed by meansof a controlled slipping clutch when the lever is placed in the forward detent or reverse detent position.
Slight ship speed variation at the detent position is normal in Express Mode.

In Express Mode, the propeller speed increases as the lever is advanced, until the lever reaches a point where the clutch is fully engaged and then engine speed increases as lever position increases.

Lever Function in Troll Mode

This mode allows the operation of the ship at low speed by mean of a controlled slipping clutch with the engine speed fixe, and the lever controlling only the propeller speed.

CHAPTER 6 – MAINTENANCE SCHEDULE

6-1. GENERAL INFORMATION

The content of the maintenance schedule prepared for each equipment or sub-assembly maintainable is precisely described with the following information:

- Reference to the equipment of the SEL with its Ship Index
- A job number for each maintenance task
- A synopsis of each maintenance task
- The periodicity of each task
- The requirements in tools and spare when required
- A link to the Maker's Documentation or to the Ship's Information Handbook when the maintenance instructions are detailed
- An estimating man hours for each
- The number of units fitted onboard

The Maintenance Schedule is presented by discipline.

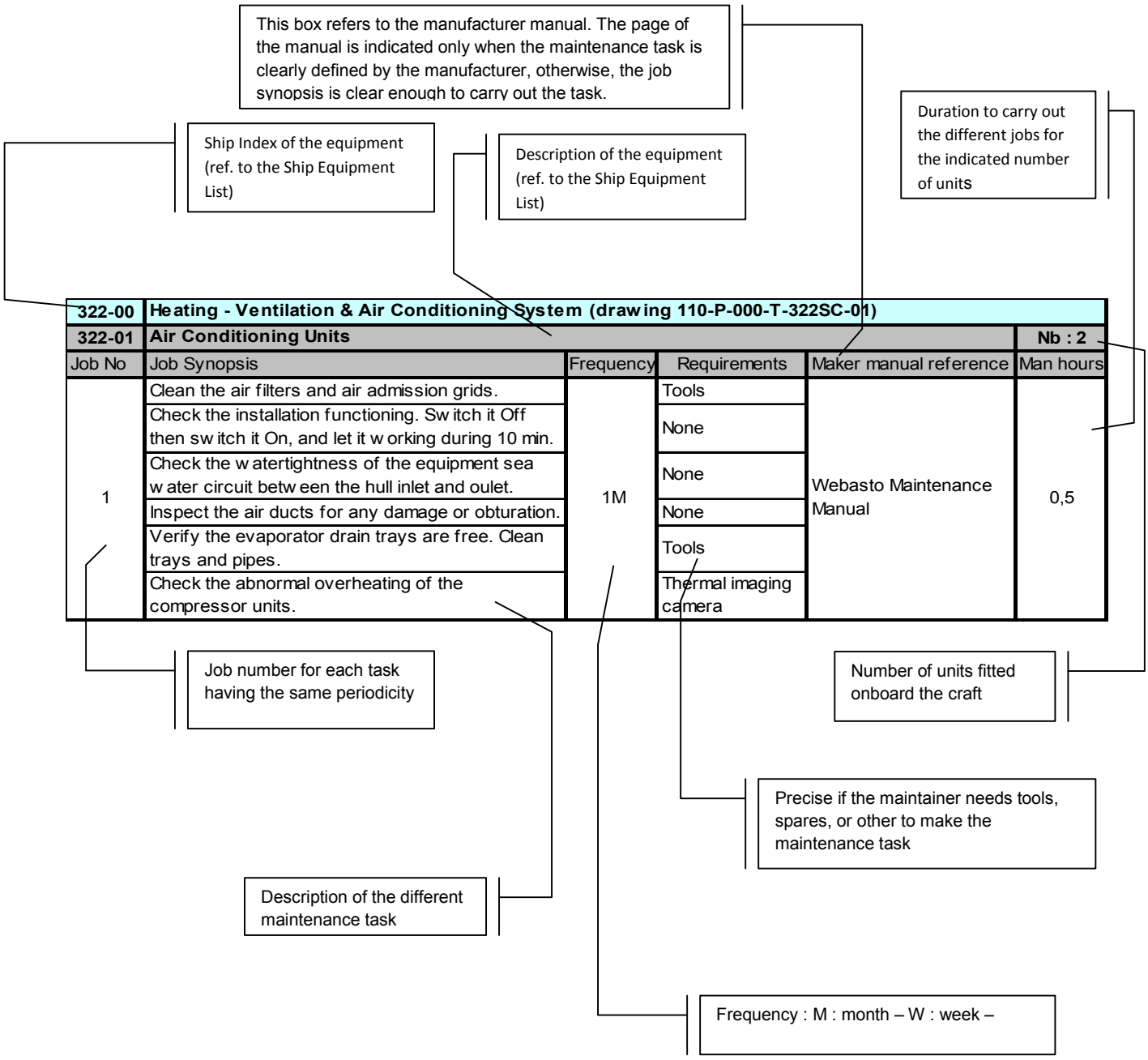
All equipment of the Ship Equipment List having periodically maintenance operation is listed in this Schedule. When a Ship Index is missing in this Schedule, it means there is no maintenance task on the equipment.

6-2. ASSUMPTIONS USED TO ELABORATE THE MAINTENANCE SCHEDULE

This maintenance Schedule is based on the standard maintenance plans, the service manuals of manufacturers and specific practices of the shipyard recommended for this category of ships.
The schedule, at which the maintenance instructions should be carried out, can be expressed on daily, weekly, monthly, yearly and/or on a running hour basis.
In the case of a double frequency (calendar / running hours), the first reached must be taken into consideration.
If the ship or some mechanical equipment (mainly diesel engine) must be subject to extreme operating conditions, the service frequency must be adapted accordingly.

Fluids and lubricants recommended by the OEM are listed in Lubricant Schedule Table § 6-9.
Compliance with these recommendations is essential to ensure a long life to systems and equipment, particularly diesel engines, gear boxes and hydraulic systems.
The recommendation and the first filling were mostly made with genuine products SHELL.
In order to facilitate the supply of lubricants, a correspondence with TOTAL products was made.

6-3. FUNCTIONING PRINCIPLE OF MAINTENANCE SCHEDULE TABLE



6-4. ANCILLARIES OF HULL

210-00	Hull				
210-00	**Underwater Hull**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Examine the general condition of the coating and of any area where deterioration has exposed bare metal. In areas where superficial deterioration of the paint coatings has occurred, remove all loose paint and apply touch up coats of the appropriate paint to restore correct dry film thickness.	3M / At Each Dry Dock Inspection	Respect Paint Scheme	Shipyard recommendation	4
2	Examine structure for mechanical damage, fractures, rust blisters and pitting.	1Y	None	Shipyard recommendation	2
210-01&02	**Zinc Anodes - Hull**				**Nb : 8+6**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check the 8x1,2kg, the 6x5,9kg and the 2x--kg zinc sacrificial anodes and replace it if they have greater than 2/3 wastage.	3M / At Each Dry Dock Inspection	None	DWG 133-F-Z00-S-21000-05 DWG 133-F-M01-P-210MM-01	0,5
210-03	**Zinc Anodes - Sea Chests**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check the 8x1,2kg, the 6x5,9kg and the 2x--kg zinc sacrificial anodes and replace it if they have greater than 2/3 wastage.	3M3M / At Each Dry Dock Inspection	None	DWG 133-F-Z00-S-21000-05 DWG 133-F-M01-P-210MM-01	2

310-00	Main Deck Arrangement				
310-02	**Gallow of unloading**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect the unit for evidence of physical damage/deterioration. Lubricate all grease nipples with Multipurpose Extreme Pressure Water Resistant Grease (NLGI 2).	1M	Grease Gun + Grease	DWG 133-F-P02-X-31000-02	0,25
310-10	**Anchoring Line**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean and grease machined surfaces using Multipurpose Extreme Pressure Water Resistant Grease (NLGI 2).	1M	Grease Gun + Grease	Shipyard recommendation	0,25

314-00	Life saving devices				
314-01	**Inflatable Liferaft**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Remove and return the liferaft to the manufacturer or qualified service station for the testing and examination.	1Y	None	Resolution IMO A.761 (18)	1
2	Remove and replace the liferaft.	12Y	None	Resolution IMO A.761 (18)	1

314-02	Inflatable Liferaft Release - Hydrostatic				Nb : 2
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Remove and replace the Hydrostatic release.	2Y	None	Hammar H-20 Manual	0,5

342-00	Non Structural Tanks				
342-03	Marine Fuel Oil Service Tank				Nb : 6
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	External and internal inspection of tank for any signs of deterioration of paint coating, corrosion and damages. Assess and record the amount and nature of sludge and debris prior cleaning the tank.	5Y	None	Shipyard recommendation	8
342-04	Oily Water Tank				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	External and internal inspection of tank for any signs of deterioration of paint coating, corrosion and damages. Assess and record the amount and nature of sludge and debris prior cleaning the tank.	5Y	None	Shipyard recommendation	8
342-05	Fuel Oil Tanks				Nb : 5
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	External and internal inspection of tank for any signs of deterioration of paint coating, corrosion and damages. Assess and record the amount and nature of sludge and debris prior cleaning the tank.	5Y	Before entering tank, ensure it's fully ventilated	Shipyard recommendation	48
342-06	Fresh Water Tank				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	External and internal inspection of tank for any signs of deterioration of paint coating, corrosion and damages. Assess and record the amount and nature of sludge and debris prior cleaning the tank.	5Y	None	Shipyard recommendation	8

350	Hatches / Doors & Windows				
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Lubricate hinges sparingly with general purpose grease.	3M	None	Shipyard recommendation	0,5
2	Inspect watertight doors and hatches for any signs of obvious damage.	1Y	None	Shipyard recommendation	1

6-5 ELECTRICAL

310-00	Main Deck Arrangement				
310-07	**Starter Panel - Windlass**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check the terminals of the electric motor. Test the drop of voltage at the terminals.	1Y	Voltmeter	Shipyard recommendation	0,25
310-08	**Local Control Panel - Windlass**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect for any signs of damage, corrosion	1Y	None	Shipyard recommendation	0,25

312-00	Steering Gear				
312-08	**Starter Panel**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check the terminals of the electric motor. Test the drop of voltage at the terminals.	1Y	Voltmeter	Shipyard recommendation	0,25

322-00	Air Conditioning Unit 4,7 kW				
322-02	**Air Conditioning Units - Electrical Control Box**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the sea water filter. Check the flow of sea water to the discharge overboard.	1W	None	Webasto Installation & Maintenance Manual	0,25
2	Clean the dust filter. Check the free flow of condensates.	1M	None	Faure Technical Data Sheet	0,25
322-03	**Air Conditioning Unit 5,9 kW**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	lean the dust filter. Check the free flow of condensates..	1M	None	Webasto Installation & Maintenance Manual	0,25

341-00	Fire Detection system				
341-02	**Fire Detection Panel**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Execute functional test of the installation	1W	Gas Detector	Marinelec Fire Detection Manual DI09	0,5
2	Replace internal 3rd source	1Y	None	Marinelec Fire Detection Manual DI09	1
341-03	**Heat/Smoke Detector**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Replace detector	10Y	None	Marinelec Fire Detection Manual DI09	2

365-00	Galley				
365-04	Hood				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the grease filter	1M	None	Faure Technical Data Sheet	0,25

410-00	AC 400V - 50Hz Electrical Network				
410-01	Main Electrical Switchboard				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect, remove dust and test Main Switchboard. Clean or replace Air Filter. Check the fastening screws, nuts, and retighten if necessary.	6M	Portable Vacuum Cleaner Electrical Toll Box	SA2EI Electrical Switchboards Technical Manual	1
410-02	Distribution Panel AC230V Machinery Room				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect and remove dust. Check the fastening screws, nuts, and retighten if necessary.	6M	Portable Vacuum Cleaner Electrical Toll Box	SA2EI Electrical Switchboards Technical Manual	0,5
410-03	Distribution Frame AC230V Wheelhouse				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect and remove dust. Check the fastening screws, nuts, and retighten if necessary.	6M	Portable Vacuum Cleaner Electrical Toll Box	SA2EI Electrical Switchboards Technical Manual	0,5
410-04	Distribution Panel AC230V Workshop				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect and remove dust. Check the fastening screws, nuts, and retighten if necessary.	6M	Portable Vacuum Cleaner Electrical Toll Box	SA2EI Electrical Switchboards Technical Manual	0,5

412-00	Generators Sets				
412-03	Alternator Leroy Somer LSAM 43.2 S25				Nb : 2
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check and retight all electric connections as required.	3M	Common tools	Shipyard recommendation	0,5

420-00	DC 24V Electrical Network				
420-01	Battery Charger - AC230V/DC24V 60A				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean inside of the equipment with a vacuum cleaner; the build-up of dust prevents heat dissipation.	3M	Portable Vacuum Cleaner	Enag User Manual CDS3 Battery Charger	0,25
2	Full inspection, check the tightness of all electrical connections	1Y	Common tools		0,5

420-02	GMDSS Power Supply Box				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean inside of the equipment with a vacuum cleaner; the build-up of dust prevents heat dissipation.	3M	Portable Vacuum Cleaner	Enag GMDSS Power Supply Box Manual July 1st 2009	0,5
2	Full inspection, check the tightness of all electrical connections	1Y	Common tools		1
3	Replace the electronic capacitors	10Y	Common tools		2
420-03	**Gel Battery 12V 165Ah**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the batteries and cables	3M	None	Shipyard recommendation	0,25
2	Check the battery cable terminal fastening and retighten if necessary	6M	Tools		0,25
420-04	**Distribution Frame DC24V Wheelhouse**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect and remove dust. Check the fastening screws, nuts, and retighten if necessary.	6M	Portable Vacuum Cleaner Electrical Toll Box	SA2EI Electrical Switchboards Technical Manual	0,5

577-00	Propulsion & Gensets Remote Control & Monitoring Systems				
577-06	**AGM Battery 12V 320Ah**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the batteries and cables	3M	None	Shipyard recommendation	0,25
2	Check the battery cable terminal fastening and retighten if necessary	6M	Tools		0,25
577-07	**AGM Battery 12V 110Ah**				**Nb : 4**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the batteries and cables	3M	None	Shipyard recommendation	0,25
2	Check the battery cable terminal fastening and retighten if necessary	6M	Tools		0,25
630-00	**Navigation System**				
630-45	**Gel Battery 12V 90Ah**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the batteries and cables	3M	None	Shipyard recommendation	0,25
2	Check the battery cable terminal fastening and retighten if necessary	6M	Tools		0,25

6-6. MECHANICAL

310-00	Main Deck Arrangement				
310-03	**Electric Winch 500 kg**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check wire rope visually.	D	None	Huchet Electric Winches Technical Manual	0,1
2	Clean and grease wire rope. Check fastening points of hook.	1M	Lubricant Fluid acc. Lubricant Table.	Huchet Electric Winches Technical Manual	0,5
3	Renew grease bath of gear box.	100H / 3Y	EP Grease	Huchet Electric Winches Technical Manual	2
310-06	**Windlass**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check reduction gear oil level. Check oil purity, change oil if necessary. Check and grease drum bearings, brake articulations, screwed rod and hexagon way of claw coupling.	1M	None	Tripomet Wire Anchor Winch Technical Manual	0,5
1	Drain and replace lubricating oil	1Y	None	Shipyard recommendation	1

312-00	Steering Gear				
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Visually inspect all system flexible hoses. Check specifically for any sign of cracking, brittleness, leaking, fretting, cuts, tears or abraded areas, deformations of the outer skin.	6M	None	Shipyard recommendation	0,5
2	Replace all flexible hoses.	5Y	None	Shipyard recommendation	2
312-01	**Steering Unit (articulations of cylinders)**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Lubricate all grease nipples with Multipurpose Extreme Pressure Water Resistant Grease.	50H/1W	Grease Gun + Grease	Fluidmecanica Instruction Manual LBI 003053	0,25
312-02	**Oil Tank, Double with Emergency Manual Pump**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check hydraulic oil level	1W	None	Fluidmecanica Instruction Manual LBI 003053	0,25
2	Drain and change the hydraulic oil using ISO VG-46 Hydraulic Oil & the filter element.	1Y	Hydraulic Oil + Filter cartridge		2
312-10	**Rudder Stock**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Lubricate Lower Bearing and Rudder Tube grease nipples with Multipurpose Extreme Pressure Water Resistant Grease (NLGI 2).	50H/1W	Grease Gun + Grease	Fluidmecanica Instruction Manual LBI 003053	0,25
2	Lubricate Pintle Housing grease nipple with Multipurpose Extreme Pressure Water Resistant Grease.	At each dry dock inspection	Grease Gun + Grease	Fluidmecanica Instruction Manual LBI 003053	0,25

322-00	Heating - Ventilation & Air Conditioning System				
322-01	**Fan Unit, Helicoïd - Air Exhaust**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the machine by blowing with dry compressed air	1Y	Dry compressed air	Enag Maintenance Guide 20097DAA	0,5
322-02	**Air Conditioning Units**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the air filters and air admission grids. Check the watertightness of the equipment sea water circuit between the hull inlet and oulet. Inspect the air ducts for any damage or obturation. Check condensed-water drainage from the condensate tray and condensed-water drain line for clear passage and leakage.	1M	None	Webasto Maintenance Manual	1
2	Check and retight if necessary all bolts, mounts, etc… Check the tightness of the refrigerant circuit for any leakage.	1Y	Thermal imaging camera Gas detector	Shipyard recommendation	1

324-00	AC Sea Water Cooling System				
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check the flow of sea water to the discharge overboard when ACU is running.	1W	None	Webasto Installation & Maintenance Manual	0,25
2	Check the zinc sacrificial anodes and replace it if they have greater than 50% wastage.	1M	None	Shipyard recommendation	1
3	Check the zinc sacrificial anodes and replace it if they have greater than 50% wastage.	3M	None	Shipyard recommendation	1

331-00	Fresh Water System				
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Visually inspect all system flexible hoses. Check specifically for any sign of cracking, brittleness, leaking, fretting, cuts, tears or abraded areas, deformations of the outer skin.	6M	None	Shipyard recommendation	0,25
2	Replace all flexible hoses.	5Y	None	Shipyard recommendation	1
331-03	**Basket Filter DN40**				**Nb : 2/1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	3M	Common tools	Shipyard recommendation	0,5
331-04	**Basket Filter DN40**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	3M	Common tools	Shipyard recommendation	0,25

332-00	Firemain System				
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Operate all seawater valves to assure they are operating and prevent the deposition of sediment.	1M	None	Shipyard recommendation	1
2	Check the zinc sacrificial anodes and replace it if they have greater than 50% wastage.	3M	none	Shipyard recommendation	1
3	Visually inspect all system flexible hoses. Check specifically for any sign of cracking, brittleness, leaking, fretting, cuts, tears or abraded areas, deformations of the outer skin.	6M	None	Shipyard recommendation	0,5
4	Replace all flexible hoses.	5Y	None	Shipyard recommendation	2

333-00	Bilge System				
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Operate all seawater valves to assure they are operating and prevent the deposition of sediment.	1M	None	Shipyard recommendation	1
2	Check the zinc sacrificial anodes and replace it if they have greater than 50% wastage.	3M	None	Shipyard recommendation	1
3	Visually inspect all system flexible hoses. Check specifically for any sign of cracking, brittleness, leaking, fretting, cuts, tears or abraded areas, deformations of the outer skin.	6M	None	Shipyard recommendation	0,5
4	Replace all flexible hoses.	5Y	None	Shipyard recommendation	2
333-04	**Mud Box DN50**				**Nb : 2**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	6M	Common tools	Shipyard recommendation	0,5
333-05	**Mud Box DN65**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	6M	Common tools	Shipyard recommendation	0,25
333-06	**Mud Box DN80**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	6M	Common tools	Shipyard recommendation	0,25

335-00	Marine Fuel Oil System				
1	Visually inspect all system flexible hoses. Check specifically for any sign of cracking, brittleness, leaking, fretting, cuts, tears or abraded areas, deformations of the outer skin.	6M	None	Shipyard recommendation	0,25
2	Replace all flexible hoses.	5Y	None	Shipyard recommendation	1

335-01	Centrifugal Water Separator Unit 760l/h				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Cleaning of bowl	72H Max.	Special tools	Alfa Laval separator manual 9001834-02 Rev.2	1
2	Replace the O-rings with new ones included in the O-ring service kit. Check the condition of discs in the bowl, replace if necessary.	1Y	Special tools	Alfa Laval separator manual 9001834-02 Rev.2	1
3	Check/replace the disc stack to maintain the separation efficiency. Fit new vibration dampers. Inspect the stop flanges of the dampers for possible damage and replace the stop flanges with new ones if necessary.	2Y.	Special tools	Alfa Laval separator manual 9001834-02 Rev.2	2
335-05	**Fuel Oil/Water Static Duplex Separator**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect or drain collection bowl of water and contaminants.	1D	Spare	Parker Racor Instructions Ref. 19536	0,25
2	Replace the fuel filter element.	500H (ME) or 6M	Spare	Parker Racor Instructions Ref. 19536	0,25
335-06	**Basket Filter DN50**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	6M	Common tools	Shipyard recommendation	0,25
335-07	**Basket Filter DN20**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	6M	Common tools	Shipyard recommendation	0,25
335-08	**Basket Filter DN65**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	6M	Common tools	Shipyard recommendation	0,25
335-09	**Hydraulic Pump Unit Station, Double for Quick Closing Valves**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Test the closing actuation of engine room fuel oil supply valves. After test, reset opening the valves into the machinery room.	2M	None	Shipyard recommendation	0,5
2	Drain and change the hydraulic oil using ISO VG-15 Hydraulic Oil.	As Request	Use hydraulic oil acc. lubricant schedule		1

336-00	Lub Oil System				
336-02	**Basket Filter DN40**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the strainer	6M	Common tools	Shipyard recommendation	0,25

338-00	Air Vents, Sounding & Overflow				
338-01	**Aseptic Filter**				**Nb : 3**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Replace the air filter element.	5Y	Common tools	Shipyard recommendation	0,5

341-10	CO2 Extinguishing system				
341-11	**Cylinder 50 litre with 33kg CO2 Charge**				**Nb : 3**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Ensure that the CO2 pressure gauge indicates 0 bar in closed CO2 manifold Check that system components are undamaged.	1M	None	Shipyard recommendation	0,25
2	Ensure that the Load of CO2 is correct.	3M	Use a paint burner to heat the self-adhesive strip during one minute or use an ultrasonic level indicator.	Shipyard recommendation	0,25

368-00	Refrigeration Plant for Fish Hold				
368-01	**Fish Hold Chiller - Compressor**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Visual check for oil leaks. Check for refrigerant leaks using an automatic halogen leak detector.	1W	Automatic halogen leak detector	Paumier Frigo-Fret Freezing System Technical Manual	0,25
2	Check viewfinder indicator on liquid line	1M	None	Paumier Frigo-Fret Freezing System Technical Manual	0,25
3	Check the trip and reclosing points of the safety devices.	3M	None	Paumier Frigo-Fret Freezing System Technical Manual	1
4	Renew compressor oil. Clean also filter and magnetic plug.	Initail 100H 3Y / 12000H	Only by skilled refrigeration personnel. Attention; Ester oils are strongly hygroscopic.	Paumier Frigo-Fret Freezing System Technical Manual	1
368-02	**Fish Hold Chiller - Condenser**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check for refrigerant leaks using an automatic halogen leak detector.	1W	Automatic halogen leak detector	Paumier Frigo-Fret Freezing System Technical Manual	0,25
2	Inspect and clean condenser.	6M	Brush	Paumier Frigo-Fret Freezing System Technical Manual	2
368-03	**Fish Hold Chiller - Electrical Control Cabinet**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean for dust. Check connectors tightening	1Y	Vacuum Cleaner	Paumier Frigo-Fret Freezing System Technical Manual	0,25

368-04	Freezing Tunnel - Compressor				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Visual check for oil leaks. Check for refrigerant leaks using an automatic halogen leak detector.	1W	Automatic halogen leak detector	Paumier Frigo-Fret Freezing System Technical Manual	0,25
2	Check viewfinder indicator on liquid line	1M	None	Paumier Frigo-Fret Freezing System Technical Manual	0,25
3	Check the trip and reclosing points of the safety devices.	3M	None	Paumier Frigo-Fret Freezing System Technical Manual	1
4	Renew compressor oil. Clean also filter and magnetic plug.	Initail 100H 3Y / 12000H	Only by skilled refrigeration personnel. Attention; Ester oils are strongly hygroscopic.	Paumier Frigo-Fret Freezing System Technical Manual	1
368-05	**Freezing Tunnel - Condenser**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check for refrigerant leaks using an automatic halogen leak detector.	1W	Automatic halogen leak detector	Paumier Frigo-Fret Freezing System Technical Manual	0,25
2	Clean condensate drain	1Y	None	Paumier Frigo-Fret Freezing System Technical Manual	0,5
368-06	**Freezing Tunnel - Electrical Control Cabinet**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean for dust. Check connectors tightening	1Y	Vacuum Cleaner	Paumier Frigo-Fret Freezing System Technical Manual	0,25
368-07	**Tank 20 litre**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Replace filter cartridges.	If the pressure drop exceed 0,5 bar	Only by skilled refrigeration personnel. Attention:Ester oils are strongly hygroscopic.	Paumier Frigo-Fret Freezing System Technical Manual	2
368-10	**Freezing Tunnel – Air Cooler**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	nspect and clean cooler casing for deterioration of paint and/or corrosion. Check coil for leaks and abnormal vibrations. As necessary, clean coil using low pressure compressed air. Check fans for any dirt build-up or unusual vibration.	3M	None.	Paumier Frigo-Fret Freezing System Technical Manual	0,25

412-00	Generators Sets				
412-02	Diesel Engine Caterpillar C4.4 (Naturally Aspirated Marine Genset)				Nb : 2
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Belt - Inspect / Adjust / Replace Coolant Level - Check Electrical Connections - Check Engine Air Cleaner Service Indicator - Inspect Engine Oil Level - Check Walk-Around Inspection	Day	None	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	0,5
2	Automatic Start / Stop - Inspect	W	None	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	0,25
3/1	Coolant sample (Level 2) - Obtain (for analysis).	Intial 500H	None	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	0,25
3/2	Auxiliary Water Pump - Inspect Engine Air Cleaner Element (Dual Element) - Inspect / Clean / Replace Engine Mounts - Inspect Engine Oil Sample - Obtain Engine Oil and Filter - Change Fuel System Primary Filter (Water Separator) Element - Replace Fuel System Secondary Filter - Replace Fuel Tank Water and Sediment - Drain Heat Exchanger - Inspect / Clean Hoses and Clamps - Inspect / Replace	500H 1Y 4150 Fuel Liters	Use lub. Oil acc. Lubricant schedule	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	8
4	Engine speed / Timing sensor - Cleaning / Inspect	1000H	Common Tools	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	0,5
5/1	Battery charger - Check	1000H 1Y	None	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	0,5
5/2	Engine Valve Lash - Check	1000H 1Y 8300 Fuel Liters	Only qualified personnel should perfrm this maintenance	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	2
6	Coolant sample (Level 2) - Obtain (for analysis).	1Y	None	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	0,25
7	Alternator - Inspect. Coolant Temperature Regulator - Replace. Generator - Inspect. Generator Set Vibration - Inspect. Rotating Rectifier - Check Starting Motor - Inspect. Water Pump - Inspect	2000H 2Y 16600 Fuel Liters	Common Tools	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	2

8	Engine protection devices - Check	3000H 3Y	Common Tools	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	1
9	Extended Life Coolant (ELC) - Adding	6000H 3Y	Use Coolant acc. Lubricant schedule	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	0,5
10	Engine Crankcase Breather - Replace	8000H	Common Tools	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	1
11	Coolant (ELC) - Change	8000H	Common Tools	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	1
12	Overhaul Considerations	12000H	Common Tools	Caterpillar Operation and Maintenance Manual C4.4 (Mech) Marine Genset MCS-3	NA

541-00	**Propulsion Plant**				
541-01	**Main Propulsion Diesel Engine Caterpillar C32 ACERT Phase 3 - Rating A**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	After cooler condensate drain valve - Inspect /Clean Engine cooling system corrosion protection system - Inspect. Sea water strainer - Clean / Inspect.	50H 1W	Common Tools Multimeter	Caterpillar Operation and Maintenance Manual C32 Marine Engine	0,5
2	Belts - Inspect / adjust / Replace. Engine Oil Sample - Obtain. Fuel tank water and sediment - Drain. Hoses and clamps - Inspect / Replace.	250H	Common Tools	Caterpillar Operation and Maintenance Manual C32 Marine Engine	0,5
3	Engine valve lash - Check. Engine valve rotators - Inspect. Fuel injector - Check	Initial 500H	Only qualified personnel should perfrm this maintenance	Caterpillar Operation and Maintenance Manual C32 Marine Engine	8
4	Coolant sample (Level 2) for analysis - Obtain. Engine crankcase breather - Clean. Fuel system primary filter (water separator) element - Replace. Fuel system secundary filter - Replace.	500H 1Y	Fuel filter elements	Caterpillar Operation and Maintenance Manual C32 Marine Engine	2
5	After cooler core - Inspect. Heat exchanger - Inspect.	Initial 1000H	Common Tools	Caterpillar Operation and Maintenance Manual C32 Marine Engine	2
6	Engine Oil and Filter - Change Engine air cleaner element (Single element) - Inspect / Replace. Turbocharger - Inspect.	1000H	Use lub. Oil acc. Lubricant Schedule	Caterpillar Operation and Maintenance Manual C32 Marine Engine	4
7	Fumes disposal filter element - Replace.	2000H	Common Tools	Caterpillar Operation and Maintenance Manual C32 Marine Engine	0,5
8/1	Bolts (Fuel filter base) - Inspect / Replace. Coolant temperature regulator - Replace. Crankshaft vibration damper - Inspect. Engine mounts - Inspect. Engine speed / Timing sensor - Clean / Inspect. Starting motor - Inspect.	3000H	Common Tools	Caterpillar Operation and Maintenance Manual C32 Marine Engine	8

8/2	Engine valve lash - Check. Engine valve rotators - Inspect. Fuel injector - Check.	3000H	Only qualified personnel should perfrm this maintenance	Caterpillar Operation and Maintenance Manual C32 Marine Engine	8
8/3	Auxiliary water pump (Bronze impeller) - Inspect / Replace.	3000H /170.000 Fuel Liters	Common Tools	Caterpillar Operation and Maintenance Manual C32 Marine Engine	2
9	Water pump - Inspect	5000H	Common Tools	Caterpillar Operation and Maintenance Manual C32 Marine Engine	4
10	Aftercooler core - Inspect. Heat exchanger - Clean / Test. Oil cooler core - Check / Clean / Test. Top end overhaul considerations.	Refer to Caterpillar Operation and Maintenance Manual C32 Marine Engine - Page 102 Maintenance Recommendations			
11	Aftercooler core - Inspect. Heat exchanger - Clean / Test. Overhaul considerations.	Refer to Caterpillar Operation and Maintenance Manual C32 Marine Engine - Page 102 Maintenance Recommendations			
541A02	**Reverse & Reduction Gear Box Twin Disc MGX5225DC**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check oil level	1D / 10H	None	Twin Disc Service Manual 1023375	0,25
2	Grease the oil shaft seals of the output shaft throught the grease fitting with Lithium Soap based NLGI 2 grease.	100H	Grease Gun + grease acc. lubricant schedule	Twin Disc Service Manual 1023375	0,25
3	Change oil and filter element. Clean suction strainer.	1000H 6M	Use lub. Oil acc. Lubricant Schedule	Twin Disc Service Manual 1023375	2
4	Check heat exchanger for leaky connections. Check the zinc sacrificial rods at the inlet and outlet heads and replace it if they have greater than 50% disintegrated.	3M	None	Twin Disc Service Manual 1023375	0,5
5	Check input torsional coupling for cracks and other signs of distress of the rubber element. Check the mounting for tightness od cracks. Inspect the input and output shafts oil seals for leakage.	2000H / 6M	None	Twin Disc Service Manual 1023375	0,5

572A00	**Shafting Line and Fixed Pitch Propeller (FPP) - Longliner**				
572A02	**Bulkhead Seal**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspection of the seal	5Y	None	Profilseal Installation and Operation Instructions	4
572A04	**Earthing Assy**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check the cleanliness of the slipring face and the correct compression of the hold-down springs of the brushes. Check the wear of the brushes.	1W	None	Profilseal Installation and Operation Instructions	0,25
572A07	**Propeller Nut**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect all sacrificial anodes for wastage; if more than 50% wastage has occurred renew the anodes.	6M	Dry docking required	Shipyard recommendations	2

572A10	Tank, Lub Oil				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check lubrification oil level.	1W	None	Shipyard recommendations	0,25
2	Change lubrication oil and filter	1Y	Use lub. Oil acc. Lubricant Schedule	Shipyard recommendations	0,5

575-00	Sea Water Cooling System				
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Operate all seawater valves to assure they are operating and prevent the deposition of sediment.	1M	None	Shipyard recommendation	1
2	Check the zinc sacrificial anodes and replace it if they have greater than 50% wastage.	3M	None	Shipyard recommendation	1
3	Visually inspect all system flexible hoses. Check specifically for any sign of cracking, brittleness, leaking, fretting, cuts, tears or abraded areas, deformations of the outer skin.	6M	None	Shipyard recommendation	0,5
4	Replace all flexible hoses.	5Y	None	Shipyard recommendation	2
575-01	Sea Water Strainer DN125				Nb : 2
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean / inspect the port & stbd strainers	1W	Common tools	Shipyard recommendation	0,5

900A00	Fishing Equipment - Longliner				
900A01	Longline Winch Hydraulic Power Pack				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check hydraulic oil level. General check for leakage.	1W	None	Bopp Longliner Winches Instruction Manual	0,1
2	Adjust pressure of valves	1M	None	Bopp Longliner Winches Instruction Manual	0,5
3	Clean filters (if metal strainers) or change cartridge (if paper filter).	500H	None	Bopp Longliner Winches Instruction Manual	0,25
4	Draining and change hydraulic oil.	1Y	Use hydraulic oil acc. Lubricant Schedule	Bopp Longliner Winches Instruction Manual	2
900A06	Winch Drum Longline				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Lubricate grease nipples with Multipurpose Extreme Pressure Water Resistant Grease.	50H/1W	Grease Gun + grease acc. lubricant schedule	Bopp Longliner Winches Instruction Manual	0,25
900A07	Line Setter				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Lubricate grease nipples with Multipurpose Extreme Pressure Water Resistant Grease.	50H/1W	Grease Gun + grease acc. lubricant schedule	Bopp Longliner Winches Instruction Manual	0,25
900A08	Pulley				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Lubricate grease nipple with Multipurpose Extreme Pressure Water Resistant Grease.	50H/1W	Grease Gun + grease acc. lubricant schedule	Bopp Longliner Winches Instruction Manual	0,1

6-7. COMMUNICATION & NAVIGATION

620-00	External Communication System				
620-01	**VHF/IMM Radiotelephone**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Execute functional Daily test.	Day	None	Furuno FM8900S VHF Radiotelephone Operator's Manual	0,25
2	Check antenna for physical damage and corrosion. emove dust from the cabinet. Check cables for tightly fastened, corrosion and rust.	1M	None	Furuno FM8900S VHF Radiotelephone Operator's Manual	0,5
620-04	**VHF/IMM Radiotelephone - Antenna**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect antenna for any damage. Check the fastenings of antenna base. Remove contamination using cleaning cloth and fresh water.	1M	None	Shipyard recommendation	0,25
2	Check all cables and connections for chaffing, damage and corrosion. Retighten connections if necessary.	1Y	None	Shipyard recommendation	0,25
620-05	**VHF Marine Radiotelephone**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check cables for tightly fastened, corrosion and rust. Wipe the LCD carefully to prevent scratching.	1M	None	Furuno FM4721 VHF Radiotelephone Operator's Manual	0,25
620-07	**VHF Marine Radiotelephone - Antenna**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect antenna for any damage. Check the fastenings of antenna base. Remove contamination using cleaning cloth and fresh water.	1M	None	Shipyard recommendation	0,25
2	Check all cables and connections for chaffing, damage and corrosion. Retighten connections if necessary.	1Y	None	Shipyard recommendation	0,25
620-08	**HF/MF BLU Radiotelephone**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect and perform a functional test.	Day	None	Furuno SSB Radiotelephone Operator's Manual	0,5
620-10	**HF/MF BLU Radiotelephone - Antenna**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect antenna for any damage. Check the fastenings of antenna base. Remove contamination using cleaning cloth and fresh water.	1M	None	Shipyard recommendation	0,25
2	Check all cables and connections for chaffing, damage and corrosion. Retighten connections if necessary.	1Y	None	Shipyard recommendation	0,25

620-14	Navtex Receiver				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check connectors for tightened and ground terminal for tightened and free of rust. Wipe the LCD carefully to prevent scratching.	1M	None	Furuno Navtex Receiver Operator's Manual	0,25
620-20	**VHF GMDSS Handheld Radiotelephone**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect, perform a functional test. Clean any grime or salt residue off the unit. Confirm the battery is within the specified expiry date.	1M	None	Ocean Signal Safesea V100 User Manual	0,5
2	Replace the battery	Before expiry date	None	Ocean Signal Safesea V100 User Manual	0,25

620-21	EPIRB				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect and perform a functional test. Confirm the battery is within the specified expiry date.	1M	None	Ocean Signal EPIRB User Manual	0,25
2	Replace the battery	5Y	None	Ocean Signal EPIRB User Manual	0,25
620-22	**Search And Rescue Transponder (SART)**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect, perform a functional test. Clean any grime or salt residue off the unit. Check correct SART operation using the test mode. Confirm the battery is within the specified expiry date.	1M	None	Ocean Signal SART User Manual	0,5
2	Replace the battery	Before expiry date	None	Ocean Signal SART User Manual	0,25

630-00	Navigation System				
630-01	**Color LCD Sounder**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check cable of transducer for damage. Check power cable of transducer for tightened. Check display unit ground for corrosion. Check voltage of power supply.	1M	None	Simrad Color LCD Sounder Operator's Manual	0,5
630-03	**Transducer 38/200khz**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Perform a thorough visual check of the transducer. If necessary clean the transducer using synthetic soap and water. Remove marine growth using fine-grade sand paper or emery paper.	At Each Dry Dock Inspection	Do not use strong solvent or high pressure water	Simrad Color ES70 Operator's Manual	0,5
630-05	**Transducer 50khz**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Perform a thorough visual check of the transducer. If necessary clean the transducer using synthetic soap and water. Remove marine growth using fine-grade sand paper or emery paper.	At Each Dry Dock Inspection	Do not use strong solvent or high pressure water	Furuno FCV1150 Operator's Manual	0,5

630-06	Transducer 38khz				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Perform a thorough visual check of the transducer. If necessary clean the transducer using synthetic soap and water. Remove marine growth using fine-grade sand paper or emery paper.	At Each Dry Dock Inspection	Do not use strong solvent or high pressure water	Furuno FCV1150 Operator's Manual	0,5
630-10	**VHF/ADDF Antenna**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect antenna for any damage. Check the fastenings of antenna base. Remove contamination using cleaning cloth and fresh water.	1M	None	Shipyard recommendation	0,25
2	Check all cables and connections for chaffing, damage and corrosion. Retighten connections if necessary.	1Y	None	Shipyard recommendation	0,25
630-11	**X Band Marine Radar 4kW 36Nm**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check connectors for tightened and ground terminal for tightened and free of rust. Check exposed nuts and bolts on antenna unit for free of rust and loosened. Check antenna radiator for dirt and cracks.	3M	None	Furuno Maine Radar Operator's Manual	0,5
630-13	**X Band Marine Radar 6kW 48Nm**				**Nb : 1**
Job No	**Job Synopsis**	**Frequency**	**Requirements**	**Maker manual reference**	**Man hours**
1	Check connectors for tightened and ground terminal for tightened and free of rust. Check exposed nuts and bolts on antenna unit for free of rust and loosened. Check antenna radiator for dirt and cracks.	3M	None	Furuno Maine Radar Operator's Manual	0,5
630-15	**Satellite Compass**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check connectors for tightened and ground terminal for tightened and free of rust. Check ground terminal for rust. Check the antenna cable for water leakage. Remove dust and dirt from display and processor unit.	1M	None	Furuno Satellite Compass Operator's Manual	0,5
630-17	**Satellite Compass - GPS Antenna**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Inspect antenna for any damage. Check the fastenings of antenna base. Remove contamination using cleaning cloth and fresh water.	1M	None	Shipyard recommendation	0,25
2	Check all cables and connections for chaffing, damage and corrosion. Retighten connections if necessary.	1Y	None	Shipyard recommendation	0,25
630-18	**GPS Display**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check connectors for tightened and ground terminal for tightened and free of rust. Check the antenna cable for water leakage. Remove dust and dirt from the cabinet. Wipe the LCD carefully to prevent scratching.	1M	None	Furuno Remote Display Operator's Manual	0,5

630-20	GPS Navigator				Nb : 1
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Check connectors for tightened and ground terminal for tightened and free of rust. Check battery terminal for rust. Remove dust and dirt from cabinet. Wipe the LCD carefully to prevent scratching.	1M	None	Furuno GPS Navigator Operator's Manual	0,25
630-29	**Autopilot**				**Nb : 1**
Job No	Job Synopsis	Frequency	Requirements	Maker manual reference	Man hours
1	Clean the display unit. Check the connectors.	1M	None	Simrad Autopilot Operator's Manual	0,25

6-8. LUBRICANT SCHEDULE

Equipment	Manufacturer	Unit capa. Litre	Product Generic Description	Initial Replenishment		TOTAL Equivalence	Standards	CMN Art.
				Manufact.	Brand Name			
Main Engine C32	Caterpillar	138	4-Stroke ULSD Diesel Engine Multi-Grade Heavy Duty, Low SAPS Technology, Mineral Blend Oil SAE 15W-40	Shell	Rimula R4L 15W-40	Rubia TIR 7900 15W-40	API CJ-4, CI-4, CF-4, CH-4, CG-4 Euro III, Euro IV, Euro V Cat ECF-2, ECF-3	91500000227 (20Li Drum) 91500000237 (Bulk)
Genset C4.4 DINA	Caterpillar	9						
Main Engine C32	Caterpillar	118	Extended Life Coolant (ELC)	Caterpillar	Cat ELC	NA	Cat EC-1	
Genset C4.4 DINA	Caterpillar	18						
Gearbox MGX5225DC	Twindisc	31,4	4-Stroke Diesel Engine Mono-Grade Heavy Duty Mineral Blend Oil SAE 40	Shell	Rimula R3(+) 40	Rubia S-40	API CF Euro II	91500000226 (Bulk)
Stern Tube (FPP)	France Hélices	50	High Performance Mineral Hydraulic Oil ISO (3448) VG-68 HVLP	Shell	Tellus S2 V68 (Previous Name Tellus T68)	Equivis ZS 68	DIN 51524 Part 3 HVLP 68	91500000117 (Bulk)
Fishing Winches Hydraulic Power Pack	Bopp	120	High Performance Mineral Hydraulic & Lubricating Oil ISO (3448) VG-46 HVLP	Shell	Tellus S2 V46 (Previous Name Tellus T46)	Equivis ZS 46	DIN 51524 Part 3 HVLP 46	91500000129 (Bulk)
Steering Gear Power Pack	Fluidmecanica	74						
Pump Unit Station, Double for Quick Closing Valves	Aquiro	NSQ	High Performance Mineral Hydraulic & Lubricating Oil ISO (3448) VG-15 HVLP	Shell	Tellus S2 V15 (Previous Name Tellus T15)	Equivis ZS 15	DIN 51524 Part 3 HVLP 15	91500000228 (Bulk)
Fish Hold Reciprocating Compressor 4DES-5Y-40S	Bitzer	NG	Refrigerating Machine Ester Lubricating Oil ISO 32 of Reciprocating Compressors	Bitzer	BSE-32			
Fish Hold Reciprocating Compressor 6GE-34Y-40P	Bitzer	NG						
Fish Hold Refrigerating Compressors	Bitzer	NG	Gas Refrigerant	Atofina	Forane R404A	NA	NA	

Equipment	Manufacturer	Unit capa. Litre	Product Generic Description	Initial Replenishment		TOTAL Equivalence	Standards	CMN Art.
				Manufact.	Brand Name			
Windlass	Tripomet	15	Extreme Pressure Mineral Gear Lubrication Oil ISO (3448) VG-320	Shell	Omala S2 G-320 (Previous Name Omala 320)	Carter EP 320	DIN 51517 Part 3 CLP 320	91500000172 (Bulk)
Electric Winch 500kg - Wire Rope	Huchez	NSQ	Lubricant biodegradable for wire ropes.	Shell	Lurop V	NA		
Electric Winch 500kg - Wire Rope	Huchez	NSQ	Solvent for Lurod V lubricant	Shell	Solvent SM	NA		
Fishing Winches	Bopp	NSQ	Extreme Pressure Lithium Soap based Grease NLGI-2	Shell	Alvania EP-2	Multis EP-2		91500000215 (Cartridge)
Rudder Stock	Fluidmecanica	NSQ						
Gearbox MGX5225DC	Twindisc	NSQ						
Electric Winch 500kg	Huchez	NSQ						

NA : Not Applicable
NG : Not Given
NSQ : No Significant Quantity

6-9. COMMERCIAL LUBRICANTS DATA SHEETS

6-9-1. Shell Rimula R4 L 15W-40 Diesel Engine Oil

Technical Data Sheet

Shell **Rimula** *R4 L 15W-40 (CJ-4)*

- *Low Emissions*
- *Extra Life - Improved Protection*

Multigrade Heavy Duty Diesel Engine Oils

Shell Rimula R4 L Energised Protection oils use the latest "Low-SAPS" additive technology to protect under the most severe conditions found in modern low emission engines. The protective power of the oil is enhanced through the use of high purity "Group II" base oils that provide increased additive activity. It delivers significant improvements in wear protection, deposit control and resistance to breakdown under high temperatures*.
The exclusive low-ash formulation helps protect the exhaust catalysts and particulate traps found on the latest low emission vehicles. Recommended by a wide range of OEMs, suitable for both the latest low-emissions (Euro 4,5, US 2007) and older model equipment.
*** compared to previous generation oils such as API CI-4 and ACEA E7**

ENERGISED PROTECTION
Adapting to your engine's changing needs

Performance, Features & Benefits

- **Simplify inventory needs**
  Shell Rimula R4 L is approved by a wide range of leading OEMs, simplifying inventory needs for fleets with a mixture of engine makes.
- **Emissions system capability**
  Advanced low-ash formulation helps control blocking of or poisoning of exhaust after-treatment devices, helping maintain vehicle emission compliance and engine fuel efficiency.
- **Lower operating costs**
  Shell Rimula R4 L is formulated with an enhanced acid-control system to help fleet operators to achieve maximum drain flexibility.
- **Outstanding wear protection**
  Demonstrated over millions of km of customer service, Shell Rimula R4 L provides significantly higher levels of wear protection than previous generation oils to prolong engine efficiency and life.

Main Applications

- **Severe duty heavy duty diesel engines**
  Shell Rimula R4 L is our highest performance 15W-40 HD oil providing outstanding protection for virtually all engines including the latest Euro 5 and US 2007 as well as older units.
- **Off-highway applications**
  Suitable for use in agricultural and construction applications, even with high levels of fuel sulphur.

Specifications, Approvals & Recommendations

- Caterpillar: ECF-2, ECF-3
- Cummins: CES 20081, 77, 72, 71
- DDC: 93K218
- Deutz: DOC III-10 LA
- MACK: EO-O Premuim Plus
- MAN: 3575
- MB Approval: 228.31
- MTU: Category 2.1
- Renault Trucks: RLD-3
- Scania: Low Ash
- JASO: DH-2
- IVECO: T2 E7 (Meets specification)
- Volvo: VDS-4, VDS-3
- API: CJ-4, CI-4+, CI-4, CH-4, CG-4, CF-4, CF.
- ACEA: E9, E7

For a full listing of equipment approvals and recommendations, please consult your local Shell Technical Helpdesk, or the OEM Approvals website.

Page 1 of 2 - Shell Rimula R4 L 15W-40 (CJ-4), v.2

Typical Physical Characteristics

Properties			Method	Shell Rimula R4 L 15W-40 (CJ-4)
Viscosity Grade				15W-40
Kinematic Viscosity	@40°C	mm²/s	ASTM D445	118
Kinematic Viscosity	@100°C	mm²/s	ASTM D445	15.5
Viscosity Index			ASTM D2270	139
Density	@15°C	kg/l	ASTM D4052	0.883
Sulphated Ash		%	ASTM D874	1.0 max
Total Base Number		mg KOH/g	ASTM D2896	10.6
Flash Point (COC)		°C	ASTM D92	227
Pour Point		°C	ASTM D97	-33

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Health, Safety & Environment

- **Health and Safety**

  Shell Rimula R4 L 15W-40 (CJ-4) is unlikely to present any significant health or safety hazard when properly used in the recommended application and good standards of personal hygiene are maintained.

  Avoid contact with skin. Use impervious gloves with used oil. After skin contact, wash immediately with soap and water.

  Guidance on Health and Safety is available on the appropriate Material Safety Data Sheet, which can be obtained from http://www.epc.shell.com/

- **Protect the Environment**

  Take used oil to an authorised collection point. Do not discharge into drains, soil or water.

Additional Information

- **Advice**

  Advice on applications not covered here may be obtained from your Shell representative.

6-9-2. Shell Rimula R3+ 40 Diesel Engine Oil

Technical Data Sheet

Shell **Rimula** *R3+ 40* *(CF/228.0)*

• *Extra Performance Monograde*

Monograde Heavy Duty Diesel Engine Oils

Shell Rimula R3 Energised Protection oils feature proven lubricant chemistry that adapts to your driving needs to provide extra protection whatever the demands of your engine or equipment. Featuring an active-detergent system to keep pistons and other engine parts clean, it provides protection against wear for long engine life and protection against deposits for efficient engine performance.

ENERGISED PROTECTION
Adapting to your engine's changing needs

Performance, Features & Benefits

- **Equipment manufacturer acceptance**
  Shell Rimula R3 monogrades are approved for use in a variety of engine applications by leading OEMs.
- **High standard of piston cleanliness**
  The high thermal stability and oil oxidation resistance provide a high standard of piston cleanliness.
- **Low engine wear and long component life**
  Overall engine cleanliness contributes to low engine wear, long component life, maintenance of power output, more operational stability and lower servicing costs.

Main Applications

- **Dedicated diesel engine oil performance**
  Shell Rimula R3 monogrades have been formulated to provide robust engine performance in a variety of off-highway applications or older on-highway diesel vehicles.
- **Construction industry application**
  Engine oil technology is sometimes specified for use in the transmission and hydraulic applications. Shell Rimula R3 monogrades offer premium performance and protection for these applications.
- **Stationary equipment**
  Shell Rimula R3 monogrades are suitable for certain stationary equipment, such as pumps, that run continuously under steady state conditions.
- **Detroit Diesel two-stroke engines**
  Shell Rimula R3 oils should not be used in Detroit Diesel two-stroke engines. An SAE 40 oil meeting the API CF-II Specification and having a sulphated ash content of less than 1% should be used.

Specifications, Approvals & Recommendations

- MAN : 270
- MB Approval: 228.0
- MTU: Category 1
- API : CF
- ACEA: E2

For a full listing of equipment approvals and recommendations, please consult your local Shell Technical Helpdesk, or the OEM Approvals website.

Typical Physical Characteristics

Properties			Method	Shell Rimula R3+ (CF/228.0)
Viscosity Grade				40
Kinematic Viscosity	@40°C	mm²/s	ASTM D 445	140
Kinematic Viscosity	@100°C	mm²/s	ASTM D 445	14.5
Dynamic Viscosity	@-25°C	mPa s	ASTM D 5293	-
Viscosity Index			ASTM D 2270	102
Density	@15°C	kg/l	ASTM D 4052	0.895
Flash Point (COC)		°C	ASTM D92	250
Pour Point		°C	ASTM D97	-15

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Health, Safety & Environment

- **Health and Safety**

  Shell Rimula R3+ Oil is unlikely to present any significant health or safety hazard when properly used in the recommended application and good standards of personal hygiene are maintained.

  Avoid contact with skin. Use impervious gloves with used oil. After skin contact, wash immediately with soap and water.

  Guidance on Health and Safety is available on the appropriate Material Safety Data Sheet, which can be obtained from http://www.epc.shell.com/

- **Protect the Environment**

  Take used oil to an authorised collection point. Do not discharge into drains, soil or water.

Additional Information

- **Advice**

  Advice on applications not covered here may be obtained from your Shell representative.

6-9-3. Shell Tellus S2 V Hydraulic Oil

Previous Name: **Shell Tellus T**

Shell **Tellus *S2 V***

- *EXTRA PROTECTION*
- *VERSATILE APPLICATIONS*

Industrial Hydraulic Fluid for wide temperature range

Shell Tellus S2 V fluids are high performance hydraulic fluids that use Shell's unique patented technology with excellent viscosity control under both severe mechanical stress and across a wide range of temperatures. They provide outstanding protection and performance in most mobile equipment and other applications subjected to wider ranges of ambient or operating temperatures.

Performance Benefits

- ***Long fluid life – Maintenance saving***

  Shell Tellus S2 V fluids help extend equipment maintenance intervals by resisting thermal and chemical breakdown. This minimizes sludge formation and provides excellent performance in the industry standard ASTM D 943 TOST test (Turbine Oil Stability Test), providing better reliability and system cleanliness

  Shell Tellus S2 V fluids also have good stability in the presence of moisture, which ensures long fluid life and reduces the risk of corrosion and rusting, particularly in moist or humid environments.

  Highly shear stable viscosity modifiers help minimize variations in the fluid properties throughout the fluid drain interval.

- ***Outstanding wear protection***

  Proven zinc-based anti-wear additives are incorporated to be effective throughout the range of operating conditions, including low load and severe duty high load conditions. Outstanding performance in a range of piston and vane pump tests, including the tough Denison T6C (dry and wet versions) and the demanding Vickers 35VQ25, demonstrates how Shell Tellus S2 V fluids can help system components last longer.

- ***Maintaining system efficiency***

  The extended temperature range capability of Shell Tellus S2 V allows efficient operation of mobile equipment from cold start to normal operating conditions

  Superior cleanliness, excellent filterability and high performance water separation, air release and anti foam characteristics all help contribute to maintaining or enhancing the efficiency of hydraulic systems.

  The unique additive system in Shell Tellus S2 V, in combination with superior cleanliness (meeting the requirements of max ISO 4406 21/19/16 class, ex Shell filling lines. As recognized by DIN 51524 specification, the oil is exposed to various influences with transport and storage that could effect the cleanliness level) helps reduce the impact of contaminants on filter blocking, allowing both extended filter life and use of finer filtration for extra equipment protection.

  Shell Tellus S2 V fluids are formulated for fast air release without excessive foaming to help efficient hydraulic power transfer and minimise fluid and equipment impacts of cavitation-induced oxidation that can shorten fluid life.

Applications

- ***Mobile/exterior hydraulic applications***

  Hydraulic and fluid power transmission systems in exposed environments can be subject to wide variations in temperature. The high viscosity index of Shell Tellus S2 V helps deliver responsive performance from cold start conditions to full load, severe duty operation.

- ***Precision hydraulic systems***

  Precision hydraulic systems require excellent control of fluid viscosity over the operating cycle. Shell Tellus S2 V provides greater temperature-viscosity stability compared to ISO HM fluids that can help improve the performance of such systems.

For more severe operating conditions, longer fluid life and enhanced efficiency, the Shell Tellus "S3" and "S4" ranges offer additional performance benefits.

Specifications and Approvals

Shell Tellus S2 V fluids have the following approvals.

Denison Hydraulics (HF-0, HF-1, HF-2)
Cincinnati Machine P-68 (ISO 32), P-70 (ISO 46), P-69 (ISO 68)
Eaton Vickers M-2950 S
Eaton Vickers I-286 S

Shell Tellus S2 V fluids meet or exceed the requirements of

Swedish Standard SS 15 54 34 AM
ISO 11158 (HV fluids)
AFNOR NF E 48-603
ASTM D158-05 (HV fluids)
DIN 51524 Part 3 HVLP type
GB 11118.1-94 (HV fluids)

For a full listing of equipment approvals and recommendations please consult your local Shell technical help desk.

Health and Safety

Guidance on Health and Safety is available on the appropriate Material Safety Data Sheet, which can be obtained from your Shell representative.

Compatibility

Shell Tellus S2 V fluids are suitable for use with most hydraulic pumps. However, please consult your Shell representative before using in pumps containing silver plated components

Fluid Compatibility

Shell Tellus S2 V fluids are compatible with most other mineral oil based hydraulic fluids. However, mineral oil hydraulic fluids should not be mixed with other fluid types (e.g. environmentally acceptable or fire resistant fluids).

Seal & Paint Compatibility

Shell Tellus S2 V fluids are compatible with seal materials and paints normally specified for use with mineral oils

Protect the Environment

Take used hydraulic fluid to an authorized collection point. Do not discharge into drains, soil or water.

Advice

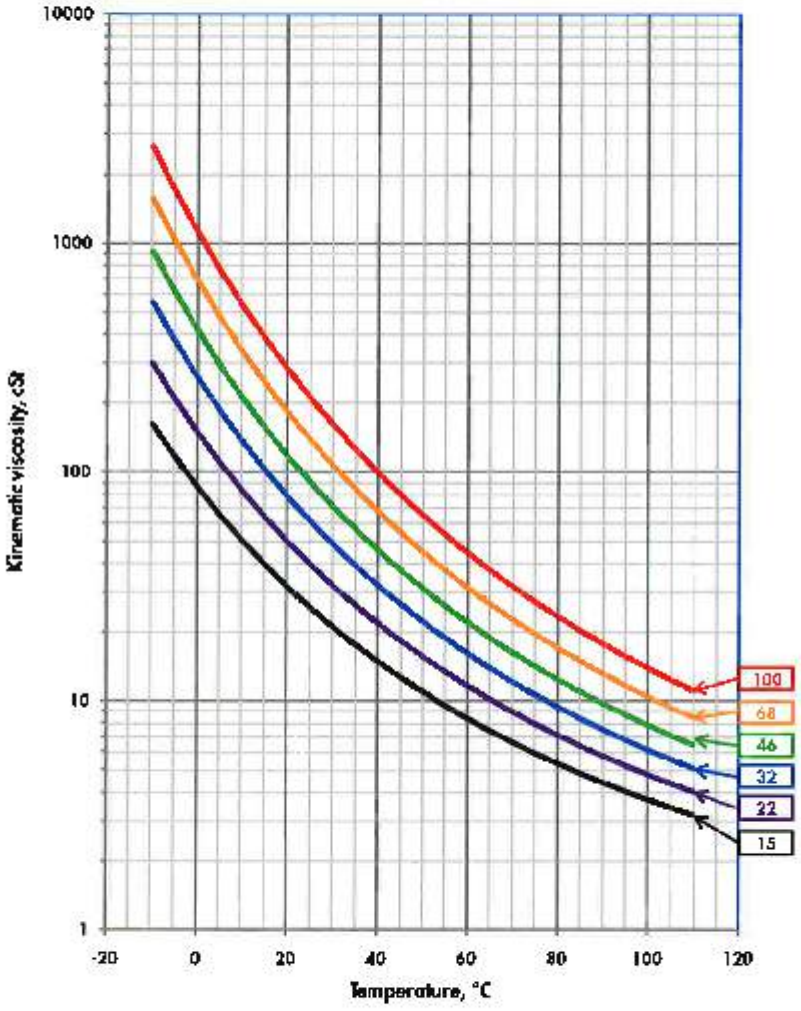
Advice on applications not covered in this leaflet may be obtained from your Shell representative

Typical Physical Characteristics

Shell Tellus S2 V	15	22	32	46	68	100
ISO Fluid Type	HV	HV	HV	HV	HV	HV
Kinematic Viscosity (ASTM D 445) @ -20°C, cSt @ 40°C, cSt @ 100°C, cSt	350 15 3.8	695 22 4.8	1300 32 6.1	2350 46 7.9	 68 10.5	 100 14.0
Viscosity Index (ISO 2909)	142	142	143	143	142	142
Density @ 15°C (ISO 12185), kg/l	872	872	872	872	877	880
Flash Point (ISO 2592) (Cleveland Open Cup), °C	170	190	210	225	225	225
Pour Point (ISO 3016), °C	-42	-42	-39	-39	-36	-30

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

Viscosity - Temperature Diagram for Shell Tellus 52 V



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6-9-4. Bitzer BS32 Refrigerating Machine Oil

Technische Information
Technical Information
Information Technique

KT-510-4

Polyolester-Öle BSE32 und BSE55 für Hubkolbenverdichter

Polyolester Oils BSE32 and BSE55 for Reciprocating Compressors

Huiles polyolester BSE32 et BSE55 pour compresseurs à piston

Inhalt

Contents

Sommaire

1 Allgemeines

BITZER-Hubkolbenverdichter werden für den Einsatz chlorfreier HFKW-Kältemittel (R134a, R404A, R407A/B, R407C, R507A etc.) mit einem hochwertigen Polyolester-Öl befüllt. Bei Fabrikbefüllung erhält die Typenbezeichnung des Verdichters den Zusatz "Y" – z. B. 4CC-6.2Y.

Esteröle bieten – im Gegensatz zu konventionellen Schmiermitteln – eine gute Löslichkeit mit HFKW-Kältemitteln und sind deshalb für den Betrieb mit diesen Stoffen zwingend erforderlich. Sie haben darüber hinaus hervorragende Schmiereigenschaften und ein günstiges Viskositätsverhalten (hoher Viskositäts-Index).

Weitere Informationen über die Besonderheiten im Umgang mit Esterölen sowie Löslichkeitsgrenzen siehe Technische Informationen KT-620 und KT-630.

1 General

BITZER reciprocating compressors which are intended for use with chlorine free HFC refrigerants (R134a, R404A, R407A/B, R407C, R507A etc.) are charged with a high quality polyolester oil. When factory charged the compressor designation has the supplement "Y" – e. g. 4CC-6.2Y.

Contrary to conventional lubricants, ester oils provide good miscibility with HFC refrigerants and are therefore essential for the operation with these substances. Moreover they have outstanding lubrication characteristics and a favourable viscosity performance (high viscosity index).

Further information concerning the special handling of ester oils and miscibility limits are given in the Technical Informations KT-620 and KT-630.

1 Généralités

Les compresseurs à pistons BITZER prévus pour travailler avec un fluide frigorigène non chloré HFC (R134a, R404A, R407A/B, R407C, R507A, etc.) sont livrés avec une charge d'huile polyolester de haute qualité. Pour les compresseurs "chargés" en usine, la désignation du type est complétée par la lettre "Y" – par exemple 4CC-6.2Y.

Contrairement aux lubrifiants conventionnels, les huiles ester sont miscibles avec les fluides frigorigènes HFC si bien que leur emploi avec ces substances s'impose forcément. De plus, ces huiles présentent de très bonnes caractéristiques lubrifiantes et un comportement avantageux de la viscosité (indice de viscosité élevé).

Pour d'autres informations relatives aux particularités et à l'utilisation des huiles ester ainsi qu'aux limites de miscibilité, se référer aux Informations techniques KT-620 et KT-630.

2 Anwendungsbereiche

2.1 BSE32

Basisviskosität 32 cSt bei 40°C

Kältemittel Refrigerant Fluide frigorigène	Anwendungsbereich Application range Champs d'application				Erläuterungen Comments Commentaires
R134a	–	H	M	(L)	
R404A	–	(H)	M	L	stationäre Kälte- und Klimaanlagen bis zu einer Verflüssigungstemperatur von 55°C
R407A	–	(H)	M	L	stationary refrigeration and air conditioning plants with condensing temperatures up to 55°C
R407B	–	–	M	L	
R407C		H	M		installations de réfrigération et de conditionnement d'air stationnaires jusqu'à une température de condensation de 55°C
R507A	–	(H)	M	L	
R22	–	–	M	L	siehe besondere Hinweise, Kapitel 5 see special recommendation, chapter 5 voir recommandations particulières, chapitre 5

2.2 BSE55

Basisviskosität 55 cSt bei 40°C

Kältemittel Refrigerant Fluide frigorigène	Anwendungsbereich Application range Champs d'application				Erläuterungen Comments Commentaires
R22	–	H	M	L	siehe besondere Hinweise, Kapitel 5 see special recommendation, chapter 5 voir recommandations particulières, chapitre 5
R134a	HH	H	M	(L)	mobile Kälte- und Klimaanlagen sowie stationäre Anlagen bei Verflüssigungstemperaturen > 55°C mobile refrigeration and air conditioning plants and stationary systems with condensing temperatures > 55°C installations de réfrigération et de conditionnement d'air mobiles et installations stationnaires pour une temp. de condensation > 55°C
R407C	–	H	M	–	
R410A	–	H	M	(L)	stationäre Kälte- und Klimaanlagen stationary refrigeration and air conditioning plants installations de réfrigération et de conditionnement d'air stationnaires

Definition der Anwendungsbereiche

HH Hochklimabereich (t_o bis 25°C)
H Klimabereich
M Normalkühl-Bereich
L Tiefkühl-Bereich
() Weniger empfohlener Anwendungsbereich (teilweise Einschränkungen z. B. L-Bereich bei R134a)

Definition of application ranges

HH high temperature air conditioning (t_o up to 25°C)
H air conditioning range
M medium temperature range
L low temperature range
() application range less recommended (partly restrictions e.g. L range in case of R134a)

Définition des champs d'application

HH climatisation à haute températures (t_o jusqu'à 25°C)
H domaine de climatisation
M domaine à moyenne température
L domaine de congélation
() champ d'application peu recommandé (restrictions partielles par exemple champ d'application L pour R134a)

2 Anwendungsbereiche

2.1 BSE32

Basisviskosität 32 cSt bei 40°C

Kältemittel Refrigerant Fluide frigorigène	Anwendungsbereich Application range Champs d'application				Erläuterungen Comments Commentaires
R134a	–	H	M	(L)	stationäre Kälte- und Klimaanlagen bis zu einer Verflüssigungstemperatur von 55°C stationary refrigeration and air conditioning plants with condensing temperatures up to 55°C installations de réfrigération et de conditionnement d'air stationnaires jusqu'à une température de condensation de 55°C
R404A	–	(H)	M	L	
R407A	–	(H)	M	L	
R407B	–	–	M	L	
R407C		H	M		
R507A	–	(H)	M	L	
R22	–	–	M	L	siehe besondere Hinweise, Kapitel 5 see special recommendation, chapter 5 voir recommandations particulières, chapitre 5

2 Application ranges

2.1 BSE32

Basic viscosity 32 cSt at 40°C

2 Champs d'application

2.1 BSE32

Viscosité de base 32 cST à 40°C

2.2 BSE55

Basisviskosität 55 cSt bei 40°C

Kältemittel Refrigerant Fluide frigorigène	Anwendungsbereich Application range Champs d'application				Erläuterungen Comments Commentaires
R22	–	H	M	L	siehe besondere Hinweise, Kapitel 5 see special recommendation, chapter 5 voir recommandations particulières, chapitre 5
R134a	HH	H	M	(L)	mobile Kälte- und Klimaanlagen sowie stationäre Anlagen bei Verflüssigungstemperaturen > 55°C mobile refrigeration and air conditioning plants and stationary systems with condensing temperatures > 55°C installations de réfrigération et de conditionnement d'air mobiles et installations stationnaires pour une temp. de condensation > 55°C
R407C	–	H	M	–	
R410A	–	H	M	(L)	stationäre Kälte- und Klimaanlagen stationary refrigeration and air conditioning plants installations de réfrigération et de conditionnement d'air stationnaires

2.2 BSE55

Basic viscosity 55 cSt at 40°C

2.2 BSE55

Viscosité de base 55 cST à 40°C

Definition der Anwendungsbereiche

HH Hochklimabereich (t_o bis 25°C)
H Klimabereich
M Normalkühl-Bereich
L Tiefkühl-Bereich
() Weniger empfohlener Anwendungsbereich (teilweise Einschränkungen z. B. L-Bereich bei R134a)

Definition of application ranges

HH high temperature air conditioning (t_o up to 25°C)
H air conditioning range
M medium temperature range
L low temperature range
() application range less recommended (partly restrictions e.g. L range in case of R134a)

Définition des champs d'application

HH climatisation à haute températures (t_o jusqu'à 25°C)
H domaine de climatisation
M domaine à moyenne température
L domaine de congélation
() champ d'application peu recommandé (restrictions partielles par exemple champ d'application L pour R134a)

3 Eigenschaften der BITZER Esteröle

3 Properties of the BITZER ester oils

3 Propriétés des huiles ester de BITZER

3.1 Technische Daten

3.1 Technical data

3.1 Données techniques

Ölsorte Oil type Type d'huile	Dichte bei 15°C Density at 15°C Densité à 15°C g/ml	Flammpunkt Flash point Point d'éclair °C	Stockpunkt Pour-point Point d'écoulement °C	Kinematische Viskosität (cSt) Kinematic viscosity (cSt) Viscosité cinématique (cSt) 20°C	40°C	100°C
BSE32	1,006	243	-48	88,1	31,2	6,0
BSE55	1,010	270	-51	149,4	55,0	8,8

3.2 Mischungsgrenzen

3.2 Miscibility limits

3.2 Limites de miscibilité

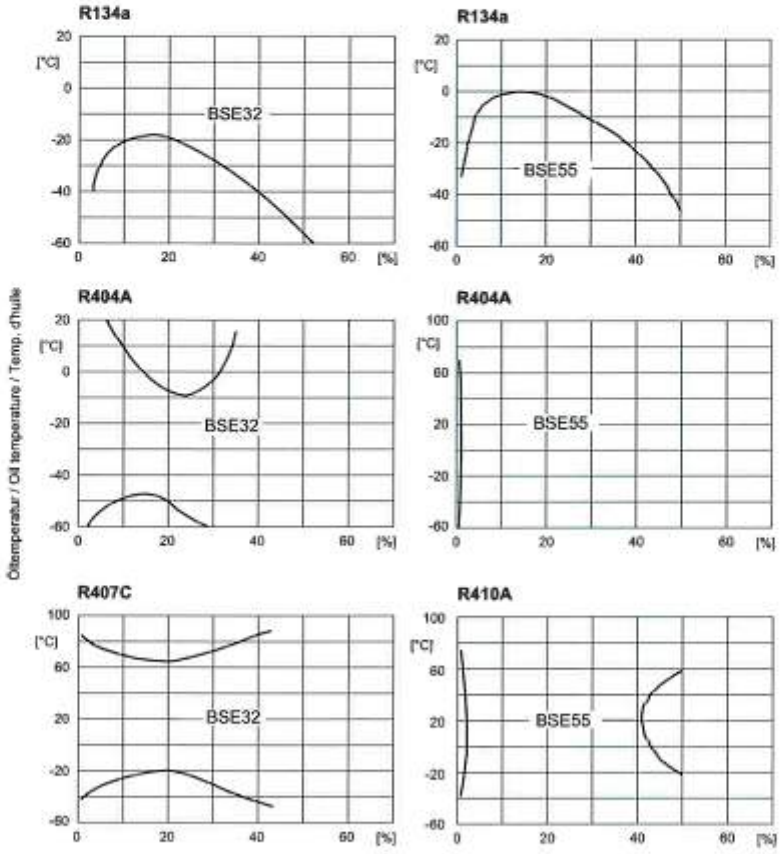

Abb. 1 Mischungsgrenzen
Gewichtsanteil Öl im Kältemittel

Fig. 1 Miscibility limits
Weight percentage oil in refrigerant

Fig.1 Limites de miscibilité
Pourcentage de masse d'huile dans fluide frigorigène

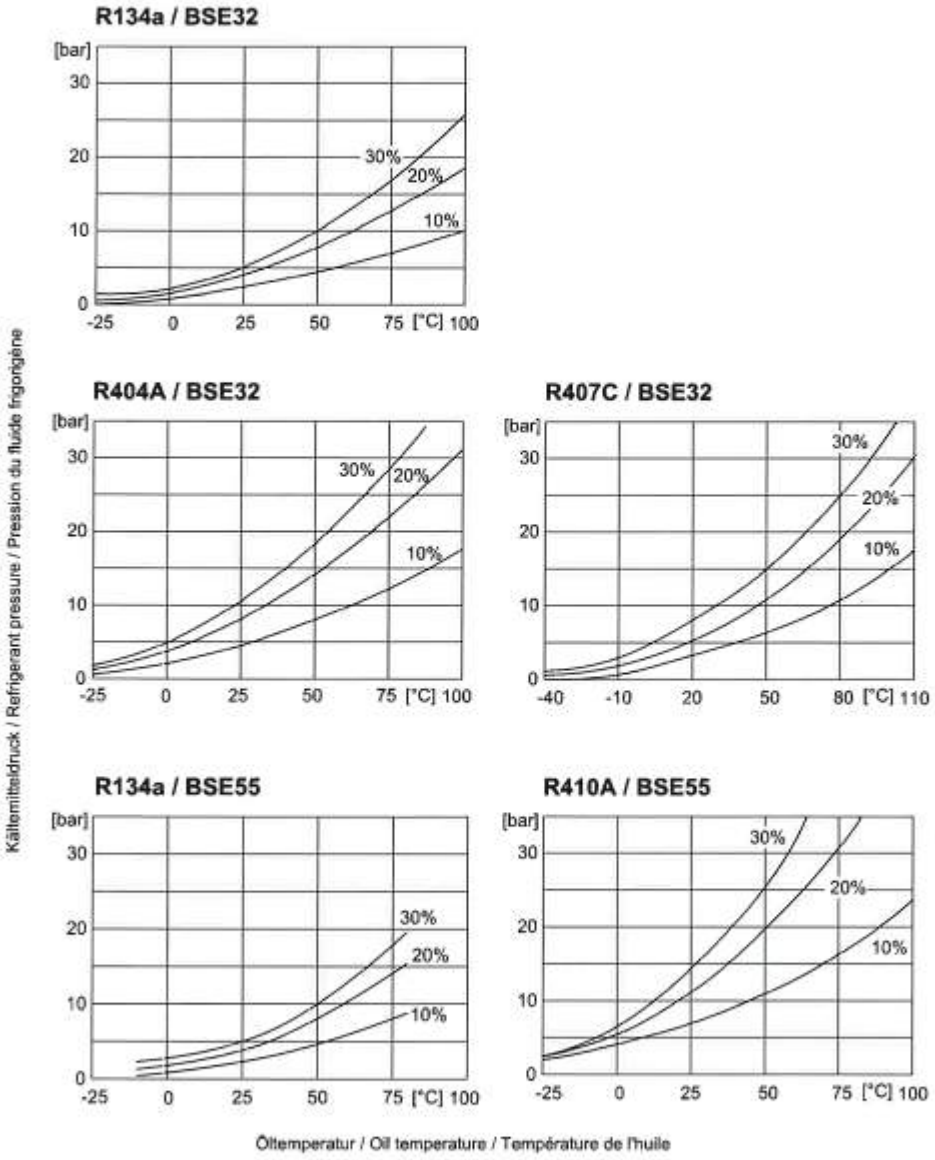

Abb. 2 Kältemittel-Konzentration (Massen %) im Öl in Abhängigkeit von Kältemitteldruck und Öltemperatur

Fig. 2 Refrigerant solution in oil depending on refrigerant pressure and oil (mass %) temperature

Fig. 2 Concentration de fluide frigorigène dans l'huile (masse %) en fonction de la pression du fluide frigorigène et de la température de l'huile

4 Alternativen zu BITZER Esterölen

4.1 BSE32

Lieferant	Ölsorte
Deutsche BP	Castrol Icematic SW 32
CPI	Solest 31-HE
ExxonMobil	EAL Arctic 22 CC EAL Arctic 32
Fuchs	SEZ 32
Shell	Clavus R32
Uniquema	RL 32 H

4.2 BSE55

Lieferant	Ölsorte
Deutsche BP	Castrol Icematic SW 68
CPI	Solest 68
ExxonMobil	EAL Arctic 68
Fuchs	SE 55
Shell	Clavus R68
Uniquema	RL 68 S

Die genannten Alternativ-Öle entsprechen in ihren Eigenschaften weitgehend der Originalfüllung BSE32 und BSE55. Eine Mischung mit dem Originalöl ist möglich – innerhalb der jeweiligen Viskositätsgruppe –, sofern entsprechende eigene oder vergleichende Erfahrungen für den betreffenden Anwendungsfall vorliegen. Grundlegende Voraussetzungen für den Einsatz von Alternativ-Ölen sind vom Hersteller bzw. Lieferanten garantierte Produktqualität und Feuchtigkeitswerte (< 50 ppm).

Achtung!
Wegen der spezifischen Formulierung des BSE55 mit Blick auf die tribologischen Eigenschaften, darf für die Erstbefüllung der Verdicher nur Originalöl verwendet werden. Oben gelistete Alternativen sind nur für den Servicefall zugelassen.

4 Alternatives to BITZER ester oils

4.1 BSE32

Supplier	Oil type
Deutsche BP	Castrol Icematic SW 32
CPI	Solest 31-HE
ExxonMobil	EAL Arctic 22 CC EAL Arctic 32
Fuchs	SEZ 32
Shell	Clavus R32
Uniquema	RL 32 H

4.2 BSE55

Supplier	Oil type
Deutsche BP	Castrol Icematic SW 68
CPI	Solest 68
ExxonMobil	EAL Arctic 68
Fuchs	SE 55
Shell	Clavus R68
Uniquema	RL 68 S

The characteristics of the alternative oils listed mainly correspond to the original BSE32 and BSE55 charge. It is also possible to mix these with the original oil, within the respective viscosity group, as long as appropriate own or comparable experience is available for the application concerned. The basic assumption for the use of these alternatives is that the manufacturer or supplier guarantees the product quality and the moisture content (< 50 ppm).

Attention!
Due to the specific formulation of BSE55 with respect to the tribological characteristics, only original oil shall be used for the first charge of the compressor. The alternatives listed above are allowed only in case of service.

4 Alternatives aux huiles ester de BITZER

4.1 BSE32

Fournisseur	Type d'huile
Deutsche BP	Castrol Icematic SW 32
CPI	Solest 31-HE
ExxonMobil	EAL Arctic 22 CC EAL Arctic 32
Fuchs	SEZ 32
Shell	Clavus R32
Uniquema	RL 32 H

4.2 BSE55

Fournisseur	Type d'huile
Deutsche BP	Castrol Icematic SW 68
CPI	Solest 68
ExxonMobil	EAL Arctic 68
Fuchs	SE 55
Shell	Clavus R68
Uniquema	RL 68 S

Les alternatives précitées présentent approximativement les mêmes propriétés que les charges d'huile d'origine, à savoir BSE32 et BSE55. A l'intérieur d'un même "groupe" de viscosité un mélange avec l'huile d'origine est possible, dans la mesure où l'on dispose de l'expérience suffisante (ou d'expériences comparables) pour le champ d'application concerné. Les conditions préliminaires à l'emploi d'huiles alternatives sont une qualité de produit et une teneur en eau (< 50 ppm) garanties par le producteur resp. le fournisseur.

Attention !
En raison de la formulation spécifique du BSE55 relative aux propriétés tribologiques, utiliser uniquement de l'huile d'origine pour le premier remplissage des compresseurs. D'autres alternatives listées ci-dessus ne sont autorisées que pour l'entretien.

5 Einsatz von Esterölen mit chlorierten (H)FCKW-Kältemitteln (R22 etc.)

Inzwischen besteht auch bei Anlagen mit (H)FCKW-Kältemitteln ein Trend zur Befüllung der Verdichter mit Esteröl, um eine spätere Umstellung auf chlorfreie Kältemittel zu vereinfachen. Esteröle sind grundsätzlich auch für derartige Anwendungen geeignet, jedoch besteht ein deutlich erhöhtes Risiko hinsichtlich Verdichterverschleiß und chemischer Stabilität des Kältekreislaufs. Dies gilt selbst im Hinblick darauf, dass in BITZER-Verdichtern nur besonders hochwertige Materialien zum Einsatz kommen – u. a. nitrierte Wellen, sonderbehandelte Lager, hartverchromte Verdichtungsringe, Edelstahl-Arbeitsventile.

Auch das Argument einer vereinfachten Umstellung auf chlorfreie Alternativstoffe gilt nur unter Einschränkung. Eine qualifizierte Umstellung erfordert auf Grund der unvermeidlichen Kontaminierung des Öls mit Chlor aus dem (H)FCKW-Kältemittel ohnehin einen mehrfachen Ölwechsel.

Der Einsatz von Esteröl in Verbindung mit (H)FCKW-Kältemitteln sollte immer sorgfältig abgewogen werden, wobei folgende Punkte berücksichtigt werden müssen:

- Beim Betrieb mit (H)FCKW ist die im Esteröl gelöste Kältemittelmenge mehr als doppelt so hoch als bei herkömmlichen Schmierstoffen oder bei Verwendung von Esteröl in Verbindung mit chlorfreien HFKW. Daraus resultiert vor allem bei hohen Saugdrücken und niedriger Öltemperatur eine starke Viskositätsminderung mit der Gefahr eines erhöhten Verschleißes. Besonders kritisch ist dabei der Startvorgang nach längeren Stillstandszeiten.
- Esteröle sind stark hygroskopisch. Sie erfordern deshalb bei (H)FCKW auf Grund des Chloranteils einen besonders hohen Trocknungsgrad (< 50 ppm), der in der Praxis nur mit erheblichem Aufwand erreicht werden kann. Überhöhte Feuchtigkeitswerte führen zu Hydrolyse und damit zu Säurebildung und Kupferplattierung sowie in der Folge zu Verdichterschaden.

5 Use of ester oils with chlorinated (H)CFC refrigerants (R22 etc.)

A trend also exists towards charging compressors with ester oil for plants with (H)CFC refrigerants, to simplify a subsequent conversion to chlorine free refrigerant. Ester oils are generally suitable for such applications, however, a significantly increased risk exists regarding compressor wear and the chemical stability of the system. This applies even though BITZER compressors are constructed with high quality materials such as surface hardened shafts, specially treated bearings, hard chrome plated compression rings and high alloy steel valve reeds.

The argument that the conversion to alternative refrigerants is simplified is only valid with certain restrictions. A qualified conversion requires repeated oil changes due to the unavoidable contamination of the oil with chlorine from the (H)CFC refrigerant.

The use of ester oil in combination with (H)CFC refrigerants should always be considered carefully especially regarding the following points:

- When operating with (H)CFC the quantity of refrigerant dissolved in the ester oil is more than double as with conventional lubricants or when operating with a combination of ester oil and chlorine free HFC. This results in a strong viscosity reduction and the danger of increased wear, especially in cases of high suction pressure and low oil temperature. The starting procedure after a long period of standstill is particularly critical.
- Ester oils are strongly hygroscopic and therefore require a very high degree of dehydration (< 50 ppm) when used with (H)CFC due to the chlorine content; this can only be achieved in practice with a considerable effort. Excessive moisture content leads to hydrolysis and thereby to acid formation with copper plating resulting in damage to the compressor.

5 Emploi d'huiles ester avec des fluides frigorigènes chlorés (H)CFC (R22 etc.)

Entre-temps, il existe une tendance au remplissage des compresseurs avec de l'huile ester même quand ceux-ci sont prévus pour travailler avec des fluides (H)CFC, ceci en vue de la simplification d'une conversion future avec un fluide exempt de chlore. En principe, les huiles ester sont adaptées à ce type d'emploi mais il subsiste un risque accru d'usure du compresseur et de stabilité chimique du circuit frigorifique. Ceci reste valable tout en sachant que seuls des matériaux de très hautes qualités sont employés dans les compresseurs BITZER – entre autre, vilebrequin nitruré, roulements spécialement traités, segments chromés dur, clapets de travail en acier inoxydable.

De même, l'argumentation d'une conversion simplifiée avec des produits de substitution exempts de chlore n'est valable que sous certaines restrictions. Une conversion de qualité nécessite, en raison de la contamination inévitable de l'huile avec du chlore (du fluide frigorigène (H)CFC), plusieurs vidanges d'huile.

L'emploi d'une huile ester avec des fluides frigorigènes (H)CFC devrait toujours être soigneusement réfléchi, en tenant compte des points suivants:

- En fonctionnement avec un fluide (H)CFC, la quantité de fluide frigorigène en solution dans l'huile ester est le double de celle avec un lubrifiant conventionnel, ou lors de l'emploi d'une huile ester avec un fluide HFC exempt de chlore. Il en résulte une forte diminution de la viscosité avec un risque d'usure plus important, principalement pour des pressions d'aspiration élevées et une faible température de l'huile. La phase de démarrage après de longues arrêts est particulièrement critique.
- Les huiles ester sont fortement hygroscopiques et nécessitent par conséquent pour les (H)CFC, en raison de la présence de chlore, un degré de dessiccation particulièrement poussé (< 50 ppm) qui, en pratique, n'est obtenu qu'avec une importante mise en oeuvre. Une teneur en eau trop élevée engendre une hydrolyse et par conséquent une formation d'acide et de dépôts de cuivre qui peuvent aboutir à des dégâts sur le compresseur.

- Esteröle haben ein besonders gutes Löslichkeitsverhalten gegenüber Schmutzablagerungen in der Anlage. Sie erhöhen damit die Gefahr einer Schädigung des Verdichters durch abgelösten Schmutz.

- Ester oils have an especially good solubility behaviour with regard to system dirt deposits and therefore increase the danger of damage to the compressor due to loosened dirt.

- Les huiles ester présentent la particularité de dissoudre fortement les dépôts d'impureté résiduels du système frigorifique ce qui augmente le risque de détérioration du compresseur par les impuretés qui ont été détachées.

Resultierende Anforderungen

- Betrieb bei Klimabedingungen (H-Bereich) und Einspritzkühlung (CIC) mit einstufigen Verdichtern:
  - Esteröl mit höherer Basisviskosität einsetzen (BSE55 an Stelle von BSE32).
- Bei der Montage:
  - grundsätzlich nur Rohrleitungen und Anlagen-Komponenten verwenden, die innen sauber und trocken sind (frei von Zunder, Metallspänen, Rost- und Phosphat-Schichten) und die luftdicht verschlossen angeliefert werden
  - reichlich dimensionierten Trockner einbauen
  - saugseitigen Reinigungsfilter einbauen
  - Öl sorgfältig handhaben: Öl vor Feuchtigkeit schützen. Nur originalverschraubte Öldosen verwenden!
- Bei der Inbetriebnahme:
  - hochgradig evakuieren
- Betrieb:
  - nur innerhalb abgesicherter Temperaturgrenzen
  - Ölsumpfheizung hoher Leistung verwenden
  - Trockner nach ca. 100 Betriebsstunden erneuern
- Mit der Anlagensteuerung sicherstellen:
  - ausreichende Sauggasüberhitzung
  - Kurzzeitbetrieb vermeiden
  - gegen Flüssigkeitsschläge absichern
  - ggf. Abpumpschaltung vorsehen

Resulting requirements

- Operation at air conditioning range (H range) and injection cooling (CIC) with single stage compressors:
  - Use ester oil with a higher basic viscosity (BSE55 instead of BSE32).
- While mounting:
  - Only use tubes and components which are clean and dry inside (free from slag, swarf, rust, and phosphate coatings) and which are delivered with an air tight seal
  - install generously sized drier
  - install suction side cleaning filter
  - handle the oil carefully: Keep oil dry. Use oil from originally sealed containers only!
- While commissioning:
  - evacuate to a high-grade vacuum
- Operation:
  - within controlled temperature limits only
  - use a high capacity crankcase heater
  - change the drier after approximately 100 operating hours
- Ensure with plant control:
  - sufficient suction gas superheat
  - avoid short operating periods
  - protect against liquid slugging
  - in certain cases provide a pump down system

Exigences résultantes

- Fonctionnement dans le domaine de climatisation (champ d'application H) et en cas de refroidissement par injection de liquide (CIC) avec un compresseur mono-étagé:
  - Employer une huile ester avec une viscosité de base plus élevée (BSE55 au lieu de BSE32).
- Pendant le montage:
  - ne utiliser que des tubes et des composants, qui sont propres et secs à l'intérieur (pas de calamine, de copeaux métalliques, de dépôts de rouille et de phosphates) et qui sont livrés hermétiquement clos
  - installer un déshydrateur largement dimensionné
  - installer un filtre de nettoyage à l'aspiration
  - Manipuler l'huile avec précaution: Protéger l'huile contre l'humidité. N'utiliser que des bidons d'huile fermés d'origine!
- Pendant la mise en service:
  - réaliser un vide poussé
- Fonctionnement:
  - seulement dans les limites de températures autorisées
  - utiliser une résistance de carter de puissance élevée
  - remplacer le déshydrateur après environ 100 heures de fonctionnement
- Assurer avec la commande d'installation:
  - surchauffe à l'aspiration suffisante
  - éviter les courts cycles
  - prévenir des coups de liquide
  - prévoir éventuellement une commande par pump down

Hinweise

- Wegen der besonderen Risiken mit Esterölen in (H)FCKW-Kältekreisläufen bleibt im Falle eines Verdichterschadens die Beurteilung eines Garantieanspruches der individuellen Überprüfung des Verdichters im Werk vorbehalten.
- Alle Verdichter der ".2-Generation" können bereits mit den chlorfreien Stoffen R134a, R404A, R407A, R407B, R407C und R507A eingesetzt werden. Dabei kommen die positiven Eigenschaften von Esteröl voll zum Tragen. Eine solche Lösung sollte deshalb gegenüber (H)FCKW-Systemen mit Esteröl bevorzugt werden.

Recommendations

- Due to the special risks with ester oils and (H)CFC refrigerant circuits, in the case of compressor damage we reserve the right to assess a guarantee claim according to an individual examination of the compressor in our factory.
- All compressors of the ".2-Generation" can already be used with R134a, R404A, R407A, R407B, R407C and R507A. Hereby the positive characteristics of ester oils are fully exploited. Such a solution should therefore be preferred over an (H)CFC system with ester oil.

Indications

- En raison des risques particuliers avec les huiles ester dans des circuits frigorifiques avec des fluides (H)CFC, le gain de la garantie, en cas de détérioration du compresseur, est assujetti au contrôle spécifique du compresseur en usine.
- Tous les compresseurs de la "génération .2" peuvent être utilisés avec les fluides frigorigènes exempts de chlore R134a, R404A, R407A, R407B, R407C et R507A. Dans ce cas, les propriétés positives des huiles ester sont pleinement exploitées. Par conséquent, une solution de ce genre devrait être préférée à celle de systèmes avec un fluide (H)CFC et une huile ester.

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6-9-5. Shell Omala Oils

Shell Omala Oils

High quality industrial gear and bearing oils

Shell Omala Oils are high quality, lead-free, extreme-pressure oils designed, primarily, for the lubrication of heavy duty industrial gears. Their high load carrying capacity and anti-friction characteristics combine to offer superior performance in gears and other industrial applications.

Applications

Shell Omala Oils are formulated using high viscosity index, solvent refined, base oils and incorporate a special sulphur-phosphorus additive to provide an extreme pressure performance which allow trouble free application in following areas:

- ***Steel gear transmissions***
- ***Industrial gear drives where a full EP performance is required***
- ***Bearings***
- ***Circulating and splash lubricated systems***

For automotive hypoid gears, the appropriate Shell Spirax Oil should be used, as the Omala are not designed for this purpose.

Performance Features and Benefits

- ***Outstanding oxidation and thermal stability***
  Withstands high thermal loading and resists the formation of sludge. Provides extended oil life, even with bulk oil temperatures of up to 100°C in certain applications.
- ***Effective corrosion inhibition***
  Protects both steel and bronze components, even in the presence of contamination by water and solids.
- ***Lead-free***
  Operator acceptability. Reduced health and product removal risks.
- ***Wide range of viscosities***
  Caters for the most varied and arduous industrial applications.
- ***Water shedding properties***
  Omala also have excellent water separation properties, such that excess water can be drained easily from lubrication systems.
  Water can greatly accelerate surface fatigue with gears and bearings as well as promoting ferrous corrosion on internal surfaces. Water contamination should therefore be avoided or removed as quickly as possible after the occurrence.
- ***Excellent Load Carrying Capacity***
  Reduces gear tooth and bearing wear on both steel and bronze components. The load carrying capacity of Omala, as determined in laboratory tests, is significantly better than that of leaded gear oils. Gear tooth wear is reduced, particularly under conditions of high load.

Typical test results for Omala 220 are :

Extreme Pressure Properties Timken wear and lubricant testing machine Min OK Load ASTM D 2782	60 lbs
Four Ball Extreme Pressure Test Initial seizure load ASTM D 2783	250 kg
FZG Load Carrying Test Failure load stage FZG A/8.3/90 FZG A/16.6/90	 >12 >12

Specification and Approvals

Meets the ISO 12925-1 Type CKC specification.

Meets the David Brown S1.53.101 specification.

Advice

Advice on applications not covered in this leaflet may be obtained from your Shell representative.

Health and Safety

Guidance on Health and Safety are available on the appropriate Material Safety Data Sheet which can be obtained from your Shell representative.

Protect the environment

Take used oil to an authorized collection point. Do not discharge into drains, soil or water.

Typical Physical Characteristics

Omala			68	100	150
ISO Viscosity Grade		ISO 3448	68	100	150
Kinematic Viscosity		ISO 3104			
at 40°C	mm^2/s		68	100	150
at 100°C	mm^2/s		8.7	11.4	15.0
Viscosity Index		ISO 2909	99	100	100
Flash Point COC	°C	ISO 2592	190	195	195
Pour Point	°C	ISO 3016	-27	-24	-24
Density at 15°C	kg/m^3	ISO 12185	887	891	897

Omala			220	320	460
ISO Viscosity Grade		ISO 3448	220	320	460
Kinematic Viscosity		ISO 3104			
at 40°C	mm^2/s		220	320	460
at 100°C	mm^2/s		19.4	25.0	30.8
Viscosity Index		ISO 2909	100	100	97
Flash Point COC	°C	ISO 2592	200	205	205
Pour Point	°C	ISO 3016	-18	-15	-12
Density at 15°C	kg/m^3	ISO 12185	899	903	904

Omala			680	800	1000
ISO Viscosity Grade		ISO 3448	680		1000
Kinematic Viscosity		ISO 3104			
at 40°C	mm^2/s		680	800	1000
at 100°C	mm^2/s		38.0	39.0	45.5
Viscosity Index		ISO 2909	92	92	85
Flash Point COC	°C	ISO 2592	205	215	225
Pour Point	°C	ISO 3016	-9	-6	-6
Density at 15°C	kg/m^3	ISO 12185	912	930	951

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

SCDP OCCP/Nr Omala - page 2:2 11/09/2003

6-9-6. Shell Lurop V

Shell Lurop V

Lubrifiant biodégradable pour câbles

Description

Shell Lurop V est un fluide de maintenance pour câbles biodégradable et exempt d'huile minérale. Il assure une excellente protection contre la corrosion et se comporte très favorablement envers les bandages en caoutchouc et plastique des rouleaux et des roues d'entraînement des câbles.
Shell Lurop V est un lubrifiant universel pour toutes les sortes de câbles. Le produit est pré-dilué avec un solvant pour faciliter son application et l'infiltration. Un film lubrifiant fin et huileux, non collant, très adhérent subsiste après l'évaporation du solvant.

Caractéristiques

- excellente propriété adhésion
- bonne biodégradabilité
- bonne protection anticorrosive

Domaine d'utilisation

- L'application se fait à l'aide d'un appareil de graissage
- La quantité de recouvrement devrait se situer entre 15 et 20 g/m^2, avant évaporation du solvant
- Un temps de séchage de quelques heures après l'application devrait être prévu pour favoriser l'adhérence du film d'huile et l'évaporation du solvant
- La lubrification des câbles devrait avoir lieu par temps sec pour obtenir une protection contre la corrosion optimale
- Un nettoyage en profondeur est une condition préliminaire indispensable pour assurer une lubrification et une protection efficace des câbles
- Shell Lurop V est pré-dilué à l'aide d'un solvant, une dilution complémentaire peut être effectuée le cas échéant au moyen du solvant Shell Solvent SM. Aucun autre solvant n'est autorisé.

Compatibilité avec joints et vernis

Compatible avec les vernis, élastomères et joints utilisés couramment pour l'huile minérale

Valeurs typiques

Shell Lurop V

Caractéristique		Méthode	
Couleur			bleue
Densité à 15°C	kg/m^3	ISO 12185	953
Viscosité cinématique à 20°C	mm^2/s	ISO 3104	100
Teneur en solvent	%		30
Point d'éclair	°C	EN 57	64
Biodégradabilité	%	OECD 301 B	>75
Code de danger (SPI)			F 3 I Fu PN3

Valeurs moyennes soumises aux tolérances usuelles. Modifications réservées.

6-9-7. Shell Alvania Greases EP

Shell Alvania Greases EP(LF)

General purpose extreme-pressure industrial grease

THICKENER	NLGI	TEMP RANGE	BASE OIL VISCOSITY		EP	WATER RESISTANCE
			40°C	100°C		
LITHIUM	00, 0, 1, 2 & 3	-20°C to +120°C	189 cSt	15.6 cSt	✓✓	☆☆

Shell Alvania Greases EP(LF) offer the excellent performance expected of the world's leading brand of grease.

They are premier quality, multipurpose, extreme-pressure industrial greases based on a blend of high viscosity index mineral oils and a lithium hydroxystreate soap thickener and contain lead free extreme-pressure and other proven additives.

Shell Alvania Greases EP(LF) are designed for the grease lubrication of rolling element and plain bearings such as those found in the steel, paper, mining, quarrying and construction industries.

Applications

Shell Alvania Greases EP(LF) 0 & 00 are specifically designed for:

- Steel mill lubrication where a softer grease is necessary for specialised dispersing systems.
- Heavy duty plain and rolling element bearings operating under severe conditions including shock loading in wet environments
- Gearbox applications where semi-fluid greases are required

Shell Alvania Grease EP(LF) 1 is designed for:

- Heavy duty bearings served by centralised dispensing equipment
- Extreme-pressure gear grease for applications at normal ambient temperature
- Heavy duty plain and rolling element bearings operating under severe conditions including shock loading in wet environments
- Low temperature greasing applications

Shell Alvania Grease EP(LF) 2 & 3

are designed for:

- Heavy duty bearings and general industrial lubrication
- Heavy duty plain and rolling element bearings operating under severe conditions including shock loading in wet environments
- Operation over the temperature range -20°C to 100°C for bearings operating at 75% of the maximum rated speed (Can withstand up to 120°C intermittently)

Performance Features

- ***Outstanding load carrying capacity***
  Shell Alvania Greases EP(LF) contain special extreme-pressure additives which enable them to withstand heavy and shock loads without failure of the lubricant film.
- ***Superior mechanical stability***
  Compared to leaded Alvania, the resistance to extended mechanical working is significantly improved. This is particularly important in vibrating environments where poor mechanical stability can lead to grease softening with subsequent loss of lubrication performance and leakage.

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- ***Excellent resistance to water wash-out***
  Shell Alvania Greases EP(LF) have been formulated to offer much improved levels of resistance to water wash-out compared to the old leaded product.
- ***Oxidation stability***
  Specially selected base oil components have excellent oxidation resistance. Their consistency will not alter in storage and they withstand high operating temperatures without hardening or forming bearing deposits
- ***Excellent corrosion protection***
  Shell Alvania Greases EP(LF) have a strong affinity with metal and have the ability to protect bearing surfaces against corrosion, even when the grease is contaminated with water.

Performance Specifications

Meet the British Timken specification for Steel Mill applications

Re-greasing Intervals

For bearings operating near their maximum recommended temperatures, re-greasing intervals should be reviewed

Health & Safety

Shell Alvania Greases EP(LF) are unlikely to present any significant health or safety hazard when properly used in the recommended application, and good standards of industrial and personal hygiene are maintained

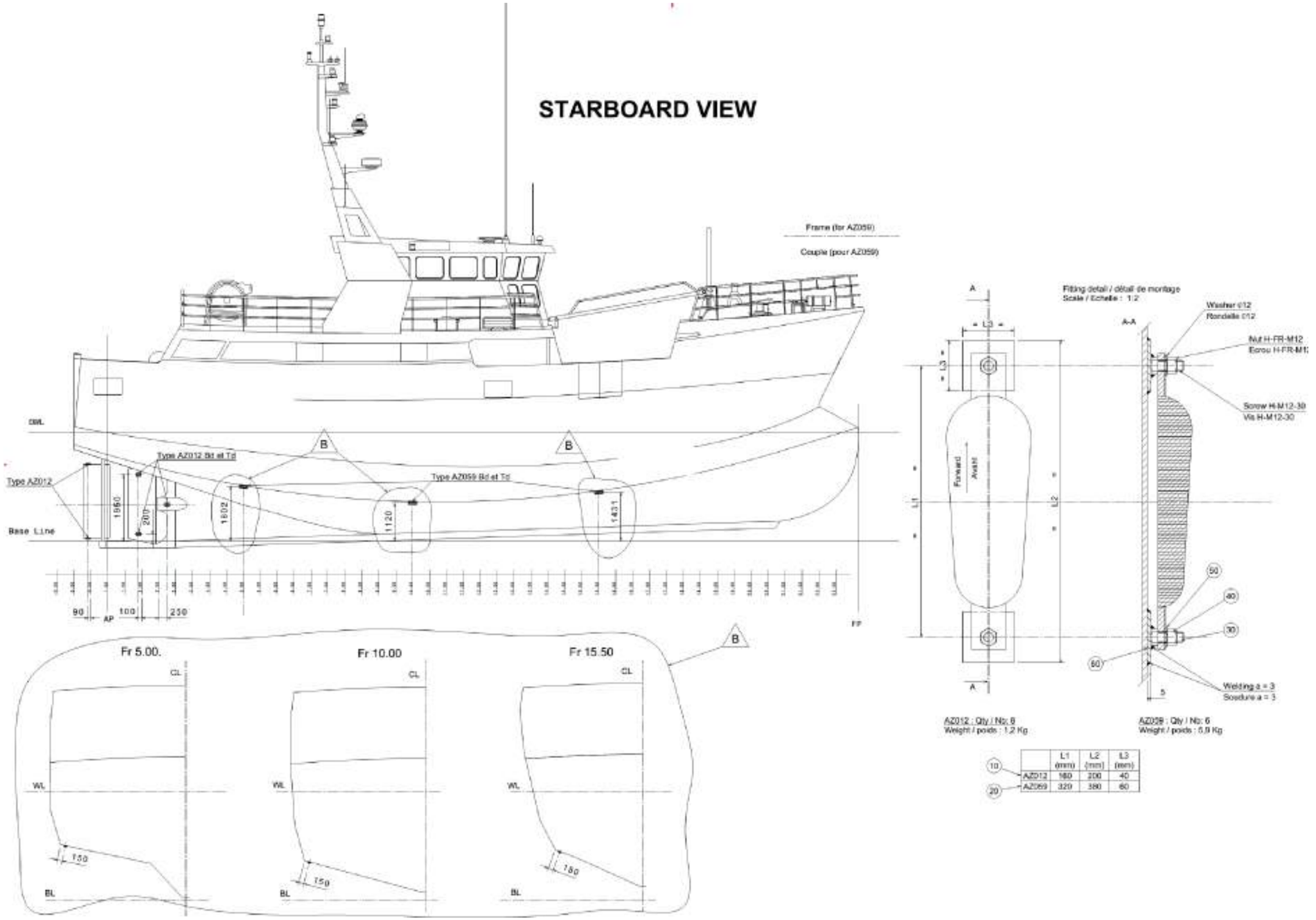
For further guidance on Product Health & Safety refer to the appropriate Shell Product Safety Data Sheet.

Typical Physical Characteristics

Shell Alvania Grease EP(LF)	00	0	1	2	3
Soap Type	Lithium	Lithium	Lithium	Lithium	Lithium
Base Oil	Mineral	Mineral	Mineral	Mineral	Mineral
Kinematic Viscosity @ 40°C cS 100°C cS (IP 71/ASTM D445)	189 15.6	189 15.6	189 15.6	189 15.6	189 15.6
Dropping Point °C (IP 132)	-	-	180	180	180
Cone Penetration Worked @ 25°C 0.1mm (IP 50/ASTM D217)	400-480	355-385	310-340	265-295	220-250

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

CHAPTER 7 – FIGURES



	L1 (mm)	L2 (mm)	L3 (mm)
AZ012	160	200	40
AZ059	320	380	60

Fig7-1 Hull Corrosion Protection System

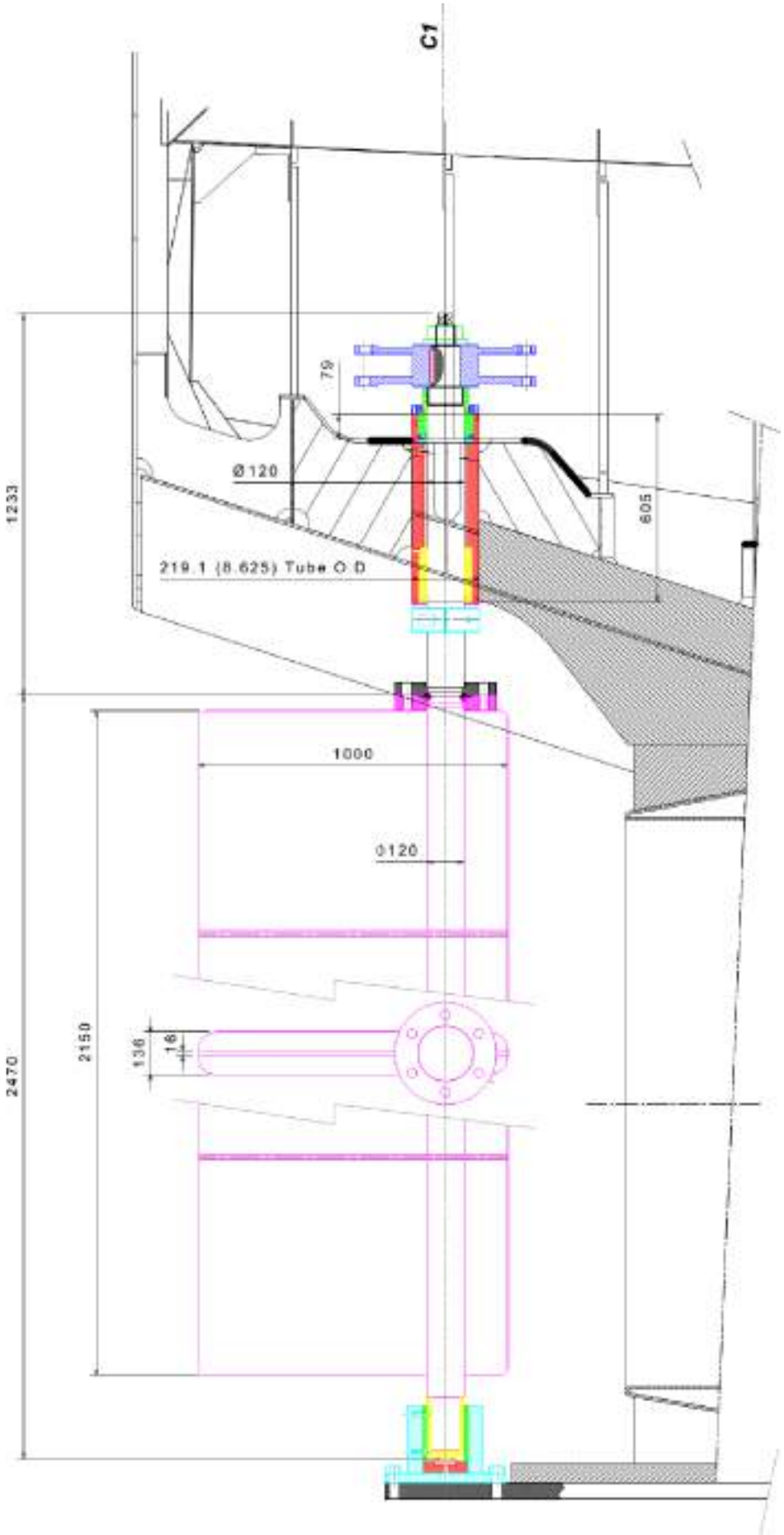


Fig7-2 Rudder Stock

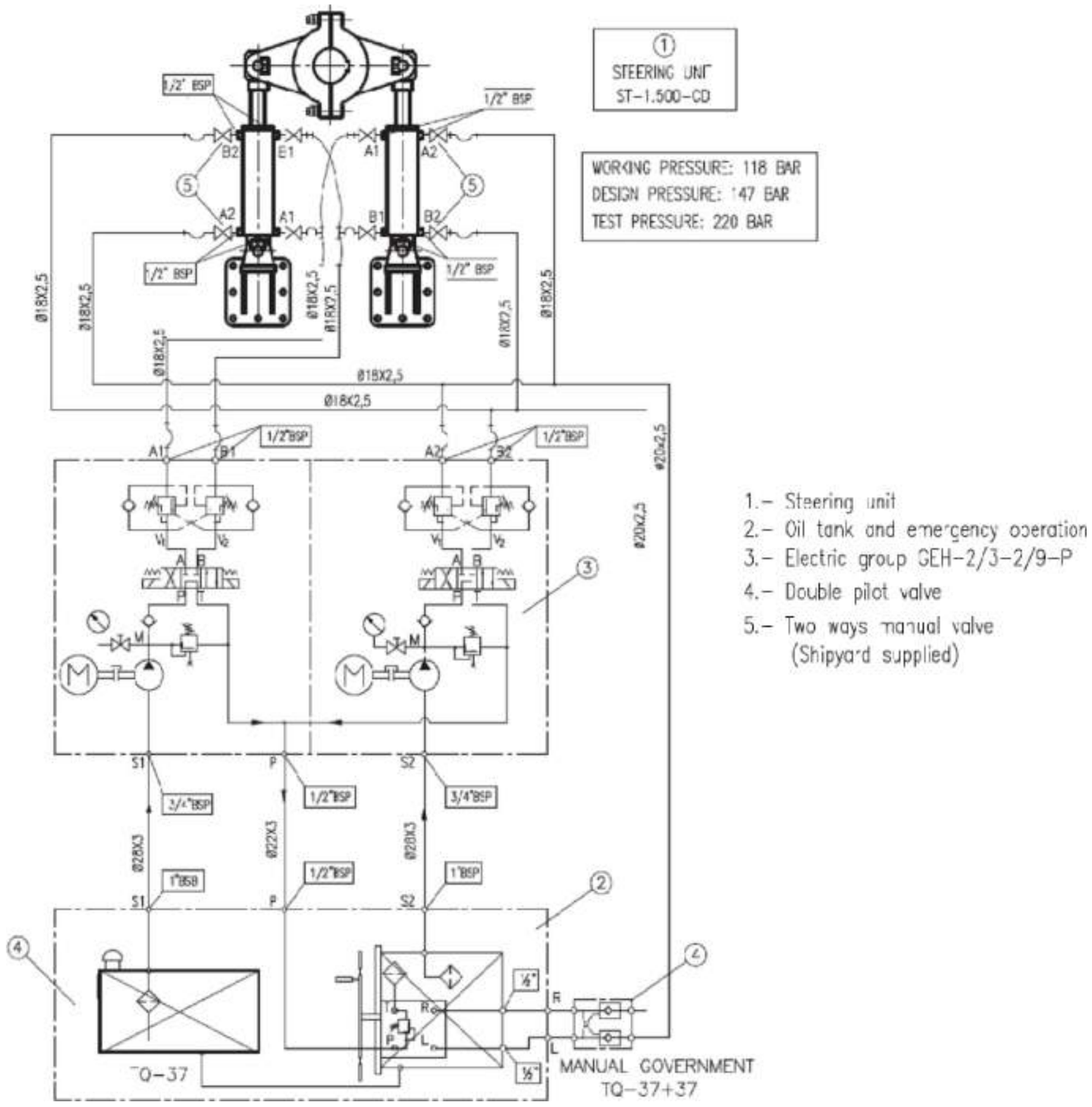


Fig7-3 Steering Gear system

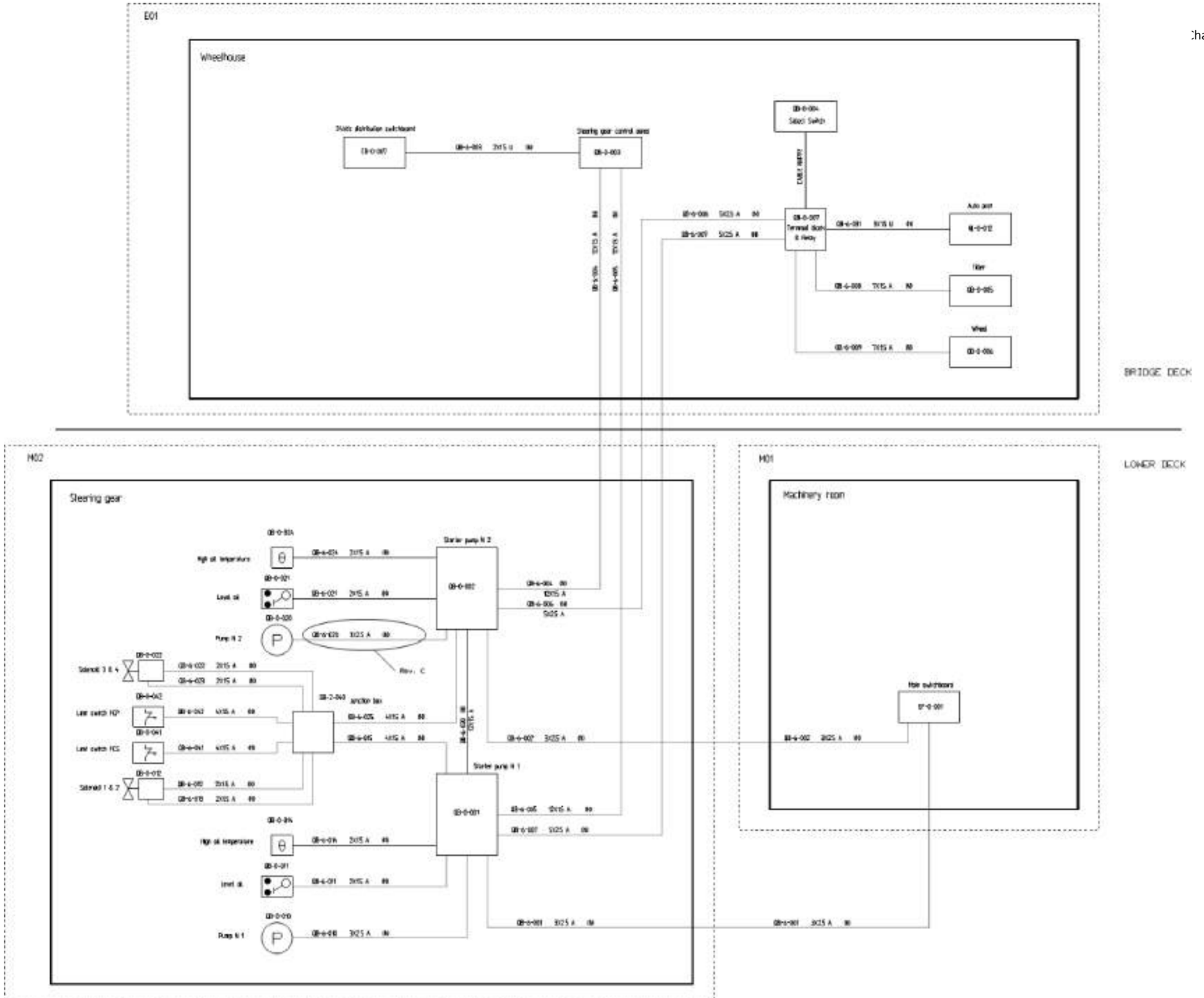


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Fig7-4 Steering Gear Network

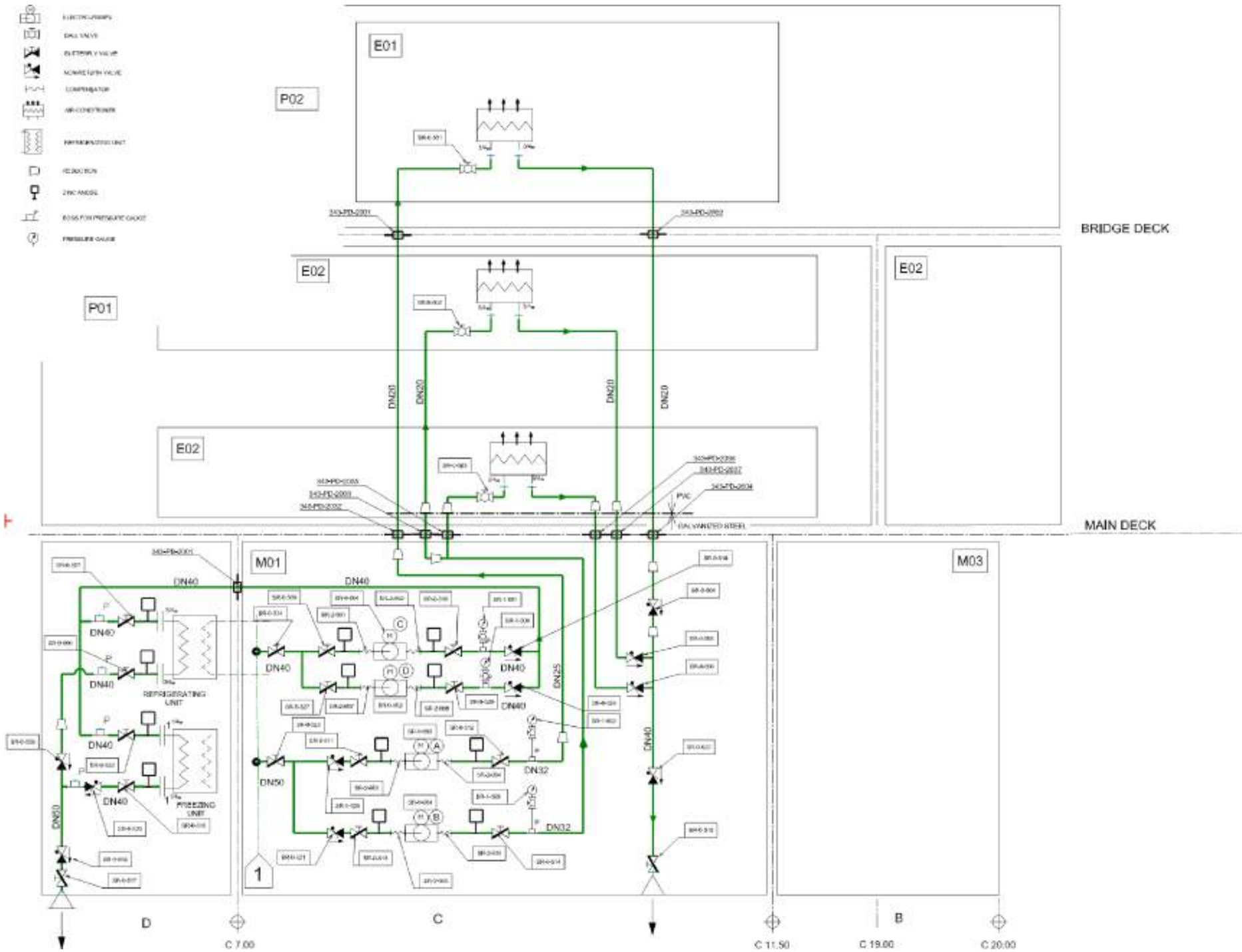

Fig7-5 AC Sea Water Cooling System

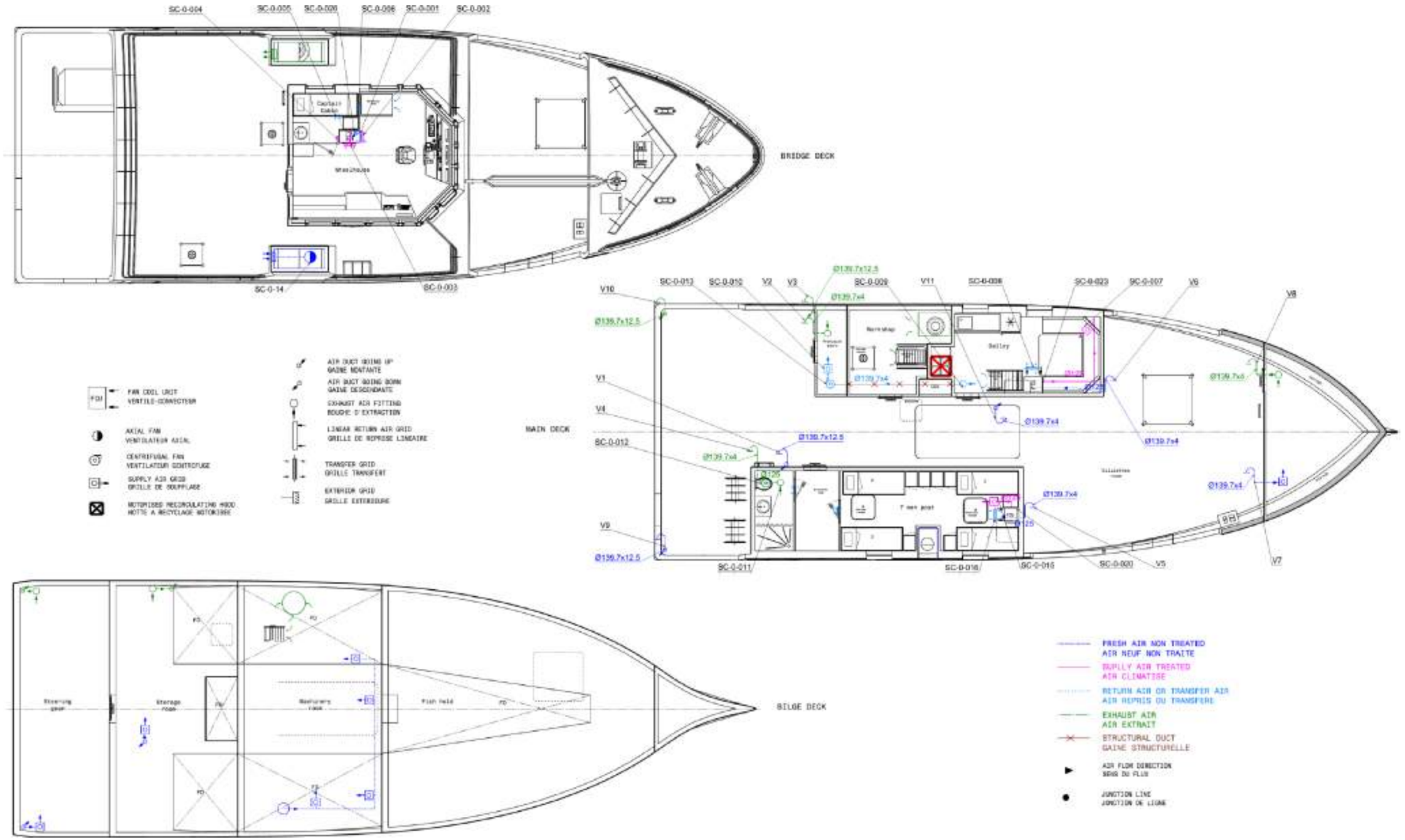

Fig7-6 HVAC System

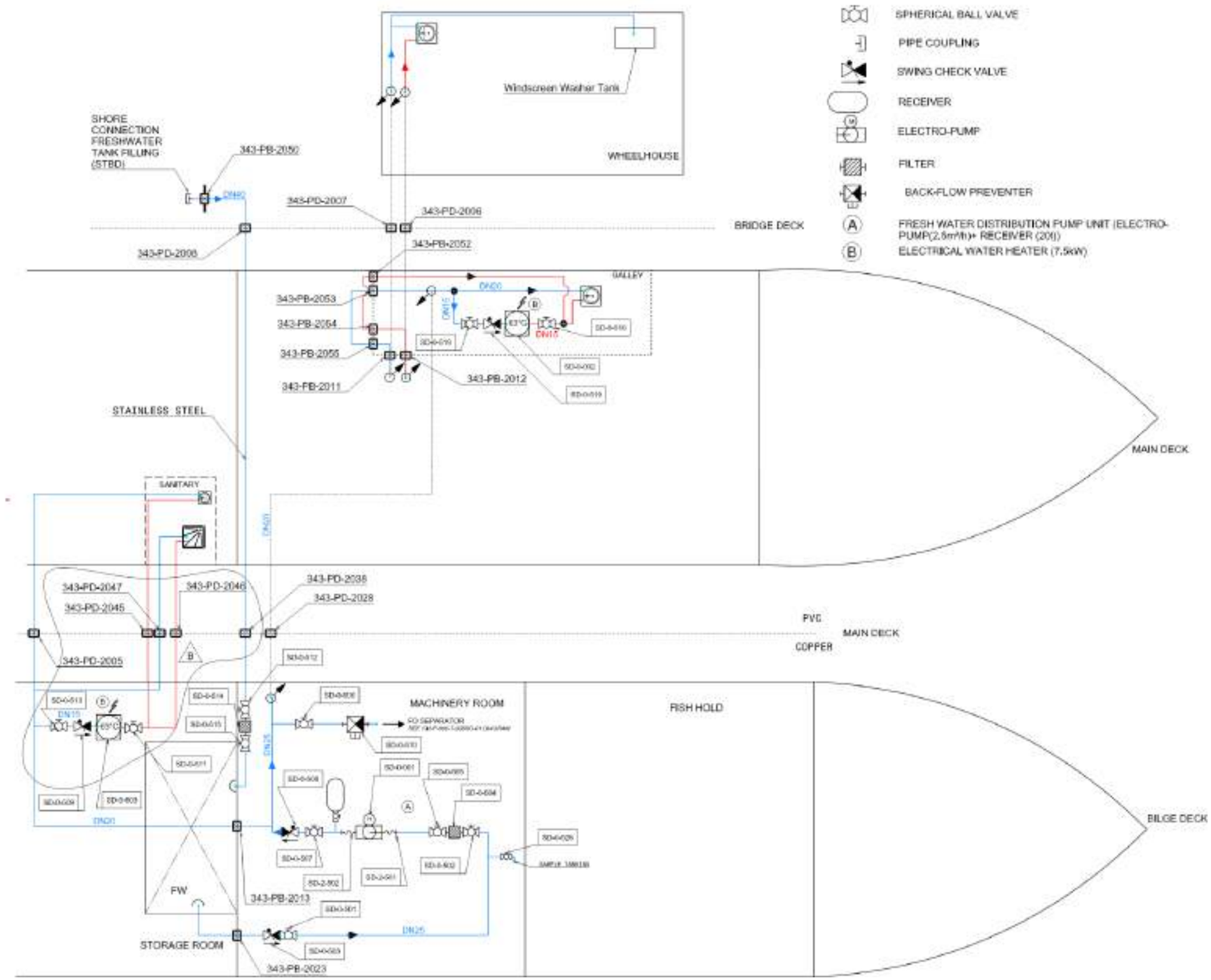

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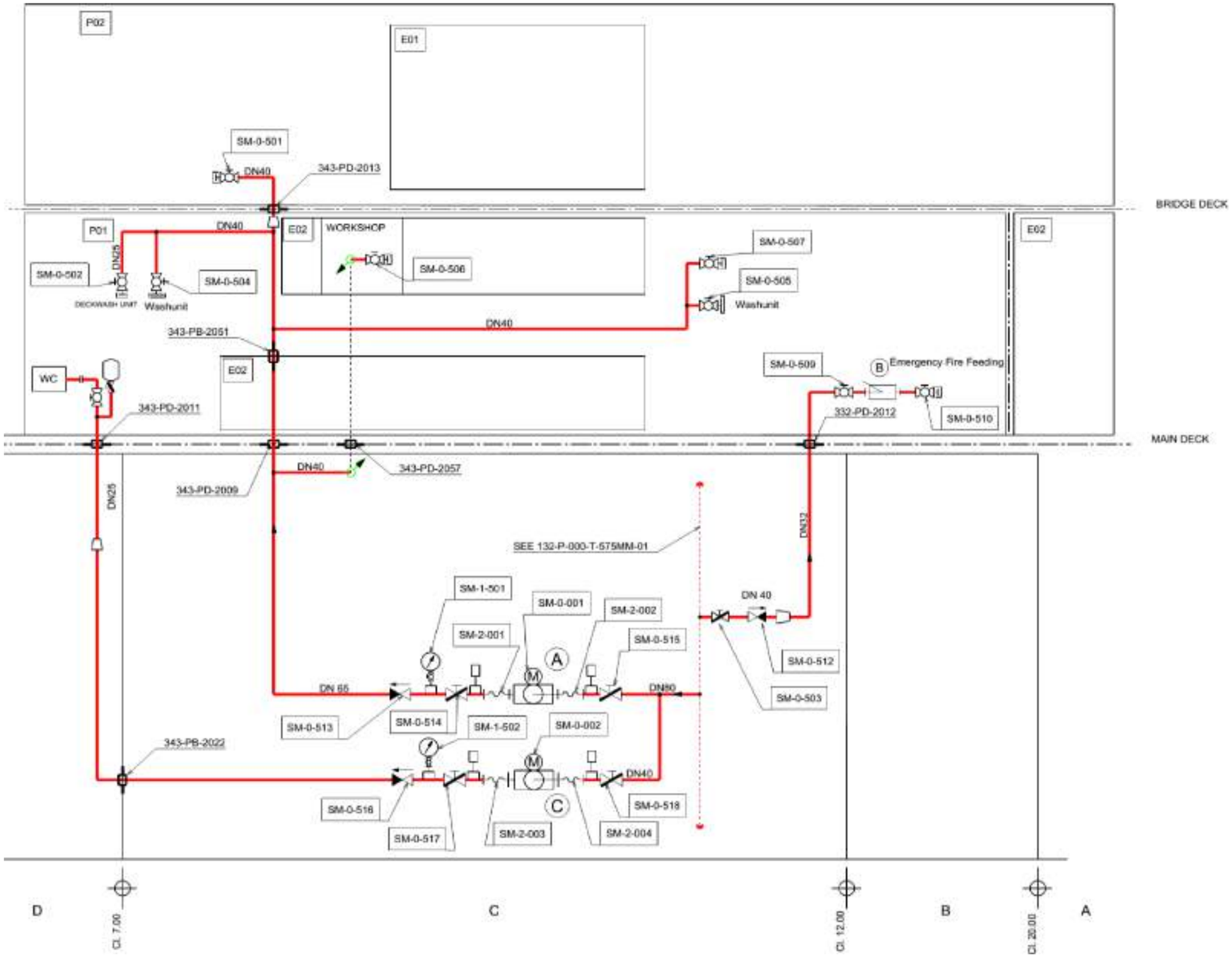
Fig7-7 Fresh Water System



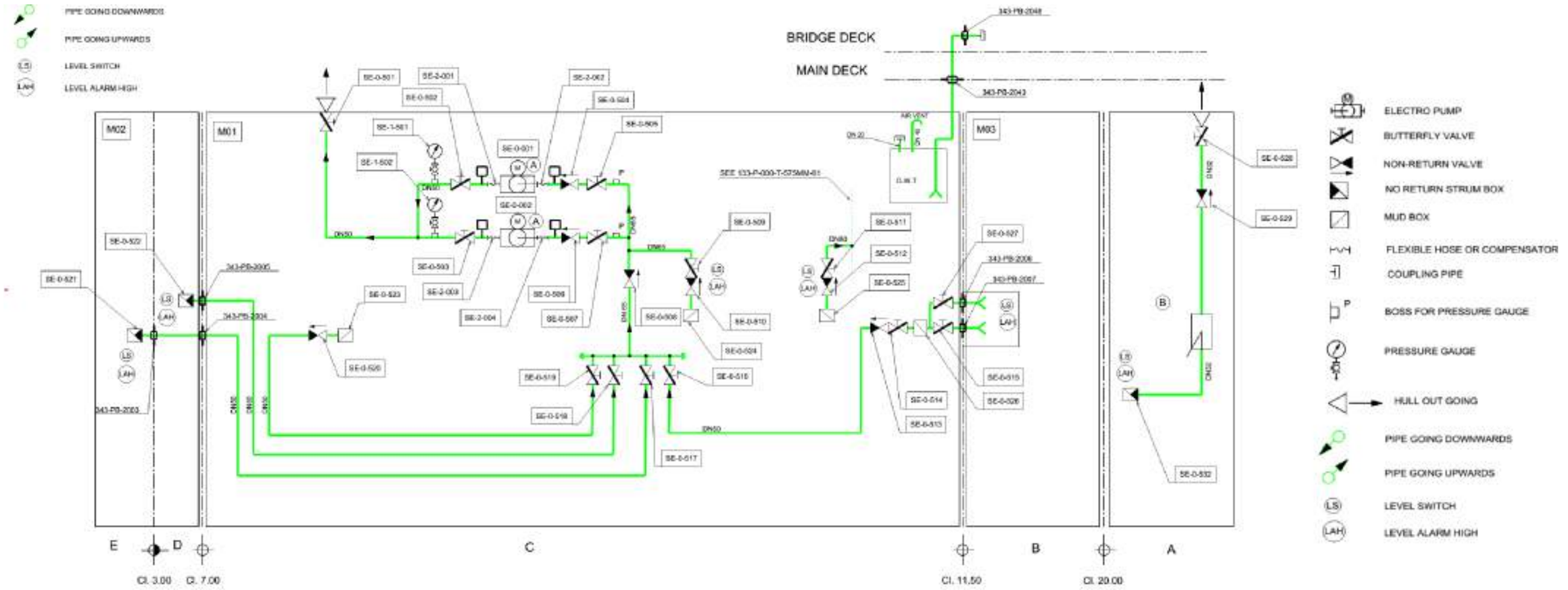
EQUIPEMENTS

(A) FIRE PUMP 25m3/h-30m

(B) HAND PUMP (JAPY) 2.7m3/h

(C) PUMP UNIT (ELECTRO-PUMP (2m3/h-25m)

Fig7-8 Firemain System



EQUIPMENTS

(A) BILGE PUMPS 15m³/h-20m

(B) HAND PUMP (JAPY) 2m³/h

Fig7-9 Bilge System

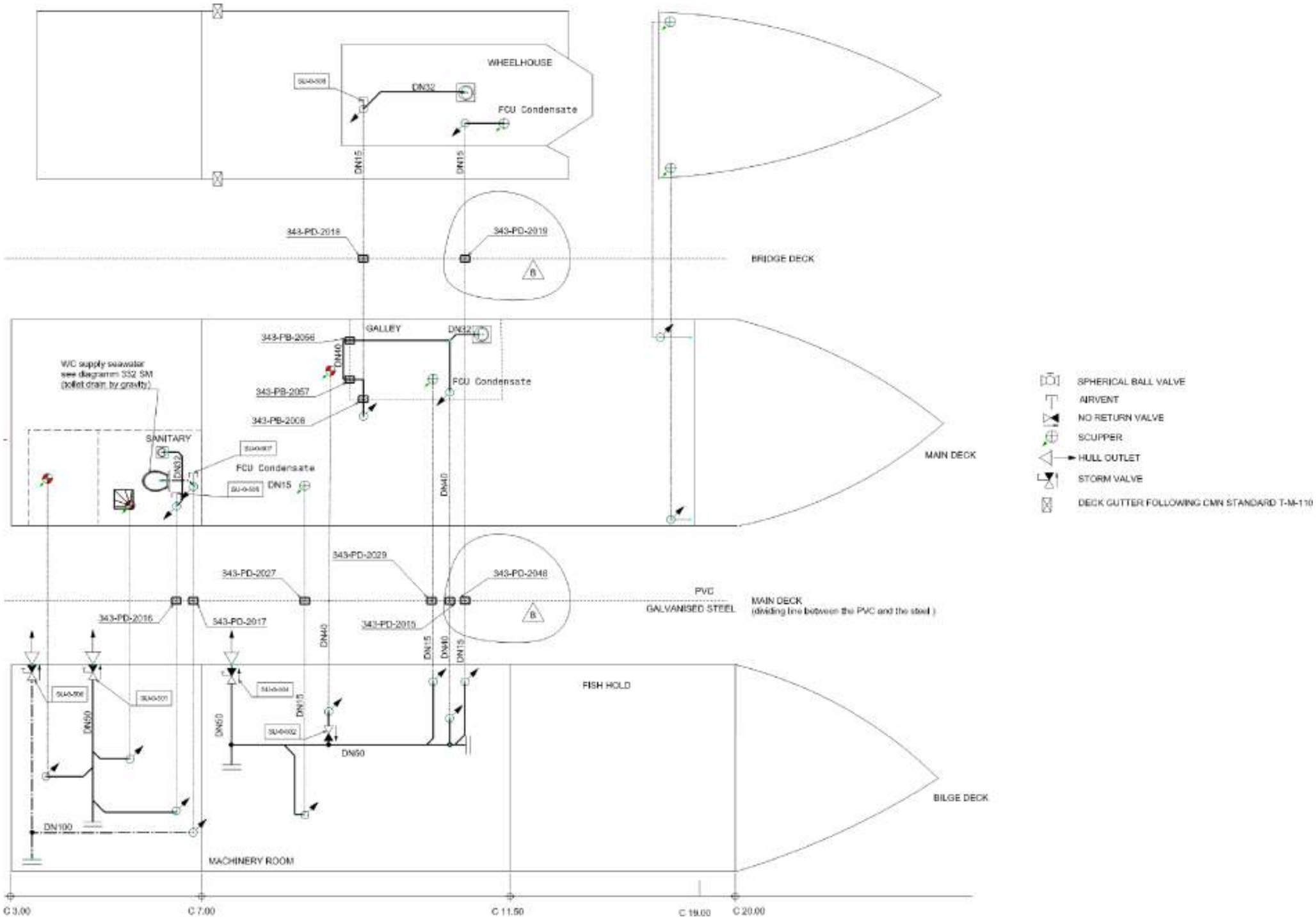


Fig7-10 Sewage System

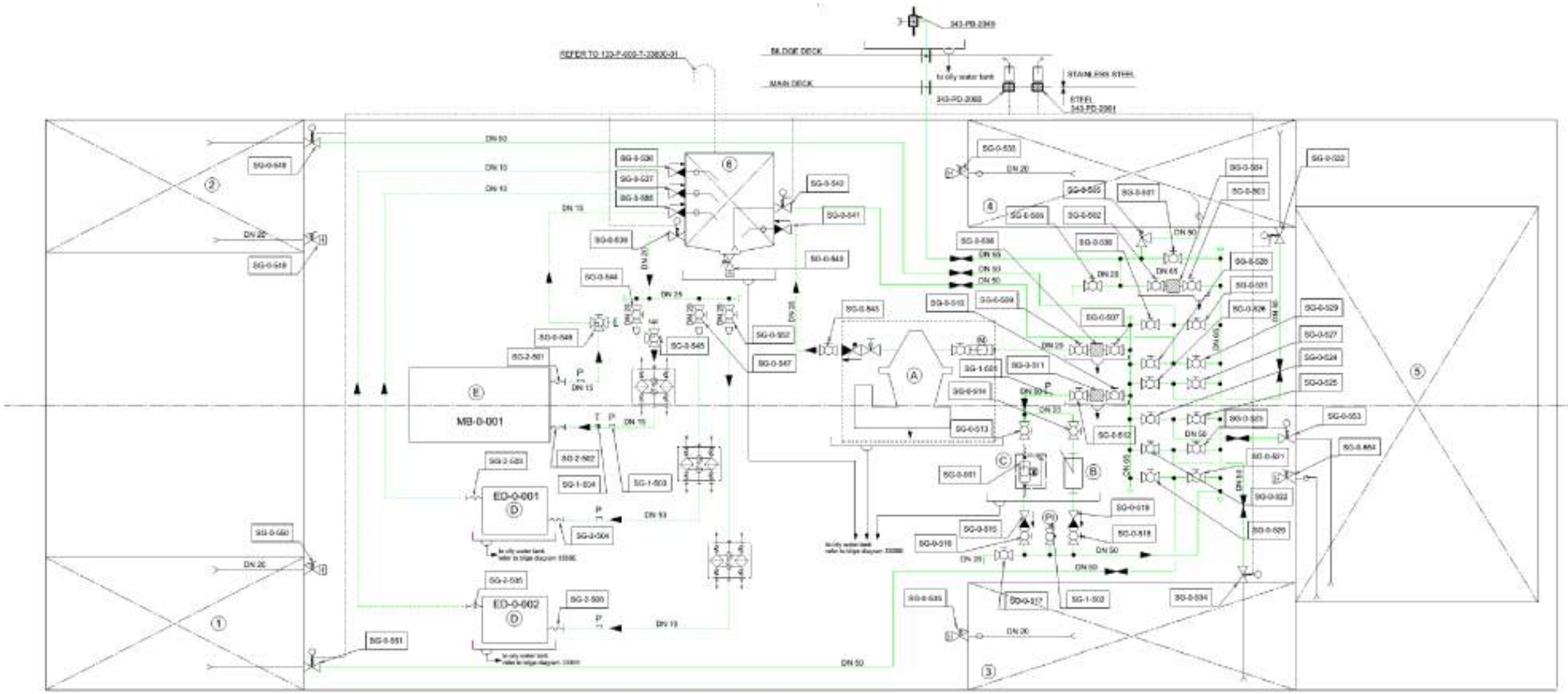


Fig7-11_Marine Fuel Oil System

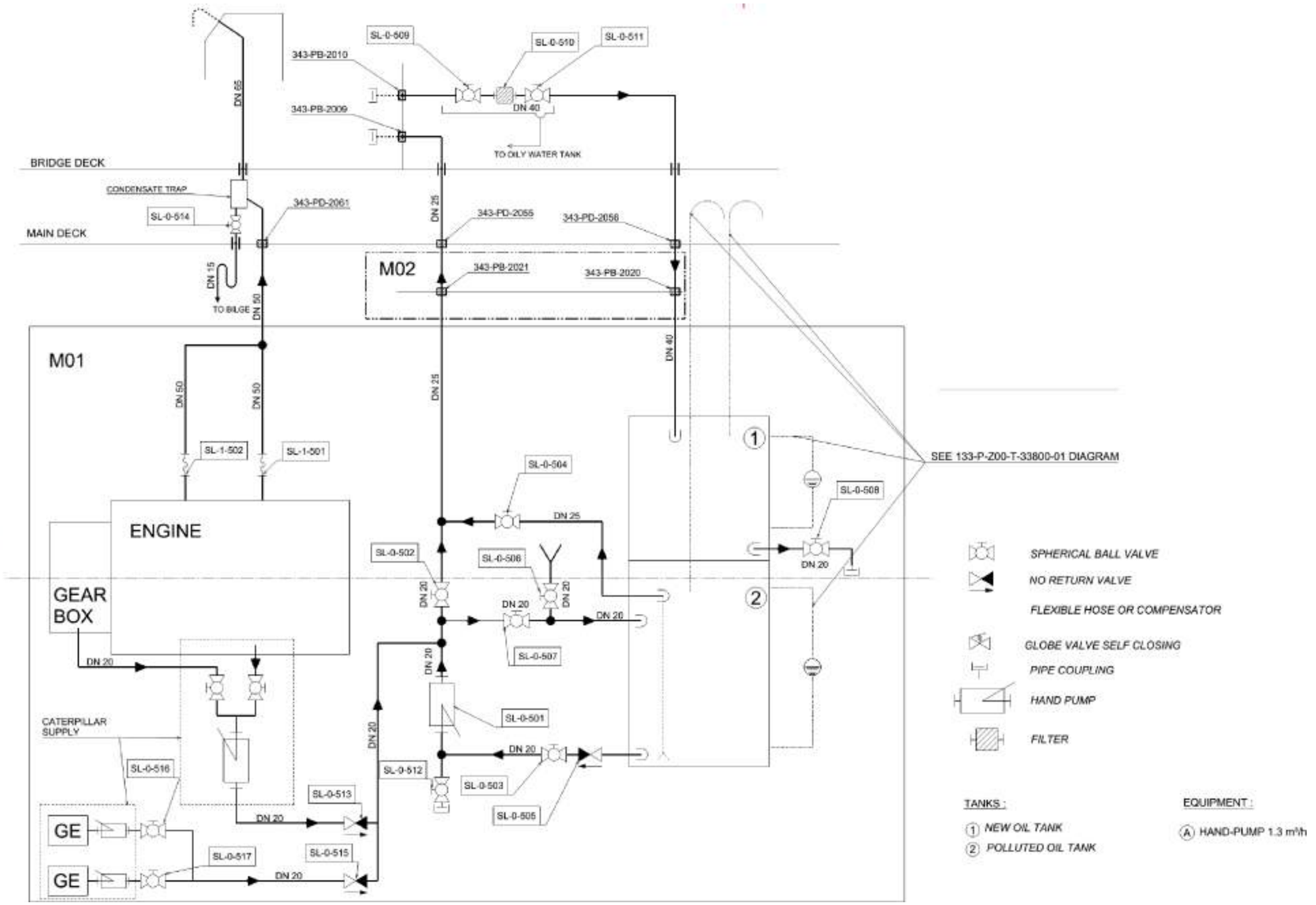
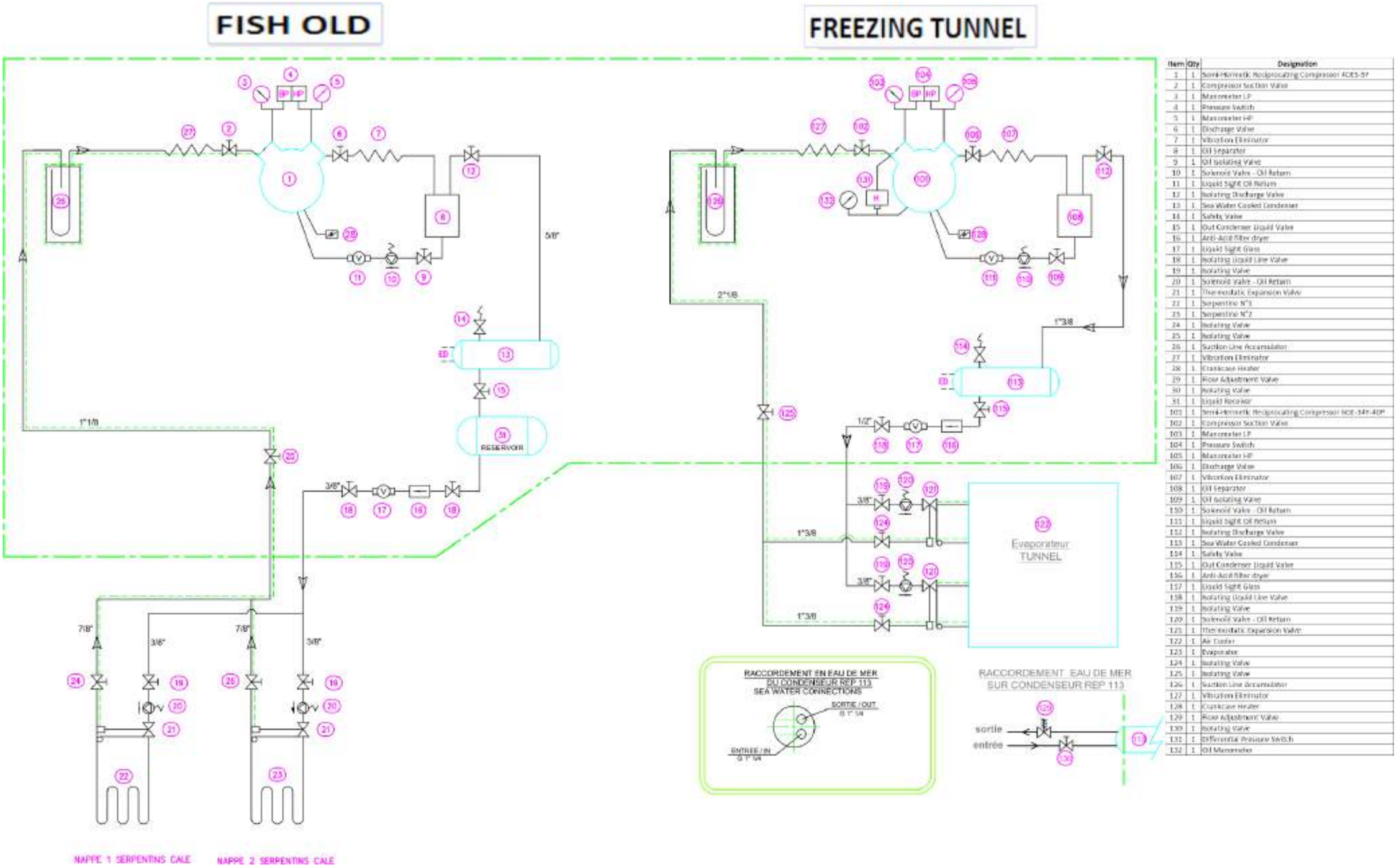


Fig7-12 Lubricating Oil System



Item	Qty	Designation
1	1	Semi-Hermetic Reciprocating Compressor ACES-5Y
2	1	Compressor Suction Valve
3	1	Manometer LP
4	1	Pressure Switch
5	1	Manometer HP
6	1	Discharge Valve
7	1	Vibration Eliminator
8	1	Oil Separator
9	1	Oil isolating Valve
10	1	Solenoid Valve - Oil Return
11	1	Liquid Sight Oil Return
12	1	Isolating Discharge Valve
13	1	Sea Water Cooled Condenser
14	1	Safety Valve
15	1	Out Condenser Liquid Valve
16	1	Anti-Acid filter dryer
17	1	Liquid Sight Glass
18	1	Isolating Liquid Line Valve
19	1	Isolating Valve
20	1	Solenoid Valve - Oil Return
21	1	Thermostatic Expansion Valve
22	1	Serpentine N°1
23	1	Serpentine N°2
24	1	Isolating Valve
25	1	Isolating Valve
26	1	Suction Line Accumulator
27	1	Vibration Eliminator
28	1	Crankcase Heater
29	1	Flow Adjustment Valve
30	1	Isolating Valve
31	1	Liquid Receiver
101	1	Semi-Hermetic Reciprocating Compressor ACE-34Y-40P
102	1	Compressor Suction Valve
103	1	Manometer LP
104	1	Pressure Switch
105	1	Manometer HP
106	1	Discharge Valve
107	1	Vibration Eliminator
108	1	Oil Separator
109	1	Oil isolating Valve
110	1	Solenoid Valve - Oil Return
111	1	Liquid Sight Oil Return
112	1	Isolating Discharge Valve
113	1	Sea Water Cooled Condenser
114	1	Safety Valve
115	1	Out Condenser Liquid Valve
116	1	Anti-Acid filter dryer
117	1	Liquid Sight Glass
118	1	Isolating Liquid Line Valve
119	1	Isolating Valve
120	1	Solenoid Valve - Oil Return
121	1	Thermostatic Expansion Valve
122	1	Air Cooler
123	1	Evaporator
124	1	Isolating Valve
125	1	Isolating Valve
126	1	Suction Line Accumulator
127	1	Vibration Eliminator
128	1	Crankcase Heater
129	1	Flow Adjustment Valve
130	1	Isolating Valve
131	1	Differential Pressure Switch
132	1	Oil Manometer

Fig7-13 Refrigeration Plant for Fish Hold & Freezing Tunnel

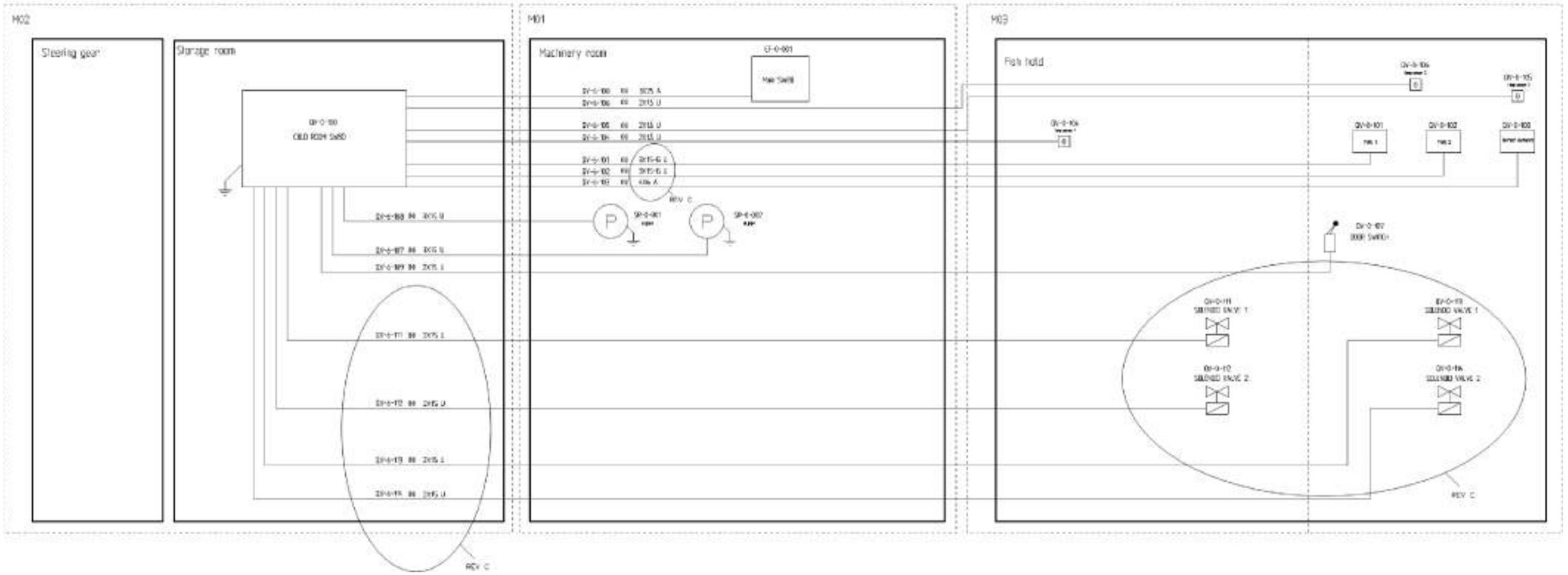


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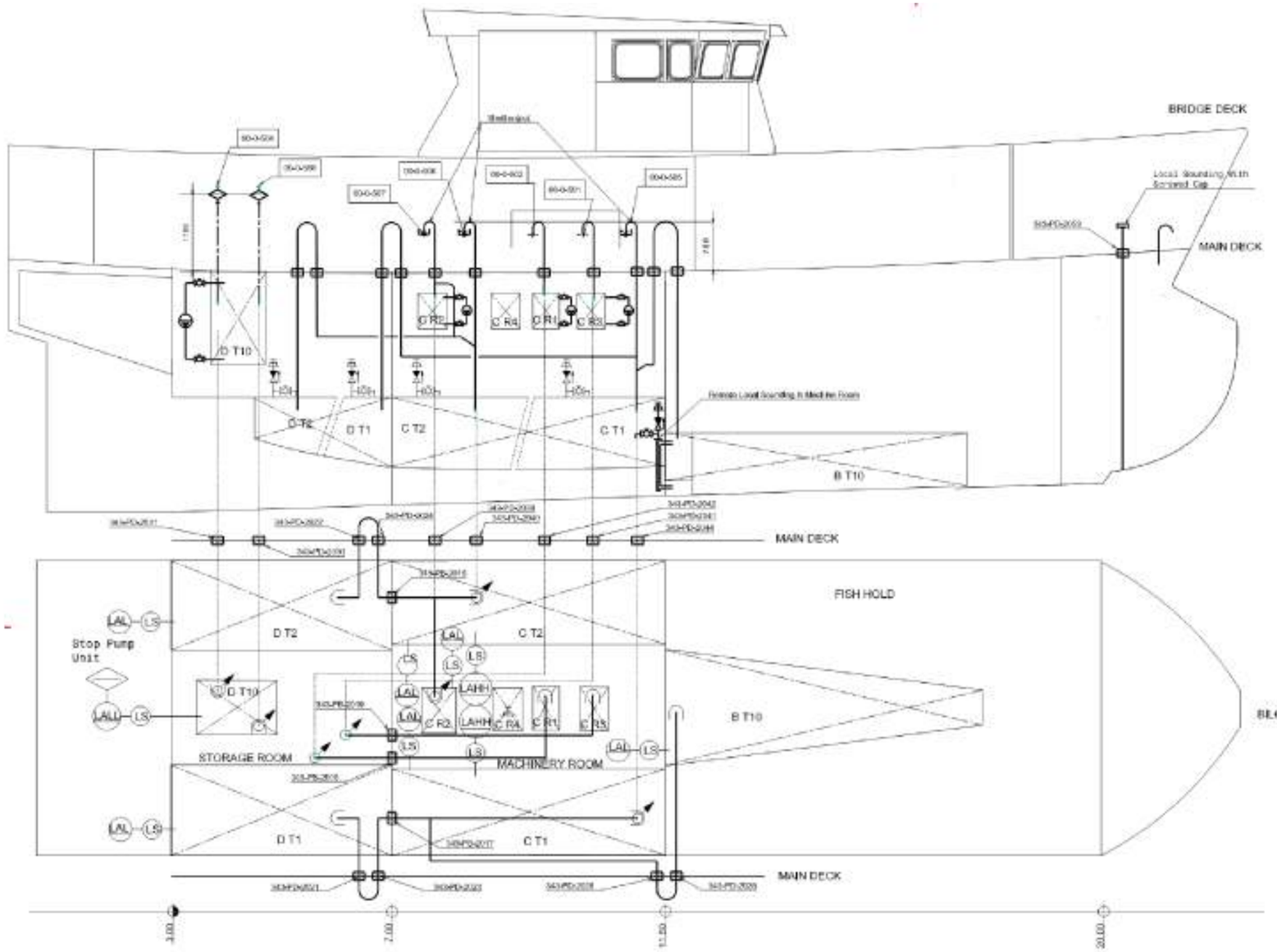
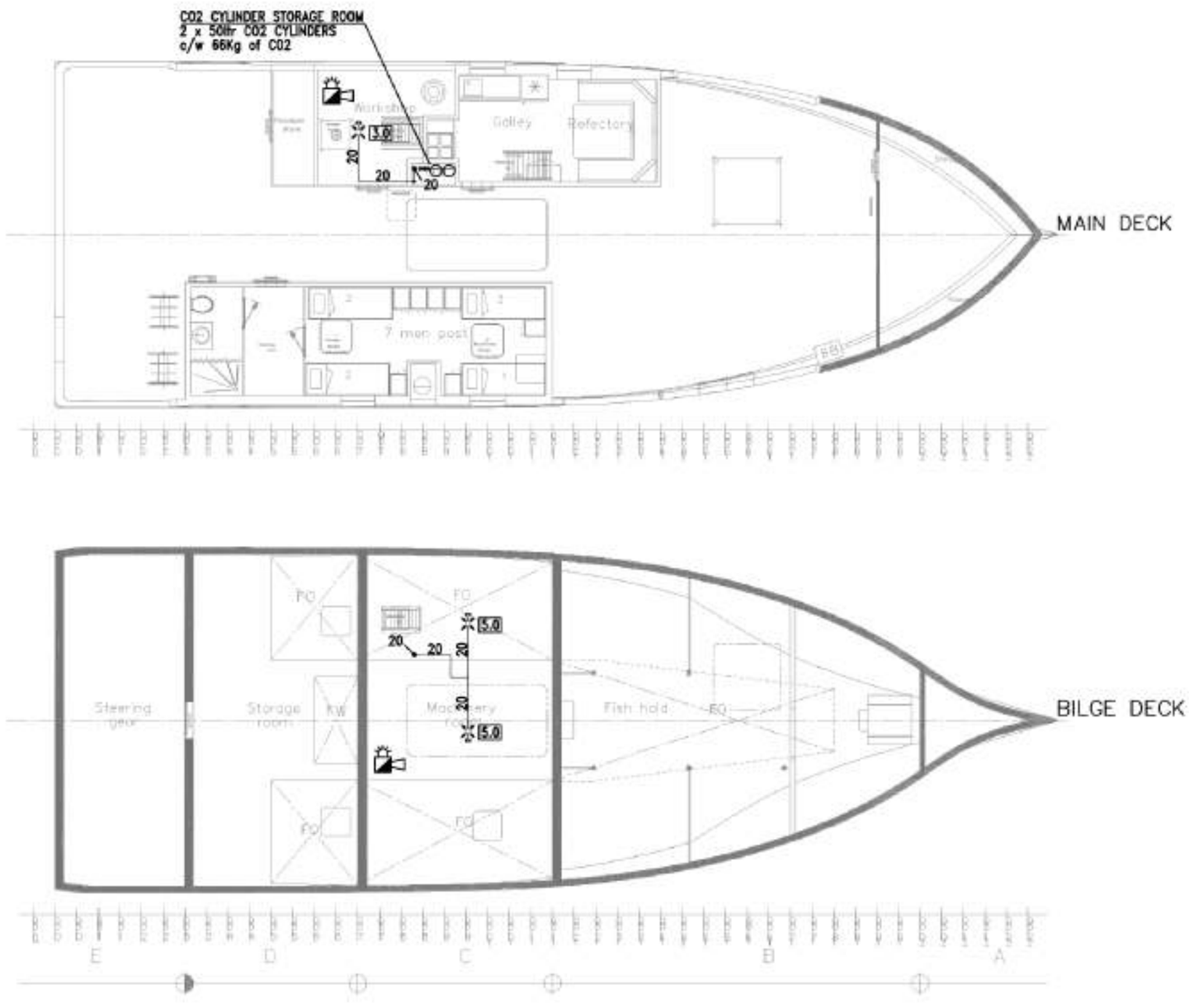
Fig7-14 Fish Hold Refrigeration Plant Electrical Network



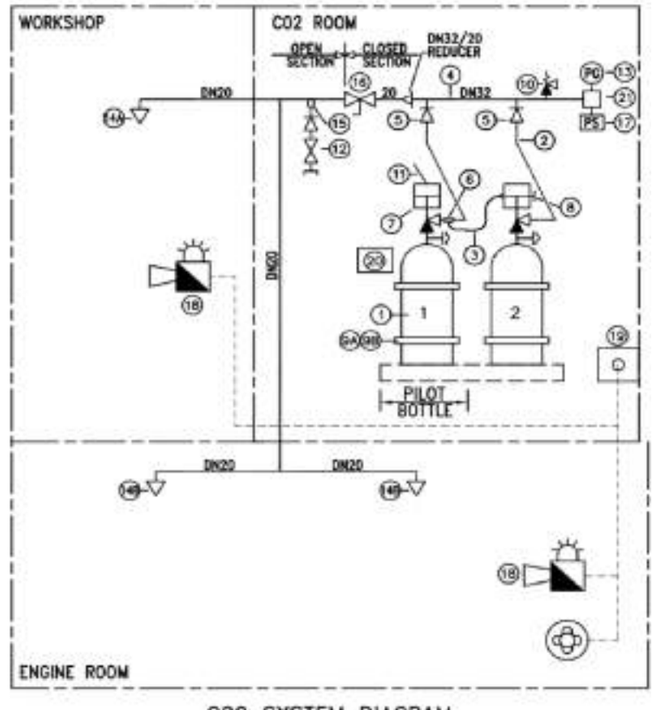
REP	Description	Net CAPACITY
	Unit	m3
B T10	Fuel Oil storage Tank	9.27
C T1	Fuel Oil storage/overflow Tank	10
C T2	Fuel Oil storage/overflow Tank	10
D T10	Fresh Water Tank	3
D T1	Fuel Oil storage Tank	3.30
D T2	Fuel Oil storage Tank	3.30
C R1	New Oil Tank	0.7
C R2	Fuel Oil service Tank	1
C R3	Polluted Oil Tank	0.3
C R4	Oily Water Tank	0.1

NO RETURN VALVE
ASSEPTIC FILTER
PIPE GOING UPWARDS
PIPE GOING DOWNWARDS
AIR VENT WITH AUTOMATIC CLOSING DEVICE AND FLAME ARRESTER
AIR VALVE WITH AUTOMATIC CLOSING DEVICE
AIR VALVE WITH FLAME ARRESTER
LOCAL SOUNDING WITH SELF CLOSING TYPE APPLIANCE AND CHECK VALVE
LOCAL SOUNDING
LAHH LEVEL ALARM VERY HIGH: 97% TANK CAPACITY
LAH LEVEL ALARM HIGH: 90% TANK CAPACITY
LAL LEVEL ALARM LOW: 30% TANK CAPACITY
LS LEVEL SWITCH
LI LEVEL INDICATOR
LEVEL INDICATOR
INTERLOCK
Steel Pipes
Stainless Steel Pipes

Fig7-15 Air Vent, Sounding and Overflow System

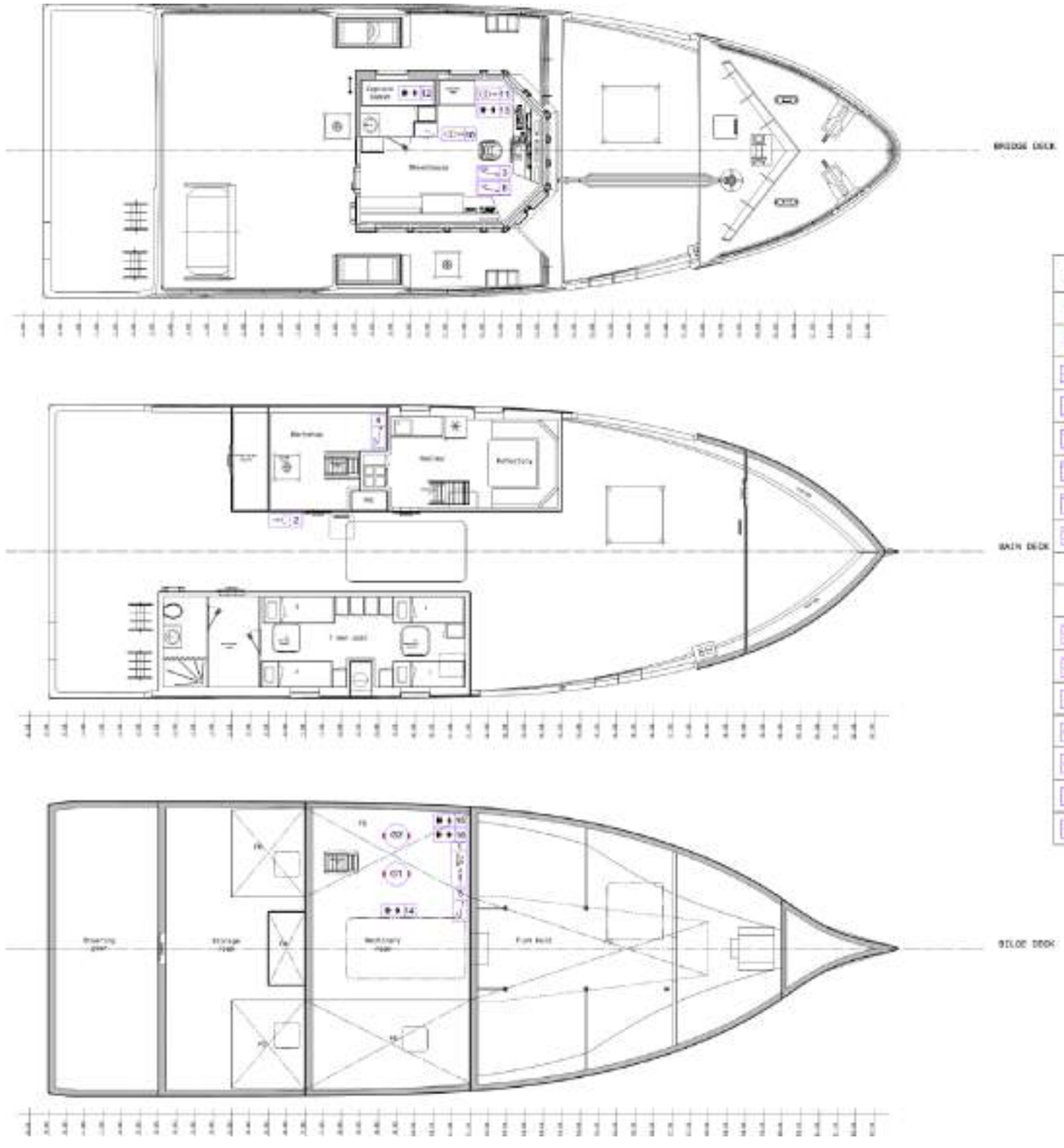


REF	SIZE	QTY	DESCRIPTION
1	33KG	2	50LTR CO2 BOTTLE
2	–	2	DISCHARGE HOSE
3	–	1	PILOT HOSE
4	DN32	1	2 CYLINDER CO2 MANIFOLD
5	–	2	MANIFOLD CHECK VALVE
6	–	1	CO2 DISCHARGE PILOT CONNECTOR
7	–	2	CYLINDER VALVE MANUAL/PNEUMATIC
8	3/8"BSPT	1	PLUG
9A	–	1	CO2 2 CYLINDER WALL RACK
9B	–	4	CO2 CYLINDER CYLINDER CLAMP
10	–	1	MANIFOLD RELIEF VALVE (120 BAR)
11	–	1	CO2 MECHANICAL RELEASE LEVER
12	DN20	1	SYSTEM BLOW THRO' CONNECTON
13	–	1	PRESSURE GAUGE 0–280 BAR
14A	15mm	1	DISCHARGE NOZZLE CODE 3.0
14B	15mm	2	DISCHARGE NOZZLE CODE 5.0
15	–	1	SINGLE CYLINDER ADAPTOR
16	DN20	1	CO2 SYSTEM ISOLATION VALVE
17	–	1	CO2 SYSTEM PRESSURE SWITCH
18	–	2	AUDIBLE/VISUAL ALARM
19	–	1	CO2 ROOM DOOR MICROSWITCH
20	–	1	WARNING/INSTRUCTION LABEL
21	–	1	2–PORT END CAP



CO2 SYSTEM DIAGRAM
FOR ENGINE ROOM & WORKSHOP

Fig7-16 CO2 Fire Extinguishing System



Symbol	Local	Ref	Voltage	Designation	HxLxW (mm)
G1	Machinery room	ED-0-001	400V AC 50Hz	Starboard generator	1323x1422x709
G2	Machinery room	ED-0-002	400V AC 50Hz	Port generator	1323x1422x709
1	Machinery room	EF-0-001	400V AC 50Hz	Main switchboard F1	1550x1400x400
2	Aft main deck	EF-0-002	400V AC 50Hz	Shore socket	
3	Wheelhouse	EE-0-002	230V AC 50Hz	230VAC distribution frame	450x400x210
4	Workshop	EE-0-003	230V AC 50Hz	230VAC distribution panel	800x600x250
5	Machinery room	EE-0-001	230V AC 50Hz	230VAC distribution panel	600x400x200
6	Wheelhouse	EB-0-007	24V Dc	24V Dc distribution frame	600x750x250
10	Wheelhouse	EB-0-001	24V Dc	Battery charger	362x356x120
11	Wheelhouse	EB-0-002	24V Dc	GMDSS Battery charger	350x450x170
12	Captain cabin	EB-0-009	24V Dc	Battery	□246x486x172)x2
13	Wheelhouse	EB-0-006	24V Dc	GMDSS battery	□163x356x167)x2
14	Machinery room	EB-0-010	24V Dc	Engine battery	□225x520x266)x2
15	Machinery room	EB-0-011	24V Dc	G1 battery	□220x330x171)x2
16	Machinery room	EB-0-012	24V Dc	G2 battery	□220x330x171)x2

Fig7-17 Electric Equipment Location

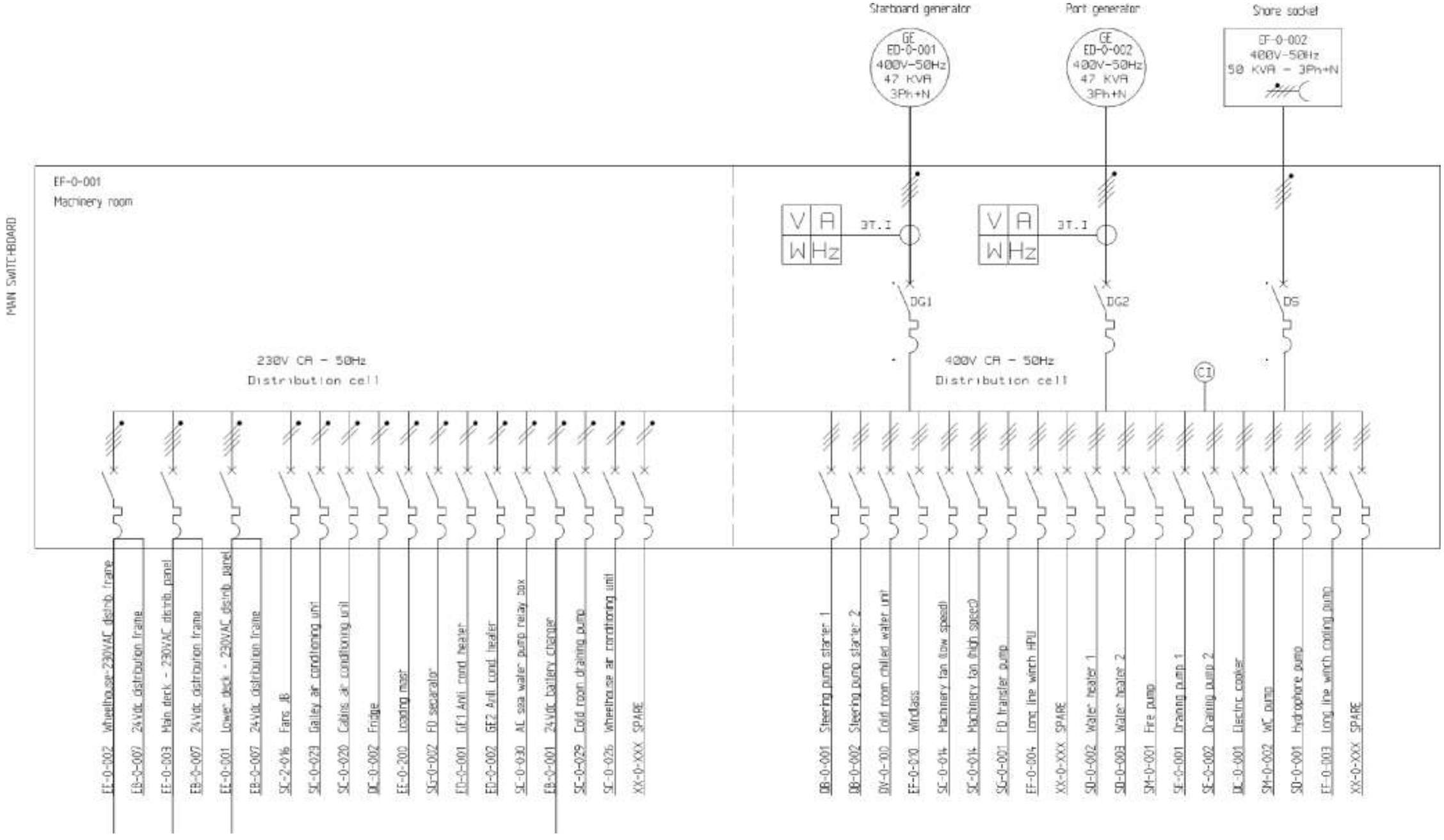
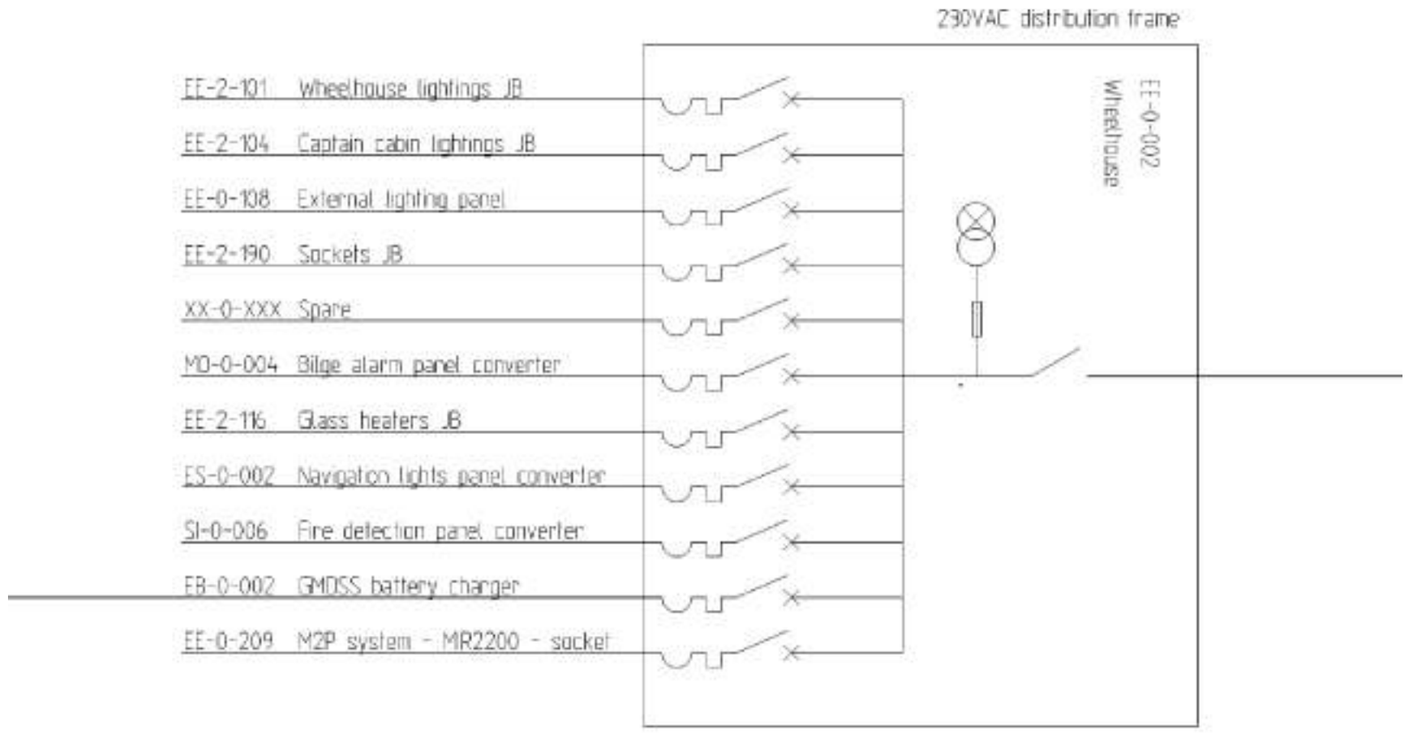
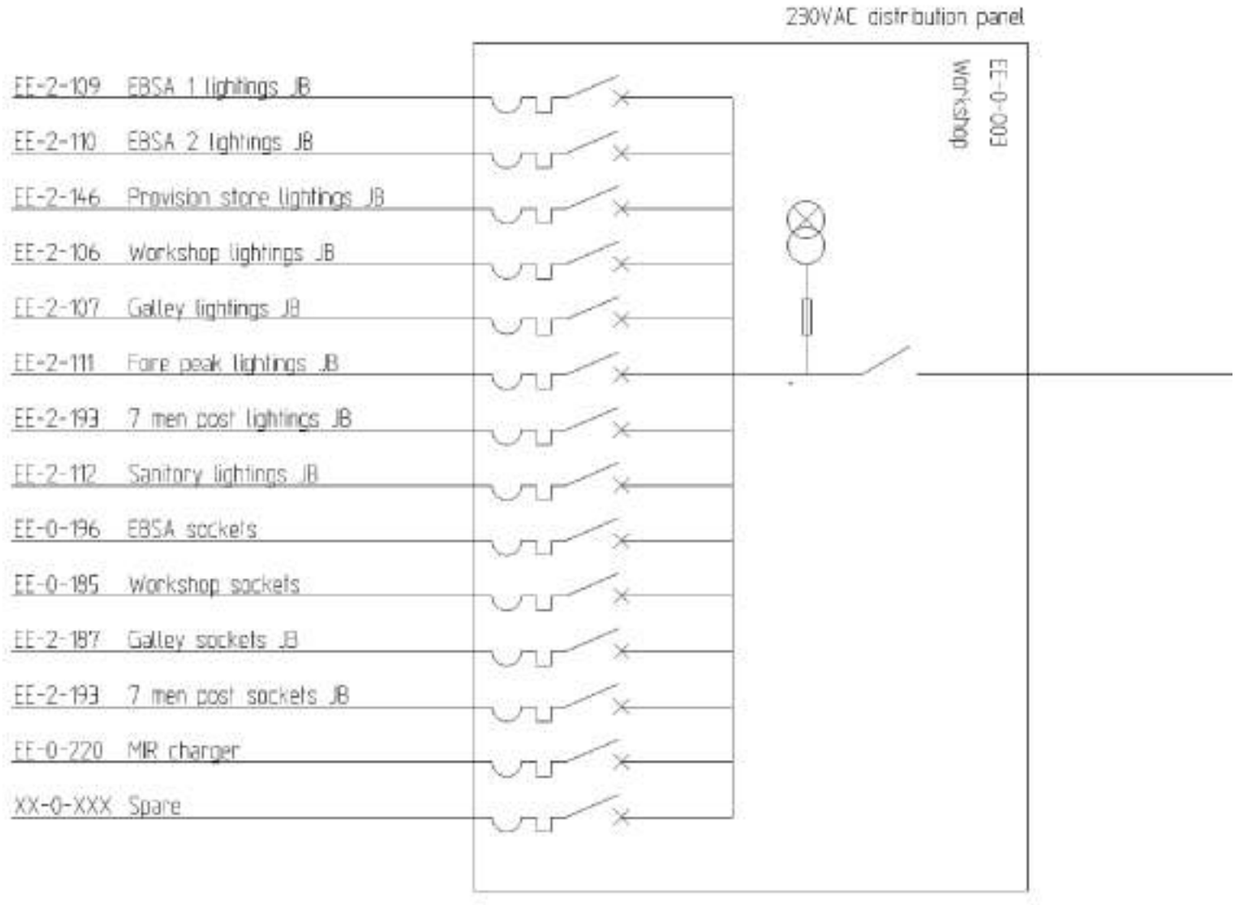


Fig7-18 Main Switchboard





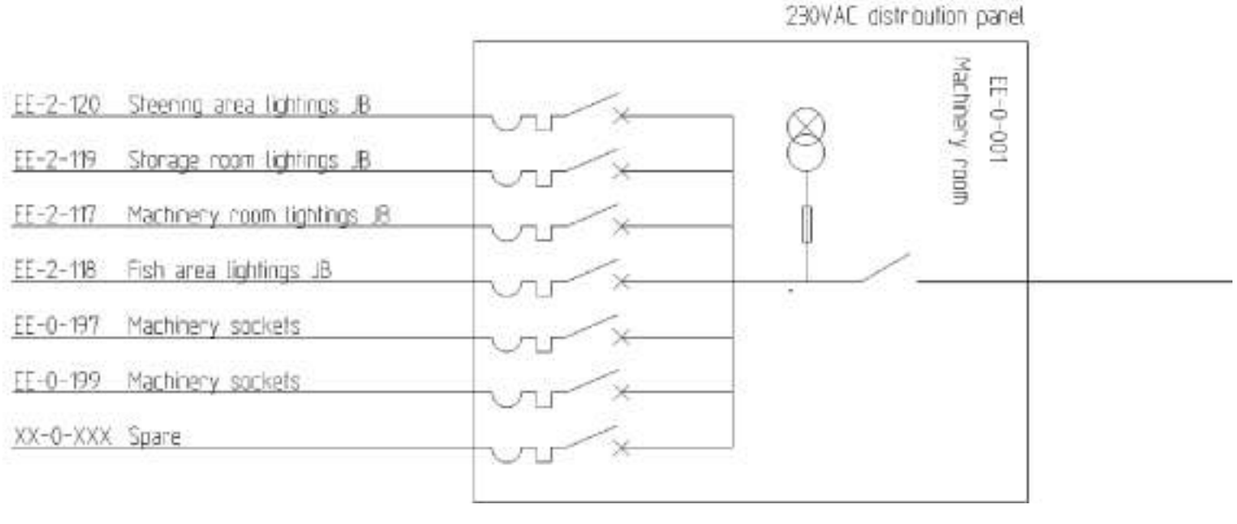


Fig7-19 AC 230V Secondary Switchboards

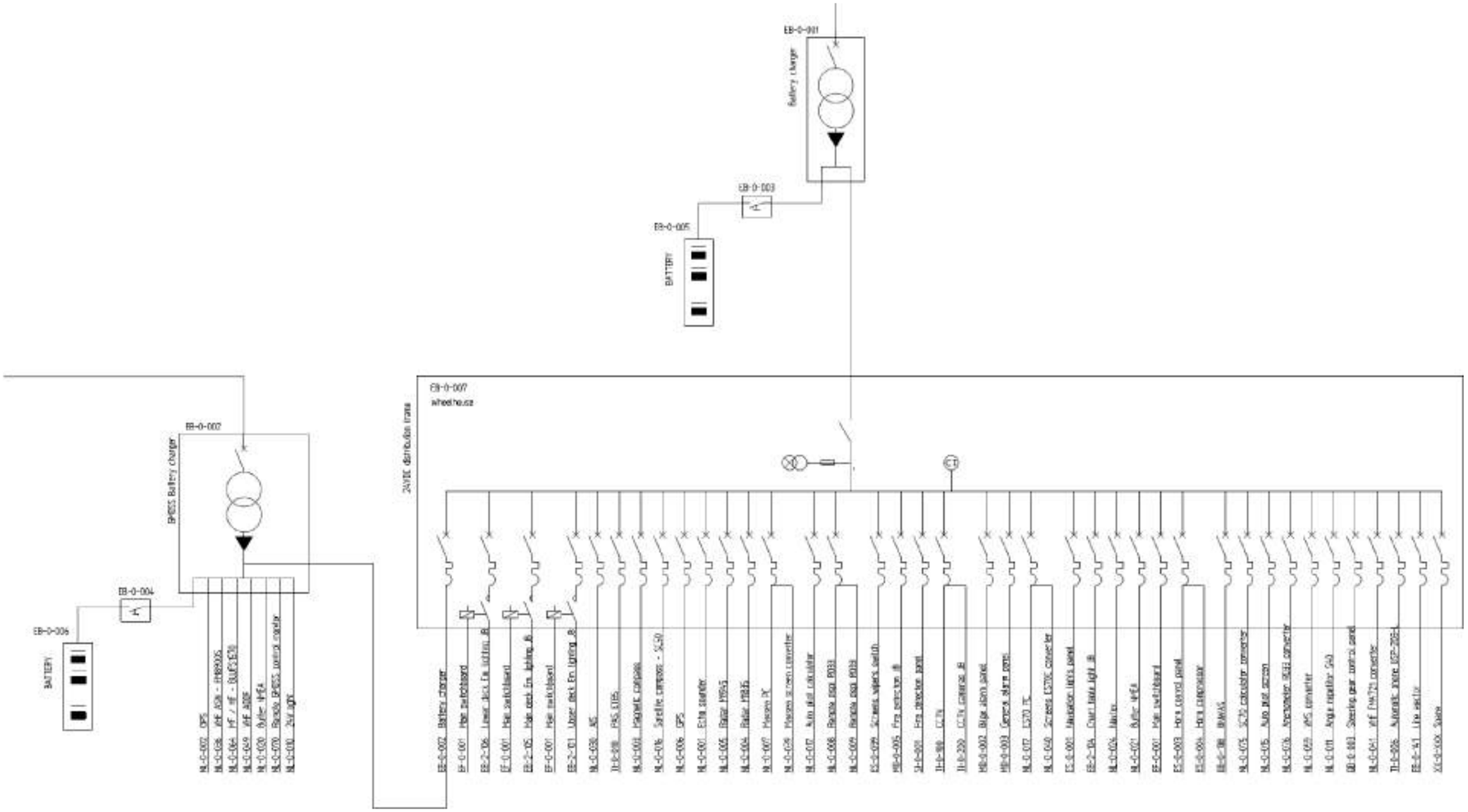


Fig7-20 C 24V Distribution Network

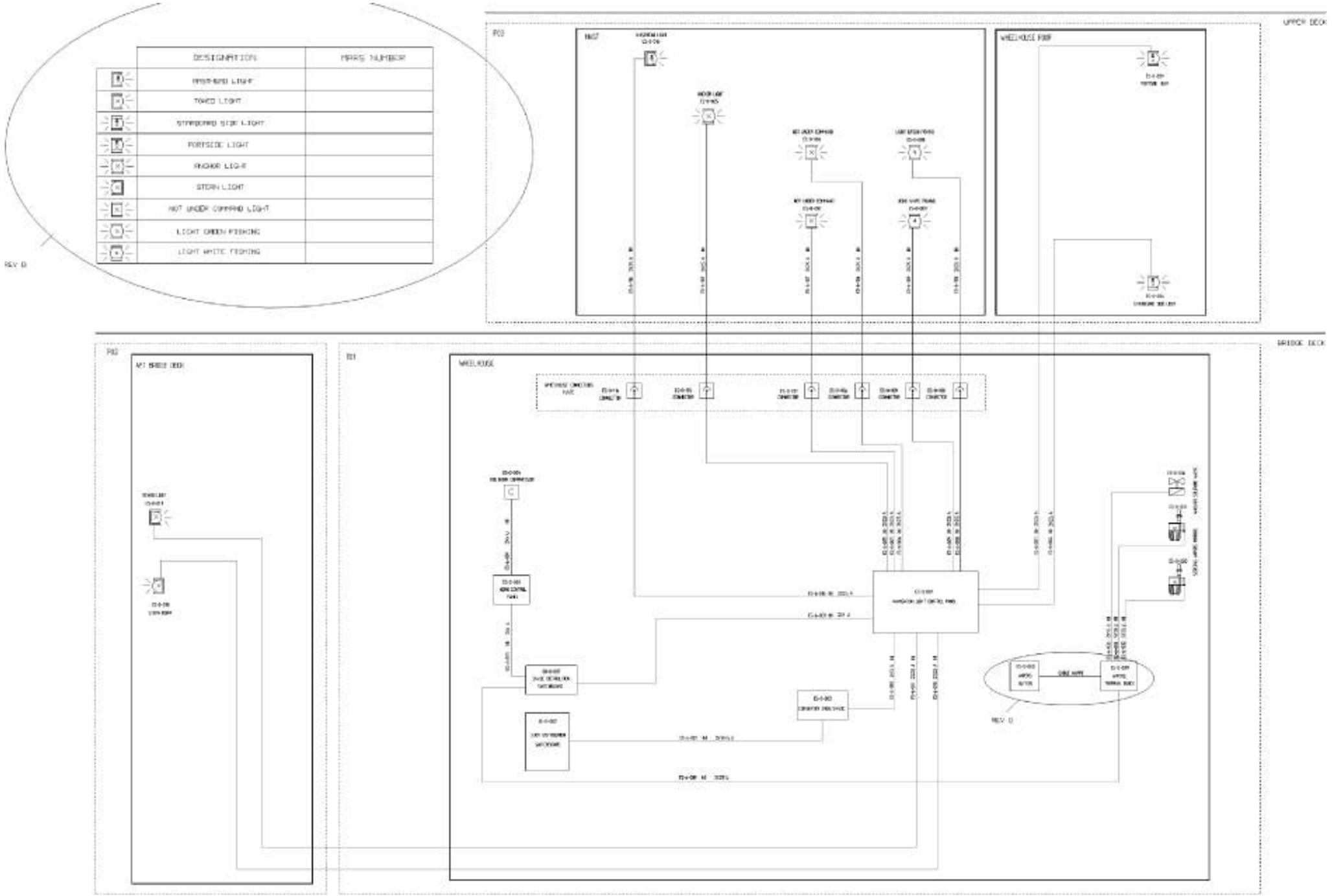
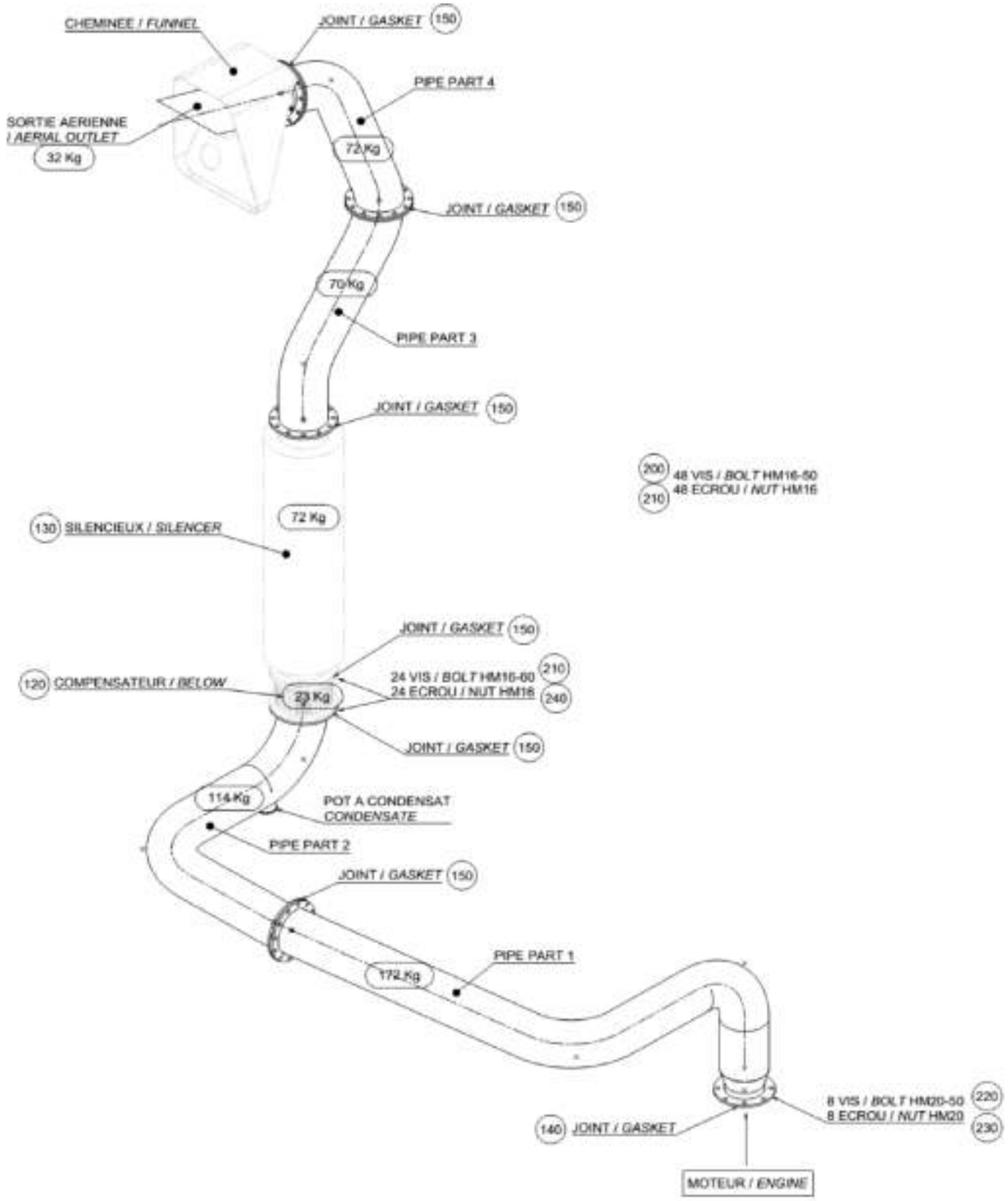


Fig7-21 DC 24V Navigation Lights Network



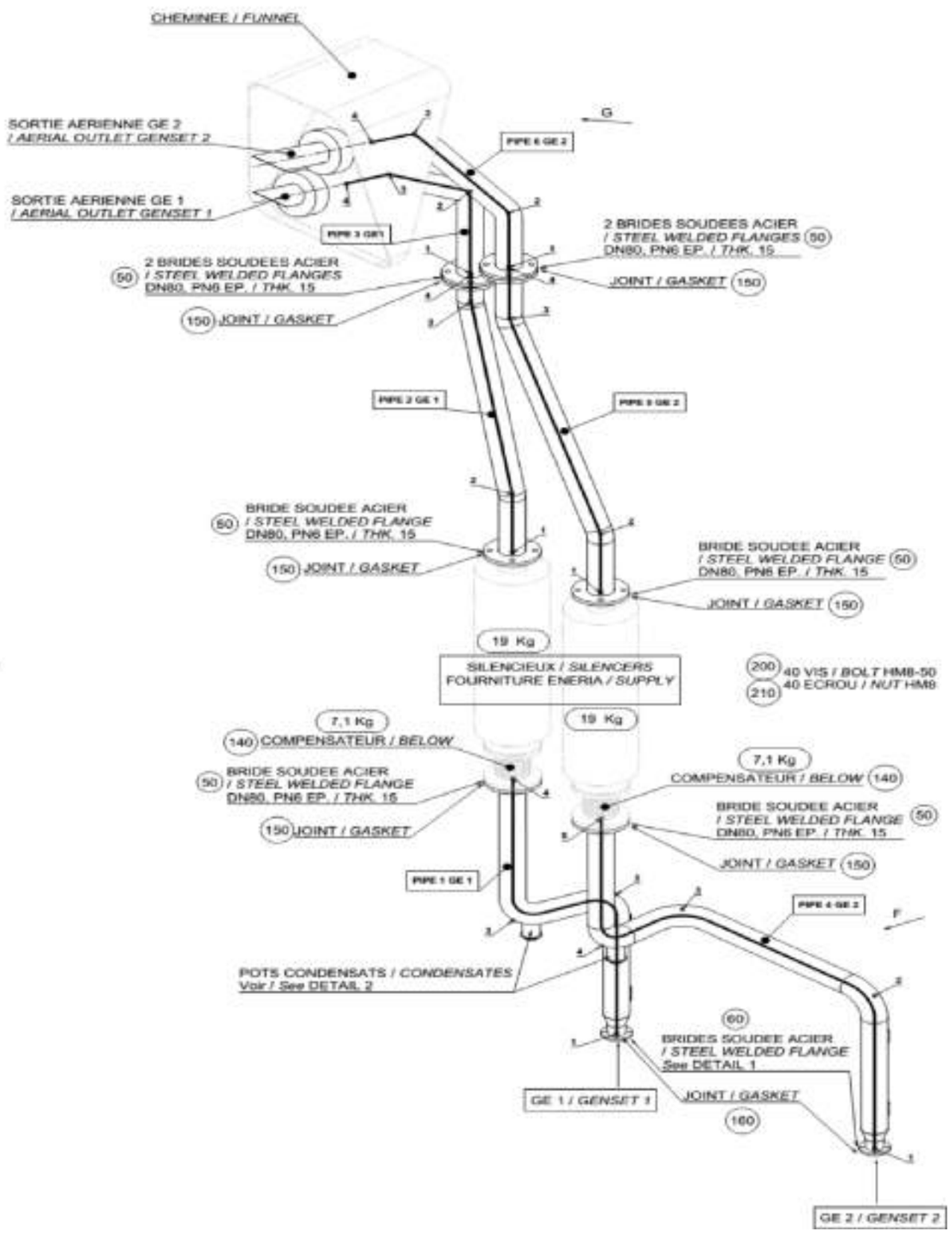


Fig7-22 Exhaust System

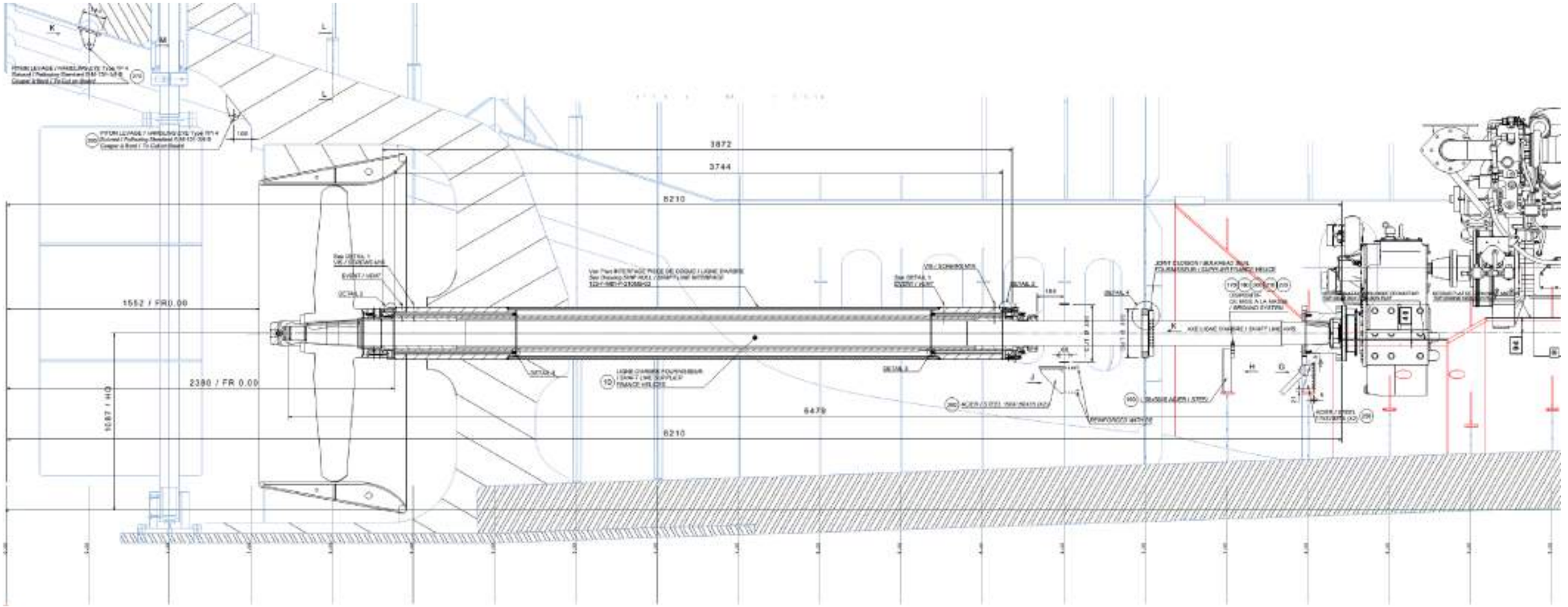


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Fig7-23 Shafting Line & Propeller

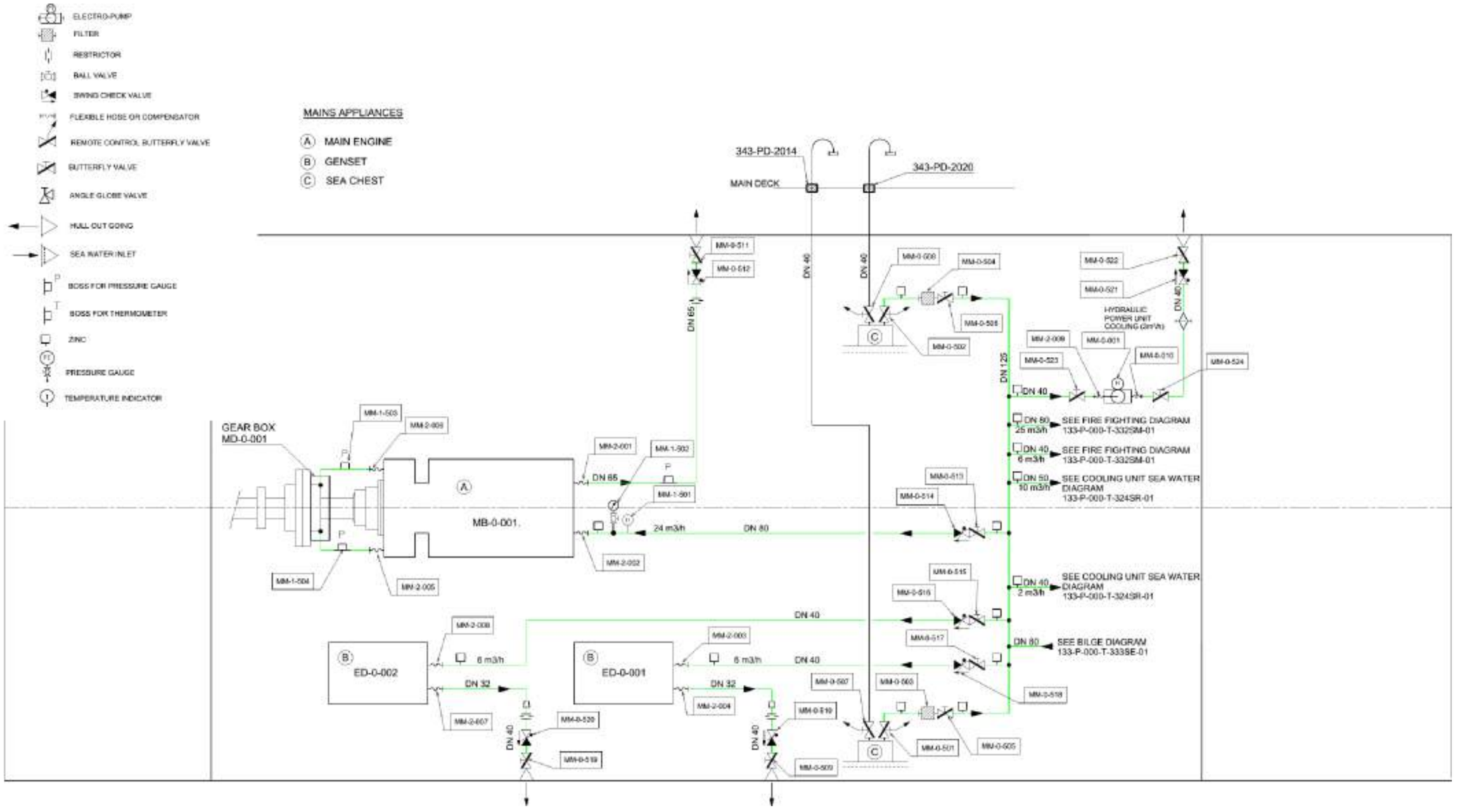
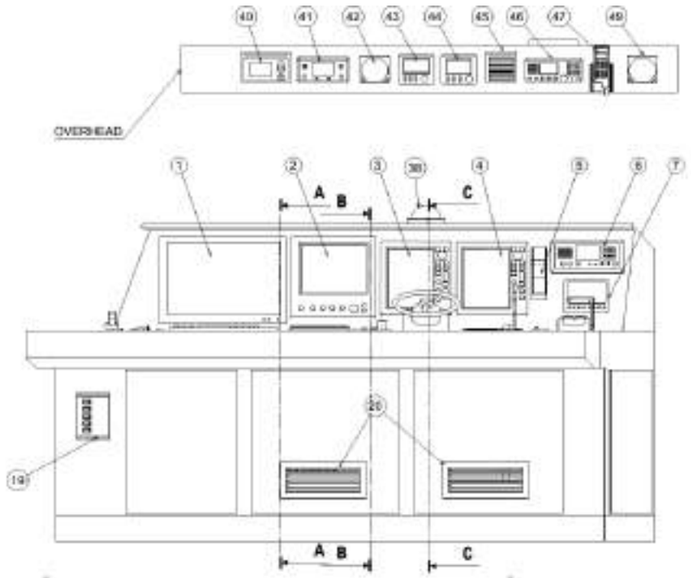
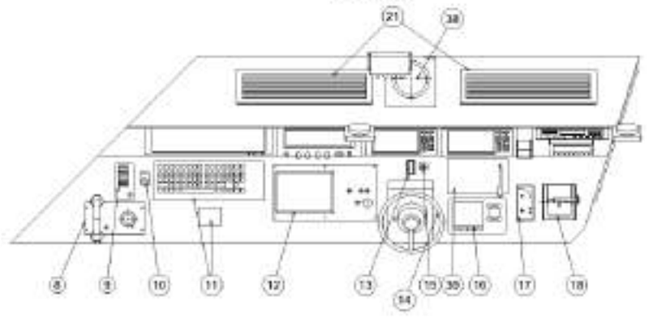


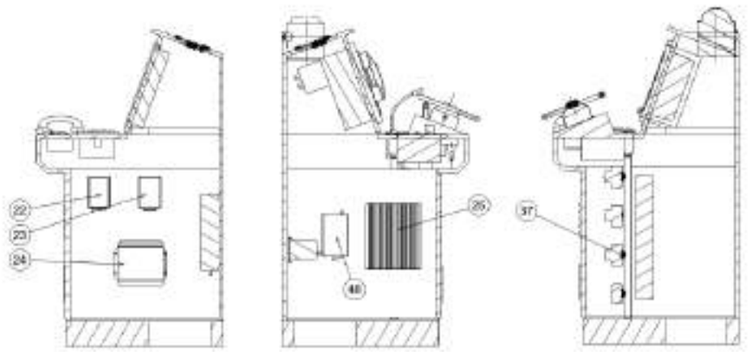
Fig7-24 Engines Cooling System



Front view

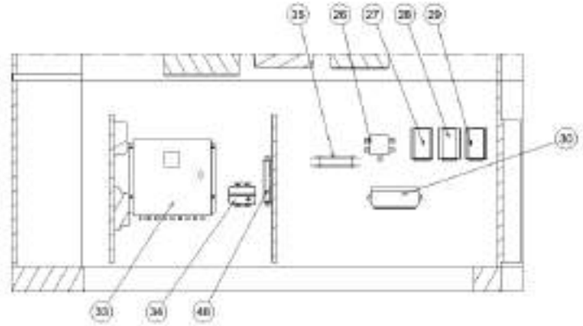


Upper view

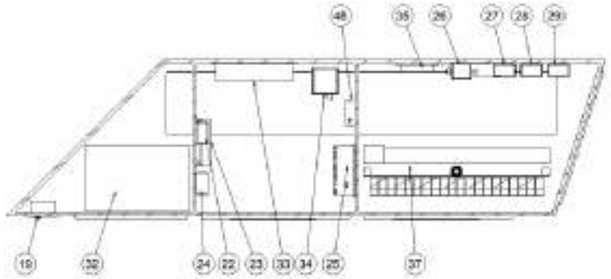


Section A-A Section B-B Section C-C

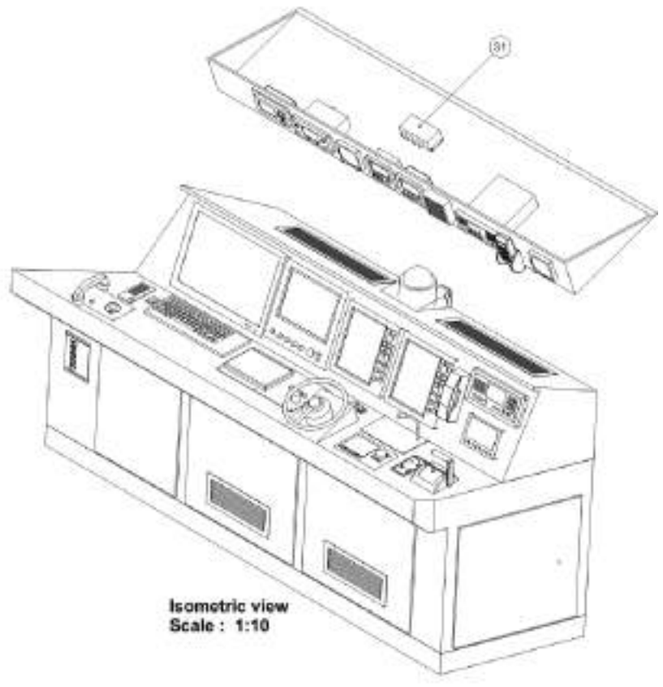
ID	DESIGNATION	NUMBER
1	CARTOGRAPHY SCREEEN	NL-0-022
2	SONDER FURUNO FCV-1150	NL-0-001
3	RADAR FURUNO M1835	NL-0-004
4	RADAR FURUNO M 1945	NL-0-005
5	HANDSET VHF 8800	NL-0-068
6	VHF FURUNO 8900	NL-0-035
7	CCTV SCREEN	TI-0-100
8	AUTOGENERATOR PHONE	TI-0-025
9	FOGHORN PANEL	ES-0-003
10	MAXSEA START BUTTON	-
11	MAXSEA KEYBOARD AND TRACKBALL	-
12	ENGINE REMOTE CONTROL PANEL	MO-0-100
13	WIPERS COMMAND PANEL	ES-0-039
14	WHEEL	QB-0-006
15	STEERING GEAR BUTTON (AUTO/MANUAL)	QB-0-004
16	AUTOPILOT PANEL AP-70	NL-0-015
17	LYNX V35 ALARM PANEL	EB-0-138
18	ENGINE CONTROL STATION	MO-0-102
19	EXTERNAL LIGHTS COMMAND PANEL	EE-0-108
20	AIR INTEK	-
21	AIR OUTLET	-
22	MAXSEA CONVERTER	NL-0-039
23	VMS CONVERTER	NL-0-059
24	AUTOPILOT CALCULATOR	NL-0-012
25	MAXSEA COMPUTER	NL-0-007
26	BUFFER NMEA	NL-0-021
27	VHF BASIC CONVERTER	NL-0-041
28	RDSS CONVERTER	NL-0-076
29	NMEA NETWORK CONVERTER	NL-0-011
30	INTERCONNECTION BOX	NL-0-077
31	AIS JUNCTION BOX	NL-0-045
32	230V FRAME	EE-0-002
33	SC-50 CALCULATOR	NL-0-016
34	GYRO-COMPAS	NL-0-013
35	WIPERS TERMINAL BLOCK	ES-0-039
36	FOG HORN COMPRESSOR	ES-0-004
37	24V FRAME	EB-0-007
38	MAGNETIC COMPAS	-
39	TALK BACK STATION	TI-0-013
40	SC-50	NL-0-090
41	AIS TRANSAT	NL-0-030
42	RUDDER INDICATOR	NL-0-023
43	GPS FURUNO	NL-0-002
44	RD33 FURUNO	NL-0-008
45	LOUDSPEAKER	NL-0-052
46	VHF BASIC 4721	NL-0-026
47	HANDSET VHF BASIC	NL-0-071
48	MIR-2290	NL-0-092
49	RUDDER INDICATOR	NL-0-014



Section E-E
Scale : 1:10

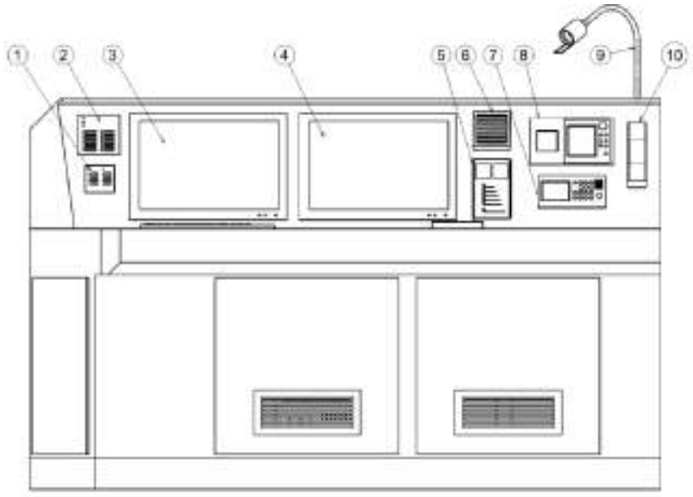


Section F-F

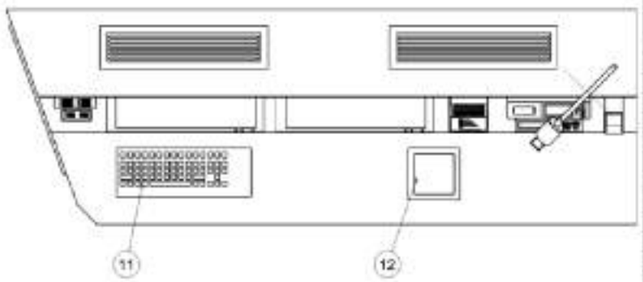


Isometric view
Scale : 1:10

Fig7-25 Wheelhouse Fwd Console

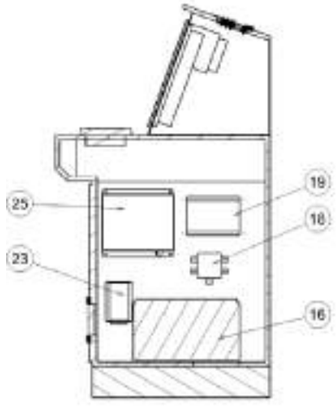


Front view

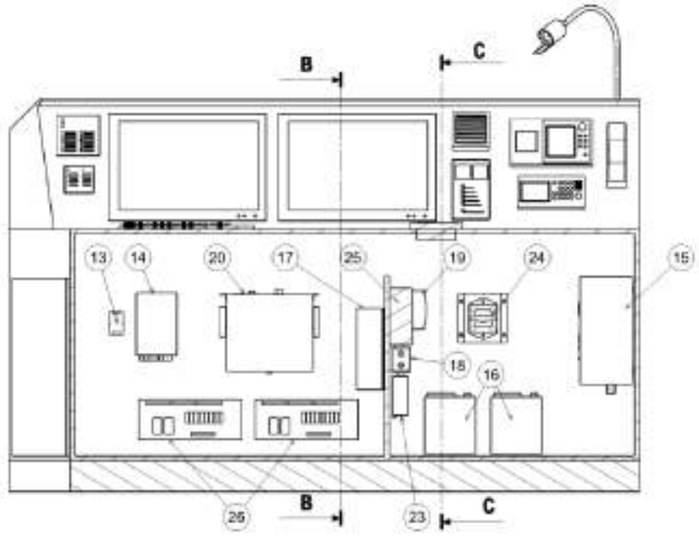


Upper view

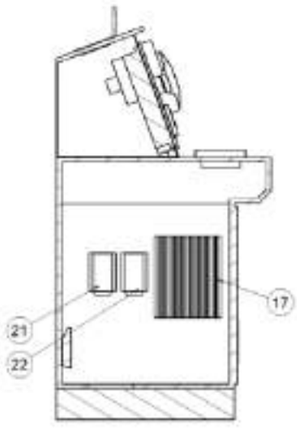
ID	DESIGNATION	NUMBER
1	ALARM PANEL ALTOR 8	MO-0-001
2	ALARM PANEL ALTAIR16	MO-0-003
3	IXBLUE SCREEN 1	NL-0-019
4	IXBLUE SCREEN 2	NL-0-069
5	GMDSS ALARM PANEL	NL-0-070
6	LOUDSPEAKER	NL-0-052
7	HF FS1570	NL-0-025
8	NAVTEX NX-700	NL-0-024
9	24V LIGHT	NL-0-010
10	VHF HANDSET	NL-0-063
11	IXBLUE KEYBOARD	-
12	NAVIGATION LIGHTS PANEL	ES-0-001
13	ALARM PANEL CONVERTER	MO-0-004
14	ACQUISITION BOX ALTOR8	MO-0-002
15	GMDSS BATTERIES CHARGER	EB-0-002
16	GMDSS BATTERIES	EB-0-006
17	IXBLUE PROCESSOR	NL-0-017
18	NMEA BUFFER	NL-0-0020
19	NAVIGATION LIGHTS CONVERTER	ES-0-002
20	SONDEUR CALCULATOR ES-70	NL-0-074
21	IXBLUE CONVERTER	NL-0-075
22	IXBLUE SCREENS	NL-0-040
23	NAVTEX CONVERTER	NL-0-066
24	BATTERIES SWITCH OFF	EB-0-004
25	NAVTEX CONNECTION BOX	NL-0-072
26	NAVIGATION LIGHT NORMA-CPU	ES-0-001



Section C-C



Section A-A



Section B-B

Doc. Title	Ship Information Handbook	CMN	201 / 205
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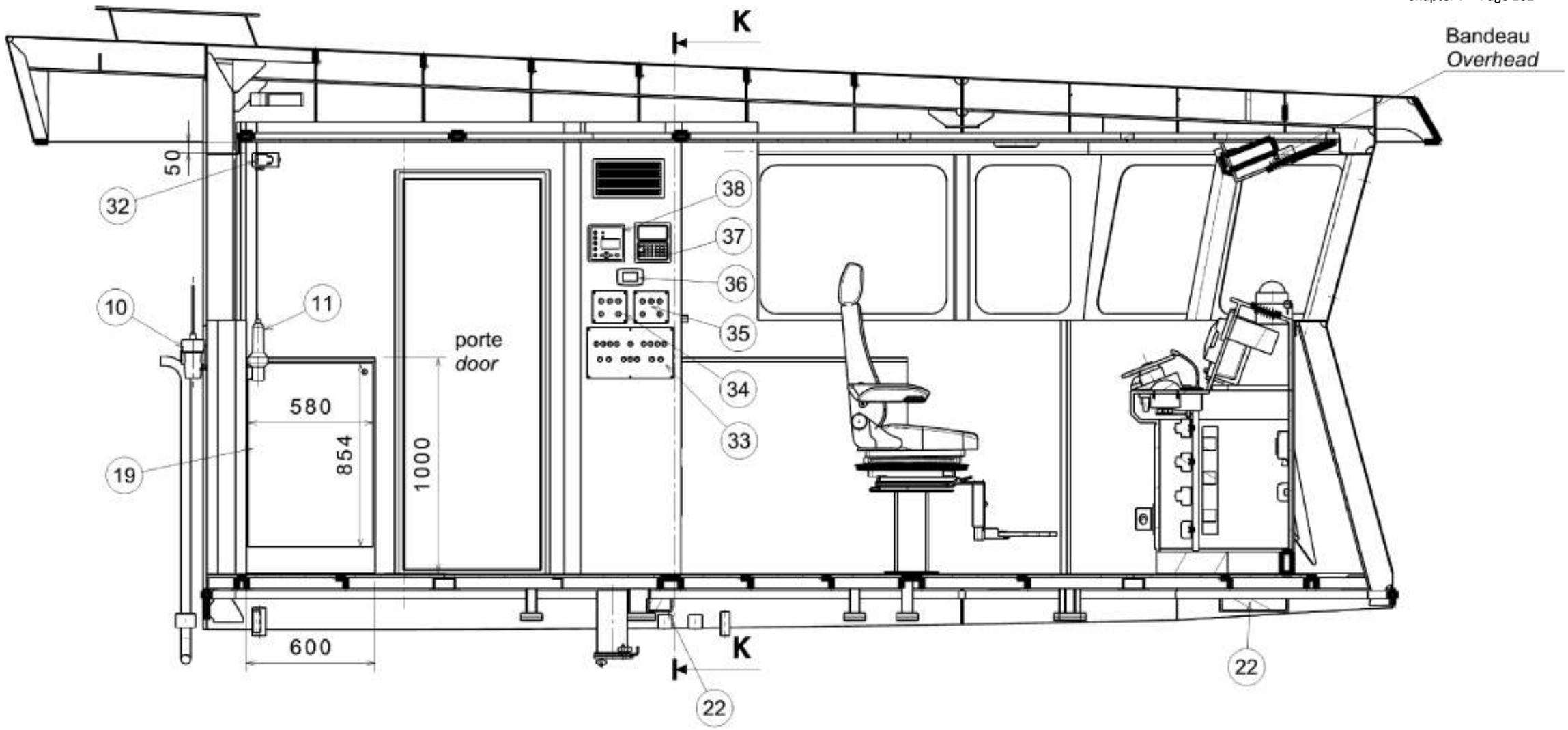
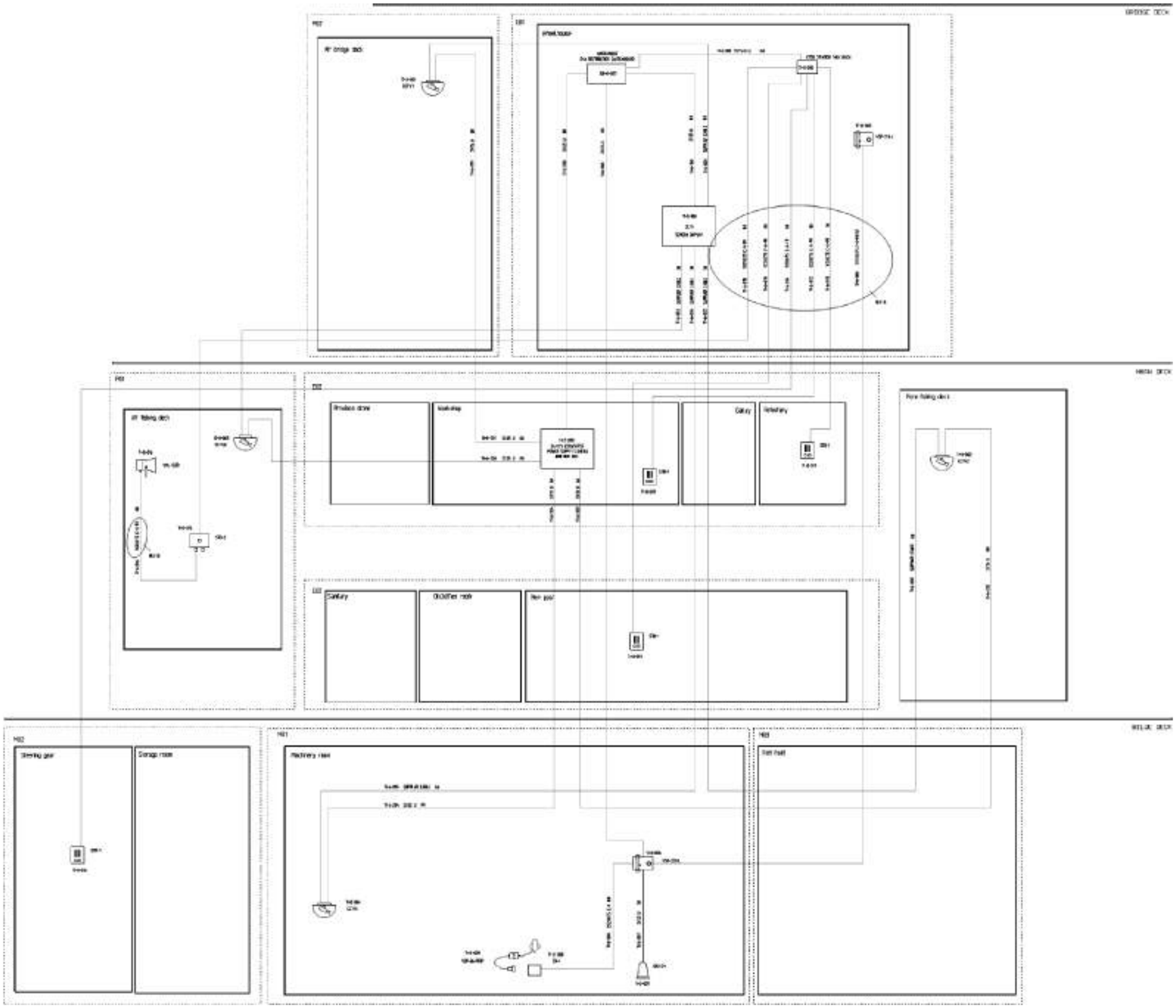
Doc. Revision & Date	B - 20/05/14		

Fig7-26 Wheelhouse Stdb Console



ID	DESIGNATION	NUMBER
33	STEERING GEAR PANEL	QB-0-003
34	GENSET PANEL 1	ED-0-110
35	GENSET PANEL 2	ED-0-120
36	CLIMA SCREEN	SC-0-028
37	VHF ADDF	NL-0-049
38	FIRE DETECTION PANEL	SI-0-001

Fig7-27 Wheelhouse Port Bulkhead Panel



Doc. Title	Ship Information Handbook		203 / 205
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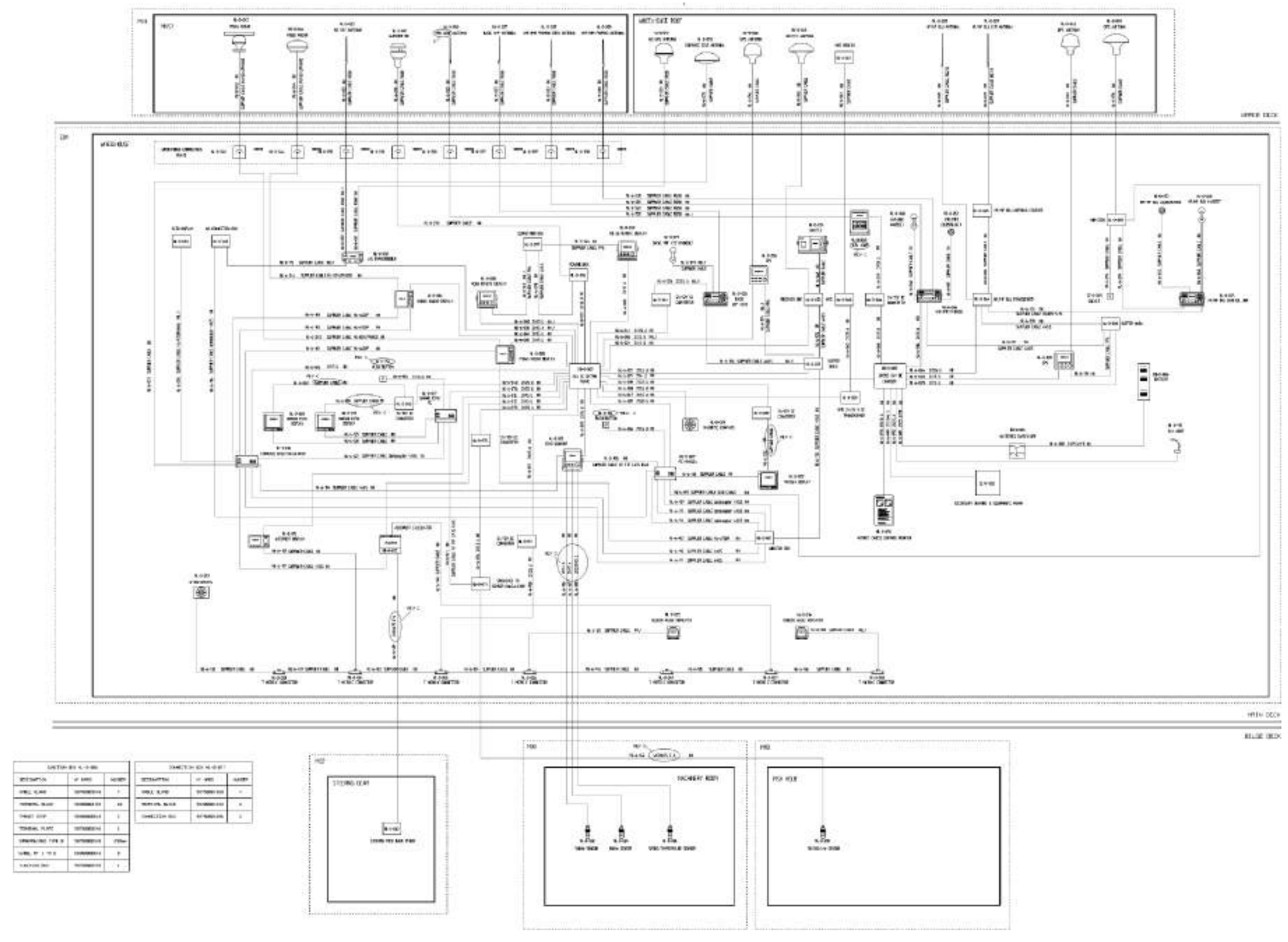
Doc. Revision & Date	B - 20/05/14		

Fig7-28 Internal Communications System



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Doc. Revision & Date	B - 20/05/14		

Fig7-29 External Communications and Navigation Systems

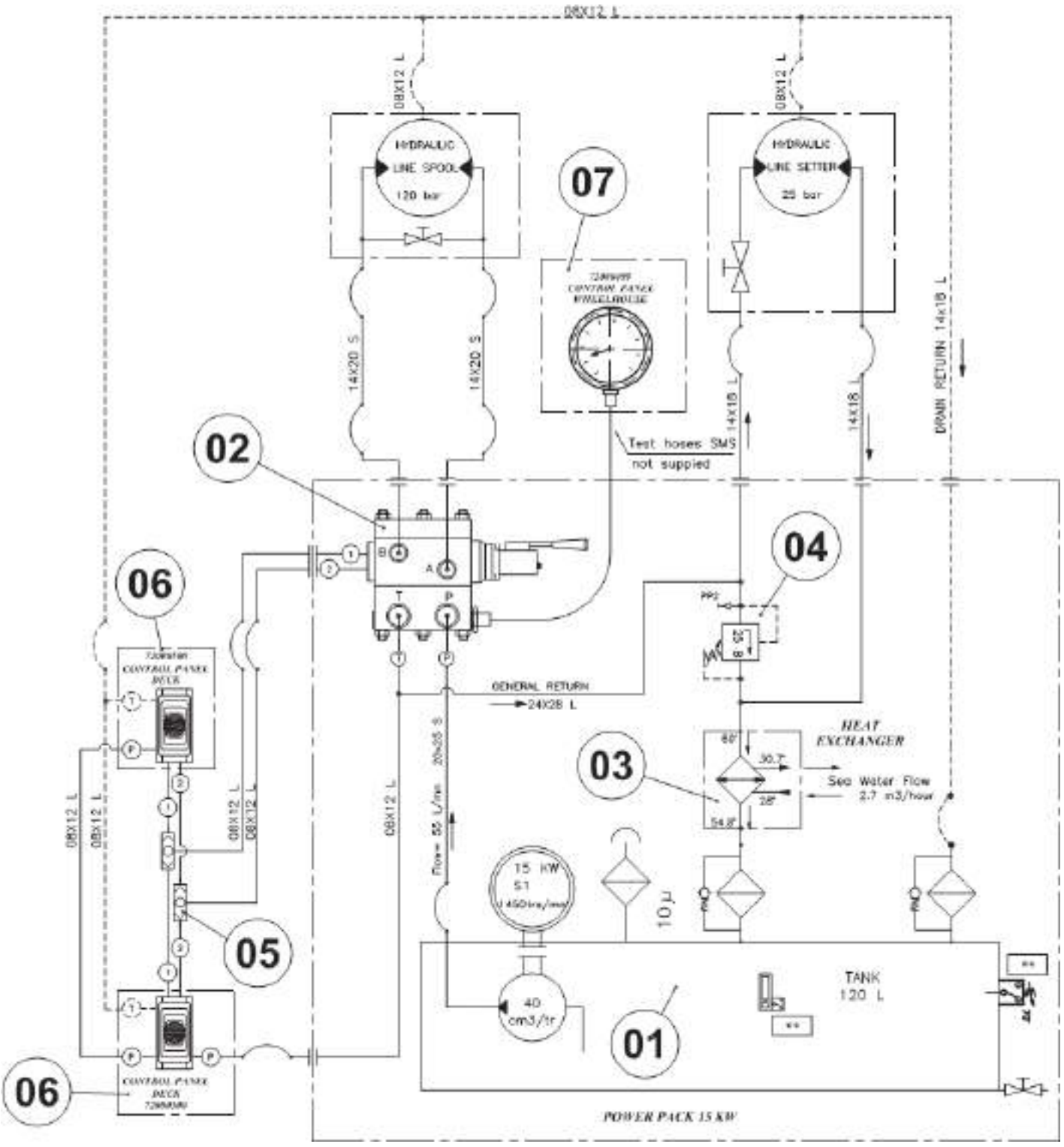

Fig7-30 Fishing Hydraulic System

Doc. Title	Ship Information Handbook		205 / 205
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Doc. Revision & Date	B - 20/05/14		