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WP280-LB

OPERATION MANUAL

APPROVED
This approval covers only ABS requirements and does not include items not required by ABS. Details of this approval are set forth in the ABS letter.
ABS

APPROVED
on behalf of the government of the vessel's registry subject to conditions of ABS letter.
ABS

OWNER 船东	PEGASUS FIRST HOLDINGS LIMITED	HULL No. 工程号	HX2330
BUILDER 船厂	QINGDAO HAIXI HEAVY-DUTY MACHINERY CO.,LTD 青岛海西重机有限责任公司	CLASS 船级社	ABS
TITLE 船名	HEA AL KHATEM	DETAIL DESIGN 详细设计	

DESIGNED 设计	Wang Jian	OPERATION MANUAL 操作手册	DWG No. 文件编号	W3036-102-007	REV.No. 版本号
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Wuhan Marine Machinery Plant co.ltd.
武汉船用机械有限责任公司

目　录

1 GENERAL

1.1 Introduction

The purpose of this manual is to provide guidance for the operating of the HX2330. This manual is not intended to cover all aspects of the S.E.U. operating, and the users of this manual are expected to have the experience and training to apply this guidance.

1.2 Description

1.2. 1 Classification

The HX2330 is a self-elevating unit which is designed in accordance to the latest requirements of American Bureau of shipping (ABS) Guide of Building and Classing of Mobile Offshore Units (MOU) for a S.E.U.（self-elevating unit）as:

ABS, ✠A1, Ⓔ* Self-Elevating Unit, Accommodation Service, ✠AMS,CRC（OC）, CPS, UWILD, HELIDK.

The S.E.U. is designed and built for the offshore oil field service with the max operation water depth of 55 m.

1.2.2 Rules and regulations

The construction of the S.E.U. conforms to the following American Bureau of Shipping and International Marine Organization (IMO) rules and regulations:

- Rules for Building and Classing Mobile Offshore Units-2023.
- IMO Resolution A1023 (26) “Code for the Construction and Equipment of Mobile Offshore Drilling Units” (2009) as amended.
- SOLAS (only applicable for those requirements which ABS MOU guide and IMO MODU Code are referred to)
- The 1988 amendments of The International Convention on Load lines,1966
- International Tonnage Admeasurement 1969
- International Regulation for Prevention of Collision at Sea, 1972 and amendments.
- Performance Standard for Protective Coating of dedicated seawater ballast tanks (PSPC)

- Maritime Agreement Regarding Oil Pollution (MARPOL) 73/78, The latest amendments of the following contents:

  Appendix 1 (Oil)

  Appendix 4 (Sewage)

  Appendix 5 (Garbage)

  Appendix 6 (Air Pollution)

- Crew cabins (work for S.E.U.) to be satisfied with MLC2006 requirement
- CAP437 8th edition
- American Petroleum Institute (API) Specification for Offshore Cranes, API Spec 2C, 8th Edition
- IEC79 for hazardous area classification and IEC92 for electrical installation.

1.2.3 Builder

The S.E.U. is designed by WMMP. The following is a description of the S.E.U.:

Type of S.E.U.	Self-elevating Unit
Class of S.E.U.	ABS
Hull number	HX2330
Builder	QINGDAO HAIXI HEAVY-DUTY MACHINERY CO.,LTD
Location	Qingdao, Shandong, China
Year	2024

1.2.4 Port of registry

The following is a description of the registration of the S.E.U.:

Name	HEA Al Khatem
Owner	PEGASUS FIRST HOLDINGS LIMITED
Flag	PANAMA
Port of registry	PANAMA
ABS number	YY289460
IMO number	1032658
Distinctive number or call sign	3E7734

MMSI	352004250
Loaded/lightship displacement	6287.2 t/ 5180.4 t
Loaded draft	3.2 m

1.3 Main dimensions

1.3. 1 Main hull

Length between perpendiculars	64.20 m
Length including helideck	~80.40 m
Width	35.40 m
Depth of hull	5.60 m

1.3.2 Legs and spudcans

Type of leg	Tubular
Length of legs (include spud can)	85.50 m
Bow to forward legs	10.80 m
Distance centerline aft legs and forward legs	42.00 m
Transverse leg centers	28.40 m
Height of spud can	1.50 m
Footing area of spud can	47.60 m2

1.3.3 Helicopter deck

Heliport	16.63 m
Type of heliport	AGUSTA/WESTLAND AW 139
Maximum take-off weight	6.8 t

1.3.4 Accommodation

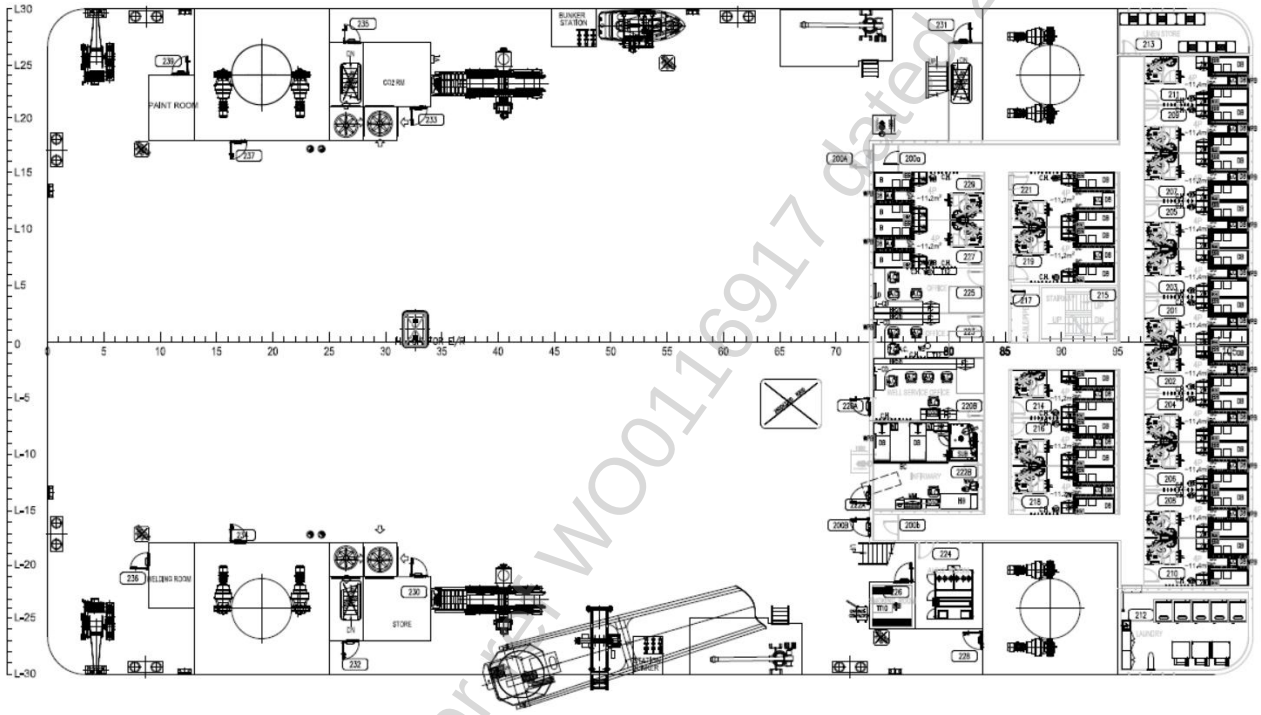
Length of accommodation	20.40 m
Width of accommodation	35.40 m
Height of accommodation	12.3 m
Maximum accommodate	150 P

1.4 Jacking system

1.4.1 Description of the jacking system

1.4.1.1 General

Corresponding to four (4) tubular legs, 48 sets of pinions, rack type jacking units and their jack frames are integrated on this S.E.U..



The jacking system has the following characteristics:

The jacking system is designed /manufactured for:

1) Hull lifting and lowering;

2) Leg lifting and lowering;

3) Activity diagonally preloading;

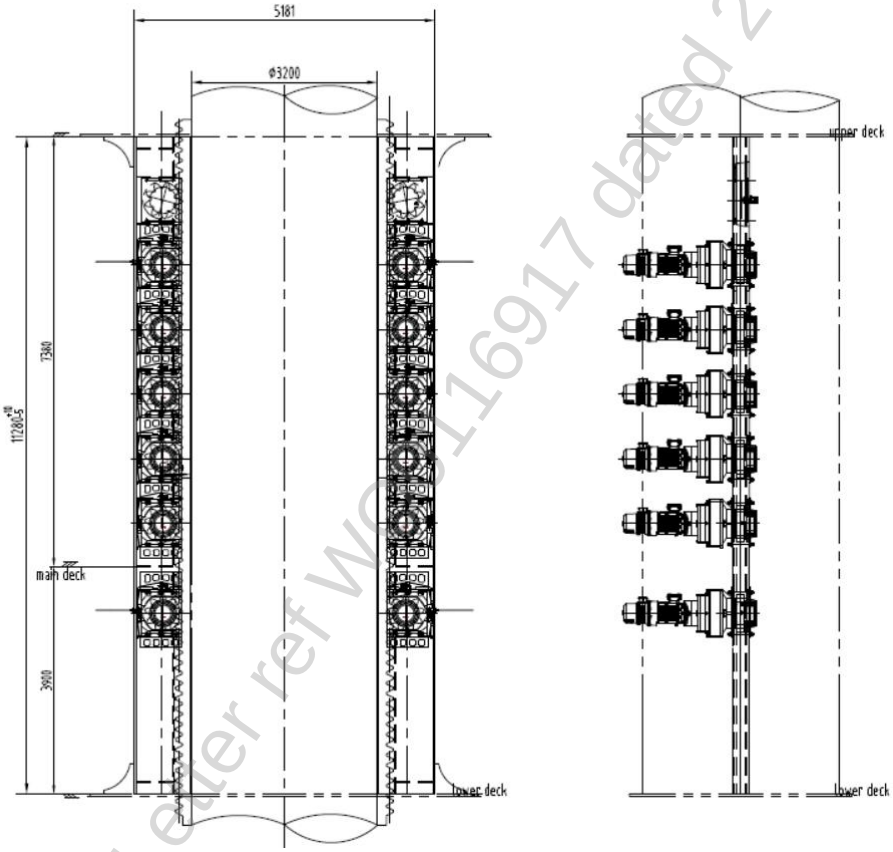
4) Operation/ storm holding.

The jacking units are equally divided into 4 groups and arranged in jack frames,each 12 sets for one leg and arranged to 6 layers.

Each jacking unit includes one electric motor and brake, gear reducer（included pinion），one motor drive one pinion. The pinions are driven by the gear boxes mounted in the jack cases by bolts, which are driven by VFD electrical motors with built-in brake. The gear reducer should be

completely close type with self-lubrication function and observation hole for the oil level. The position of the jacking units could be adjusted by wedges which are installed on upside and left side of the jackcase.

The arrangement of the jacking system is such that in the event of one single failure, jacking can be continued.



1.4.1.2 Characteristics of jacking system

The pinions are driven by the electrical motors and gearboxes, the gear speed reducers are completely close type with self-lubrication function and observation hole for the oil level.

The jacking mechanisms are designed and manufactured for lowering and lifting the unit in the maximum rated normal load condition specified in this operating manual, all the mechanical losses are considered. And the mechanisms are able to withstand the forces imposed on the S.E.U. from the maximum environment criteria for the S.E.U..

The electromagnetic brake should be normal close type with distance switch, temperature switch and wear condition detection switch, using for measure the open or close state of the brake and overheat.

The gear reducer is completely close type, and uses splash system lubrication. And it has a window for observing the oil level.

Each driving unit is modularized, so that upon failure of any one unit, it could be remove from the jack case and prevent an uncontrolled descent of the unit.

1.4.1.3Controls

The electrical control system is a field bus control system based on international famous brand's PLC and VFD to achieve control and monitor function of the jacking system. The motors are driven by frequency converter, which combined with PLC to control the multi-function and safety protection of the jacking system. The whole control system includes central control station, leg control unit, VFD power cabinet, brake resistor cabinet, phase-shifting transformer, local control box, leg junction box and sensors. Each intelligent unit exchanges data and sharing information with field bus.

There are 12 electrical jacking units installed on each leg. Central control station will be provided in bridge room, including gradienter and indicator to control the normal operation of the jacking system. The jacking system can be operated by local control pineland central control console. The jacking speed is not less than 0.6 m/min with full deadweight. Maximum jacking speed should be limited to avoid leg damage and excessive wear during hull lowering.The VFD power cabinet should be located in the AC room, whose temperature is keeping below 40 degrees.Considered the calorific value of the braking resistor cabins in the condition of lowering the unit, the cabins should be arranged in the place so that the heat won't affect the normal operation of other equipment and the temperature of the resistor is controlled under the 280℃.

1.4.2 Technical data of the jacking system

The basic specification parameters of the jacking system are to be listed as follows:

Number of jacking units in each leg	12
Normal jacking capacity of each unit	110ton
Preload jacking capacity of each unit	165ton
Max. normal holding capacity of each unit	165ton
Storm holding capacity of each unit	220ton

Normal jacking life	2000hrs
Preload life	400hrs
Leg jacking speed	1m/min
Hull jacking speed	0.6 m/min
Alarm angle	0.5°
Electric source	AC 690V 50Hz 3 ph

1.4.3 Operating manual

For more information of the jacking system, please refer to HJY-PTS28-1-S-WHSC OPERATION AND MAINTENANCE MANUAL from WMMP.

1.5 Lightship weight

1.5.1 Basic weight Information (legs no sink）

Name	Weight(t)	LCG (to FR.0) (+fwd, -aft)(m)	TCG (to C.L.) (+ P,-S) (m)	VCG (to B.L.) (m)
Light Ship without legs and spud cans	3291.96	35.572	-0.074	8.749
legs and spud cans	1888.44	32.391	0.00	41.795
Light Ship	5180.4	34.413	-0.047	20.796

1.5.2 Basic weight Information (legs sink 10m）

Name	Weight(t)	LCG (to FR.0) (+fwd, -aft)(m)	TCG (to C.L.) (+ P,-S) (m)	VCG (to B.L.) (m)
Light Ship without legs and spud cans	3291.96	35.572	-0.074	8.749
legs and spud cans	1888.44	32.391	0.000	31.795
Light Ship	5180.40	34.413	-0.047	17.150

1) The lightship condition consists of the hull and the installed equipment, the four legs and

spud cans. Four (4) sets of spud cans are buoyant.

2)The legs and spud cans are being stored above the base line of the hull (T.O.C.= 0 m).

3)Cranes are in the stowed position.

4)Leg VCG as started is measured from the base line of hull.

5)In ocean move, the legs and spud cans are lowered 10 m below base line (T.O.C. = 10 m below baseline).

WARNING

The lightship particulars are based on HX2330 lightship weight measurement report W3036-942-002SY REPORT OF INCLINING TEST. Any change in the lightship and variable load values in this manual is revised accordingly.

1.5.2 Lightship components

The lightship weight includes the hull and superstructures, as well as other items of permanent construction, machinery, mechanical equipment, piping, and all other outfitting items that are included in the lightship condition at their wet weight, including water, oil and grease at normal operating level and with the pipes full of liquid.

All major equipment items and lifesaving equipment items are include in the lightship,in their normal position, crane boom stowed, and the anchors racked.

Items intended to be excluded from lightship weight are those items expected to vary during normal operation, such as variable deck load, treated water, sanitary water, potable water, fuel oil, lube oil, brine water, ballast and any other miscellaneous items.

Items specifically excluded from lightship and CG:

1) Fluids in miscellaneous tanks

2) Crews and effects

3) Galley provisions and stores

The lightship value input on the loading forms shall be the one officially approved by the Class Society. In the event of a lightship adjustment, the adjustment value shall be included as deck load in the loading form to reach the correct total lightship, until official approval for the adjustment is obtained. If there are any questions about what the adjustment should be, the engineering department of the Owner must be contacted for further guidance.

All alterations onboard the S.E.U. resulting in lightship changes from the approved value must be recorded. The lightship alterations shall be reported to the S.E.U. Manager, who shall maintain a running file. A record of these alterations shall also be kept onboard.

An alteration can either be a weight added or removed or relocated.

Running totals of the lightship changes shall be record on the lightship alteration forms as deck load until the lightship value is revised by the engineering department of Owner,submitted to and approved by the Class Society.

Date	Name	Weight (tons)	LCG (to FR.0) (+fwd,-aft) (m)	TCG (to C.L.) (+P, -S) (m)	VCG (to B.L.) (m)
2024-07-26	Elevated lightship	3291.96	35.572	-0.074	8.749
	Transit legs and spud cans	1888.44	32.391	0.00	41.795
	Lightship condition	5180.4	34.413	-0.047	20.796
	Added weight				
	Remove weight				
	Relocated weight				
	Elevated lightship				
	Transit legs and spud cans				
	Lightship condition				

Added weight list							
Name	Weight (t)	VCG above BL		LCG from AP		TCG (PS+,SB-)	
		Arm (m)	Moment (t*m)	Arm (m)	Moment (t*m)	Arm (m)	Moment (t*m)

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Sum (+)							

Removed weight list							
Name	Weight	VCG above BL		LCG from AP		TCG (PS+,SB-)	
	(t)	Arm (m)	Moment (t*m)	Arm (m)	Moment (t*m)	Arm (m)	Moment (t*m)
Sum (-)							

Relocated weight list							
Name	Weight	VCG above BL		LCG from AP		TCG (PS+,SB-)	
	(t)	Arm (m)	Moment (t*m)	Arm (m)	Moment (t*m)	Arm (m)	Moment (t*m)
Initial state							
Sum1							
Operation state							
Sum2							
Total (sum2-sum1)							

CAUTION

All alterations and repairs are subject to the same Class requirements specified for the initial construction of the S.E.U.. Class approvals and inspections maybe required for the alterations or repairs.

1.6 Corrosion protection

All the steel plates are protected by good coating and all the structures can be checked through the structure access. For more information about the structure access, please refer to W3036-266-02_STRUCTURE ACCESS MANUAL.

2 DESIGN CRITERIA

2.1 Environmental criteria

2.1.1 Storm condition

Water depth (m)	25
Max. wave height (m)	8
Wave period (s)	10.2
Wind velocity (m/s)	51.5
Current velocity at surface (m/s)	1.5
Current velocity at mud line (m/s)	1.03
Air gap (m)	9
Total elevated load (excluding legs, t)	3691.96
Penetration depth (m)	3
Maximum hull elevation (air gap + water depth, m)	34

2.1.2 Maximum operating condition

	Operation1	Operation2	Crane working
Water depth (m)	55	30	43
Max. wave height (m)	6.3	6.3	5
Wave period (s)	7	8.3	7
Wind velocity (m/s)	25.7	36	15.5
Current velocity at surface (m/s)	0.77	0.77	0.77
Current velocity at seabed (m/s)	0.26	0.26	0.26
Air gap (m)	13	15	25
Total elevated load (excluding legs, t)	4291.96	4291.96	4291.96
Penetration depth (m)	3	3	3
Maximum hull elevation (air gap + water depth, m)	68	45	68

2.1.3 Maximum allowable transit/ tow condition

Maximum allowable draft (m)	3.2
Displacement (t)**	6287.2
Wind velocity	20knots
Wave height	2m

** Note：

Allowable vertical center of gravity value (AVCG) as per section 7.2.

Legs sink 10 m for ocean move.

2.1.5 Maximum allowable condition for the jacking-up and/or jacking down operations

Design wind speed (1 minute mean speed, m/s)	10.3
Maximum wave height (m)	2.0
Current speed – at surface (m/s)	1.03
Current speed – at bottom (m/s)	0.00
Leg & spud can weight (t)	1888.44
Maximum allowable weight for hull (excluding legs, t)	4291.96
Displacement** (t)	6180.4
Associated draft of the hull (m)	3.16
Maximum allowable trim	0.5° (0.433m)
Maximum allowable heel	0.5° (0.309m)

** Note:

Before jacking-up operation, variable load should be reduced to 1000 t as per section 7.3.2 form for elevated (normal operating).

CAUTION

The maximum air gap should not be greater than 25m in any case.The maximum leg length underneath the hull (air gap +water depth+Penetration) should not be greater than 71 m in any case.

2.1.6 Design temperature

Ambient temperature	0 ℃ ~ 50 ℃
Sea water temperature	0 ℃ ~ 35 ℃

Note: Materials of hull structure, leg structure and jacking system are to be designed 0 ℃.

2.2 Variable load

2.2.1 Definition

The variable load of the S.E.U. includes:

(1) Personnel and their effects, supplies, stores, and spare parts.

(2) Liquid onboard for operation, such as fuel oil, lubricate oil, fresh water, ballast water,etc.

(3) Any temporary equipment.

2.2.2 Variable load capacity

The maximum variable load at each condition is as follows:

	variable load (tons)	LCG (to FR.0) (+fwd,-aft) (m)	TCG (to C.L.) (+P, -S) (m)	VCG (to B.L.) (m)
Afloat condition (field move & ocean move)	1000 t	24.26	0.03	4.04
Elevated condition (during jacking up/ down)	1000 t	21.88	0.35	4.11
Jacked up operating condition	1000 t	21.87	-0.18	4.77
Jacked up survival condition (storm condition)	400 t	18.50	-0.73	1.70

Note:

Locally, on the main deck, the design load is 5.0 t/ m2.

Design Loads for deck loads are as follows:

Main deck area	5.0 t/ m^2
Storage area	1.325 t/ m^2
Machinery area	2.0 t/ m^2
Muster area/ top of accommodation	0.46 t/ m^2
Accommodation area/ passage & walkway	0.46 t/ m^2
Work area	0.92 t/ m^2

For more information about deck loads, please refer to W3036-103-010_DECK LOADING PLAN.

2.2.3 Helideck

The helideck is designed according to CAP437 8th edition.

The helideck is designed according to the following helicopter models:

AGUSTA/WESTLAND AW 139, MTOM=6.8T, D-VALUE=16.63M.

If other helicopter models need to land on this Helideck, the MTOM should be less than 6.8 t and D-VALUE must be less than 16.63 M.

3 OPERATIONAL CRITERIA AND LIMITATIONS

3.1 Afloat condition

3.1.1 Field move

The Captain of the S.E.U. shall have in his possession, and shall adhere to the specific rules or local requirements that are applicable to the area of the move.

CAUTION

No field move shall be conducted should the predicted weather exceed the following limits:

Wind speed: 20 knots

Draught: 3.2 m

Whenever possible, the anticipated duration of the field move, plus the elevating process should not exceed the predicted weather window. However, should, for any reason, the anticipated duration of the entire move, exceed the predicted weather window, the route shall be planned to ensure that the major portion of the move is in a water depth that does not exceed 55 m sand permits a safe jacking operation.

The Captain shall always minimize the time the S.E.U. remains in a water depth that exceeds 55 m.

The Captain shall have the liberty to reduce the above criteria, should any condition deteriorate. It shall be ascertained that:

1) The total displacement and vertical position of the center of gravity shall comply with:

a. The ABS load lines (summer freeboard 2.408 m).

b. The limits provided in the hydrostatic tables (as shown in section 7.1) and maximum allowable KG chart (as shown in section 7.2).

2)The horizontal weight distribution shall ensure that the static trim does not exceed

321 mm.

The maximum allowable difference between forward and aft marks is 248 mm.

3)The horizontal weight distribution shall ensure that the static heel angle does not exceed 0.2 degree.

The maximum allowable difference between PS and SB marks is 124 mm.

4)All watertight openings on the main deck are to be secured watertight.

Ventilators installed height greater than 4.5 m above main deck are to be kept open and ventilators installed height less than 4.5 m above main deck are to be kept weathertight during navigation.

For the engine room, all manual controlled weather tight louvers (installation height is greater than 4.5 m above main deck) used as air supply (fitted at the top of supply fan room) and air exhaust (fitted at the top of exhaust fan room) should be kept open,and two sets of air supply fans respectively installed on PS and SB should be adjusted according to the use of main diesel generator sets in the engine room, in this case, the ventilation capacity shall be capable of the maximum supply air volume. Two sets of air exhaust fans respectively installed on PS and SB shall be used for air exhaust of engine room.

5）All watertight doors below main deck levels are to be secured closed.

6)The submersible pumps shall be raised onboard and hoses shall be secured.

7)Any heavy equipment shall be stowed in its designated location and secured.

8)Ascertain the position of the four legs utilizing the leg marks and calculate the corresponding draft. Verify that the legs are in their correct position relative to the guides. If required, a temporary sea fastening of the legs should be installed.

3.1.2 Ocean move/ towage (legs sink 10 m)

The feasibility of any ocean move shall be studied, in accordance with:

1) The route

2) The duration

3) The season

Further to this study, particular requirements shall be determined by the designer, for example:

1)The maximum allowable displacement

2)The position of the legs and sea fastening

CAUTION

No ocean move/ towage shall be conducted should the predicted weather exceed the following limits:

Wind speed: 20 knots

Draught: 3.2 m

It shall be ascertained that:

1)The total displacement and vertical position of the center of gravity shall comply with:

a. The limits provided in the hydrostatic tables (as shown in section 7. 1) and maximum allowable KG chart (as shown in section 7.2).

2)The horizontal weight distribution shall ensure that the static trim does not exceed 321 mm.

The maximum allowable difference between forward and aft marks is 248 mm.

3)The horizontal weight distribution shall ensure that the static heel angle does not exceed 0.2 degree.

The maximum allowable difference between PS and SB marks is 124 mm.

4)All watertight openings on the main deck are to be secured watertight.

Ventilators installed height greater than 4.5 m above main deck are to be kept open

and ventilators installed height less than 4.5 m above main deck are to be kept weathertight during navigation.

For the engine room, all manual controlled weather tight louvers (installation height is greater than 4.5 m above main deck) used as air supply (fitted at the top of supply fan room) and air exhaust (fitted at the top of exhaust fan room) should be kept open,and two sets of air supply fans respectively installed on PS and SB should be adjusted according to the use of main diesel generator sets, in this case, the ventilation capacity shall be capable of the maximum supply air volume. Two sets of air exhaust fans respectively installed on PS and SB shall be used for air exhaust of engine room.

5)All watertight doors below main deck levels are to be secured closed.

6)The submersible pumps shall be raised onboard and hoses shall be secured.

7)Any heavy equipment shall be stowed in its designated location and secured.

8)Ascertain the position of the four legs utilizing the leg marks and calculate the corresponding draft. Verify that the legs are in their correct position relative to the guides. If required, a temporary sea fastening of the legs should be installed.

For more information of towing arrangement, please refer to W3036-222-001 TOWING EQUIPMENT ARRANGEMENT.

3.2 During jacking up/ down

Verification check should be conducted before the S.E.U. is elevated/ lowered.

Ascertain the load on each leg, by reference to the leg load measuring system.

The maximum allowable static load on one leg is 1320 t.

The max allowable static load ratio between two legs is 1.2 .

The maximum allowable weight shall not exceed 4291.96 t (excluding legs and spudcans）

Ascertain that the S.E.U. is level, by reference to the trim indicators.

The maximum allowable angle is 0.5 degree (trim ±0.433m,heel ±0.309m)

CAUTION

Do not attempt to elevate the S.E.U. if the static load on any leg exceeds 1320 t.

3.3 Buffer tank

Water stored in the buffer tank is not to be less than 40 m^3 before unit lifting or lowering.

Refer to ABS approved drawing: W3036-463-01_DIAGRAM OF WATER COOLING PIPING SYSTEM, 40 m^3 stored in the buffer tank for firefighting system, Considering of volume allowance, sea water stored in the buffer tank is 50 m^3.

CAUTION

The seawater in buffer tank shall not less than 50 m^3 before jacking operation.

3.4 Jack up operating condition

The following checks should be conducted before the elevated unit is in the operating condition.

The total displacement of the S.E.U. shall not exceed 4291.96 t (excluding legs,including the crane load), meaning that the addition of the four weights given by the four load indicators shall not exceed 4291.96 t.

The center of gravity of the S.E.U. (excluding legs) should be adjusted to near x=32.4 and Y=0. Calculate table reference 7.3.2.2.

The maximum allowable departure of the center of gravity in X direction is -0.5m~0.5m.

The maximum allowable departure of the center of gravity in Y direction is -0.3m~0.3m.

The difference between any two weights given by the load indicators shall not exceed 200.0 t.

Periodic checks should be conducted whilst the elevated unit is in the operating condition.

Ascertain the load on each leg, by reference to the leg load measuring system

The maximum allowable pay load of each leg to be restricted to 1860 t.

Ascertain that the S.E.U. is level, by reference to the trim indicators.

The maximum allowable angle is 0.5 degree.

CAUTION

Following completion of the preloading procedure, it is considered that the leg penetration will remain static. Any alarm activation, will indicate that the maximum angle of trim has been exceeded and that the penetration of one or more legs has increased. All operations shall be aborted and the S.E.U. shall be lowered down to the water. The preloading sequence must then be repeated.

Ascertain that, at any time, the S.E.U. can be elevated to the survival condition within four hours.Due attention shall be given to the operating condition criteria, as shown in chapter 3.

Should a weather forecast exceed the operating conditions, all the instructions required under survival conditions shall be applied.

CAUTION

The air gap between the still water level and the bottom of the hull shall not be Correct value （as shown in section 2.1.2）.

CAUTION

At operating locations where securing and seabed conditions may cause eccentric effect due to uneven bottom bearing, the operator/ Owner shall take measures to avoid uneven bearing under spud can.

3.5 Jack up survival condition

The total displacement of the S.E.U. shall not exceed 3691.96 t (excluding legs), meaning that the addition of the four weights given by the four load indicators shall not exceed 3691.96 t.

The center of gravity of the S.E.U. (excluding legs) should be adjusted to near x=33.72 and Y=0. Calculate table reference 7.3.2.2.

The maximum allowable departure of the center of gravity in X direction is -0.3m~0.3m.

The maximum allowable departure of the center of gravity in Y direction is -0.2m~0.2m.

The difference between any two weights given by the load indicators shall not exceed 55.00 t.

The air gap between the lowest still water level and the bottom of the hull shall be 9m. This must be verified for the intended location/ area according to weather for survival condition.

All watertight doors and openings through the main deck shall be closed securely.

All heavy equipment on deck shall be stowed and duly sea fastened.

CAUTION

All miscellaneous equipment, with particular applicability to cranes, shall be stowed to provide the minimum resistance to the wind.

- **Check the emergency power supply.**
- **When the S.E.U. is operating in the elevated condition in more than 25.0 m of water depth, weather forecast monitoring shall be maintained, in order to ensure that the S.E.U. can be safely jacked down, moved to a location that water depth is not more than 25.0 m and jacked up to an air gap of 9.0 m.**
- **The S.E.U. is not allowed going to any areas with wind exceeding 100 knots**

3.6 Limiting conditions of temporary mooring system

The set of anchoring equipment located in the SB at the bow will be used as temporary mooring purpose. Guidance for the normal operating limitations of the winch should be referred to OPERATION AND MAINTENANCE MANUAL from WMMP.

If a propulsion failure occurs during ocean move, the Captain should make judgments based on the situation and give orders to deploy the temporary anchor and activate the bow and stern thruster to maintain the position as appropriate.

When the S.E.U. is anchored for periods longer than 21 days, additional means of anchoring or external assistance such as a stand-by towing vessel will need to be provided.

3.7 other limitations

3.7.1 Limiting conditions of helideck

The maximum take-off mass of the helicopter is 6.8 t.

The helicopter shall not takeoff and land during crane operations.

The helicopter shall not takeoff and land during jacking operations.

The helicopter shall not takeoff and land during preloading operations.

The helicopter shall not takeoff and land when the S.E.U. is afloat.

Once caught fire on the helideck or supporting structure, the helideck should undergo a structural analysis to determine its suitability for further use.

3.7.2 Limiting conditions of crane operations

3.8.2.1 General operational limitations

Guidance for the normal operating limitations of crane operations regarding the load, angle and reach are shown in the specific CRANE OPERATIONS MANUAL and the relevant crane load charts.

3.7.2.2 Additional operational limitations

Additional guidelines shall be adhered to as follows:

1) The wind limits of the cranes are as follows:

Main Crane – 15.5 m/s

Aux. Crane – 15.5 m/s

Neither should the cranes be used in wind speed in excess of the above nor should they be used in wind speed in excess of field operational limits. The Crane operator at all times has the final decision on whether or not to operate the cranes.

2) The cranes shall not be used during helicopter operations.

3) The cranes shall not be used during jacking operations.

4)The cranes shall not be used during preloading operations.

5) The auxiliary hook of the main crane can be allowed to use for man riding transfer when the S.E.U. is Elevated.

4 S.E.U. MOVE PROCEDURE

WARNING

Any operation of the S.E.U. approaching the design criteria and operational limitations presented in this manual is to be checked in a site specific assessment.

4.1 Introduction

4.1.1 General description

This chapter describes a complete jacking operation, i.e. from the elevated situation on one location, through the procedures of hull lowering, leg lifting, repositioning of the S.E.U., leg lowering, preloading and jacking to the elevated position on the next location.

It includes checks, precautions and logs that are related to the actual jacking operations.

For limitations details, see chapter 3.

For more information about jacking system and specific operation guide, please refer to HJY-PTS28-1-S-WHSC OPERATION AND MAINTENANCE MANUAL from WMMP.

4.1.2 Responsible person

Before the S.E.U. move starts, there must be trained and competent personnel who are responsible for the jacking operation and to check all stability calculations before jacking started.

4.1.3 S.E.U. move report

The format of the S.E.U. move report will vary per company, but the basic contents noted are:

1)Premove information, site information for present and next location includes coordinates, water depth, seabed condition, expected penetration and any other relevant information.

2) Sailing information such as distance between locations, estimated sailing time.

3)Information of personnel onboard during the move: names of personnel, their responsibilities and duty stations.

4)Weather forecast.

5)Report on S.E.U. inspection to move.

6)Load sheet, includes variable load onboard, calculation center of gravity, stability verification, etc.

4.1.4 Log of actual move

This part of the report covers the actual operation and contains information, such as: Time record of operation, actual draft, trim and corrections made departure and arrival on site, weather data events, any requirement to be met prior to the next S.E.U. move operations.

4.2 Preparations for S.E.U. move

4.2.1 Check on variable load onboard

During the jacking operation, the center of gravity of the elevated weight will be within a certain area (see chapter 3.2).

The liquids onboard are arranged in such a way that a minimum of free surface areas in tanks is obtained when the S.E.U. is afloat, i.e. tanks are arranged to be either full or empty as much as possible.

4.2.2 Premove inspection

The equipment directly involved in the S.E.U. move operation is to be inspected, such as: Jacking system, submersible hose reel, cooling water supply system, instrumentation,lifesaving appliance, alarm & warning system, and thrusters.

Any required cleaning, adjusting, lubricating (especially between rack and pinions/guide), etc. is to betaken care of.

4.2.3 Preparations for floating condition

All preparations for the floating condition are made, such as: Watertight doors and

hatches are closed, loose equipment is properly stowed and crane booms are fastened on the boom rests.

4.2.4 Assignment of personnel

All personnel involved in the jacking operation are assigned to their duty stations.

4.2.5 Final weather checks

The actual weather and sea state conditions as well as the forecast are to be within the design conditions for operation.

4.2.6 Premove task list - Captain

The Captain shall:

1) Assemble all charts, weather forecast information and data for the planned route of the move.

2) Assemble all data for the next location.

3)Ensure receipt of the S.E.U. mooring procedure/ approach procedure.

4)Recalculate loading conditions (using sample loading conditions) and stability calculations and verify if everything is safe/ within acceptable limits. Please refer to section 7.3 in this operating manual.

5)Request a diving and geotechnical survey of the new location when required. The position and direction of all pipelines should be marked utilizing two location buoys, if required. The Captain shall request to receive a written report of any obstruction or abnormality on the seabed at the new location.

6)Check the navigation lights and day shapes.

7)Check the VHF radios, telephone and public address system.

8)Assign personnel to key locations and brief accordingly.

9)Ensure good interdepartmental communications are maintained.

10) Complete a jacking panel function test for lamps and alarms.

11) Ascertain that the weight distribution on the S.E.U. is within the acceptable limits of the jacking system.

12) Ensure that the wave height is suitable for the jacking operation in accordance with the operating manual (as shown in section 3. 1).

13) Ascertain that all designated personnel check lists have been completed.

Watertight hatches and doors shall remain securely closed, with all dogs on, at all

times whilst the S.E.U. is afloat (as shown in section 4.2.3).

4.2.7 Premove task list - Captain

Date_____ Time_____

1.Is jacking panel function tested? (Lamp/alarm test): Yes ☐ No☐

1.1 Motors' alarms for:

a.Supply defect On ☐ Off ☐

b.Overload temperature rise On ☐ Off ☐

c.Brakes defects On ☐ Off ☐

1.2 Weight distribution on each leg:

Leg No.1 _____t

Leg No.2 _____t

Leg No.3 _____t

Leg No.4 _____t

1.3 Trim/heel inclination:

XX _____m

YY _____°

1.4 WT doors "closed/ open" indicator light of:

Door No.1 On ☐ Off ☐

Door No.2 On ☐ Off ☐

Door No.3 On ☐ Off ☐

Door No.4 On ☐ Off ☐

Door No.5 On ☐ Off ☐

Door No.6 On ☐ Off ☐

Door No.7 On ☐ Off ☐

Door No.8 On ☐ Off ☐

Door No.9 On ☐ Off ☐

1.5 Last time inspection of brake discs. (Date): _____

See Chief engineer pre-move check list

2.Date for the next location: _____

2.1Weather forecast for prospected duration of move:

Max significant wave height：2 m qualified☐ unqualified☐

Max wind speed：20 knots qualified☐ unqualified☐

Max current speed：2 knots qualified☐ unqualified☐

2.2 How many hours of weather window is required for the move? _____

2.3 If weather window is not sufficient for the final destination, is the " STBY position" determined? Yes☐ No☐

2.4 Is S.E.U. orientation diagram received? Yes☐ No☐

2.5 Sea bottom survey is received and analyzed. Yes☐ No☐

3.Radio and navigation equipment check-up

3.1 Navigation charts oilfield charts for the S.E.U.'s move are assembled. Yes☐ No☐

3.2 Navigation lights and day shapes checked. Yes☐ No☐

3.3 Communication means tested and found OK.

a. VHP radio Yes☐ No☐

b. PA system Yes☐ No☐

c. SPT telephone Yes☐ No☐

3.4Navigational equipment tested and ready:

a. Gyro compass Yes☐ No☐

b. Magnetic compass Yes☐ No☐

c. NDB system Yes☐ No☐

d. Radars (PS & SB) Yes☐ No☐

e. GPS Yes☐ No☐

4. Others

4.1 Is load condition form completed? Yes☐ No☐

4.2 Actual variable load_____（Max allowable for jacking up or down is 1320 t）

4.3Afloat stability calculation is made Yes☐ No☐

(See stability calculation sheets.)

Max allowable difference between:

fore and aft 0.321 m

PS and SB 0.124 m

4.4 Are WT openings on the MD and BMD secured watertight? Yes☐ No☐

i.e. Tank manhole covers, all WT doors and hatches

4.5 Is entry into deck logbook made in regard of all WT doors & hatches closure? Yes☐ No☐

4.6 Has announcement been made, prior to the commencement of jacking down?

Yes☐ No☐

4.7 Has Chief engineer done his pre-move check and has it been registered in deck logbook?

Yes☐ No☐

4.8 Has Chief Officer done his pre-move check and has it been registered in deck logbook?

Yes☐ No☐

4.9 Is hull integrity check done at 1 .5 m draft? Yes☐ No☐

4.10 Are propulsion motors tested? Yes☐ No☐

4.11 Are the bow thrusters tested? Yes☐ No☐

4.12 Is S.E.U. ready for jacking procedure and the move? Yes☐ No☐

Captain_____ Signature_____

4.2.8 Premove task list - Chief Officer

The Chief Officer shall:

1) Ensure that all movable equipments on the S.E.U. are secured.

2) Confirm that the submersible pumps have been raised onboard and the hoses are secured on deck.

3) Ascertain that all the pump valves are closed.

4) Inspect all void tanks to ascertain that they are empty, and rechecked for integrity at 1.5 m draft.

CAUTION

Whilst making along move, all void tanks shall be regularly checked for ingress of seawater.

Should any ingress be found, the appropriate action shall be instigated.

5) Check the legs above and below the hull are free of obstructions.

6) Ensure that the cranes are stowed and secured.

7) Ensure that all watertight doors, hatches and openings on the S.E.U. have been closed and all dogs are on.

8) Report to the Captain that all the above items have been checked and confirm with a signed notation in the logbook.

4.2.9 Premove check list - Chief Officer

Date_____ Time_____

1. All WT doors, hatches and opening on the S.E.U. have been closed and all dogs are on.

Yes☐ No☐

2.All movable equipments on the S.E.U. are secured. Yes☐ No☐

3.Towing gear has been inspected and is ready. Yes☐ No☐

4. Anchor checked and ready for deployment. Yes☐ No☐

5. S.E.U. is in seagoing position. Yes☐ No☐

6. Submersible pumps are removed and secured. Yes☐ No☐

7. All pump valves are closed. Yes☐ No☐

8. All void tanks are inspected for fluids. Yes☐ No☐

9. Legs above and below hull are free of obstructions. Yes☐ No☐

10. Cranes are secured in seagoing position. Yes☐ No☐

11. Greases and nozzles are available at each leg. Yes☐ No☐

12. Report to the Captain has been made. Yes☐ No☐

13.Results of premove checking are noted in the logbook. Yes☐ No☐

14. S.E.U. is ready for jacking procedure and for the move Yes☐ No☐

Chief Officer_____ Signature_____

4.2.10 Premove task for Chief engineer

The Chief engineer shall:

1) Check the generators and main electrical functions.

2) Check the jacking equipment and verify the brakes are correctly set,please refer to HJY-PTS28-1-S-WHSC OPERATION AND MAINTENANCE MANUAL.

3)Check the weight distribution on the pinion of each leg.

4) Adjust the torque on each gear train as required.

5) Raise the submersible pumps onboard and secured the hoses on deck.

6) Ascertain that the oil levels in jacking motor gearboxes are correct.

7) Report to the Captain that all the above items have been checked and confirm with a signed notation in the logbook.

NOTE：

Reference shall be made to OPERATION AND MAINTENANCE MANUAL from WMMP for details of the jacking system.

4.2.11 Premove task for Crane operator

The Crane operator shall ensure that:

1) The cranes are stowed in sea fastening position.

2) There is no load applied to crane’s hook.

3) Any cargo lifted immediately before preparing to move the S.E.U. has been properly stowed/ sea fastened as required.

4.3 Lowering the hull to floating condition

4.3.1 Procedures before hull lowering

Before the commencement of hull lowering operation, the following procedures are to be performed:

1) Ensure that main generator sets are on line with:

a. When the hull is above the water level: Minimum combined electrical capacity of 3.6 MW + stand-by generator, and:

b. When the hull is in the water: Minimum combined electrical capacity of 3.6 MW + stand-by generator.

2) Confirm that the load on the mechanisms is satisfactorily distributed between pinions.

3) Confirm that the weight is correctly distributed on four legs.

4) Confirm that the weight shall not exceed 4291.96 t (excluding legs and spudcans）

4.3.2 Hull lowering

Commence lowering the hull. During lowering, intermediate stoppage may be necessary for checking of the proper functioning of the jacking system. This operation must be performed at a low speed.

In general, do not interrupt the lowering procedure of the S.E.U. between the moment that the S.E.U. touches water and the moment that the S.E.U. is afloat.

On reaching about 1.5 m water draft, allow to stop jacking and confirm watertight integrity of all tanks and spaces before continuing jacking to floating draft.

4.3.3 Thruster system

Before entering the wave zone (air gap approx. 2 m), the Captain is to verify that the propulsion system is ready for operation（power on the equipment, check if the steering of the Azimuth thruster and the pitch adjustment function of the Bow thruster are normal, and make sure whether there are any fault alarms. Ensure that there are no issues before floating.）.

4.3.4 Leg pulling/ lifting

WARNING

When the Penetration depth is large (≥ 5m) or the leg pulling is difficult, the leg pulling operation should be carried out at or near high flat tide to prevent serious accidents such as lifting system failure, etc. in emergency situations, which may cause the S.E.U. to be unable to jack up normally and lead to flooding of the main deck due to rising tide.

The lowering operation is again continued until the hull is at free-floating draft（Note the hull " free floating " draft, defined as the draft when there is no load on the jacking system, changes with the water depth since the legs are buoyant.）. The thruster system is on stand-by mode. When the hull is afloat, the legs are pulled free from the seabed.

If the legs do not released, the jetting system should be utilized to loosen the areas around the spud cans. In areas where leg extraction is expected to be difficult, it is a good practice to utilize the jetting system prior to leg pulling, i.e. once the S.E.U. is at floating draft.

Pulling legs in diagonal pairs. As soon as any abnormal inclination(≥0.5°) is observed on the inclinometers, the leg pulling is stopped and the S.E.U. is to be leveled. After leveling, leg pulling is to be started again.

WARNING

The Jetting system needs to be regularly maintained during floating, dock repair and leg **pulling end to ensure that the pump and pipeline are intact and prevent the pile flushing pipe from being blocked by mud, sand, and stones; Before leg lowering and hull elevating, the jetting system should be checked to verify it is intact.**

Although these activities may add times taken to depart location, they are necessary to reduce the possibility of any damage to the S.E.U. or facility.

If one or more of the legs are still stuck in the seabed, the other leg(s) is (are) to be kept on the seabed in order to prevent the possible rotation of the hull, which could induce twisting of the leg(s).

The max. allowable load per leg should not exceed 1860t and when leg pulling and the

max. Trim should not exceed 0.5 ° (0.433m) and max. Heel should not exceed 0.5 ° (0.309m).

At no time it is permitted to try and release the legs by thrusters or winches to move or turn the S.E.U.. This imposes unacceptable stresses on the legs and jacking system with a high risk of spud can damage.

When all four legs are free (i.e. only resting on the seabed), the thrusters are activated with the control system on manual. All four legs are elevated and when the S.E.U. is at a safe distance from nearby structure.

4.3.5 Preparations for sailing

When the S.E.U. is afloat, it can sail on its own power to the next location.

4.4 Leg lowering and hull elevating

4.4. 1 Procedures before leg lowering

When the S.E.U. arrives at the new location, preparations for the actual jacking operations start:

1) Ensure the proper functioning of the propulsion system for maneuvering the S.E.U. near to the platform.

2) Ensure that main generator sets are in line and it needs minimum combined electrical capacity of 2.4 MW.

3) Ensure buffer tank is filled to 50 m^3.

4)Maximum jacking load 4291.96 t is to be checked, and maximum total allowable elevated weight is to be checked.

5)The center of gravity of the elevated weight is to be checked and, if necessary, by shifting variable load, adjust to make sure the inclination angles are less than 0.5° on both two horizontal perpendicular axes.

6)The jacking crews are assigned to their stations.

7)All warning and alarm systems are checked on proper functioning.

4.4.2 Leg lowering

Provided the actual environmental conditions and the forecast are acceptable for the operation, the jacking operation can start. The legs are lowered down to approx. 3 to 5 m above the seabed.

4.4.3 Final positioning

The lowering of the legs is stopped and the final positioning of the S.E.U. is performed.

4.4.4 Legs lowered onto the seabed

In general, the legs are lowered onto the seabed simultaneously. If straddling pipeline or close to pipelines, two or more legs (clear from the obstructions) may be lowered first, then position confirmed by a diver before lowering the others. During this operation the inclinometers are continuously observed and the S.E.U. is kept level within the acceptable range.

4.4.5 Pre-jacking

The S.E.U. is begun to lift out of water by four legs, whilst the draft is decreasing.

When the draft reaches about 1.5 m, the jacking procedure should be paused, then inspect all void tanks to ascertain that they are empty, and recheck for integrity.

4.4.6 Hull lifting to preload position

According to the seabed conditions, in order to ensure the safety of the platform after jacking from the water surface, the platform can be preload in stage 1 before the platform is completely out of the water (such as when the platform's draft remains 0.5-1m),and the tilt of the platform must be leveled (< 0.2° ,trim ±0.173m,heel ±0.124m) before preloading;

The S.E.U. is lifted out of water to the preload position (air gap of 1.5 ~ 2.5 m), to ensure that the hull bottom not to be stroked by waves.The tilt of the platform must be leveled (< 0.2°) before preloading;Then the platform can be preload in stage 2 & 3.

For more information of the jacking system, please refer to HJY-PTS28-1-S-WHSC OPERATION AND MAINTENANCE MANUAL from WMMP.

4.5 Preloading

4.5.1 Preloading procedure

Before the preloading procedure, the center of gravity of the S.E.U. should be adjusted to near x=32.4 and Y=0. Calculate table reference 7.3.2.2.

The four legs are preloaded in diagonal pairs. As soon as any abnormal inclination is observed on the inclinometers, the preloading is stopped and the S.E.U. is to be leveled. After leveling, preloading is to be started again.

The jacking capacities as per section 1.4.2 are available per leg.

The preloading is divided into 3 stages, each stage corresponds to 75%, 90% and 100% of the preloading load respectively.

Diagonal preloading is allowed up to a maximum load of 1860 t per leg at jacking system level.

To achieve this maximum preload, the elevated weight should range from 3920 (1860*2 +200) t to 4291.96t.

For preloading legs 1 & 4, switch to preload mode, jacking hull on legs 1 & 4 slightly, which will bring the major part of the elevated weight on legs 1 & 4 themselves. Stop when the load indicators of legs 1 & 4 have reached the required preload.

In case load on leg 1 & 4 is not distributed equally, the S.E.U. has to be leveled before preloading may resume.

In case penetration is encountered during preloading, the preloading process is to be stopped. The S.E.U. is to be leveled before preloading may resume.

After preloading of legs 1 & 4, legs 2 & 3 will be preloaded in the same way.

4.5.2 Duration of preloading

The full amount of preload is maintained for a certain period depending on the type of seabed encountered. Soil mechanical reports made prior to the move will define this period.

Generally, at least 15 minutes maintenance is required for confirmation.

4.5.3 Sudden penetration

The following steps should be undertaken in the event of a sudden penetration (punch through) of one leg:

1) The hull is to be leveled by means of lowering of the hull at the non-penetrated legs.

2) Legs, in way of guides, should be visually checked for any structural distortion or cracking. This checking is also to be done on the jacking system.

3)Re-assess the location. Either resume preloading operations or make preparations for a move to another location.

4.6 Elevating to required air gap

Before jacking is commenced it is to be verified that the S.E.U. is in line with jacking limitations as per section 3.2.

The hull is elevated to the required air gap, i.e. the operational height. During this operation the hull is to be maintained level within the predefined margin.The maximum speed of platform jacking is 0.6 m/min.

4.7 Sea water supply

Put the submersible pump immerse in seawater and the immersion of the pump should not less than 3 m.

CAUTION

Regularly inspect the Hose Reel to ensure that the hose is intact and undamaged.

4.8 Personnel transfer to/ from S.E.U.

When transferring personnel to and from vessel, the following procedures are to be implemented:

In Port

The vessel ’s gangway should be installed between the S.E.U. and the nearest dock such that personnel can walk safely on and off the vessel.

Elevated alongside a fixed platform

If the S.E.U. is close to a fixed platform, the gangway may be extended between the

platform and the S.E.U. in a position that will not interfere with the proper operation of the vessel. In the event that the S.E.U. must be elevated out of reach of the gangway, or if operations prohibit the physical connection of the vessel to the platform, personnel shall be transferred using the vessel 's crane and the personnel basket provided onboard. When personnel are boarding the vessel from areas other than the adjacent platform (e.g. crew change), they can be transferred via personnel basket or helicopter using the vessel 's helicopter deck.

In Transit

Under no circumstance (except in case of emergency) should personnel be transferred to or from the S.E.U. whilst it is underway.

5 BASIC UNIT AND SYSTEMS

5.1 General

For further information and reference and operation of equipment and systems consult:

- Relevant equipment manuals;
- Relevant builders manuals;
- Relevant drawings;
- Technical advisory manuals

5.2 Main Power Supply

The main power supply on the S.E.U. is provided by four (4) diesel engine generator sets（4*1200 ekW）. When the S.E.U. is field transit, three 1200 ekW generators will be working in parallel. When the S.E.U. is elevating or lowering, two 1200 ekW generators will be working in parallel. When the S.E.U. is standing and crane operating, two 1200 ekW generators will be working in parallel. When the S.E.U. is in/out port, three 1200 ekW generators will be working in parallel. All four generators could work in parallel to swift the load. Need to have a main generator on standby at all times in sailing mode.

The main parameter and description of the generators as follows:

Capacity	1200ekW x4
Voltage	AC690V
Phase	3 phase
Power factor	0.8
Frequency	50 Hz
Insulation class	H
Excitation form	Brushless
Cooling method	Air cooling
Space heater	AC230V

Following minimum equipment must be operational at all the time:

- Battery charging system
- Communication & PA system

- Fire and gas detection system
- Fire water system
- Bilge system
- Emergency lighting Transformer(Navigation, Signal, Alarms)
- Air compressor

Limiting factors

- Generators have Power Limit Function to limit AC power when load exceeds limit

5.3 Emergency Power Supply

The S.E.U. is fitted with a diesel driven emergency generator set, with the capacity to provide 250 ekW, three phases, 50 Hz to the emergency switchboard.

In normal condition, the emergency generator should be in remote control mode, and the emergency switchboard should be in automatic mode. The emergency switchboard supplies power only to the emergency load, and cannot supply to the main switchboard.

In an emergency condition, when the main switchboard loses power， the emergency generator will automatically start and supply power to the emergency switchboard within 45 seconds, and the equipment powered by the emergency switchboard will resume work, including emergency lighting, PA/GA, fire and gas detection, emergency submersible pump, emergency fire pump, water spray system, radio equipment, etc.

When the S.E.U. blackout for some reasons, the emergency generator will automatically start and supply power to the emergency switchboard within 45 seconds, and the equipment powered by the emergency switchboard will resume work, including emergency lighting, emergency air compressor, engine room emergency fan, PA/GA, fire and gas detection, radio equipment, etc.

If the PMS at auto mode, When the S.E.U. blackout, the standby main generator will automatically start to restore the power supply of the main switchboard. Then the equipment that were in operation before the power failure will automatically start in sequence, 0s: propulsion sea water cooling pump, propulsion fresh water cooling pump, general service & fire pump, emergency fire pump; 10s: engine room fan, bilge & ballast pump, foam fire pump.

If the PMS at manual mode, The recovery of the main generator and main switchboard requires

manual control.

Then disconnect the breaker between the emergency switchboard and the emergency generator, and then close the breaker between emergency switchboard and the main switchboard, and then the emergency generator automatically stop. The tripped main generator and income breaker needs to be manually reset after inspection. Then start generators according to the load and restore power to the S.E.U.

5.4 Propulsion System

The S.E.U. equip with two (2) 1300 kW VFD driven azimuth thrusters and two (2) 400kW bow thrusters.

The azimuth thrusters and bow thruster can be remotely controlled from wheelhouse, and local control.

5.4.1 Azimuth Thruster

LV VFD system

Two (2) sets of LV VFD system for azimuth thrusters to be provided onboard. Each one of them is working for one azimuth thruster; each one consists of the following:

Qty	Equipment/Apparatus
1	LV asynchronous main propulsion motors (induction motor), 1300kW
1	LV AFE converters with integrated control system

Electric Motor: **Two (2) sets**

Product model: YPKS500-4-H 1300kW

Type: Horizontal, Variable frequency, frequency motor

Rated speed: 1500rpm

Variable speed range: 0-1500 rpm

Rated voltage: 690V

Rotation: P.S:clockwise, B.S:Anti-clockwise（As viewed from the output shaft side）

Insulation class: F

Cooling type: Fresh water cooling

Azimuth Propulsion:	**Two (2) sets**
Product model:	NRP180
Input power max:	1300kW
Propeller diameter:	abt. 2000mm

5.4.2 Bow Thruster

QTY:	Two (2)
Propeller type:	CPP
No. of propeller blades:	4
Drive motor power:	400kW
Rated voltage:	690V
Drive motor shaft speed:	1500 r/min
Protection:	IP44
The cooling type:	air cooling

5.5 Transformer

Unless otherwise specified, all the transformers installed in the S.E.U. are dry type, air-cooled marine transformer.

5.5.1 Main transformer

Two (2) main transformers to be provided in the transformer room, with each other as standby to supply power for AC400V consumers, the specification to be as follows:

Rated capacity:	1250kVA
Voltage:	690V/400V
Frequency:	50 Hz
Phase:	3-phase
Protection class:	IP23
Type:	dry-type
Insulation class:	F

5.5.2 Main lighting transformer

Two (2) main lighting transformers to be provided in the transformer room, with each

other as standby to supply power for lighting and day life consumers, the specification to be as follows:

Rated capacity:	200kVA
Voltage:	400V/230V
Frequency:	50Hz
Phase:	3-phase
Protection class:	IP23
Type:	dry-type
Insulation class:	F

5.5.3 Emergency lighting transformer

Two (2) emergency lighting transformers shall be provided in the emergency generator room to supply power for lighting and consumers, the specification to be as follows:

Rated capacity:	75kVA
Voltage:	400V/230V
Frequency:	50Hz
Phase:	3-phase
Protection class:	IP23

5.5.4 Galley isolation transformer

One (1) galley isolation transformer to be provided in the transformer room, to provide 400/400V,400V/230V power for galley equipment consumers, the specification to be as follows:

Rated capacity:	300kVA(400/400V)
	50kVA(400/230V)
Frequency:	50Hz
Phase:	3-phase
Protection class:	IP23
Type:	dry-type
Insulation class:	F

5.5.5 Deck equipment transformer

One (1) deck equipment transformer to be provided in the transformer room, to provide 120V power for deck equipment consumers, the specification to be as follows:

Rated capacity:	50kVA
Voltage:	400V/120V
Frequency:	50Hz
Phase:	3-phase
Protection class:	IP23

5.6 Firefighting Facilities

Fire Control and Safety are indicated on 'W3036-103-004 RevA FIRE CONTROL & SAFETY PLAN '.

The fire safety systems shall be installed (fire water, foam and smoke detection) as required by IMO and American Bureau of Shipping.

General service & fire pump	1 sets	80/60m3/h@4/7bar
Emergency fire pump	1 sets	60m3/h@7bar
Fire hydrant stations	2sets	25m hoses and Ø12mm nozzles
	4sets	25m hoses and Ø19mm nozzles
	11sets	20m hoses and Ø12mm nozzles
	4sets	15m hoses and Ø19mm nozzles

Helideck Foam System:

Foam pump	1set	150m3/h@12bar	
Foam tank device	1set	500L	with proportioning device
Foam nozzle station	2set	20m hoses	

Water sprinkler system

Water spray pump	1set	110m3/h@6bar	
Fresh water pump	1ses	5m3/h@6bar	for keeping pressure
Fresh water pressure tank	1set	4000L	for keeping pressure

Other Fire Protection Equipment/Systems:

Fixed CO2 system for engine room, paint store room, emergency generator room and exhaust ducts from galley range;

H_2S & Flammable Gas Detection and Alarm system is installed on accommodation entrance and major inlets of ventilation;

Fire Extinguishers of various types and media are distributed throughout the Unit as shown on the Fire Control & Safety Plan

5.7 Lifesaving Equipment

The location of the equipment is shown on the 'W3036-103-004 FIRE CONTROL & SAFETY PLAN'.

Lifeboat:	Two (2) sets	
Max passenger:	150P	
Start:	electrical motor	
Drive type of lifeboat:	diesel	
Lowering type:	gravity	

The crew can release or stop both inside of the lifeboats and on the deck.

Fast Rescue Craft :	One (1) set	with davit
Max. passenger:	6P	
Life rafts:	Three (3) sets P	with launching davit.
	Three (3) sets S	with launching davit.
Max. passenger:	25P/set	

Others:

Life jackets:	208	with light
Working life jackets:	16	
Life Buoys:	2	
	2	with light
	2	with a life line,56m
	2	with light and smoke pod

Embarkation ladders:	2	6.2m,rope-type,only in afloat condition
Line throwing appliance:	1	
Rocket parachute flares:	12	
Two-way VHF radiotelephone:	4	
Search and rescue locating device:	4	
EPIRB:	1	
First aid medicine cabinet:	2	
Stretcher:	1	

5.8 Cranes

5.8.1 Main crane

There is a main crane which can slew ±180°fixed on the platform through the AFT port-side leg . The crane is driven by electrical motor through hydraulic system. The boom which luffed by wire rope is truss structure. Four motions (slewing, main hoist, auxiliary hoist and luffing) can be operated on rated load.、

Main hook and Auxiliary hook used condition:

		Main Hook	Aux.Hook
SWL(Onboard lift)		100t@25m 40t@40m	20t@43m 3t@43m(personnel lift)
Hook Trevel	above top of jackhouse	40.4m	44.4m
	below top ofjackhouse	30.6m	
Lifting Speed		10m/min	30m/min
Slew Speed		0~0.75 r/min	
Luffing Time		~150 sec	
Slew sector		±180°	
Max.Heel/Trim		0.5°/0.5°	
Ambient Temp.		0-50℃	

Please refer to the equipment manufacturer's operating manual to operate the crane.

5.8.2 Auxiliary crane

There is a auxiliary crane fixed on the starboard side of the platform.

PRINCIPAL PARTICULARS

Load condition	Cargo lifting	Personnel lifting
Hoisting load	Hsig=0.5m(fixed)：15t@25m，11t@30m Hsig=1 m(fixed)：11t@25m，8t@30m Hsig=1.5m(fixed)：8t@25m，5t@30m Hsig=0.5m(floating)：4.5t@30m	2 t
Slewing radius	5 m~30 m	
Max. Lift	55 m	
Slew sector	360°	
Hoisting speed	15 t × 15 m/min	2 t × 45 m/min
Lowering speed	Abt. 45 m/min at rated load	
Luffing time	~48 s	
Slewing speed	0～0.65 rpm	

5.8.3 Main Crane & Auxiliary Crane working condition

Wind speed in service condition	15.5m/s
Wind speed out service condition, but the boom stowed on boom rest	51.5m/s
Design service temperature	0-50℃
Platform inclination	Trim/ heel 0.5°

When the auxiliary crane is operating in a floating state, the platform's heel should not exceed 2.5 ° and trim should not exceed 1 ° ,Hsig≤0.5m.

5.9 Mooring Equipment

Anchor winch **1 set**

Working load @ speed 226.5kN (6th layer) @ 9m/min (5th layer)

Holding load 2328kN (static)

Drum capacity	Φ68 x 460m
Motor power	55kW, 380V, 50Hz
Electric winch	**3 sets**
Rated load	100kN (1st layer)
Rated speed	12m/min
Holding load	300kN (80%MBL)
Drum capacity	Φ24x 400m
Motor power	30kW/30kW/14.5kW, 380V, 50Hz
Others:	
Mooring rope	5 sets, Φ52 x 200m, 451kN
Bollards:	8
Chocks:	8
Anchor:	
Type:	AC-14 H.H.P. Anchor
Weight:	5175kg.
Quantity	1 set

5.10 Radio Communication & Navigation Equipment

The radio communication system is satisfied with the requirement for A1+A2+A3

Pos.	Description	Model	Brand	Qty
1	DGPS Navigator	R6 NAV DGNSS	SAAB	1
2	AIS	V5035	SIMRAD	1
3	Gyro Compass	STD-22NX	Anschutz	1
4	Autopilot	Pilotstar NX	Anschutz	1
5	Magnetic Compass	MK2020S	Lilley & Gillie	1
6	S-BAND RADAR	R5024 30U/12S	SIMRAD	1
7	X-BAND RADAR	R5024 25U/6X	SIMRAD	1
8	ECDIS with RADAR Overlay Function	ECDIS 900 MK15A	SIMRAD	1
9	Echo Sounder	S3009	SIMRAD	1
10	Single Axis Speed Log	DL1	Skipper	1
11	VDR	F2	Consilium	1
12	Anemometer & Anemoscope	OMC-140	Observator	1
13	Helideck Monitor System (HMS)	SMCwms	SMC	1
14	GMDSS Radio Console (Floor Stand)	TT6000F2	CHINA- BRAND	1
15	MF/HF Radio 250W W/O NBDP	SAILOR 6320	SAILOR	1
16	Mini-C W/EGC, SSAS & LRIT	SAILOR 6110	SAILOR	2
17	VHF Radio W/DSC	SAILOR 7222	SAILOR	2
18	NAVTEX Receiver	SAILOR 6390	SAILOR	1
19	GMDSS Two-Way Portable VHF Radio	R5	Mcmurdo	4
20	406MHz Satellite EPIRB	G8 AIS+	Mcmurdo	1
21	AIS RADAR SART	S5A	Mcmurdo	4
22	Portable Air Band VHF Radio	IC-A25	ICOM	1
23	Fixed Air Band VHF Radio	TR-7750	JOTRON	2
24	Non-Directional Beacon (NDB)	JTM30C	JTM	1
25	BNWAS	P7007	Lilley & Gillie	1
26	Weather Fax Receiver	FAX-608	DEEK	1
27	VSAT	V100NX	Intellian	1

5.11 Inner communication

5.11.1 Public Address System

5.11.1.1 Introduction & description

A new advanced PA system has been installed on the S.E.U. which has several salient advanced features described as below. The system consists of the following components:

1) 2 * Amplifier

2) 6 * Voice announcement boards

3) 6 * general alarm control panels

All the loudspeakers and status lights in the S.E.U. also work as general alarm, which can send the following alarms:

General alarm

Fire alarm

Combustible gas detected

TOXIC gas alarm

Abandon ship alarm

The system have follow interface with the other equipment:

FIRE ALARM from the fire alarm control panel

Combustible gas/ TOXIC gas alarm from the gas detection control unit

POWER FAILURE alarm to the AMS

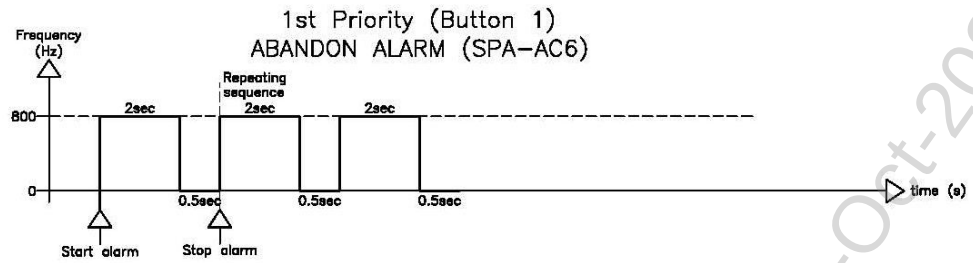
GENERAL ALARM to the audio visual alarm column control box

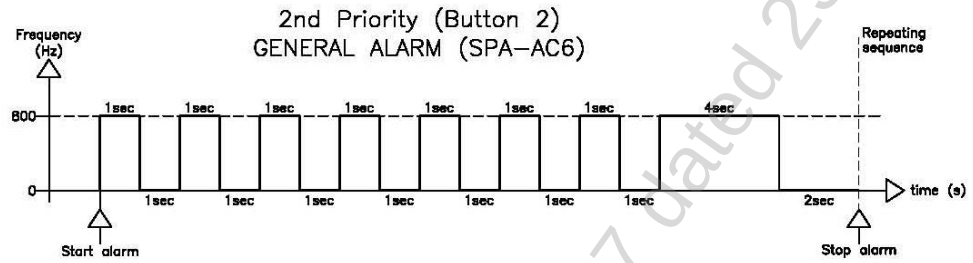
CUT OFF signal to the satellite TV main unit

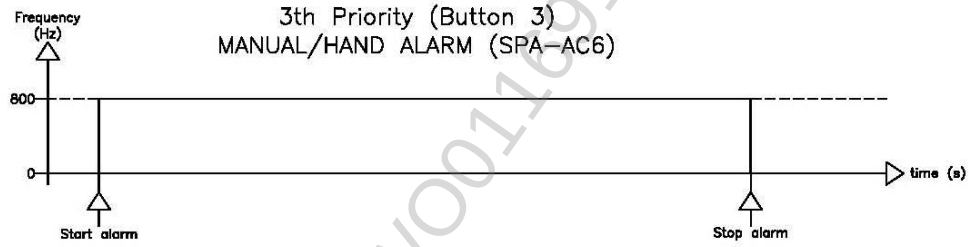
GENERAL ALARM to the fog horn control box

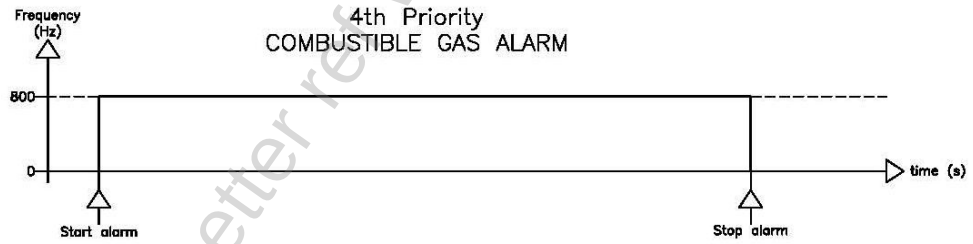
GENERAL ALARM to the VDR

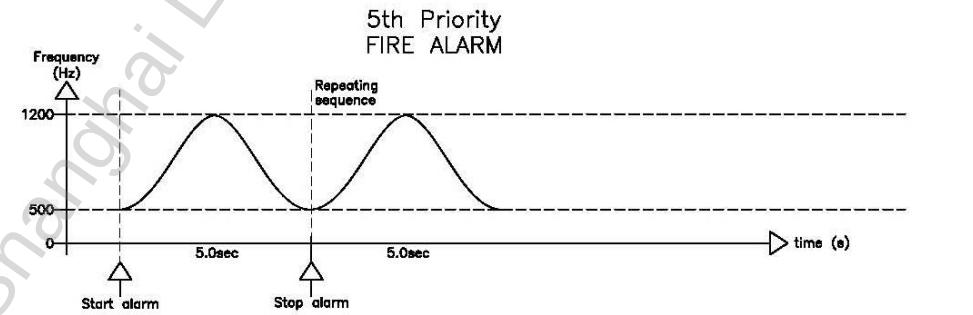
The time sequence of the alarm audio is as following:

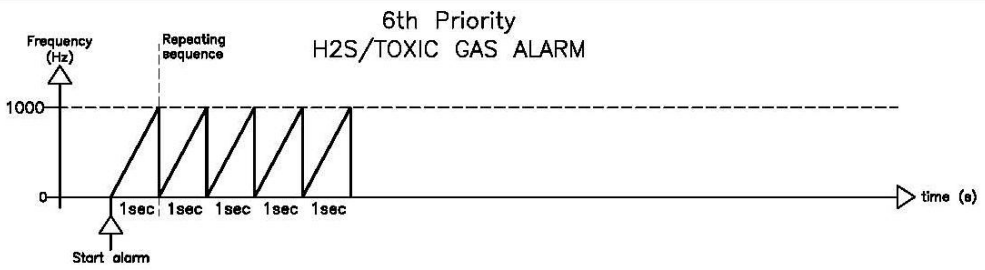












5.11.1.2 Zoning

The speakers are fitted all over the S.E.U. and have been divided into 5 zones as below. Special care should be taken not to disturb sleeping crew for routine non-emergency announcements:

Top deck

Open deck area

Accommodation area

Below main deck public area

Machinery area

5.11.1.3 Location of Voice announcement boards and general alarm control panels

There are six (6) mics located as below :

1) Wheelhouse - wheelhouse console (fwd)

2) Wheelhouse - wheelhouse console (aft)

3) Lifeboat (PS)

4) Lifeboat (SB)

5) CO_2 room

6) Engine control console

5.11.2 Automatic Telephone

One (1) set of digital automatic telephone exchanges is provided in the Unit, with a total capacity of 120.

Automatic telephone exchange to have the following functions:

- Phone connected PA system (password connected)
- Connecting to the satellite communication station

Machinery space with noise, such as E/R and emergency generator room, is equipped with flashing bell unit, helmet-style headphones and microphone.

5.11.3 Sound Powered Telephone System

This Unit is equipped with selective sound power telephone system of 13 circuits.

The sound powered telephones are located at:

- Engine room (helmet-style headphone, with flashing bell)

- Switchboard room (Connect to engine room alarm column)
- Emergency generator room (noise helmet-style headphone, with flashing bell)
- Lifeboat P & S
- CO2 room
- Bow thruster room
- Rudder propeller room P &M& S (noise helmet-style headphone, with flashing bell)
- Wheelhouse fore console and aft console
- Captain room

5.11.4 Others

Engineer call alarm system: One (1) set (C/E office, mess room, meeting room, C/E room, after bridge console)

Hospital call alarm system: One (1) set every bed in ward, with flashing light. (call unit: NO.1 sickbed/ NO.2 sickbed/infirmary lavatory unit , alarm unit: FWD bridge console/main deck corridor)

Refrigerator call system: One (1) set (call unit: chiller/freezer, alarm unit: FWD bridge console/mess room)

CCTV system: Three (3) sets (monitor: FWD bridge console/ AFT bridge console , camera: radar mast for helideck/A deck port for windlass/top deck for NO.1 LEG/ top deck for NO.2 LEG/ wheelhouse deck for NO.3 LEG/ wheelhouse deck for NO.4 LEG/ top deck port for main deck/ top deck stbd for main deck)

5.12 Service Pumps

Item	Name	Qty.	Type
1	Fuel oil transfer pump	2	5m³/h @ 0.3MPa
2	Lub.oil pump（handle pump）	1	48L/min @0.25MPa
3	Dirty oil pump	1	5m³/h@ 0.3MPa
4	Bilge daily pump	1	5m³/h @ 0.3MPa

5	Jetting pump	1	50m³/h @6.0MPa
6	Hose reel Submersible pump	3	Abt.450m³/h @1.2MPa x2 sets Abt.80m³/h @ 0.5MPa x1 sets
7	Bilge & Ballast pump	1	60m³/h @0.4MPa
8	General service & Fire pump (served as ballast pump & bilge pump)	1	80/60m³/h @0.4/0.7MPa
9	Foam pump	1	150m³/h @1.2MPa
10	Sewage pump	1	20 m³/h @0.25MPa
11	Fresh water trans. pump	1	25 m³/h @0.3MPa
12	Emergency fire pump	1	60 m3/h @0.7MPa
13	FW Cooling Pump	2	50m3/h @ 0.4MPa
14	Propulsion SW Cooling Pump	2	50 m3/h @0.4MPa
15	Brine Pump	1	100m3/h @ 0.5MPa
16	Brine circulation pump	2	10m3/h @ 0.3MPa

5.13 Dirty Oil System

Oil drains from most of machinery in engine room are to be collected into the dirty oil tank.

Sludge from the purifiers is to be discharged into the dirty oil tank, the detain period of dirty oil tank is 14 days in the Unit.

The sewage water is considered clean, so it is usually drained directly overboard, in case of oil leakage from helideck, it is to be collected into the holding tank. The holding tank is to be discharged to collecting ship, and this leakage is not permitted to transfer to other space in the Unit.

5.14 Sewage Discharge

In general, the sewage flows to sewage water treatment plant and then discharged overboard.

The sewage flows to black water tank when the sewage water treatment plants are not working. The sewage from black water tank and grey water tank is pumped to sewage water treatment plant, and then discharged overboard.

The sewage from black water tank and grey water tank could also be discharge to support

vessel via shore connection on main deck.

5.15 Jetting system

The jetting system to be arranged to reduce the vacuum suction when pulling out the legs. Six (6) nozzles to be installed at the bottom of each spud cans and Six (6) nozzles at the top of each spud cans. Each leg to be fitted with two DN 80mm pipes with working pressure of 6.0MPa and two joint at suitable location to ensure jetting is feasible at operation height. The nozzle will be designed not to be blocked when deep penetration.

One (1) jetting pump and one(1) General service & Fire pump (served as jetting pump) to be arranged in the pump room.

The pipes of jetting system to be led to the vicinity of the legs with the stop valve which to be connected with the leg joint by hose.

5.16 Compressed Air System

Two air compressors to be provided according to the rules.

The air compressor can start and stop automatically according to the pressure of main air reservoirs.

The main air reservoir shall be used for starting the generator engine in dead ship condition.

COMPRESSED AIR SYETEM EQUIPMENT

	Pressure	Capacity	Quantity
Main Air Compressor	3MPa	60 m3/h	2 sets
Main Air Reservoir	3MPa	800 L	2 sets
Daily air reservoir	1MPa	500 L	1 set
Dryer		60m3/h	1 set
Quick Closing Valve Control Box	0.7 Mpa	40L	1 set

5.17 Air Conditioning

5.17.1 Air Cooled Chiller Unit

Two (2) air cooled chiller units are arranged in Aux. Machinery Room (2).

5.17.2 Air Handling Unit

One (1) marine indirect air handling unit service for lower deck

One (1) marine indirect air handling unit service for main deck

One (1) marine indirect air handling unit service for A deck

One (1) marine indirect air handling unit service for B deck

5.17.3 Fan Coil Unit (FCU) and Package air conditioner (PAC)

One FCU service for M.S.B, One FCU service for Jacking system VFD room, One FCU service for A/Z VFD room, One FCU service for B/W VFD room, One FCU service for laundry room, One FCU service for dry store, Two FCU service for wheel house.

Two fan cooling PAC service for Gelley.

5.18 Ventilation System

The minimum requirement for ventilation air volume, i.e., the rate of air changes per hour to be as the following table:

Space	Mech. Ventilation		Natural Ventilation		Air Changes (times/h)
	Supply	Exhaust	Supply	Exhaust	
Engine Room	√	√			40/HR.
Aux. Machinery Room		√	√		10/HR.
Switchboard Room	√			√	12/HR.
Emergency Generator Room	√			√	20/HR.
CO2 Room		√	√		15/HR.
Galley	√	√			20/HR MS.
Office		√			8/HR.
Change Room		√			8/HR.
Public Toilet		√			15/HR.
AHU Room		√	√		10/HR.
Mess Room		√			8/HR.
Meeting Room		√			8/HR.
Sick Bay		√			12/HR. ME 10/HR. AC

Space	Mech. Ventilation		Natural Ventilation		Air Changes (times/h)
	Supply	Exhaust	Supply	Exhaust	
Living room					6/HR. AC.
W.C. UNIT		√			10/HR.
Laundry room		√			12/HR. AC
Jackhouse room		√	√		8/HR.

5.19 Refrigeration Compressor Unit

Quantity One (1) set

Cooling capacity: 10kW

The main parameter of refrigerators the following table:

Refrigeration Requirements			
Name	Loading Temp. ℃	Un-loading Temp. ℃	Method of Cooling
Dry Store	From 15 to 25	From 15 to 25	AC two ventilation duct
Chiller (vegetable)	+4	-1	evaporator with air cooler fan
Freezer (meat & fish storage)	-18	-25	evaporator with air cooler fan, electrical defrost heat and drain pipe heating

5.20 External Firefighting System

In this system, Two (2) water monitors to be provided for the protection of the Jack-up S.E.U. during emergency situations occurring on other offshore platforms, Water flow / protection shall be sufficient to enable the Jack-up S.E.U. time to jack down and move away in such emergency. The required throw of the monitors shall be such that the whole working deck area and the aft part of the vessel is covered. Two submersible pumps shall supply feed water directly to the monitors.

Each monitor shall have a minimum capacity of 300 m^3/hr .

5.21 Fire-extinguishing systems and equipment

5.21.1 Fire proportion bulkheads and decks

Please refer to W3036- 103-005_FIRE PROOF DIVISION PLAN.

5.21.2 Fire detection system

5.21.2.1Description

The system consists of smoke detectors and heat detectors are laid out as per following drawing.

1) Smoke detectors

Area served	Qty
WET AREA	39
DRY AREA	107
EXP.-proof	2

3) Call points

CONSILIUM brand call points are provided.

Area served	Qty
WET AREA	13
DRY AREA	20

4) Heat detectors

They are fitted in smoking room and galley.

5.21.2.2 Fire detection equipment layout

Please refer to W3036-604-007_ARRANGEMENT OF FIRE AND GAS DETECTION ALARM EQUIPMENT.

5.21.3 CO_2 flooding system

5.21.3.1 Description

The engine room and galley ducting are provided with a CO2 flooding system. It is manufacture and installed by WUHAN MODERN CHANGJIANG MORGAN

TECHNOLOGY CO.,LTD. Please refer to WUHAN MODERN CHANGJIANG MORGAN TECHNOLOGY CO.,LTD. operation instructions onboard.

5.21.3.2 GA plan of CO2 system

Please refer to the *CO2 Fire Extinguishing System AS-BUILT DRAWING* supplied by WUHAN MODERN CHANGJIANG MORGAN TECHNOLOGY CO.,LTD.

5.21.3.3 CO2 operation instructions

Please refer to the *CO2 Fire Extinguishing System AS-BUILT DRAWING* supplied by WUHAN MODERN CHANGJIANG MORGAN TECHNOLOGY CO.,LTD.

5.21..4 Water sprinkler system

The living quarter is provided with water sprinkler system, designed and supplied by WUHAN MODERN CHANGJIANG MORGAN TECHNOLOGY CO.,LTD.

Please refer to the W3036-531-004 RevZ DIAGRAM OF SPRINKLER PIPING SYSTEM.

5.21.5 Fire main system

A complete fire main system is provided for the S.E.U.

Please refer to W3036-521-001_DIAGRAM OF FIRE MAIN PIPING SYSTEM.

5.21.6 Helideck firefighting system

One set of fixed foam firefighting system is provided for helideck firefighting.

Please refer to W3036-526-006_DIAGRAM OF FOAM FIREFIGHTING PIPING SYSTEM FOR HELIDECK.

5.21.7 Fire & safety plan

Please refer to W3036- 103-004_FIRE CONTROL & SAFETY PLAN.

6 EMERGENCY SITUATIONS AND COUNTERMEASURES

6.1 General

This chapter describes various emergencies response systems. Competence, training common sense, initiative and good seamanship will be required when dealing with emergencies. The Captain of the Unit, and other senior supervisory personnel are the final authority, and responsible for implementing these instructions, and maintaining safe operations.

6.2 Fire Detection and Alarm System

The Unit is fitted with a Fire Detection and Alarm system. The system monitors heat and smoke in the machinery spaces and accommodation. Detectors are located throughout the Unit as shown on the Fire Control & Safety Plan attached to this Manual. A control / summary panel is located inside the wheelhouse. When the system detects abnormal heat or smoke in the spaces at any of the terminal devices, it will activate an alarm (steady tone) at the wheelhouse, and the control panel will indicate the affected zone. If the alarm is not acknowledged within two (2) minutes, the General Alarm will be activated and sounded throughout the Unit.

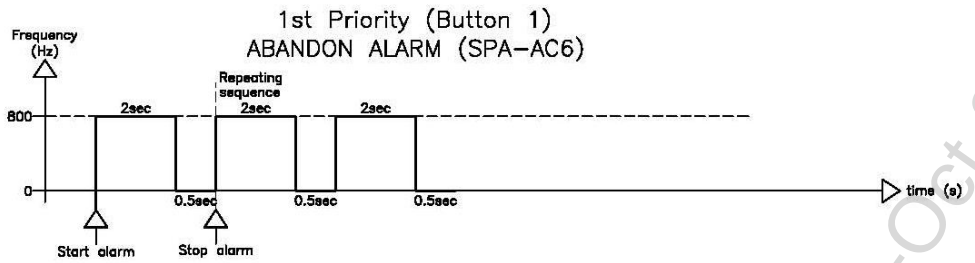
6.3 Combustible Gas and H_2S Detection and Alarm System

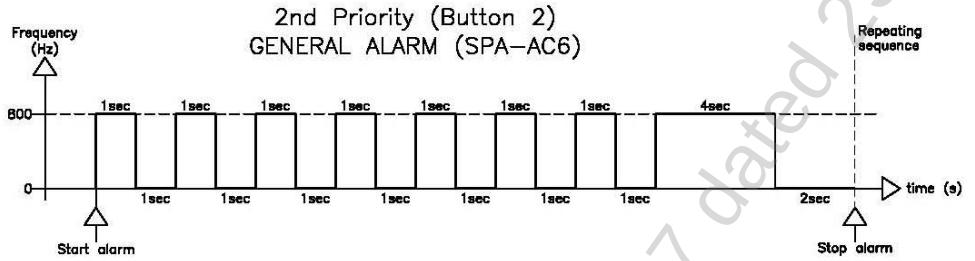
Combustible gas and H_2S detectors are provided at the ventilation intake where necessary. When the combustible gas or H_2S is detected, the alarm point will be indicated in the control panel, if the alarm is not acknowledged, immediately, the combustible gas or TOXIC gas Alarm will be activated and sounded throughout the PA/GA system. for low level alarm, after 2 minutes, and for the high level alarm, immediately, the combustible gas or TOXIC gas Alarm will sent to the helicopter deck state lights for the helicopter operator’s information.

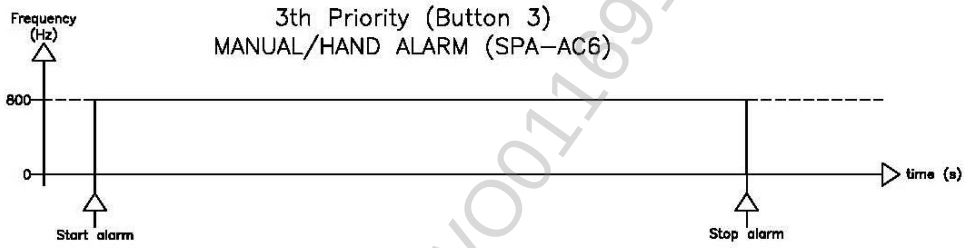
The gas detection system is also interlocked with emergency shutdown system, when combustible gas or H_2S gas is detected, all the ventilation fans, air conditioners, etc. will be shutdown.

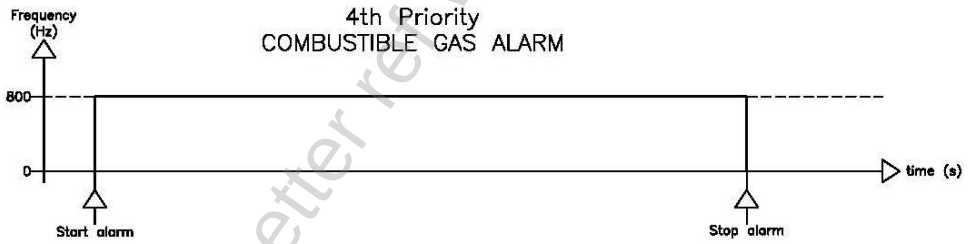
6.4 General Alarm/Public Address System

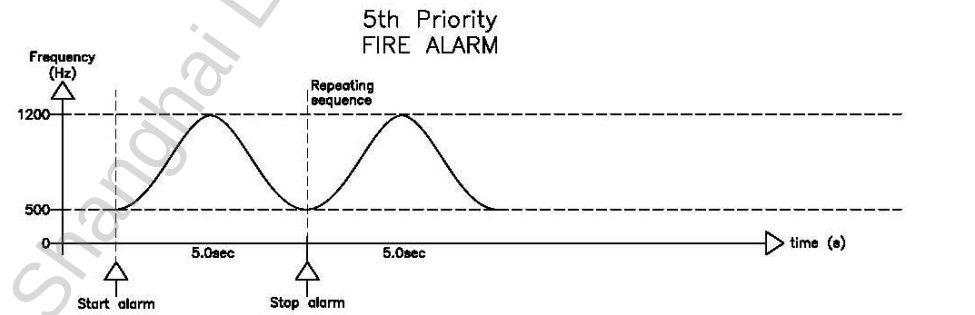
The Unit is fitted with a General Alarm system. General Alarm control panel are located at the wheelhouse. The time sequence of the alarms is as following:

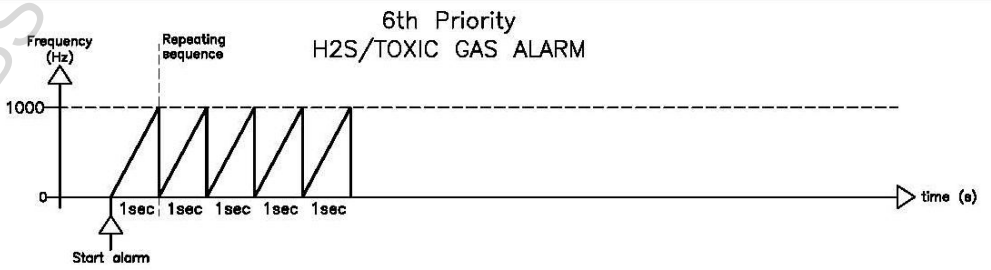












6.5 Emergency Shutdown System

The emergency shutdown system includes 8 group. In the event of an emergency situation such as a fire, the operator should cut off the corresponding equipment according to the specific situation. The recommended operating procedures for the emergency shutdown system are as follows：

a). In case of engine room fire, group ES0, ES1, ES2 should be shutdown;

b). In case of Machinery space fire, group ES5 should be shutdown;

c). In case of accommodation fire, group ES3 should be shutdown;

d). In case of emergency generator room fire, group ES4 should be shutdown;

e). In case of galley fire, group ES6 should be shutdown;

f). In case of laundry fire, group ES7 should be shutdown;

g).In case of abandon ship, group ES0 to group ES7 should be shutdown, and the general alarm should be activated at same time.

Shutdown group	Description	Operation location
ES0	Main generator	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
ES1	Engine room oil pumps	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
		Main deck FR.33(p) E/R entrance
		Main deck FR.33(s) E/R entrance
		Main deck FR.80(P) E/R entrance
		Engine control console
ES2	Engine room fans	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
		Main deck FR.33(p) E/R entrance
		Main deck FR.33(s) E/R entrance
		Main deck FR.80(P) E/R entrance

		Engine control console
ES3	Accommodation fans & air conditioner	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
		Main deck FR.78(P) accommodation entrance
		Main deck FR.78(S) accommodation entrance
ES4	Emergency generator room fans,	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
		Emergency generator room entrance
ES5	Machinery space fans & oil pumps	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
		Main deck FR.33(p) E/R entrance
		Main deck FR.33(s) E/R entrance
		Main deck FR.80(P) E/R entrance
ES6	Galley equipment	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
		Mess room entrance
		SCULLERY
ES7	Laundry equipment	FWD bridge console
		Lifeboat muster area (p)
		Lifeboat muster area (S)
		Laundry entrance

6.6 Uncontrolled escape of H_2S/other gases

6.6.1 Introduction

This procedure shall be implemented whenever an uncontrolled gas escape has been

confirmed by the appropriate announcement on the public address system by the Radio operator

6.6.2 Procedure

The Captain shall:

1) Raise alarm and make announcement as per muster list.

2) Ensure that all personnel don breathing apparatus.

3) Implement the emergency shutdown of operations.

4) Ascertain that all personnel report to the designated muster stations.

5) Implement ahead count.

6) Instruct all vessels moored to the liftboat to castoff immediately.

7) Ensure that the air conditioning as well as ventilation systems are shutdown to prevent ingress of gas.

8) Ensure that all the air vents that may permit ingress of gas are closed.

9) Implement no smoking and naked light restrictions.

WARNING

Should the Captain feel necessary, he will instruct all personnel onboard the vessel to abandon the S.E.U.

6.7 Power Restore after Total Shutdown

When the emergency shutdown system activated, the recovery procedure of after shutdown are as follows:

a). Confirm fire and other emergency situation has been eliminated.

b). Reset the fire alarm and general alarm.

c). Check all the equipment and relevant cables, make sure that they can working normally.

d). Check all the tanks and relevant pipes, make sure that there is no leakage.

e).If group ES1 has been activated, the oil level of fuel oil daily tank should be checked, make sure that the oil is enough for main generator operation.

f). If group ES4 has been activated, the oil level of emergency diesel oil tank should be

checked, make sure that the oil is enough for emergency generator operation.

g).Reset the emergency shutdown pushbutton and the power breaker.

h).Start the emergency generator, close the ACB of emergency generator on ESB.

i). Start the air compressor which powered from ESB, and charged the air bottle.

j). When the air pressure of air bottle is over 1.5Mpa, start main generator.

k). Close the ACB of main generator on MSB, and the ACB of emergency generator opened automatically, then the bus-tie of MSB and ESB closed, the ESB powered from MSB.

l). The MSB and ESB supply power to all the equipment onboard, and all the equipment can resume normal working condition.

6.8 Flooding or Unexpected Trim and List Countermeasure

In the event that the Unit is broken and flooded due to collision or some other reason, prompt counter measure may be necessary. If the Unit is afloat with an unexplained list or trim, the first step is to determine its cause and water ingress source. If one certain tank is confirmed by inspection or tank gauges, measures shall be taken immediately to avoid flood spreading to other compartments by shutting watertight doors, hatch covers, or manhole covers and valves, if these are open. Activate the Bilge pump and take suction from affected compartment by opening / closing applicable valves in the Bilge Manifold in the engine room. Where possible or necessary,lower the leg closest to the holding compartment to increase buoyancy in that zone but ensure there is sufficient water depth to undertake that operation.

Alternatively, jacking the unit up to drain the water can be one option where permissible depending on water depth and time availability.

If all else fails to control flooding, it is advised to proceed towards the nearest anchorage or safe haven.

The Unit can dewater any tank/compartment using the bilge and ballast system. The Unit's tanks and compartments may be bilged using either bilge pump or ballast & bilge pump in the engine room via bilge systems.

In damaged condition Unit cannot withstand any wind over and above 50 knots. In such situation it is strongly recommended to seek shelter or safe haven.

6.9 Bilge System

Please refer to W3036-510-001_DIAGRAM OF BILGE PIPING SYSTEM for system arrangement and various pump capacities.

The S.E.U. is equipped with one set of general service & fire pump and one set of bilge & ballast pump as main bilge pumps, listed as below :

1) General service & fire pump: 80/ 60 m3/h @ 4/ 7 bar 37kW self-priming, centrifugal pump.

2) Bilge & ballast pump： 60 m3/h @ 4bar 15kW self-priming, centrifugal pump.

In addition, the S.E.U. is equipped a bilge daily pump (5 m3/h @ 3 bar) used for daily bilge water transfer and discharge.

There is bilge suction in the engine room, thruster room, chiller room, B/T room, emergency fire fighting pump room, all of void tanks and other machinery space etc.

Please refer to W3036-462-002_DIAGRAM OF DIRTY OIL PIPING SYSTEM and W3036-510-001_DIAGRAM OF BILGE PIPING SYSTEM.

Oily bilge should be drained into the bilge tank (capacity 47 m3) and then processed with the oily water separator (2 m^3/h) with oily result to fill into the dirty oil tank (capacity 11.1 m^3), the balance water below 15 ppm going to the sea being monitored by built-in monitor module that protect against accidental overboard discharge of oil.

In the process of removing bilge water, the valve of the corresponding tank or room should be opened correctly, and the bilge water valve of other tank or room should be kept closed, and the appropriate bilge pump should be opened according to the amount of bilge water required to remove.

6.10 Fuel Oil System

Diesel oil is filled into two F.O. store tanks from the bunker station on both sides of main deck. Filling manifold is provided with safety valve, and discharged into F.O. store tank. High level alarm is provided for F.O. store tanks.

Two (2) F.O. transfer pumps are used as standby for each other.

F.O. transfer pump take suction from F.O. store tanks, and discharge to F.O. day tanks, emergency GE F.O. tank, also take suction from F.O. day tanks, and discharge to F.O. store tanks.

Low and high suction are arranged for F.O. store tanks. Overflow pipe of F.O. day tanks

are led to F.O. store tank P or S.

Below the valve on the tanks, oil coaming are arranged and drain from oil coaming are collected and/or led to dirty oil tank.

One (1) fuel oil purifier is provided. Fuel oil in F.O. store tanks are led to purifier, and discharge clean oil to F.O. day tanks. and emergency generator F.O. day tank. The oil purifier can also be used for circulating purification fuel oil in the F.O. day tank, and the fuel oil in the day tank can be discharged into the store tank through the purifier.

Water and sludge separated from fuel oil is led to dirty oil tank.

Fuel oil system for main generator and emergency generator engine are designed according to the engine manufacturer's standards.

The fuel oil from F.O. day tanks are supplied for main generator engines via fuel oil manifold pipe. Duplex type strainer shall be fitted in the fuel oil supply line.

F.O. return pipe shall be led to F.O. day tanks or emergency generator F.O. tank.

High and low level alarm are provided for F.O. day tanks and emergency generator F.O. tank.

Please refer to W3036-461-001 DIAGRAM OF FUEL OIL TRANSFER PIPING SYSTEM and W3036-461-002 DIAGRAM OF FUEL OIL PURIFIED PIPING SYSTEM and W3036-461-003 DIAGRAM OF MAIN GENERATOR FUEL OIL PIPING SYSTEM and W3036-430-002 DIAGRAM OF EMERGENCY GENERATOR ROOM PIPING SYSTEM

6.11 Fire Fighting

All personnel must be familiar with the Fire Control & Safety Plan and procedures and be aware of their designated muster stations. In the event of a fire, the Captain and Fire team leaders will oversee the firefighting operations. The following guidelines may be followed:

1. Activate the general alarm. Designated fire teams should join in the firefighting operations.

2. Identify the source and location of the fire.

3. As soon as the alarm is sounded, all personnel must report to their assigned fire stations. If a particular fire station cannot be manned due to the location of the fire, those persons assigned to that station will be reassigned as the Captain deems necessary.

4. Start all fire pumps.

5. Confine fire, push the emergency shutdown button to cut off ventilation of the corresponding area.

6. Determine the best means of fighting the fire and start the fire relevant fighting measure.

7. If fire becomes uncontrollable, abandon ship alarm should be activated.

8. Notify filed Operator, Shore base, and coastal state Rescue Coordination Center when necessary.

9. Personnel must report to their designated abandon ship station. Abandonment will be done by lifeboat, liferaft, helicopter, or as determined by the Captain.

6.12 Emergency Operation after Failure of Jacking System

For Emergency Operation after Failure of Jacking System, please see the "HJ/Y-PTS28-1-S-WHSC JACKING SYSTEM OPERATION AND MAINTENANCE MANUAL".

6.13 Damage Control Plan

Please refer to 'W3036-103-007 DAMAGE CONTROL PLAN' as per section 7.5.

6.14 Procedures for helicopter operations

6.14.1 Helicopter

The helicopter deck has been designed for use of the following helicopters:

Type	AGUSTA/WESTLAND AW 139
Heliport	16.63 m
Max take-off weight	6.8 t

6.14.2 Helicopter deck

The main dimensions of the helicopter deck please refer to drawing: W3036-286-001 HELIDECK ARRANGEMENT.

6.14.3 Limitations

The helicopter deck may not be used by any helicopter that has an overall length that is greater than 16.63m or a take-off weight that is greater than 6.8t.

The helicopter deck is to be used only when the hull is in the elevated mode.

6.14.4 Operations

The helicopter landing officer (HLO) shall be responsible for all operations to be conducted on the helicopter deck.

It will be his responsibility to ensure:

- Close contact with the radio operator and authorities
- Proper maintenance of the helicopter deck with all its equipment and to deal with the required inspection times
- Keeping up-to-date the necessary instructions/routines with regard to:

① Emergency situations

② Maintenance (radio equipment, landing and marking lights, meteorological equipment, emergency power, fire and rescue outfitting, lashing equipment)

③ Alarms

④ Fire fighting direction

⑤ Access to the helicopter deck when in use

6.14.5 Signboards

The helicopter deck shall be equipped with signboards prohibiting:

- The presence of personnel on helicopter during landing/take-off.
- Smoking on helicopter deck.
- Personnel to move behind the helicopter during embarkation/disembarkation.

6.14.6 Landing/take-off

The passengers must not access the helicopter deck until order is given by the HLO.

During landing or take-off, the platform's equipment must be in safe position outside the landing sector and in accordance with the HLO's instruction,

The HLO must be located so that he can overlook the helicopter deck and be ready to sound the alarm in case of an accident.

6.14.7 Helicopter accident

The PIC will coordinate the rescue operation.

He will:

- Determine the location of the damaged helicopter
- Direct the rescue boat, and if available other boats, to the helicopter
- Advise any national rescue center
- Advise the airport control tower

The radio operator shall gather as much information as possible:

- The exact location of the helicopter
- Its call sign
- The time of the accident

6.14.8 Fire-fighting

The fire-fighting and rescue team will prepare themselves as quickly as possible.

If the fire is on the platform itself, the HLO should order the helicopter pilot to be ready for take-off.

If the helicopter jet engine is on fire, direct the fire extinguishers into the marked area of fire extinguisher openings on the engine.

Generally fight the fire from the base of the helicopter and upwards.

6.15 hazardous areas

Please refer to ‘W3036- 103- 012_HAZARDOUS ZONE PLAN’ as per section 7.5.

7 APPENDICES

7.1 Hydrostatics properties from stability study

1）Hydrostatic data (Legs no sink)

Trim 0 m by bow

T m	TK m	VOLM m3	DISP t	LCB m	VCB m	LCA m	KMT m	KML m	TCP t/cm	CB	CP	CM	CW	MCT tm/cm	WSA m2
1.00	1.008	1740.7	1800.6	32.739	0.507	32.839	108.45	237.85	18.83	0.766	0.766	1.0000	0.808	66.57	1979.4
1.05	1.058	1832.4	1894.7	32.741	0.533	32.798	103.28	227.17	18.86	0.768	0.768	1.0000	0.809	66.89	1989.6
1.10	1.108	1924.3	1989.0	32.741	0.558	32.756	98.59	217.49	18.89	0.770	0.770	1.0000	0.810	67.21	1999.8
1.15	1.158	2015.5	2082.7	32.740	0.584	32.735	92.17	204.15	18.71	0.771	0.771	1.0000	0.802	66.04	2029.3
1.20	1.208	2106.9	2176.7	32.746	0.609	33.056	88.94	202.70	18.91	0.773	0.773	1.0000	0.811	68.52	2070.9
1.25	1.258	2198.8	2271.0	32.756	0.634	33.017	84.63	193.66	18.86	0.774	0.774	1.0000	0.808	68.28	2087.2
1.30	1.308	2290.1	2364.9	32.762	0.659	32.873	79.95	183.42	18.72	0.775	0.775	1.0000	0.803	67.32	2112.0
1.35	1.358	2381.1	2458.3	32.764	0.684	32.872	76.41	176.71	18.69	0.776	0.776	1.0000	0.796	67.40	2129.6
1.40	1.408	2470.2	2550.1	32.771	0.709	33.011	70.43	164.70	18.32	0.776	0.776	1.0000	0.785	65.14	2179.8
1.45	1.458	2558.9	2641.2	32.774	0.734	33.119	68.06	161.82	18.39	0.777	0.777	1.0000	0.789	66.27	2209.3
1.50	1.508	2648.4	2733.1	32.785	0.758	33.075	65.51	156.32	18.37	0.777	0.777	1.0000	0.787	66.23	2222.6
1.55	1.558	2737.8	2824.8	32.793	0.783	32.994	62.91	150.66	18.31	0.777	0.777	1.0000	0.785	65.94	2273.9
1.60	1.608	2826.9	2916.3	32.798	0.808	32.952	60.70	145.92	18.28	0.777	0.777	1.0000	0.774	65.92	2288.8
1.65	1.658	2914.6	3006.5	32.803	0.832	32.934	57.02	137.83	18.01	0.777	0.777	1.0000	0.772	64.16	2329.2
1.70	1.708	3002.7	3098.5	32.810	0.857	33.199	67.82	165.39	20.02	0.777	0.777	1.0000	0.823	79.41	2532.8
1.75	1.758	3100.3	3198.6	32.822	0.885	33.157	65.85	160.99	20.05	0.780	0.780	1.0000	0.860	79.77	2544.3
1.80	1.808	3198.1	3298.9	32.831	0.912	33.115	64.00	156.86	20.08	0.782	0.782	1.0000	0.861	80.14	2555.8
1.85	1.858	3296.0	3399.4	32.839	0.939	33.073	62.26	152.97	20.11	0.784	0.784	1.0000	0.862	80.50	2567.3
1.90	1.908	3394.0	3500.0	32.845	0.966	33.030	60.61	149.30	20.14	0.786	0.786	1.0000	0.864	80.87	2578.7
1.95	1.958	3492.2	3600.9	32.851	0.993	33.143	59.43	148.23	20.28	0.788	0.788	1.0000	0.870	82.58	2601.3
2.00	2.008	3591.2	3702.3	32.859	1.021	33.101	57.94	144.87	20.31	0.790	0.790	1.0000	0.871	82.95	2612.8
2.05	2.058	3690.2	3804.0	32.865	1.048	33.059	56.53	141.68	20.34	0.792	0.792	1.0000	0.873	83.33	2624.3
2.10	2.108	3789.4	3905.7	32.869	1.075	33.017	55.19	138.67	20.37	0.794	0.794	1.0000	0.874	83.71	2635.8
2.15	2.158	3888.9	4008.0	32.875	1.102	33.241	54.49	139.60	20.60	0.796	0.796	1.0000	0.884	86.46	2664.7
2.20	2.208	3989.4	4111.1	32.883	1.129	33.198	53.25	136.76	20.63	0.798	0.798	1.0000	0.885	86.85	2673.7
2.25	2.258	4090.0	4214.3	32.890	1.156	33.156	52.08	134.05	20.66	0.800	0.800	1.0000	0.886	87.24	2683.0
2.30	2.308	4190.8	4317.7	32.896	1.182	33.114	50.96	131.48	20.69	0.802	0.802	1.0000	0.887	87.63	2692.4
2.35	2.358	4291.8	4421.4	32.902	1.209	33.154	50.05	130.13	20.79	0.804	0.804	1.0000	0.891	88.78	2708.0
2.40	2.408	4393.2	4525.5	32.908	1.236	33.179	49.15	128.62	20.86	0.805	0.805	1.0000	0.895	89.80	2722.5
2.45	2.458	4495.0	4629.9	32.914	1.263	33.170	48.23	126.76	20.92	0.807	0.807	1.0000	0.897	90.51	2734.7
2.50	2.508	4597.2	4734.7	32.920	1.290	33.194	47.41	125.40	21.00	0.809	0.809	1.0000	0.901	91.53	2749.5
2.55	2.558	4699.6	4839.9	32.926	1.316	33.201	46.58	123.90	21.07	0.811	0.811	1.0000	0.904	92.41	2763.1
2.60	2.608	4802.4	4945.3	32.931	1.343	33.159	45.71	121.84	21.10	0.813	0.813	1.0000	0.905	92.82	2773.2
2.65	2.658	4905.5	5051.2	32.937	1.370	33.250	45.10	121.49	21.23	0.815	0.815	1.0000	0.910	94.51	2792.9
2.70	2.708	5009.0	5157.4	32.943	1.397	33.153	44.37	120.21	21.30	0.816	0.816	1.0000	0.912	95.45	2828.1
2.75	2.758	5113.7	5265.1	32.944	1.424	32.758	44.39	125.04	21.73	0.818	0.818	1.0000	0.930	101.37	2881.8
2.80	2.808	5220.2	5374.6	32.935	1.452	32.274	44.23	128.50	22.08	0.820	0.820	1.0000	0.943	106.36	2922.6
2.85	2.858	5328.4	5485.9	32.917	1.480	31.792	44.03	131.95	22.43	0.823	0.823	1.0000	0.959	111.49	2965.8

Trim 0 m by bow

T m	TK m	VOLM m3	DISP t	LCB m	VCB m	LCA m	KMT m	KML m	TCP t/cm	CB	CP	CM	CW	MCT tm/cm	WSA m2
2.90	2.908	5438.3	5598.9	32.889	1.508	31.394	43.69	134.35	22.72	0.825	0.825	1.0000	0.975	115.85	3004.7
2.95	2.958	5549.7	5713.3	32.864	1.536	31.658	43.27	135.08	22.91	0.828	0.828	1.0000	0.983	118.84	3033.0
3.00	3.008	5661.4	5827.9	32.840	1.564	31.656	42.48	132.51	22.92	0.830	0.830	1.0000	0.983	118.87	3042.3
3.05	3.058	5773.1	5942.5	32.817	1.593	31.654	41.72	130.03	22.92	0.833	0.833	1.0000	0.983	118.89	3051.5
3.10	3.108	5884.9	6057.1	32.795	1.621	31.668	41.03	127.82	22.93	0.835	0.835	1.0000	0.983	119.07	3061.8
3.15	3.158	5996.9	6172.1	32.776	1.649	31.784	40.45	126.88	23.01	0.838	0.838	1.0000	0.987	120.39	3079.2
3.20	3.208	6109.1	6287.2	32.758	1.677	31.784	39.77	124.62	23.01	0.840	0.840	1.0000	0.987	120.40	3088.3
3.25	3.258	6221.4	6402.3	32.740	1.704	31.805	39.18	122.68	23.03	0.842	0.842	1.0000	0.988	120.64	3099.1
3.30	3.308	6333.7	6517.5	32.724	1.732	32.002	38.71	122.80	23.17	0.845	0.845	1.0000	0.989	122.90	3122.2
3.35	3.358	6446.6	6633.5	32.712	1.760	32.038	38.16	121.10	23.20	0.847	0.847	1.0000	0.995	123.31	3133.9
3.40	3.408	6559.7	6749.5	32.700	1.788	32.038	37.57	119.08	23.20	0.849	0.849	1.0000	0.995	123.32	3143.0
3.45	3.458	6672.8	6865.5	32.689	1.815	32.038	36.99	117.13	23.20	0.851	0.851	1.0000	0.995	123.32	3152.1
3.50	3.508	6785.9	6981.5	32.679	1.843	32.098	36.49	115.88	23.24	0.853	0.853	1.0000	0.997	124.01	3165.5
3.55	3.558	6899.2	7097.7	32.669	1.871	32.098	35.95	114.04	23.24	0.855	0.855	1.0000	0.997	124.01	3174.6
3.60	3.608	7012.5	7213.9	32.660	1.898	32.099	35.43	112.27	23.24	0.857	0.857	1.0000	0.997	124.02	3183.8
3.65	3.658	7125.8	7330.1	32.651	1.925	32.099	34.93	110.55	23.24	0.859	0.859	1.0000	0.997	124.02	3192.9
3.70	3.708	7239.1	7446.4	32.642	1.953	32.099	34.44	108.88	23.24	0.861	0.861	1.0000	0.997	124.03	3202.1
3.75	3.758	7352.4	7562.6	32.634	1.980	32.099	33.97	107.27	23.24	0.863	0.863	1.0000	0.997	124.03	3211.2
3.80	3.808	7465.7	7678.8	32.626	2.007	32.100	33.51	105.70	23.24	0.864	0.864	1.0000	0.997	124.03	3220.4
3.85	3.858	7579.1	7795.0	32.618	2.034	32.100	33.07	104.18	23.24	0.866	0.866	1.0000	0.997	124.03	3229.5
3.90	3.908	7692.4	7911.2	32.610	2.061	32.100	32.64	102.71	23.24	0.868	0.868	1.0000	0.997	124.03	3238.7
3.95	3.958	7805.7	8027.5	32.603	2.088	32.100	32.23	101.28	23.24	0.870	0.870	1.0000	0.997	124.03	3247.8
4.00	4.008	7919.1	8143.7	32.596	2.115	32.100	31.82	99.89	23.24	0.871	0.871	1.0000	0.997	124.03	3256.9
4.05	4.058	8032.4	8259.9	32.589	2.142	32.100	31.43	98.55	23.24	0.873	0.873	1.0000	0.997	124.03	3266.1
4.10	4.108	8145.7	8376.2	32.582	2.169	32.100	31.05	97.23	23.24	0.874	0.874	1.0000	0.997	124.03	3275.2
4.15	4.158	8259.0	8492.4	32.575	2.196	32.100	30.68	95.96	23.24	0.876	0.876	1.0000	0.997	124.03	3284.4
4.20	4.208	8372.3	8608.6	32.569	2.222	32.100	30.32	94.72	23.24	0.877	0.877	1.0000	0.997	124.03	3293.5
4.25	4.258	8485.7	8724.9	32.562	2.249	32.101	29.98	93.51	23.24	0.879	0.879	1.0000	0.997	124.03	3302.7
4.30	4.308	8599.0	8841.1	32.556	2.276	32.101	29.64	92.34	23.24	0.880	0.880	1.0000	0.997	124.03	3311.8
4.35	4.358	8712.3	8957.3	32.550	2.302	32.101	29.31	91.20	23.24	0.881	0.881	1.0000	0.997	124.03	3320.9
4.40	4.408	8825.6	9073.5	32.545	2.329	32.101	28.99	90.08	23.24	0.883	0.883	1.0000	0.997	124.02	3330.1
4.45	4.458	8938.9	9189.8	32.539	2.355	32.101	28.68	89.00	23.24	0.884	0.884	1.0000	0.997	124.02	3339.2
4.50	4.508	9052.2	9306.0	32.534	2.382	32.101	28.38	87.94	23.24	0.885	0.885	1.0000	0.997	124.02	3348.4
4.55	4.558	9165.5	9422.2	32.528	2.408	32.101	28.08	86.91	23.24	0.886	0.886	1.0000	0.997	124.02	3357.5
4.60	4.608	9278.8	9538.4	32.523	2.435	32.101	27.80	85.90	23.24	0.888	0.888	1.0000	0.997	124.01	3366.7
4.65	4.658	9392.1	9654.6	32.518	2.461	32.101	27.52	84.92	23.24	0.889	0.889	1.0000	0.997	124.01	3375.8
4.70	4.708	9505.5	9770.8	32.513	2.487	32.101	27.24	83.97	23.24	0.890	0.890	1.0000	0.997	124.00	3384.9
4.75	4.758	9618.8	9887.0	32.508	2.514	32.101	26.98	83.03	23.24	0.891	0.891	1.0000	0.997	124.00	3394.1

Trim 0 m by bow

T m	TK m	VOLM m3	DISP t	LCB m	VCB m	LCA m	KMT m	KML m	TCP t/cm	CB	CP	CM	CW	MCT tm/cm	WSA m2
4.80	4.808	9732.1	10003.2	32.503	2.540	32.101	26.72	82.12	23.24	0.892	0.892	1.0000	0.997	123.99	3403.2
4.85	4.858	9845.3	10119.4	32.499	2.566	32.101	26.47	81.23	23.24	0.893	0.893	1.0000	0.997	123.99	3412.4
4.90	4.908	9958.6	10235.6	32.494	2.592	32.101	26.22	80.36	23.24	0.894	0.894	1.0000	0.997	123.99	3421.5
4.95	4.958	10071.9	10351.8	32.490	2.619	32.101	25.98	79.51	23.24	0.895	0.895	1.0000	0.997	123.98	3430.7
5.00	5.008	10185.2	10468.0	32.486	2.645	32.101	25.75	78.68	23.24	0.896	0.896	1.0000	0.997	123.98	3439.8
5.05	5.058	10298.5	10584.2	32.481	2.671	32.102	25.52	77.87	23.24	0.897	0.897	1.0000	0.997	123.97	3448.9
5.10	5.108	10411.8	10700.4	32.477	2.697	32.102	25.30	77.07	23.24	0.898	0.898	1.0000	0.997	123.97	3458.1
5.15	5.158	10525.0	10816.6	32.473	2.723	32.102	25.08	76.30	23.24	0.899	0.899	1.0000	0.997	123.96	3467.2
5.20	5.208	10638.3	10932.8	32.469	2.749	32.103	24.87	75.54	23.24	0.900	0.900	1.0000	0.997	123.95	3476.3
5.25	5.258	10751.6	11048.9	32.466	2.775	32.103	24.66	74.79	23.24	0.901	0.901	1.0000	0.997	123.95	3485.4
5.30	5.308	10864.8	11165.1	32.462	2.801	32.104	24.46	74.07	23.24	0.902	0.902	1.0000	0.997	123.94	3494.6
5.35	5.358	10978.1	11281.3	32.458	2.827	32.104	24.26	73.36	23.24	0.903	0.903	1.0000	0.997	123.93	3503.7
5.40	5.408	11091.4	11397.4	32.455	2.853	32.105	24.07	72.66	23.24	0.904	0.904	1.0000	0.997	123.93	3512.8
5.45	5.458	11204.6	11513.6	32.451	2.879	32.105	23.88	71.98	23.24	0.905	0.905	1.0000	0.997	123.92	3522.0
5.50	5.508	11317.9	11629.8	32.448	2.905	32.106	23.70	71.31	23.24	0.905	0.905	1.0000	0.997	123.91	3531.1
5.55	5.558	11431.1	11745.9	32.445	2.931	32.106	23.52	70.65	23.24	0.906	0.906	1.0000	0.997	123.90	3540.2
5.60	5.608	11544.8	11862.1	32.441	2.957	32.107	23.34	70.01	23.24	0.907	0.907	1.0000	0.250	123.90	3549.4

2)Hydrostatic data (Legs sink 10 m)

Trim 0 m by bow

T m	TK m	VOLM m3	DISP t	LCB m	VCB m	LCA m	KMT m	KML m	TCP t/cm	CB	CP	CM	CW	MCT tm/cm	WSA m2
1.00	1.008	2120.7	2193.4	32.678	-1.202	32.882	71.86	160.02	17.18	0.933	0.933	1.0000	0.737	55.08	2390.4
1.05	1.058	2204.4	2279.3	32.683	-1.119	32.836	69.33	154.93	17.21	0.924	0.924	1.0000	0.738	55.40	2399.0
1.10	1.108	2288.2	2365.3	32.687	-1.039	32.790	66.98	150.21	17.24	0.915	0.915	1.0000	0.739	55.72	2407.7
1.15	1.158	2372.2	2451.5	32.688	-0.963	32.746	64.79	145.85	17.27	0.908	0.908	1.0000	0.741	56.06	2416.5
1.20	1.208	2456.9	2538.6	32.695	-0.890	33.090	63.93	148.65	17.56	0.901	0.901	1.0000	0.753	59.13	2450.7
1.25	1.258	2542.4	2626.4	32.706	-0.819	33.046	61.95	144.59	17.60	0.895	0.895	1.0000	0.755	59.48	2459.6
1.30	1.308	2628.2	2714.3	32.715	-0.752	33.004	60.10	140.80	17.63	0.890	0.890	1.0000	0.756	59.85	2468.6
1.35	1.358	2714.1	2802.5	32.722	-0.687	32.994	58.37	137.85	17.68	0.885	0.885	1.0000	0.758	60.48	2479.3
1.40	1.408	2800.2	2890.9	32.729	-0.624	32.970	56.74	134.82	17.72	0.880	0.880	1.0000	0.760	60.99	2489.4
1.45	1.458	2886.2	2979.2	32.732	-0.563	33.118	55.71	134.67	17.89	0.876	0.876	1.0000	0.767	62.76	2511.5
1.50	1.508	2973.5	3068.7	32.742	-0.504	33.072	54.23	131.51	17.92	0.872	0.872	1.0000	0.768	63.10	2520.2
1.55	1.558	3060.9	3158.4	32.751	-0.447	33.026	52.84	128.53	17.95	0.869	0.869	1.0000	0.770	63.45	2564.1
1.60	1.608	3148.4	3248.2	32.758	-0.391	32.980	51.52	125.72	17.98	0.866	0.866	1.0000	0.771	63.80	2574.7
1.65	1.658	3236.1	3338.2	32.763	-0.336	32.934	50.27	123.05	18.01	0.863	0.863	1.0000	0.772	64.16	2585.2
1.70	1.708	3324.2	3430.1	32.771	-0.282	33.199	60.21	148.34	20.02	0.860	0.860	1.0000	0.823	79.41	2788.8
1.75	1.758	3421.8	3530.3	32.782	-0.225	33.157	58.64	144.84	20.05	0.860	0.860	1.0000	0.860	79.77	2800.3
1.80	1.808	3519.6	3630.6	32.792	-0.170	33.115	57.15	141.53	20.08	0.860	0.860	1.0000	0.861	80.14	2811.8
1.85	1.858	3617.5	3731.0	32.800	-0.116	33.073	55.75	138.40	20.11	0.860	0.860	1.0000	0.862	80.50	2823.3
1.90	1.908	3715.5	3831.6	32.807	-0.064	33.030	54.42	135.43	20.14	0.860	0.860	1.0000	0.864	80.87	2834.7
1.95	1.958	3813.7	3932.5	32.813	-0.012	33.143	53.49	134.80	20.28	0.861	0.861	1.0000	0.870	82.58	2857.3
2.00	2.008	3912.7	4034.0	32.821	0.038	33.101	52.28	132.06	20.31	0.861	0.861	1.0000	0.871	82.95	2868.8
2.05	2.058	4011.7	4135.6	32.827	0.087	33.059	51.12	129.45	20.34	0.861	0.861	1.0000	0.873	83.33	2880.3
2.10	2.108	4110.9	4237.4	32.833	0.135	33.017	50.02	126.96	20.37	0.861	0.861	1.0000	0.874	83.71	2891.8
2.15	2.158	4210.4	4339.6	32.838	0.182	33.241	49.49	128.10	20.60	0.862	0.862	1.0000	0.884	86.46	2920.7
2.20	2.208	4310.9	4442.7	32.847	0.228	33.198	48.46	125.73	20.63	0.862	0.862	1.0000	0.885	86.85	2929.7
2.25	2.258	4411.5	4545.9	32.855	0.274	33.156	47.48	123.48	20.66	0.863	0.863	1.0000	0.886	87.24	2939.0
2.30	2.308	4512.3	4649.3	32.861	0.318	33.114	46.55	121.32	20.69	0.863	0.863	1.0000	0.887	87.63	2948.4
2.35	2.358	4613.3	4753.0	32.867	0.362	33.154	45.80	120.28	20.79	0.864	0.864	1.0000	0.891	88.78	2964.0
2.40	2.408	4714.7	4857.1	32.873	0.405	33.179	45.05	119.09	20.86	0.864	0.864	1.0000	0.895	89.80	2978.5
2.45	2.458	4816.5	4961.6	32.879	0.448	33.170	44.28	117.56	20.92	0.865	0.865	1.0000	0.897	90.51	2990.7
2.50	2.508	4918.7	5066.4	32.886	0.490	33.194	43.59	116.48	21.00	0.866	0.866	1.0000	0.901	91.53	3005.5
2.55	2.558	5021.1	5171.6	32.892	0.531	33.201	42.90	115.25	21.07	0.866	0.866	1.0000	0.904	92.41	3019.1
2.60	2.608	5123.9	5277.0	32.898	0.572	33.159	42.15	113.50	21.10	0.867	0.867	1.0000	0.905	92.82	3029.2
2.65	2.658	5227.0	5382.9	32.904	0.612	33.250	41.65	113.33	21.23	0.868	0.868	1.0000	0.910	94.51	3048.9
2.70	2.708	5330.5	5489.1	32.910	0.652	33.153	41.03	112.29	21.30	0.869	0.869	1.0000	0.912	95.45	3084.1
2.75	2.758	5435.2	5596.7	32.912	0.692	32.758	41.11	116.98	21.73	0.870	0.870	1.0000	0.930	101.37	3137.8
2.80	2.808	5541.7	5706.3	32.904	0.732	32.274	41.02	120.39	22.08	0.871	0.871	1.0000	0.943	106.36	3178.6
2.85	2.858	5649.9	5817.5	32.887	0.772	31.792	40.89	123.81	22.43	0.872	0.872	1.0000	0.959	111.49	3221.8

Trim 0 m by bow

T m	TK m	VOLM m3	DISP t	LCB m	VCB m	LCA m	KMT m	KML m	TCP t/cm	CB	CP	CM	CW	MCT tm/cm	WSA m2
2.90	2.908	5759.8	5930.5	32.862	0.812	31.394	40.64	126.23	22.72	0.874	0.874	1.0000	0.975	115.85	3260.7
2.95	2.958	5871.2	6044.9	32.838	0.852	31.658	40.29	127.07	22.91	0.876	0.876	1.0000	0.983	118.84	3289.0
3.00	3.008	5982.9	6159.5	32.816	0.892	31.656	39.60	124.79	22.92	0.878	0.878	1.0000	0.983	118.87	3298.3
3.05	3.058	6094.6	6274.1	32.795	0.931	31.654	38.93	122.58	22.92	0.879	0.879	1.0000	0.983	118.89	3307.5
3.10	3.108	6206.4	6388.7	32.775	0.969	31.668	38.33	120.62	22.93	0.881	0.881	1.0000	0.983	119.07	3317.8
3.15	3.158	6318.4	6503.7	32.757	1.007	31.784	37.83	119.85	23.01	0.883	0.883	1.0000	0.987	120.39	3335.2
3.20	3.208	6430.6	6618.8	32.740	1.045	31.784	37.23	117.82	23.01	0.884	0.884	1.0000	0.987	120.40	3344.3
3.25	3.258	6542.9	6733.9	32.724	1.082	31.805	36.71	116.10	23.03	0.886	0.886	1.0000	0.988	120.64	3355.1
3.30	3.308	6655.2	6849.2	32.708	1.119	32.002	36.31	116.32	23.17	0.887	0.887	1.0000	0.989	122.90	3378.2
3.35	3.358	6768.1	6965.1	32.697	1.156	32.038	35.82	114.82	23.20	0.889	0.889	1.0000	0.995	123.31	3389.9
3.40	3.408	6881.2	7081.1	32.686	1.192	32.038	35.29	112.99	23.20	0.891	0.891	1.0000	0.995	123.32	3399.0
3.45	3.458	6994.3	7197.1	32.676	1.228	32.038	34.78	111.23	23.20	0.892	0.892	1.0000	0.995	123.32	3408.1
3.50	3.508	7107.4	7313.1	32.666	1.264	32.098	34.34	110.13	23.24	0.894	0.894	1.0000	0.997	124.01	3421.5
3.55	3.558	7220.7	7429.3	32.657	1.299	32.098	33.86	108.46	23.24	0.895	0.895	1.0000	0.997	124.01	3430.6
3.60	3.608	7334.0	7545.6	32.648	1.334	32.099	33.39	106.85	23.24	0.896	0.896	1.0000	0.997	124.02	3439.8
3.65	3.658	7447.3	7661.8	32.640	1.369	32.099	32.94	105.29	23.24	0.898	0.898	1.0000	0.997	124.02	3448.9
3.70	3.708	7560.6	7778.0	32.632	1.403	32.099	32.51	103.77	23.24	0.899	0.899	1.0000	0.997	124.03	3458.1
3.75	3.758	7673.9	7894.2	32.624	1.438	32.099	32.08	102.30	23.24	0.900	0.900	1.0000	0.997	124.03	3467.2
3.80	3.808	7787.2	8010.4	32.617	1.471	32.100	31.67	100.88	23.24	0.902	0.902	1.0000	0.997	124.03	3476.4
3.85	3.858	7900.6	8126.6	32.609	1.505	32.100	31.27	99.49	23.24	0.903	0.903	1.0000	0.997	124.03	3485.5
3.90	3.908	8013.9	8242.9	32.602	1.539	32.100	30.89	98.14	23.24	0.904	0.904	1.0000	0.997	124.03	3494.7
3.95	3.958	8127.2	8359.1	32.595	1.572	32.100	30.51	96.83	23.24	0.905	0.905	1.0000	0.997	124.03	3503.8
4.00	4.008	8240.6	8475.3	32.588	1.605	32.100	30.15	95.56	23.24	0.906	0.906	1.0000	0.997	124.03	3512.9
4.05	4.058	8353.9	8591.6	32.581	1.637	32.100	29.80	94.32	23.24	0.908	0.908	1.0000	0.997	124.03	3522.1
4.10	4.108	8467.2	8707.8	32.575	1.670	32.100	29.45	93.11	23.24	0.909	0.909	1.0000	0.997	124.03	3531.2
4.15	4.158	8580.5	8824.0	32.569	1.702	32.100	29.12	91.94	23.24	0.910	0.910	1.0000	0.997	124.03	3540.4
4.20	4.208	8693.8	8940.3	32.562	1.734	32.100	28.79	90.80	23.24	0.911	0.911	1.0000	0.997	124.03	3549.5
4.25	4.258	8807.2	9056.5	32.557	1.766	32.101	28.48	89.69	23.24	0.912	0.912	1.0000	0.997	124.03	3558.7
4.30	4.308	8920.5	9172.7	32.551	1.798	32.101	28.17	88.61	23.24	0.913	0.913	1.0000	0.997	124.03	3567.8
4.35	4.358	9033.8	9288.9	32.545	1.830	32.101	27.87	87.55	23.24	0.914	0.914	1.0000	0.997	124.03	3576.9
4.40	4.408	9147.1	9405.2	32.540	1.861	32.101	27.58	86.52	23.24	0.915	0.915	1.0000	0.997	124.02	3586.1
4.45	4.458	9260.4	9521.4	32.534	1.893	32.101	27.30	85.52	23.24	0.916	0.916	1.0000	0.997	124.02	3595.2
4.50	4.508	9373.7	9637.6	32.529	1.924	32.101	27.02	84.54	23.24	0.917	0.917	1.0000	0.997	124.02	3604.4
4.55	4.558	9487.0	9753.8	32.524	1.955	32.101	26.76	83.58	23.24	0.917	0.917	1.0000	0.997	124.02	3613.5
4.60	4.608	9600.3	9870.0	32.519	1.986	32.101	26.49	82.65	23.24	0.918	0.918	1.0000	0.997	124.01	3622.7
4.65	4.658	9713.6	9986.3	32.514	2.016	32.101	26.24	81.74	23.24	0.919	0.919	1.0000	0.997	124.01	3631.8
4.70	4.708	9826.9	10102.5	32.509	2.047	32.101	25.99	80.85	23.24	0.920	0.920	1.0000	0.997	124.00	3640.9
4.75	4.758	9940.3	10218.7	32.505	2.077	32.101	25.75	79.98	23.24	0.921	0.921	1.0000	0.997	124.00	3650.1

Trim 0 m by bow

T m	TK m	VOLM m3	DISP t	LCB m	VCB m	LCA m	KMT m	KML m	TCP t/cm	CB	CP	CM	CW	MCT tm/cm	WSA m2
4.80	4.808	10053.5	10334.9	32.500	2.108	32.101	25.51	79.13	23.24	0.922	0.922	1.0000	0.997	123.99	3659.2
4.85	4.858	10166.8	10451.1	32.496	2.138	32.101	25.28	78.30	23.24	0.922	0.922	1.0000	0.997	123.99	3668.4
4.90	4.908	10280.1	10567.3	32.491	2.168	32.101	25.06	77.49	23.24	0.923	0.923	1.0000	0.997	123.99	3677.5
4.95	4.958	10393.4	10683.5	32.487	2.198	32.101	24.84	76.70	23.24	0.924	0.924	1.0000	0.997	123.98	3686.7
5.00	5.008	10506.7	10799.7	32.483	2.228	32.101	24.62	75.93	23.24	0.925	0.925	1.0000	0.997	123.98	3695.8
5.05	5.058	10620.0	10915.9	32.479	2.258	32.102	24.41	75.17	23.24	0.925	0.925	1.0000	0.997	123.97	3704.9
5.10	5.108	10733.3	11032.0	32.475	2.287	32.102	24.21	74.43	23.24	0.926	0.926	1.0000	0.997	123.97	3714.1
5.15	5.158	10846.5	11148.2	32.471	2.317	32.102	24.01	73.70	23.24	0.927	0.927	1.0000	0.997	123.96	3723.2
5.20	5.208	10959.8	11264.4	32.467	2.346	32.103	23.82	72.99	23.24	0.927	0.927	1.0000	0.997	123.95	3732.3
5.25	5.258	11073.1	11380.6	32.464	2.376	32.103	23.63	72.30	23.24	0.928	0.928	1.0000	0.997	123.95	3741.4
5.30	5.308	11186.3	11496.7	32.460	2.405	32.104	23.44	71.62	23.24	0.929	0.929	1.0000	0.997	123.94	3750.6
5.35	5.358	11299.6	11612.9	32.457	2.434	32.104	23.26	70.95	23.24	0.929	0.929	1.0000	0.997	123.93	3759.7
5.40	5.408	11412.9	11729.1	32.453	2.463	32.105	23.08	70.30	23.24	0.930	0.930	1.0000	0.997	123.93	3768.8
5.45	5.458	11526.1	11845.2	32.450	2.492	32.105	22.91	69.66	23.24	0.931	0.931	1.0000	0.997	123.92	3778.0
5.50	5.508	11639.4	11961.4	32.447	2.521	32.106	22.74	69.03	23.24	0.931	0.931	1.0000	0.997	123.91	3787.1
5.55	5.558	11752.6	12077.6	32.443	2.550	32.106	22.57	68.41	23.24	0.932	0.932	1.0000	0.997	123.90	3796.2
5.60	5.608	11866.3	12193.7	32.440	2.579	32.107	22.41	67.81	23.24	0.932	0.932	1.0000	0.250	123.90	3805.4

7.2 Maximum allowable KG and Typical Floating Cases

7.2.1 Maximum allowable KG

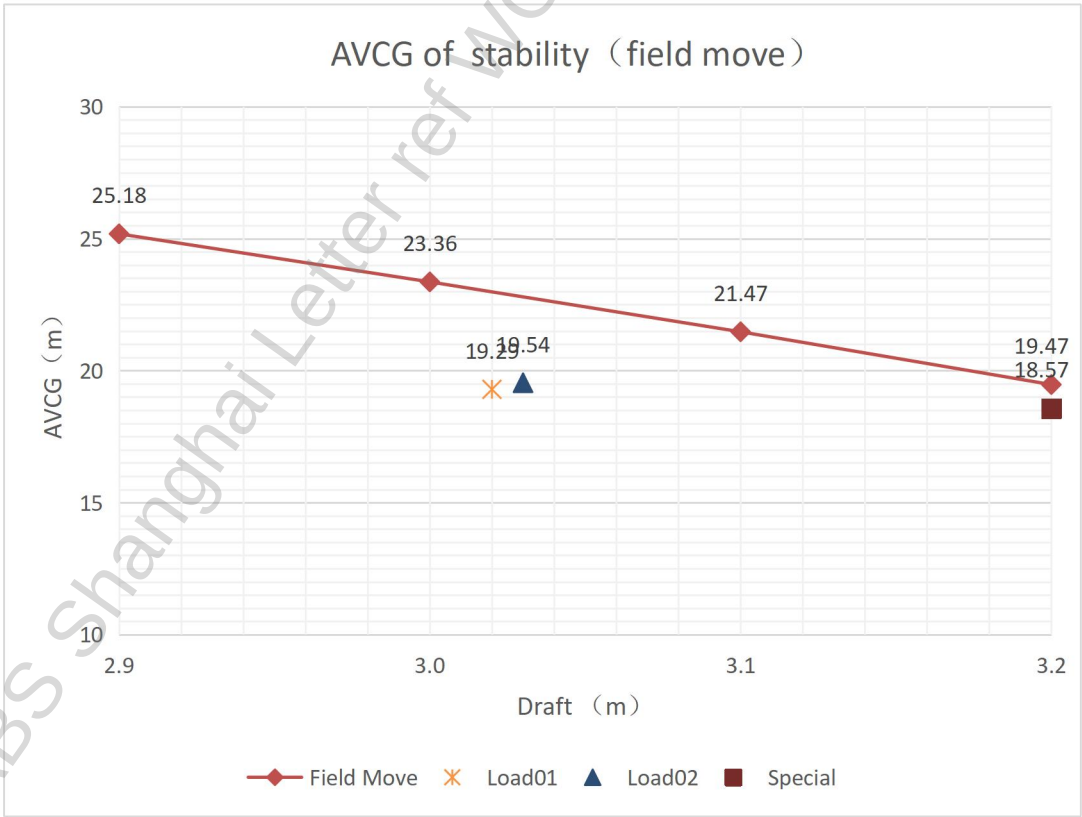
Leg length = 85.5 m;

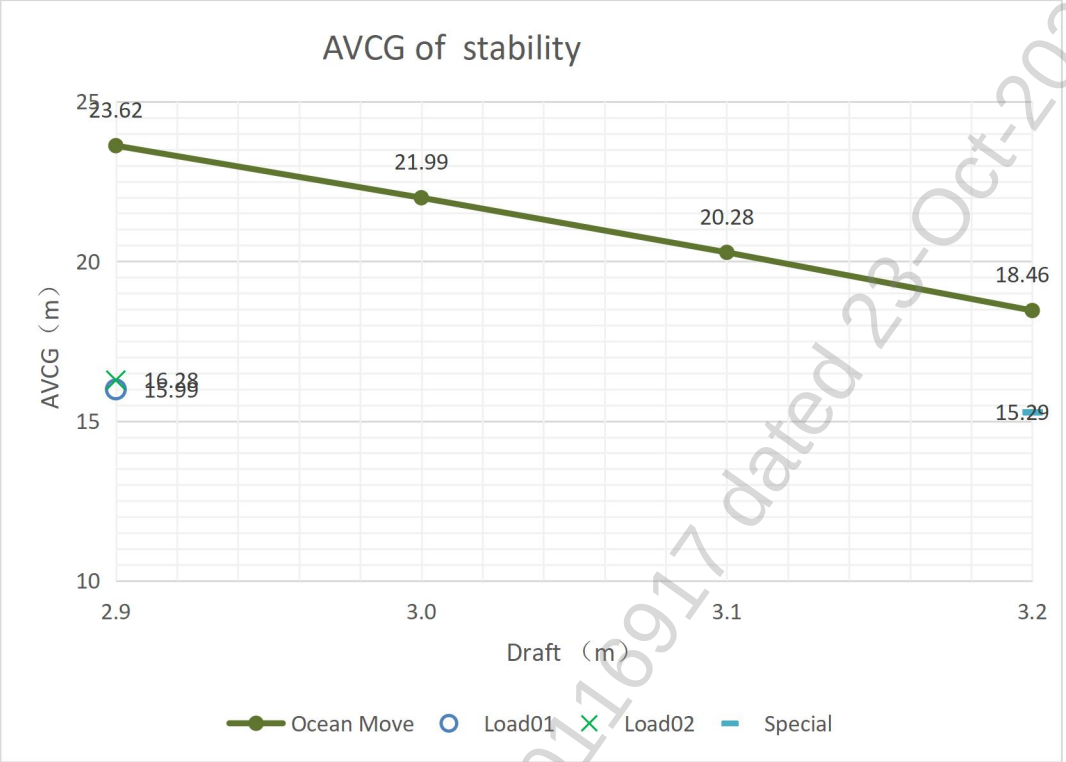
Legs No Sink for field move;Legs Sink 10m for ocean move;

The unit's vertical center of gravity, corrected for free surface effects, shall not exceed the following allowable VCG (AVCG) in meters:

Allowable vertical center of gravity (AVCG)

Draft	Field move (70 knots) leg length = 85.5m (Legs No Sink)		Ocean move (100 knots) leg length =85.5 m (Legs Sink 10m)	
	Displacement	Legs no sink	Displacement	Legs sink 10 m
(m)	(t)	(m)	(t)	(m)
2.9	5598.9	25.18	5930.5	23.62
3.0	5827.9	23.36	6159.5	21.99
3.1	6057.1	21.47	6388.7	20.28
3.2	6287.2	19.47	6618.8	18.46





Intermediate values may be determined by linear interpolation

When operated in accordance with the above AVCG and the restrictions below, the unit will be in compliance with the intact stability requirements of the above Guide and Regulations for 100 knot winds for severe storm/ ocean moving and 70 knot winds for field move respectively, and the damage stability requirements with extends of damage as set forth by the same Guide and Regulations with a 50 knots wind superimposed.

No lifting operation shall be carried out during afloat condition.

7.2.2 Downflooding Points

The unit is considered as lost when the engine rooms and the emergency generator room flood via the vents.

All the unprotected openings are listed as follows:

No.	Description	X	Y	Z
OP01	Engine room vent opening P	18.6	12.5	10.1
OP02	Engine room vent opening S	18.6	-12.5	10.1

OP03	Engine room vent opening P	15	12.5	10.1
OP04	Engine room vent opening S	15	-12.5	10.1
OP05	emergency generator room vent opening	43.8	-10.7	12
OP06	emergency generator room vent opening	43.8	-6.6	12
OP07	emergency generator room vent opening	49.8	-10.7	12

The above unprotected openings shall be used for intact stability calculation.

The weathertight opening including air pipe, weathertight doors.

For a conservative approach, the air pipe are considered at the forward and aft deck edge (as shown in the table below) , and 760mm above the deck as required by ABS.

According to 2009 MODU Code 10.6.2,a davit-launched liferaft should be so positioned that the survival raft is upon embarkation at least 2 m above the waterline when the unit is in the limiting damaged condition. So the critical point below 2 m of embarkation for the survival raft will be used for damage stability analysis.

The locations of the critical points used in the damage stability analysis are shown as follows:

No.	Description	X	Y	Z
OP08	Weathertight	0	17.7	6.2
OP09	Weathertight	0	-17.7	6.2
OP10	Weathertight	64.2	17.7	6.2
OP11	Weathertight	64.2	-17.7	6.2
OP12	liferaft	39	17.7	4.6
OP13	liferaft	45	17.7	4.6
OP14	liferaft	34.2	-17.7	4.6
OP15	liferaft	40.2	-17.7	4.6

7.2.3 Typical Floating Cases

The floating conditions includes the following loading cases:

1.field move

(1)SPECIAL, the consumables meet the demand for 14 days，legs no sink

(2) Load01，100% consumables, legs no sink

(3)Load02，10% consumables, legs no sink

Summary Of Loading Conditions

CASE	LIGV	DISP t	LW t	LOAD t	FW t	FO t	DECKCARGO t	BW t	T m
LOAD01	M	5883.2	5180.4	702.8	229.1	327.4	0	78.1	3.02
LOAD02	M	5906.6	5180.4	726.2	22.9	52.3	0	391.3	3.03
SPECIAL	M	6286.7	5180.4	1106.3	229.1	261.9	430	117.0	3.20

CASE	TF m	TA m	TR m	HEEL deg	GM m	ZCG m	KMT m	GMCORR m	KG(CORR) m
LOAD01	3.022	3.027	-0.005	0.0	22.816	18.62	42.106	-0.673	19.29
LOAD02	3.033	3.036	-0.002	0.0	22.413	18.50	41.951	-1.042	19.54
SPECIAL	3.192	3.208	-0.016	0.0	21.204	17.92	39.776	-0.648	18.57

符号说明 EXPLANATION OF SYMBOLS:

LIGV	Lightship weight	t
DISP	Total displacement	t
LW	Light weight	t
FW	mass of fresh water	t
FO	Fuel oil	t
LO	Lubricating oil	t
DECKCARGO		Deck cargo t
BW	Mass of ballast water	t
T	Mean draught, moulded	m
TF	Draught fore, moulded	m
TA	Draught aft, moulded	m
TR	Trim, (+):by stem, (-):by stern	m
HEEL	Heeling angle, (+):PS, (-):SB	degree
GM	Metacentric height corrected	m
ZCG	Z of center of gravity	m
KMT	Transv. metac. height	m

The detailed floating conditions are as follows：

LOADING CONDITION LOAD01

L O A D I N G C O M P O N E N T S

Name		Max. weight	Mass	Center of gravity cgx	cgy	cgz	Free s. moment
Ballast Water, RHO=1.025							
BW1P	B.W.T 1P	182.8	54.1	58.99	14.20	2.11	124.85
BW1S	B.W.T 1S	182.8	23.9	58.32	-14.20	1.54	34.49
Total of BW		365.6	78.1	58.79	5.50	1.94	159.34
Fresh Water, RHO=1.000							
FWP	FRESH WATER P	114.6	114.6	5.92	14.20	3.55	42.36
FWS	FRESH WATER S	114.6	114.6	5.92	-14.20	3.55	42.36
Total of FW		229.1	229.1	5.92	0.00	3.55	84.72
Miscellaneous, RHO=1.000							
DIRTY	DIRTY OIL TA.	11.1	1.1	11.10	3.90	0.07	10.87
BILGE	BILGE WATER .	47.0	4.7	10.73	0.00	0.08	77.16
GREY	GREY WATER T.	78.5	7.8	51.60	-6.25	0.12	33.91
BLACK	BLACK WATER .	76.1	7.6	54.81	-6.24	0.17	33.91
Total of MIS		212.7	21.3	41.60	-4.33	0.13	155.85
Diesel Oil, RHO=0.860							
FODTP	FODT P	10.5	10.5	21.90	15.05	3.23	3.22
FODTS	FODT S	10.5	10.5	21.90	-15.05	3.23	3.22
FOP	FUEL OIL TANK	153.2	153.2	19.11	14.64	1.70	290.23
FOS	FUEL OIL TANK	153.2	153.2	19.11	-14.64	1.70	290.23
Total of DO		327.4	327.4	19.29	0.00	1.80	586.90
Brine, RHO=1.300							
BRINEP	BRINE TK P	266.9	0.0	33.30	14.20	1.25	1486.62
BRINES	BRINE TK S	266.9	0.0	33.30	-14.20	1.25	1486.62
Total of BR		533.7	0.0	0.00	0.00	0.00	2973.24
CONSTANT							
PROVISI.		0.0	14.0	40.50	-6.60	4.50	0.00
SPARE		0.0	21.0	21.60	0.00	3.40	0.00
CREW.		0.0	12.0	54.00	0.00	9.00	0.00
Total of		0.0	47.0	35.50	-1.97	5.16	0.00
Deadweight			702.8	21.08	0.35	2.56	3960.0
Lightweight			5180.4	34.41	-0.05	20.80	
Displacement (rho=1.025)			5883.2	32.82	0.00	18.62	3960.0

FLOATING POSITION

Draught moulded	3.024	m	KM	42.11 m
Trim	-0.005	m	KG	18.62 m
Heel, PS=+	0.0	deg		
TA	3.027	m	GM0	23.49 m
TF	3.022	m	GMCORR	-0.67 m
Trimming moment	-51	tonm	GM	22.82 m

LOADING CONDITION LOAD02

L O A D I N G C O M P O N E N T S

Name		Max. weight	Mass	Center of gravity cgx	cgy	cgz	Free s. moment
Ballast Water, RHO=1.025							
BW4P	NO.4 BW P	68.0	68.0	1.87	14.08	4.20	0.00
BW4S	NO.4 BW S	68.0	68.0	1.87	-14.08	4.20	0.00
BW4M	NO.4 BWT M	60.6	60.6	1.82	0.00	4.20	0.00
BW3P	B.W.T 3P	47.4	47.4	10.53	7.75	0.76	0.00
BW2P	B.W.T 2P	222.5	147.4	20.10	5.35	0.50	2353.91
Total of BW		466.5	391.3	9.78	2.95	2.39	2353.91
Fresh Water, RHO=1.000							
FWP	FRESH WATER P	114.6	11.5	7.02	14.20	1.31	42.36
FWS	FRESH WATER S	114.6	11.5	7.02	-14.20	1.31	42.36
Total of FW		229.1	22.9	7.02	0.00	1.31	84.72
Miscellaneous, RHO=1.000							
DIRTY	DIRTY OIL TA.	11.1	11.1	11.10	3.90	0.75	10.87
BILGE	BILGE WATER .	47.0	47.0	10.53	0.00	0.76	77.16
GREY	GREY WATER T.	78.5	78.5	51.60	-6.25	1.25	33.91
BLACK	BLACK WATER .	76.1	76.1	55.16	-6.25	1.29	33.91
Total of MIS		212.7	212.7	41.68	-4.34	1.13	155.85
Diesel Oil, RHO=0.860							
FODTP	FODT P	10.5	10.5	21.90	15.05	3.23	3.22
FODTS	FODT S	10.5	10.5	21.90	-15.05	3.23	3.22
FOP	FUEL OIL TANK	153.2	15.6	19.18	14.21	0.16	290.23
FOS	FUEL OIL TANK	153.2	15.6	19.18	-14.21	0.16	290.23
Total of DO		327.4	52.3	20.28	0.00	1.39	586.90
Brine, RHO=1.300							
BRINEP	BRINE TK P	266.9	0.0	33.30	14.20	1.25	1486.62
BRINES	BRINE TK S	266.9	0.0	33.30	-14.20	1.25	1486.62
Total of BR		533.7	0.0	0.00	0.00	0.00	2973.24
CONSTANT							
PROVISI.		0.0	14.0	40.50	-6.60	4.50	0.00
SPARE		0.0	21.0	21.60	0.00	3.40	0.00
CREW.		0.0	12.0	54.00	0.00	9.00	0.00
Total of		0.0	47.0	35.50	-1.97	5.16	0.00

Name	Max. weight	Mass	Center of gravity		Free s.
Deadweight		726.2	21.45	0.19	2.09	6154.6
Lightweight		5180.4	34.41	-0.05	20.80	
Displacement (rho=1.025)		5906.6	32.82	-0.02	18.50	6154.6

FLOATING POSITION

Draught moulded	3.034	m	KM	41.95 m
Trim	-0.002	m	KG	18.50 m
Heel, PS=+	0.0	deg		
TA	3.036	m	GM0	23.45 m
TF	3.033	m	GMCORR	-1.04 m
Trimming moment	-25	tonm	GM	22.41 m

LOADING CONDITION SPECIAL

L O A D I N G C O M P O N E N T S

Name		Max. weight	Mass	Center of gravity cgx	cgy	cgz	Free s. moment
Ballast Water, RHO=1.025							
BW1P	B.W.T 1P	182.8	77.0	59.37	14.19	2.44	204.02
BW1S	B.W.T 1S	182.8	40.0	58.71	-14.20	1.87	71.62
Total of BW		365.6	117.0	59.15	4.49	2.25	275.64
Fresh Water, RHO=1.000							
FWP	FRESH WATER P	114.6	114.6	5.92	14.20	3.55	42.36
FWS	FRESH WATER S	114.6	114.6	5.92	-14.20	3.55	42.36
Total of FW		229.1	229.1	5.92	0.00	3.55	84.72
Miscellaneous, RHO=1.000							
DIRTY	DIRTY OIL TA.	11.1	1.1	11.10	3.90	0.07	10.87
BILGE	BILGE WATER .	47.0	4.7	10.73	0.00	0.08	77.16
GREY	GREY WATER T.	78.5	7.8	51.60	-6.25	0.12	33.91
BLACK	BLACK WATER .	76.1	7.6	54.81	-6.24	0.17	33.91
Total of MIS		212.7	21.3	41.60	-4.33	0.13	155.85
Diesel Oil, RHO=0.860							
FODTP	FODT P	10.5	10.5	21.90	15.05	3.23	3.22
FODTS	FODT S	10.5	10.5	21.90	-15.05	3.23	3.22
FOP	FUEL OIL TANK	153.2	120.4	19.14	14.19	1.23	290.23
FOS	FUEL OIL TANK	153.2	120.4	19.14	-14.19	1.23	290.23
Total of DO		327.4	261.9	19.36	0.00	1.39	586.90
Brine, RHO=1.300							
BRINEP	BRINE TK P	266.9	0.0	33.30	14.20	1.25	1486.62
BRINES	BRINE TK S	266.9	0.0	33.30	-14.20	1.25	1486.62
Total of BR		533.7	0.0	0.00	0.00	0.00	2973.24
CONSTANT							
PROVISI.		0.0	14.0	40.50	-6.60	4.50	0.00
SPARE		0.0	21.0	21.60	0.00	3.40	0.00
CREW.		0.0	12.0	54.00	0.00	9.00	0.00
Total of		0.0	47.0	35.50	-1.97	5.16	0.00

Name	Max. weight	Mass	Center of gravity cgx	cgy	cgz	Free s. moment
DECKLOAD						
DECKLOAD	0.0	430.0	27.00	0.00	7.60	0.00
Deadweight		1106.3	24.87	0.31	4.48	4076.3
Lightweight		5180.4	34.41	-0.05	20.80	
Displacement (rho=1.025)		6286.7	32.73	0.02	17.92	4076.3

FLOATING POSITION

Draught moulded	3.200	m	KM	39.78 m
Trim	-0.016	m	KG	17.92 m
Heel, PS=+	0.0	deg		
TA	3.208	m	GM0	21.85 m
TF	3.192	m	GMCORR	-0.65 m
Trimming moment	-171	tonm	GM	21.20 m

2. ocean move

（1）SPECIAL, the consumables meet the demand for 14 days， legs sink 10m

（2）Load01，100% consumables, legs sink 10m

（3）Load02，10% consumables, legs sink 10m

Summary Of Loading Conditions

CASE	LIGV	DISP t	LW t	LOAD t	FW t	FO t	DECKCARGO t	BW t	T m
LOAD01	N	5932.2	5180.4	751.8	229.1	327.4	0	127.0	2.90
LOAD02	N	5931.8	5180.4	751.4	22.9	52.3	0	416.5	2.90
SPECIAL	N	6619.1	5180.4	1438.7	229.1	261.9	430	449.4	3.20

CASE	TF m	TA m	TR m	HEEL deg	GM m	ZCG m	KMT m	GMCORR m	KG(CORR) m
LOAD01	2.896	2.905	-0.009	0.0	24.630	15.30	40.625	-0.692	15.99
LOAD02	2.899	2.902	-0.003	0.0	24.345	15.22	40.627	-1.062	16.28
SPECIAL	3.200	3.200	0.000	0.2	21.939	14.28	37.231	-1.012	15.29

符号说明 EXPLANATION OF SYMBOLS:

LIGV	Lightship weight	t
DISP	Total displacement	t
LW	Light weight	t

FW	mass of fresh water	t
FO	Fuel oil	t
LO	Lubricating oil	t
DECKCARGO		Deck cargo t
BW	Mass of ballast water	t
T	Mean draught, moulded	m
TF	Draught fore, moulded	m
TA	Draught aft, moulded	m
TR	Trim, (+):by stem, (-):by stern	m
HEEL	Heeling angle, (+):PS, (-):SB	degree
GM	Metacentric height corrected	m
ZCG	Z of center of gravity	m
KMT	Transv. metac. height	m

The detailed floating conditions are as follows：

LOADING CONDITION LOAD01

L O A D I N G C O M P O N E N T S

Name		Max. weight	Mass	Center of gravity cgx	cgy	cgz	Free s. moment
Ballast Water, RHO=1.025							
BW4P	NO.4 BW P	68.0	10.0	1.98	14.10	3.01	25.42
BW4S	NO.4 BW S	68.0	10.0	1.98	-14.10	3.01	25.42
BW1P	B.W.T 1P	182.8	72.8	59.31	14.19	2.39	192.02
BW1S	B.W.T 1P	182.8	34.2	58.58	-14.20	1.76	59.80
Total of BW		501.7	127.0	50.08	4.31	2.32	302.66
Fresh Water, RHO=1.000							
FWP	FRESH WATER P	114.6	114.6	5.92	14.20	3.55	42.36
FWS	FRESH WATER S	114.6	114.6	5.92	-14.20	3.55	42.36
Total of FW		229.1	229.1	5.92	0.00	3.55	84.72
Miscellaneous, RHO=1.000							
DIRTY	DIRTY OIL TA.	11.1	1.1	11.10	3.90	0.07	10.87
BILGE	BILGE WATER .	47.0	4.7	10.73	0.00	0.08	77.16
GREY	GREY WATER T.	78.5	7.8	51.60	-6.25	0.12	33.91
BLACK	BLACK WATER .	76.1	7.6	54.81	-6.24	0.17	33.91
Total of MIS		212.7	21.3	41.60	-4.33	0.13	155.85
Diesel Oil, RHO=0.860							
FODTP	FODT P	10.5	10.5	21.90	15.05	3.23	3.22
FODTS	FODT S	10.5	10.5	21.90	-15.05	3.23	3.22
FOP	FUEL OIL TANK	153.2	153.2	19.11	14.64	1.70	290.23
FOS	FUEL OIL TANK	153.2	153.2	19.11	-14.64	1.70	290.23
Total of DO		327.4	327.4	19.29	0.00	1.80	586.90
Brine, RHO=1.300							
BRINEP	BRINE TK P	266.9	0.0	33.30	14.20	1.25	1486.62
BRINES	BRINE TK S	266.9	0.0	33.30	-14.20	1.25	1486.62
Total of BR		533.7	0.0	0.00	0.00	0.00	2973.24
CONSTANT							
PROVISI.		0.0	14.0	40.50	-6.60	4.50	0.00
SPARE		0.0	21.0	21.60	0.00	3.40	0.00
CREW.		0.0	12.0	54.00	0.00	9.00	0.00
Total of		0.0	47.0	35.50	-1.97	5.16	0.00
Deadweight			751.8	22.06	0.48	2.58	4103.4
Lightweight			5180.4	34.41	-0.05	17.15	
Displacement (rho=1.025)			5932.2	32.85	0.02	15.30	4103.4

FLOATING POSITION

Draught moulded	2.901	m	KM	40.62 m
Trim	-0.009	m	KG	15.30 m
Heel, PS=+	0.0	deg		
TA	2.905	m	GM0	25.32 m
TF	2.896	m	GMCORR	-0.69 m
Trimming moment	-96	tonm	GM	24.63 m

LOADING CONDITION LOAD02

L O A D I N G C O M P O N E N T S

Name		Max. weight	Mass	Center of gravity cgx	cgy	cgz	Free s. moment
Ballast Water, RHO=1.025							
BW4P	NO.4 BW P	68.0	68.0	1.87	14.08	4.20	0.00
BW4S	NO.4 BW S	68.0	44.8	1.88	-14.08	3.73	25.39
BW4M	NO.4 BWT M	60.6	60.4	1.82	0.00	4.20	0.00
BW3P	B.W.T 3P	47.4	47.2	10.53	7.75	0.76	0.00
BW3S	B.W.T 3S	61.8	52.2	10.54	-6.85	0.64	101.49
BW2P	B.W.T 2P	222.5	127.3	20.10	5.35	0.43	2353.91
BW1P	B.W.T 1P	182.8	16.5	58.10	14.19	1.34	19.90
Total of BW		711.1	416.5	11.73	3.00	2.05	2500.69
Fresh Water, RHO=1.000							
FWP	FRESH WATER P	114.6	11.5	7.02	14.20	1.31	42.36
FWS	FRESH WATER S	114.6	11.5	7.02	-14.20	1.31	42.36
Total of FW		229.1	22.9	7.02	0.00	1.31	84.72
Miscellaneous, RHO=1.000							
DIRTY	DIRTY OIL TA.	11.1	11.1	11.10	3.90	0.75	10.87
BILGE	BILGE WATER .	47.0	47.0	10.53	0.00	0.76	77.16
GREY	GREY WATER T.	78.5	78.5	51.60	-6.25	1.25	33.91
BLACK	BLACK WATER .	76.1	76.1	55.16	-6.25	1.29	33.91
Total of MIS		212.7	212.7	41.68	-4.34	1.13	155.85
Diesel Oil, RHO=0.860							
FODTP	FODT P	10.5	10.5	21.90	15.05	3.23	3.22
FODTS	FODT S	10.5	10.5	21.90	-15.05	3.23	3.22
FOP	FUEL OIL TANK	153.2	15.6	19.18	14.21	0.16	290.23
FOS	FUEL OIL TANK	153.2	15.6	19.18	-14.21	0.16	290.23
Total of DO		327.4	52.3	20.28	0.00	1.39	586.90
Brine, RHO=1.300							
BRINEP	BRINE TK P	266.9	0.0	33.30	14.20	1.25	1486.62
BRINES	BRINE TK S	266.9	0.0	33.30	-14.20	1.25	1486.62
Total of BR		533.7	0.0	0.00	0.00	0.00	2973.24
CONSTANT							
PROVISI.		0.0	14.0	40.50	-6.60	4.50	0.00
SPARE		0.0	21.0	21.60	0.00	3.40	0.00
CREW.		0.0	12.0	54.00	0.00	9.00	0.00

CONSTANT

Total of	0.0	47.0	35.50	-1.97	5.16	0.00
Deadweight		751.4	22.15	0.31	1.91	6301.4
Lightweight		5180.4	34.41	-0.05	17.15	
Displacement (rho=1.025)		5931.8	32.86	0.00	15.22	6301.4

FLOATING POSITION

Draught moulded	2.901	m	KM	40.63 m
Trim	-0.003	m	KG	15.22 m
Heel, PS=+	0.0	deg		
TA	2.902	m	GM0	25.41 m
TF	2.899	m	GMCORR	-1.06 m
Trimming moment	-28	tonm	GM	24.34 m

LOADING CONDITION SPECIAL

L O A D I N G C O M P O N E N T S

Name		Max. weight	Mass	Center of gravity cgx	cgy	cgz	Free s. moment
Ballast Water, RHO=1.025							
BW4P	NO.4 BW P	68.0	41.0	1.88	14.08	3.65	25.39
BW3S	B.W.T 3S	61.8	47.0	10.54	-6.85	0.58	101.49
BW2P	B.W.T 2P	222.5	109.1	20.10	5.35	0.37	2353.91
BW1P	B.W.T 1P	182.8	126.6	59.83	14.17	3.04	209.54
BW1S	B.W.T 1P	182.8	125.7	59.82	-14.17	3.03	209.55
Total of BW		718.0	449.4	39.74	1.90	2.19	2899.88
Fresh Water, RHO=1.000							
FWP	FRESH WATER P	114.6	114.6	5.92	14.20	3.55	42.36
FWS	FRESH WATER S	114.6	114.6	5.92	-14.20	3.55	42.36
Total of FW		229.1	229.1	5.92	0.00	3.55	84.72
Miscellaneous, RHO=1.000							
DIRTY	DIRTY OIL TA.	11.1	1.1	11.10	3.90	0.07	10.87
BILGE	BILGE WATER	47.0	4.7	10.73	0.00	0.08	77.16
GREY	GREY WATER T.	78.5	7.8	51.60	-6.25	0.12	33.91
BLACK	BLACK WATER .	76.1	7.6	54.81	-6.24	0.17	33.91
Total of MIS		212.7	21.3	41.60	-4.33	0.13	155.85
Diesel Oil, RHO=0.860							
FODTP	FODT P	10.5	10.5	21.90	15.05	3.23	3.22
FODTS	FODT S	10.5	10.5	21.90	-15.05	3.23	3.22
FOP	FUEL OIL TANK	153.2	120.4	19.14	14.19	1.23	290.23
FOS	FUEL OIL TANK	153.2	120.4	19.14	-14.19	1.23	290.23
Total of DO		327.4	261.9	19.36	0.00	1.39	586.90
Brine, RHO=1.300							
BRINEP	BRINE TK P	266.9	0.0	33.30	14.20	1.25	1486.62
BRINES	BRINE TK S	266.9	0.0	33.30	-14.20	1.25	1486.62
Total of BR		533.7	0.0	0.00	0.00	0.00	2973.24

CONSTANT						
PROVISI.	0.0	14.0	40.50	-6.60	4.50	0.00
SPARE	0.0	21.0	21.60	0.00	3.40	0.00
CREW.	0.0	12.0	54.00	0.00	9.00	0.00
Total of	0.0	47.0	35.50	-1.97	5.16	0.00
DECKLOAD						
DECKLOAD	0.0	430.0	27.00	0.00	7.60	0.00
Deadweight		1438.7	26.73	0.46	3.94	6700.6
Lightweight		5180.4	34.41	-0.05	17.15	
Displacement (rho=1.025)		6619.1	32.74	0.06	14.28	6700.6

FLOATING POSITION

Draught moulded	3.200	m	KM	37.23 m
Trim	0.000	m	KG	14.28 m
Heel, PS=+	0.2	deg		
TA	3.200	m	GM0	22.95 m
TF	3.200	m	GMCORR	-1.01 m
Trimming moment	0	tonm	GM	21.94 m

7.3 Load condition and stability calculations

7.3.1 Weight calculation procedures

The load condition calculations shall determine the weight and centers of gravity for the loaded S.E.U.. LCG is measured from the stern (frame 0), TCG is measured from the hull centerline with PS positive and SB negative and VCG is measured from the hull baseline.

A load condition form shall be completed prior to any change of mode, including entering the afloat mode.

1) Ascertain the volume quantity of fluids in each tank and enter this information in the form.

2) Ascertain the weight of fluids in each tank, using the tank tables (as shown in section 7.4) and enter this information in the form.

3) Ascertain the free surface correction value of any slack tank, using the free surface correction table (as shown in section 7.4) and enter this information in the form.

4) For all load conditions, other than the elevated condition, the cranes shall be considered to be in the stowed position.

5) Calculate the total displacement of the S.E.U.. If the value as per hydrostatic data after applying the appendages is less than 6287.2t, proceed to the afloat forms. If the value is greater, reduce the variable load before proceeding.

6) The afloat stability form shall be used to ascertain the stability of the loaded S.E.U. during, or prior to any afloat operation. The calculated weight and centre of gravity information shown in the load condition weight summary shall be entered in the form. Ascertain the relevant hydrostatic data (as shown in section 7.1) and KG (as shown in section 7.2) and enter this information in the form.

7) The elevated stability form shall be used to ascertain the stability of the loaded S.E.U. during elevated operation. The calculated weight and center of gravity information shown in the load condition weight summary shall be entered in the form.

NOTE

The VCG calculation is not required in an elevated mode.

8) The predicted wind and wave conditions shall be monitored on an ongoing basis.

9) Compare the calculated pinion load to the maximum allowable.

7.3.2 Loading condition calculation

Please use blank calculation sheets provided on the following pages. Sample load conditions are also provided for ready reference and ease of use/ familiarization.

7.3.2.1 stability calculation blank form

Weight and Gravity Center Calculation(solid variable load)								
solid variable load	Weight(t)	longitudinal		Transverse		Vertical		Remark
		LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	
CREW								
PROVISION								
SPARE								
DECKLOAD								
SUBTOTAL								
Longitudinal: Positive aft of Fr.0, Transverse: Positive port-side of centerline,Vertical: Positive above baseline								

Weight and Gravity Center Calculation(Liquid variable load)

Liquid variable load	Tank Capacity(t)	Load Factor(%)	Weight(t)	longitudinal		Transverse		Vertical		Free surface correction	
				LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	L-MT(t*m)	T-MT(t*m)
Fresh water tank P											
Fresh water tank S											
Fuel oil tank P											
Fuel oil tank S											
FODT P											
FODT S											
SW ballast tank 1P											
SW ballast tank 1S											
SW ballast tank 2P											
SW ballast tank 2S											
SW ballast tank 3P											
SW ballast tank 3S											
SW ballast tank 4P& buffer tank											
SW ballast tank 4S& buffer tank											
SW ballast tank 4M											

Grey water tank											
Black water tank											
Dirty oil tank											
Bilge water tank											
Lube oil tank											
SUBTOTAL											

L-MT(t*m)=ρ*Iy, T-MT(t*m)=ρ*Ix, ρ:the density of the liquid.

Ix: TRANSVERSE MOMENT OF INERTIA(refer to ‘W3036-103-02 Capacity data’)

Iy: LONGITUDINAL MOMENT OF INERTIA(refer to ‘W3036-103-02 Capacity data’)

Weight and Gravity Center Calculation(Load Summary)									
Total Load	Weight(t)	longitudinal		Transverse		Vertical		Free surface correction	
		LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	L-MT(t*m)	T-MT(t*m)
Lightweight of Hull									
Legs and spud cans									
solid variable load									
Liquid variable load									
Sum. total for variable load									
Lightweight of Unit									
Sum. Total for jacking									
Sum. Total for floating									

	Draft & Stability Calculation Table			
Ser.	Item	Data	Unit	Remark
1	Displacement		t	From Weight and Gravity Center Calculation(Load Summary) Table
2	Draft		m	Interpolate from Hydrostatic Data
3	VCG		m	From Weight and Gravity Center Calculation(Load Summary) Table
4	Free surface correction		t*m	The larger of the longitudinal and transverse FSM from Weight and Gravity Center Calculation(Load Summary) Table
5	Increase Vertical Center of Gravity		m	Increase Vertical Center of Gravity=NO.4/NO.1
6	Corrected Vertical Center of Gravity		m	Corrected Vertical Center of Gravity=NO.3+NO.5
7	Allowable Vertical Center of Gravity		m	Interpolate from the Allowable VCG Curve According the Draft
Conclusion: The requirement can be satisfied if the value in No.6 is not larger than that of No.7, not otherwise.				
Longitudinal: Positive aft of Fr.0, Transverse: Positive port-side of centerline,Vertical: Positive above baseline				

7.3.2.2 preload sequence blank form

Weight and Gravity Center Calculation(solid variable load)								
solid variable load	Weight(t)	longitudinal		Transverse		Vertical		Remark
		LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	
CREW								
PROVISION								
SPARE								
DECKLOAD								
SUBTOTAL								
Longitudinal: Positive aft of Fr.0, Transverse: Positive port-side of centerline,Vertical: Positive above baseline								

Weight and Gravity Center Calculation(Liquid variable load)

Liquid variable load	Tank Capacity(t)	Load Factor(%)	Weight(t)	longitudinal		Transverse		Vertical	
				LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)
Fresh water tank P									
Fresh water tank S									
Fuel oil tank P									
Fuel oil tank S									
FODT P									
FODT S									
SW ballast tank 1P									
SW ballast tank 1S									
SW ballast tank 2P									
SW ballast tank 2S									
SW ballast tank 3P									
SW ballast tank 3S									
SW ballast tank 4P& buffer tank									
SW ballast tank 4S& buffer tank									

SW ballast tank 4M									
Grey water tank									
Black water tank									
Dirty oil tank									
Bilge water tank									
Lube oil tank									
SUBTOTAL									

Weight and Gravity Center Calculation(Load Summary)							
Total Load	Weight(t)	longitudinal		Transverse		Vertical	
		LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)
Lightweight of Hull							
Legs and spud cans							
solid variable load							
Liquid variable load							
Sum. total for variable load							
Lightweight of Unit							
Sum. Total for jacking							
Sum. Total for floating							

Preload Force Calculation			
Weight and Center of Gravity			
weight(t)			
TCG(m)			
LCG(m)			
Preload Legs #1 & #4		Preload Legs #1 & #4	
Formula	Value	Formula	Value
D1 = loading indication of #1	1860	D1 = (Weight-D1*2)/2	
D2 = (Weight-D1*2)/2		D2 = loading indication of #2	1860
D2 = (Weight-D1*2)/2		D3 = loading indication of #3	1860
D4 = loading indication of #4	1860	D4 = (Weight-D1*2)/2	
Note:The buoyancy of legs and spud cans are calculated based on the water depth is 55m;The minimum loading indication of the jacking system is 350t during preload. Before preload, the center of gravity needs to be adjusted：TCG=0m，LCG=32.4m			

7.3.2.3 leg load calculation blank form（jacking up）

Weight and Gravity Center Calculation(solid variable load)								
solid variable load	Weight(t)	longitudinal		Transverse		Vertical		Remark
		LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	
CREW								
PROVISION								
SPARE								
DECKLOAD								
SUBTOTAL								
Longitudinal: Positive aft of Fr.0, Transverse: Positive port-side of centerline,Vertical: Positive above baseline								

Weight and Gravity Center Calculation(Liquid variable load)

Liquid variable load	Tank Capacity(t)	Load Factor(%)	Weight(t)	longitudinal		Transverse		Vertical	
				LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)
Fresh water tank P									
Fresh water tank S									
Fuel oil tank P									
Fuel oil tank S									
FODT P									
FODT S									
SW ballast tank 1P									
SW ballast tank 1S									
SW ballast tank 2P									
SW ballast tank 2S									
SW ballast tank 3P									
SW ballast tank 3S									
SW ballast tank 4P& buffer tank									
SW ballast tank 4S& buffer tank									

SW ballast tank 4M									
Grey water tank									
Black water tank									
Dirty oil tank									
Bilge water tank									
Lube oil tank									
SUBTOTAL									

Weight and Gravity Center Calculation(Load Summary)							
Total Load	Weight(t)	longitudinal		Transverse		Vertical	
		LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)	LCG(m)	Moment(t*m)
Lightweight of Hull							
Legs and spud cans							
solid variable load							
Liquid variable load							
Sum. total for variable load							
Lightweight of Unit							
Sum. Total for jacking							
Sum. Total for floating							

Leg Load Calculation				
Center Gravity and Weight				
LCG(m)	TCG(m)	WEIGHT(t)		
Leg Load Distribution Coefficient				
C1=(LCG-11.4)*(28.4/2+TCG)/28.4/42				
C2=(LCG-11.4)*(28.4/2-TCG)/28.4/42				
C3=(11.4+42-LCG)*(28.4/2+TCG)/28.4/42				
C4=(11.4+42-LCG)*(28.4/2-TCG)/28.4/42				
ITEM	Load of Each Leg			
Leg No.	1#	2#	3#	4#
Leg location	Fwd P	Fwd S	Aft P	Aft S
Leg load coefficient	C1	C2	C3	C4
Leg load under jacking condition	WEIGHT*C1	WEIGHT*C2	WEIGHT*C3	WEIGHT*C4
Mean pinion load				
Normal Jacking Capacity For Each Pinion (t)			110t	
Normal Jacking Capacity For Each Leg (t)			1320t	
Maximum Jacking Capacity For Each Pinion (t)			165t	
Storm Holding Capacity For Each Pinion (t)			220t	

7.4 Capacity plan, free surface and capacity data

No.	TANK NAME	LOCATION		VOLM	VNET	L.C.G	T.C.G	V.C.G	IXMAX	IYMAX
		FR.MIN	FR.MAX	m^3	m^3	m	m	m	m^4	m^4
压载水 BALLAST WATER : REDUCTION = 0.02 DENSITY = 1.025										
1	SW BALLAST TANK 1P	95	107	182	178.4	60.05	14.16	3.65	196.62	207.89
2	SW BALLAST TANK 1S	95	107	182	178.4	60.05	-14.16	3.65	196.62	207.89
3	SW BALLAST TANK 2P	22	45	221.5	217.1	20.1	5.35	0.75	1408.8	2343.36
4	SW BALLAST TANK 2S	22	45	221.5	217.1	20.1	-5.35	0.75	1408.8	2343.36
5	SW BALLAST TANK 3P	13	22	47.2	46.2	10.53	7.75	0.76	92.42	77.42
6	SW BALLAST TANK 3S	13	22	61.5	60.3	10.53	-6.85	0.76	205.44	101.04
7	SW BALLAST TANK 4P & BUFFER TANK P	0	6	67.7	66.4	1.87	14.08	4.20	93.44	25.26
8	SW BALLAST TANK 4M	0	6	60.3	59.1	1.82	0	4.20	64.80	23.33
9	SW BALLAST TANK 4S & BUFFER TANK S	0	6	67.7	66.4	1.87	-14.08	4.20	93.44	25.26
	TOTAL			1111.4	1089.4					
淡水 FRESH WATER : REDUCTION = 0.02 DENSITY = 1										
10	FRESH WATER TANK P	6	13	116.9	114.6	5.92	14.2	3.55	120.05	43.22
11	FRESH WATER TANK S	6	13	116.9	114.6	5.92	-14.2	3.55	120.05	43.22
	TOTAL			233.8	229.2					
燃油 FUEL OIL : REDUCTION = 0.02 DENSITY = 0.85										
12	FUEL OIL STORE TANK P	25	39	185.4	181.7	19.11	14.67	1.75	239.90	344.36
13	FUEL OIL STORE TANK S	25	39	185.4	181.7	19.11	-14.67	1.75	239.90	344.36
14	FODT P	34	39	12.8	12.5	21.9	15.05	3.25	1.23	3.82
15	FODT S	34	39	12.8	12.5	19.80	-15.05	3.25	1.23	3.82
16	E.G.FUEL OIL TK.	73	76	3.0	3.0	44.7	-7.00	12.95	0.08	0.39
	TOTAL			399.4	391.4					
其他 MISCELLANEOUS : REDUCTION = 0.02 DENSITY =1										
17	BILGE WATER TK	13	22	48.0	47.0	10.53	0	0.76	97.20	78.73
18	DIRTY OIL TK	15	22	11.3	11.1	11.10	3.90	0.75	2.04	11.09
19	GREY WATER TK	83	89	80.1	78.5	51.6	-6.25	1.25	211.49	34.60
20	BLACK WATER TK	89	95	77.6	76.1	55.16	-6.25	1.29	211.49	34.60
	TOTAL			217.0	212.7					
盐水 BRINE WATER : REDUCTION = 0.02 DENSITY = 1.3										
21	BRINE WATER TK P	45	66	220.5	216.1	33.30	14.20	1.25	360.15	1166.89
22	BRINE WATER TK S	45	66	220.5	216.1	33.30	-14.20	1.25	360.15	1166.89
	TOTAL			441.0	432.2					
VOLM: VOLUME MOULDED VNET: NET VOLUME L.C.G: LONGITUDINAL CENTER OF GRAVITY T.C.G: TRAMSVERSE CENTER OF GRAVITY V.C.G: VERTICAL CENTER OF GRAVITY IXMAX: TRANSVERSE MOMENT OF INERTIA IYMAX: LONGITUDINAL MOMENT OF INERTIA										

7.5 List of drawings

No.	Drawing No.	Drawing Description
1	W3036-100-004	GENERAL ARRANGEMENT
2	W3036-103-001	CAPACITY PLAN
3	W3036-103-002	CAPACITY DATA
4	W3036-103-003	SOUNDING TABLES
5	W3036-103-004	FIRE CONTROL & SAFETY PLAN
6	W3036-103-005	FIRE PROOF DIVISION PLAN
7	W3036-103-006	WATERTIGHT SUBDIVISION PLAN
8	W3036-103-007	DAMAGE CONTROL PLAN
9	W3036-103-010	DECK LOADING PLAN
10	W3036-212-001	ARRANGEMENT OF ANCHOR EQUIPMENT
11	W3036-220-001	MOORING EQUIPMENT ARRANGEMENT
12	W3036-222-001	TOWING EQUIPMENT ARRANGEMENT
13	W3036-266-001	STRUCTURE_ACCESS_ARRANGEMENT
14	W3036-266-02	STRUCTURE ACCESS MANUAL
15	W3036-286-001	HELIDECK ARRANGEMENT
16	W3036-430-002	DIAGRAM OF EMERGENCY GENERATOR ROOM PIPING SYSTEM
17	W3036-461-001	DIAGRAM OF FUEL OIL TRANSFER PIPING SYSTEM
18	W3036-461-002	DIAGRAM OF FUEL OIL PURIFIED PIPING SYSTEM
19	W3036-461-003	DIAGRAM OF MAIN GENERATOR FUEL OIL PIPING SYSTEM
20	W3036-462-002	DIAGRAM OF DIRTY OIL PIPING SYSTEM
21	W3036-463-001	DIAGRAM OF WATER COOLING PIPING SYSTEM
22	W3036-510-001	DIAGRAM OF BILGE PIPING SYSTEM
23	W3036-521-001	DIAGRAM OF FIRE MAIN PIPING SYSTEM

24	W3036-526-006	DIAGRAM OF FOAM FIREFIGHTING PIPING SYSTEM FOR HELIDECK
25	W3036-531-004	DIAGRAM OF SPRINKLER PIPING SYSTEM
26	W3036-942-002SY	REPORT OF INCLINING TEST
27	W3036-110-012	CRITICAL STRUCTURE AREA

7.6 List of Manuals

1.Operation and maintenance manual for electric pinion and rack jacking system.

2.Instruction manual for operation of anchor winch

3.Operation manual of crane

4.CO2 Fire Extinguishing System AS-BUILT DRAWING

Appendix 1 drawings

Appendix 2 Operation and maintenance manual