Detailed Assets

List of Diving Equipments available with the company

Sr. No.	Description	Qty
1.	**Saturation Spread 1 – (Six Man Saturation Diving Spread)**	**1**
2.	**Saturation Spread 2 - (Twelve Man Saturation Diving Spread)**	**1**
3.	**Saturation Spread 3 - (Twelve Man Saturation Diving Spread)**	
4.	**Surface Supplied Mixed Gas Diving Spread 002**	**1**
	3.1 Containerized Deck Decompression Chamber (Approved by Germanischer Lloyds)	1
	3.2 Three Diver Mixed Gas Panel with Depth Gauges (3D) and High Pressure Regulators (Tescom)	1
	3.3 Rack Mounted two Diver Comms Radio (Amron)	1
	3.4 Underwater Video System, each consisting of	2
	3.4.1 LCD screen	*1*
	3.4.2 Power Unit For regulated power supply to Underwater Light and Camera (Oultand Tech)	*1*
	3.4.3 DVD Recorder	*1*
	3.4.4 Underwater Camera (Outland Tech)	*1*
	3.4.5 Underwater Light	*1*
	3.5 Diver Launch and Recovery System consisting of	1
	3.5.1 Hydraulic Man Riding Winch	1
	3.5.2 Hydraulic Power Unit	1
	3.5.3 Hydraulic Control Console	1
	3.5.4 A - Frame	1
	3.5.5 Hydraulic Cylinders	2
	3.5.6 Wire Rope	1
	3.5.7 Diving Cage with Air Cylinder	1
	3.6 Secondary Recovery System consisting of	1
	3.6.1 Hydraulic Man Riding Winch	1
	3.6.2 Clump Weight with Tool Basket	1
	3.7 Gas Container Consisting of	1
	3.7.1 L P Compressor	*2*
	3.7.2 H P Compressor	*1*
	3.7.3 Air Receiver (500 liters.)	*1*
	3.7.4 9 Cylinder Air Quads	*2*
	3.7.5 Crane - SWL 1.5 tons	*1*
5.	**Surface Supplied Mixed Gas Diving Spread 003**	**1**
	4.1 Combo of LARS and DDC consisting of	1
	4.1.1 Diver Launch and Recovery System consisting of	*1*
	4.1.1.1 Hydraulic man Riding Winch	*1*
	4.1.1.2 Hydraulic Power Unit	*1*
	4.1.1.3 Hydraulic Control Console	*1*

	4.1.1.4 A - Frame	*1*
	4.1.1.5 Hydraulic Cylinders	*2*
	4.1.1.6 Wire Rope	*1*
	4.1.1.7 Two Man Diving Cage with two Air Cylinders, two Mixed Gas Cylinders	*1*
	4.1.2 Secondary Recovery System consisting of	*1*
	4.1.2.1 Hydraulic Man Riding Winch	*1*
	4.1.2.2 Clump Weight with tool basket	*1*
	4.1.3 Deck Decompression Chamber (Approved by Germanischer Lloyds)	*1*
	4.2 Dive Control Container consisting of	1
	4.2.1 Three Diver Mixed Gas Panel	*1*
	4.2.2 Two Diver Rack Mounted Comms Radio (Amron)	*1*
	4.2.3 Desktop	*2*
	4.2.4 Printer - Scanner (All in One)	*1*
	4.2.5 Underwater Video System, each consisting of	*2*
	4.2.5.1 LCD screen	*1*
	4.2.5.2 Power Unit For regulated power supply to Underwater Light and Camera (Oultand Tech)	*1*
	4.2.5.3 DVD Recorder	*1*
	4.2.5.4 Underwater Camera (Outland Tech)	*1*
	4.2.5.5 Underwater Light	*1*
	4.3 Gas Container Consisting of	1
	4.3.1 L P Compressor	*2*
	4.3.2 H P Compressor	*1*
	4.3.3 Air Receiver (500 liters)	*1*
	4.3.4 9 Cylinder Air Quads	*2*
6.	**Surface Supplied Mixed Gas Diving Spread 004**	**1**
	5.1 Combo of LARS and Dive Control consisting of	1
	5.1.1 Diver Launch and Recovery System consisting of	*1*
	5.1.1.1 Hydraulic man Riding Winch	*1*
	5.1.1.2 Hydraulic Power Unit	*1*
	5.1.1.3 Hydraulic Control Console	*1*
	5.1.1.4 A - Frame	*1*
	5.1.1.5 Hydraulic Cylinders	*2*
	5.1.1.6 Wire Rope	*1*
	5.1.1.7 Two Man Diving Cage with two Air Cylinders, two Mixed Gas Cylinders	*1*
	5.1.2 Secondary Recovery System consisting of	*1*
	5.1.2.1 Hydraulic Man Riding Winch	*1*
	5.1.2.2 Clump Weight with tool basket	*1*
	5.1.3 Dive Control consisting of	*1*
	5.1.3.1 Three Diver Mixed Gas Panel	*1*
	5.1.3.2 Two Diver Rack Mounted Comms Radio (Amron)	*1*
	5.1.3.3 Underwater Video System, each	*2*

	consisting of *5.1.3.3.1 LCD screen* *5.1.3.3.2 Power Unit For regulated power supply to Underwater Light and Camera (Oultand Tech)* *5.1.3.3.3 DVD Recorder* *5.1.3.3.4 Underwater Camera (Outland Tech)* *5.1.3.3.5 Underwater Light*	 *1* *1* *1* *1* *1*
	5.2 Containerized Deck Decompression Chamber (Approved by Germanischer Lloyds)	1
	5.3 Three Diver Mixed Gas Panel with Depth Gauges (3D) and High Pressure Regulators (Tescom)	1
	5.4 Rack Mounted two Diver Comms Radio (Amron)	1
	5.5 Underwater Video System, each consisting of *5.5.1 LCD screen* *5.5.2 Power Unit For regulated power supply to Underwater Light and Camera (Oultand Tech)* *5.5.3 DVD Recorder* *5.5.4 Underwater Camera (Outland Tech)* *5.5.5 Underwater Light*	2 *1* *1* *1* *1* *1*
	5.6 Gas Container Consisting of *5.6.1 L P Compressor* *5.6.2 H P Compressor* *5.6.3 Air Receiver (500 liters.)* *5.6.4 9 Cylinder Air Quads*	1 *2* *1* *1* *2*
7.	**Surface Supplied Mixed Gas Diving Spread 005**	**1**
	6.1 Combo of DDC, LARS, Gas Container and Dive Control consisting of *6.1.1 Diver Launch and Recovery System consisting of* *6.1.1.1 Hydraulic man Riding Winch* *6.1.1.2 Hydraulic Power Unit* *6.1.1.3 Hydraulic Control Console* *6.1.1.4 A - Frame* *6.1.1.5 Hydraulic Cylinders* *6.1.1.6 Wire Rope* *6.1.1.7 Two Man Diving Cage with two Air Cylinders, two Mixed Gas Cylinders* *6.1.2 Secondary Recovery System consisting of* *6.1.2.1 Hydraulic Man Riding Winch* *6.1.2.2 Clump Weight with tool basket* *6.1.3 Deck Decompression Chamber (Approved by Germanischer Lloyds)* *6.1.4 Dive Control consisting of* *6.1.4.1 Three Diver Mixed Gas Panel* *6.1.4.2 Two Diver Rack Mounted Comms Radio*	1 *1* *1* *1* *1* *1* *2* *1* *1* *1* *1* *1* *1* *1* *1* *1*

	(Amron)	
	6.1.4.3 Underwater Video System, each consisting of	*2*
	6.1.4.3.1 LCD screen	*1*
	6.1.4.3.2 Power Unit For regulated power supply to Underwater Light and Camera (Oultand Tech)	*1*
	6.1.4.3.3 DVD Recorder	*1*
	6.1.4.3.4 Underwater Camera (Outland Tech)	*1*
	6.1.4.3.5 Underwater Light	*1*
	6.1.5 Gas Container Consisting of	*1*
	6.1.5.1 L P Compressor	*2*
	6.1.5.2 *H P Compressor*	*1*
	6.1.5.3 *Air Receiver (500 liters.)*	*1*
	6.1.5.4 *9 Cylinder Air Quads*	*2*
8.	**Surface Supplied Mixed Gas Diving Spread 006**	**1**
	7.1 Containerized Deck Decompression Chamber (Approved by Germanischer Lloyds)	1
	7.2 Three Diver Mixed Gas Panel with Depth Gauges (3D) and High Pressure Regulators (Tescom)	1
	7.3 Rack Mounted two Diver Comms Radio (Amron)	1
	7.4 Underwater Video System, each consisting of	2
	7.4.1 LCD screen	*1*
	7.4.2 Power Unit For regulated power supply to Underwater Light and Camera (Oultand Tech)	*1* *1*
	7.4.3 DVD Recorder	*1*
	7.4.4 Underwater Camera (Outland Tech)	*1*
	7.4.5 Underwater Light	*1*
	7.5 Diver Launch and Recovery System consisting of	1
	7.5.1 Hydraulic Man Riding Winch	1
	7.5.2 Hydraulic Power Unit	1
	7.5.3 Hydraulic Control Console	1
	7.5.4 A - Frame	1
	7.5.5 Hydraulic Cylinders	2
	7.5.6 Wire Rope	1
	7.5.7 Diving Cage with Air Cylinder	1
	7.6 Secondary Recovery System consisting of	1
	7.6.1 Hydraulic Man Riding Winch	1
	7.6.2 Clump Weight with Tool Basket	1
	7.7 Gas Container Consisting of	1
	7.7.1 L P Compressor	*2*
	7.7.2 H P Compressor	*1*
	7.7.3 Air Receiver (500 liters.)	*1*
	7.7.4 9 Cylinder Air Quads	*2*
9.	**Deck Decompression Chamber (Approved from**	**2**

	Germanischer Lloyds)	
10.	**Hydraulic Power Units**	**1**
11.	**Pneumatic Winches**	**5**
12.	**L P Compressor**	**4**
13.	**Grit Blaster / Hupper with Hose**	**2**
14.	**Underwater Video System with**	**10**
	13.1 LCD screen	
	13.2 Power Unit For regulated power supply to Underwater Light and Camera (Oultand Tech)	
	13.3 DVD Recorder	
	13.4 Underwater Camera (Outland Tech)	
	13.5 Underwater Light	
15.	**Diving Comms Radio - Portable 3/ 2 Diver (Amron)**	**10**
16.	**KirloskarGenset - 62.5 kVA**	**1**
17.	**KirloskarGenset - 250 kVA**	**1**
18.	**Portable two Diver Air Diving Panel**	**2**
19.	**Equipment Launch and Recovery System**	**3**
20.	**Scuba Replacement Unit**	**1**
21.	**Zodiac with Outboard Motor**	**8**
22.	**Fiber Boat**	**3**
23.	**M P I Unit**	**1**
24.	**C P Unit**	**1**
25.	**U T Meter**	**1**
26.	**Air Quads**	**2**
27.	**Oxygen Quad**	**5**
28.	**Mixed Gas Quad**	**6**
29.	**Diving Helmets**	
	27.1 Kirby Morgan Superlite - 17 B with Ultrajewel 601 reclaim valve	2
	27.2 Kirby Morgan Superlite - 17 C with Ultrajewel 601 reclaim valve	4
	27.3 Kirby Morgan Superlite - 17 C	4
	27.4 Kirby Morgan Superlite - 37	9
	27.5 Kirby Morgan Superlite - 27	1
	27.6 Kirby Morgan Bandmask - 18	4
	27.7 Kirby Morgan Bandmask - 28	4
30.	**Scuba Cylinders**	**9**
31.	**Diving Umbilical with comms cable and video cable**	**12**
32.	**Fire Extinguisher**	**2**
33.	**CRT Monitors**	**3**
34.	**Scuba Regulator**	**8**
35.	**Depth gauge(WIKA)**	**10**
36.	**High Pressure Regulator(Tescom)**	**25**
37.	**Carbon Dioxide Analyzer (Analox)**	**1**
38.	**Oxygen Analyzer (Analox)**	**5**
39.	**Welding Machines**	**5**
40.	**Crane - SWL 1.5 tons**	**1**

SATURATION SPREAD 1

1. INTRODUCTION

This document describes the Oceanus Offshore Services owned Six (6) Man Saturation, 2 Man Bell Diving System after its September 09 upgrade to bring it in line with all International Marine Contractor's Association (IMCA) standards. It is the responsibility of the Asset Manager to keep this document updated.

2. GENERAL

The lightweight, 300m deep diving system named "6 - Man Saturation Diving System " is designed to enable 2 divers to work at depths of 150-350m in Saturation Dive Technique.

The equipment includes a 4 Man living chamber, a closed diving bell, a pivoting frame and lifting winch, two constant tension winches, two machinery vans containing two gas regeneration units and a dual divers hot water unit and a diving /Life Support control cabin. The system also includes a Hyperbaric Rescue Chamber, which also doubles up as a two man living chamber and a Hyperbaric Rescue Chamber Control Van. The "6-Man Saturation Diving System system, due to its compactness can be very easily and rapidly installed on board ships or rigs.

3. SPECIFICATIONS

3.1 MAIN PARTICULARS AND FEATURES

Certification	:	Various, a Combination of ABS and Lloyds
Location	:	Middle East
Saturation Diving System	:	
Configuration	:	2 Main Modules + Sundry items
Design Rating	:	200 MSW
Depth Rating	:	200 MSW
Manning Level	:	6 Divers
Chamber Complex	:	2 x Living Chambers
	:	2 x Transfer Chambers
Diver Rescue	:	8 Man Hyperbaric Rescue Chamber
Diving Bell (Side Mating)	:	2.7 Cu Mtr2 Man Diving Bell
System Floodable Volume (aprox)	:	26 Cu Mtr
Bell Deployment Frame	:	Fully articulated, Suitable for Moonpool or Over the Side
Bell Handling System	:	Electro Hydraulic
Emergency Bell Handling	:	Pneumatic
Diver Heating	:	Electrically Powered (Calorifier)
Diver Gas Recovery	:	Yes
ECU Systems	:	External
Life Support Package (LSP)	:	Containerised, c/w Heating, Cooling, Gas Management etc.
Gas Management System	:	N/A

In Built Gas Storage : N/A

3.2 TECHNICAL CHARACTERISTICS

This main module groups together on the same platform consisting of a 30 bar decompression chamber, a 200 meter diving-bell and its handling and lifting systems. It also contains a second two man living chamber which also doubles up as an eight man HRC for diver rescue in times of emergencies. It also includes all ancillary equipment to safely carry out extended saturation diving operations.

3.2.1 Diver Transport

The SDC is a 200 meter diving-bell with an internal and external working pressure of 20 bars. The bell mates onto the chamber by horizontal hub, divers' exit via vertical hub. Electrical supply and communications are provided by means of the Electro mechanical cable in the main bell umbilical. Gas is supplied by means of the main bell umbilical with back up gas supplied from 8 onboard gas cylinders mounted on the outside of the diving-bell. Hot water can be supplied from the surface for divers hot water suits Electrical heating of the divers' suits.

3.2.2 Hyperbaric Rescue Chamber and Control Van

The system includes a Hyperbaric Rescue Chamber and a separate Control Van which is embarked on a separate standby vessel or on land if close enough. The HRC CV provides the facility to manage the HRC when it has been deployed. It contains the necessary panels, communications and analysis equipment to be able to monitor and control the decompression of divers and to control the environment inside the HRC. It also contains the hoses and interconnect cables required to mate with the HRC. The system also requires that sufficient gas is stored with the HRC CV to enable treatment and decompression of the divers.
The HRC is monitored in normal operations through the Saturation CV and can be deployed by a number of means including a gravity deployment system if the height is not too great or by crane.

3.2.3 Compression and decompression

Internal working pressure of chamber is 30 bar. Internal diameter 1,800mm x length 3,800mm. Main chamber contains four beds. The decompression chamber is equipped with two separate control panels (one for the main chamber and one for the lock) for the gas, power and communications systems. The mating of the diving-bell to the decompression chamber is carried out by a manual clamp with a pneumatic safety interlock that prevents accidental removal of the clamp and depressurization of the bell and or chamber hydraulic clamp.
The second living chamber consists of two bunks. The mating of the first chamber to second chamber is carried out with a clamp in a similar manner as stated above.

3.2.4 Handling System

The diving-bell is transferred from the decompression chamber to the dive position by means of a pivoting hydraulic handling A Frame. (The pivoting movement functions by means of hydraulic rams). The hydraulic

lifting winch of 4.OT has a speed of 20m/min. The diving-bell is guided by guide lines maintained in constant tension by pneumatic winches.

3.2.5 Standard Equipment

The system comes complete with a colour video system with video overlay, full analysis capability, a complete array of helium unscrambler radios for diving and life support functions as well as a full range of tools and spares for the system equipment.

3.2.6 Support Service Requirements

Main Power : 440v x 50 / 60 Hz x 350 kVA
EmgyPower : 440v x 50 Hz x 250 kVA: Utility Air : 500 CFM @ 6 Bar:
Salt Water : 60 ltrs/Min @ 3 Bar Min:
Potable Water: 25ltrs/min for short periods through the day
Hook up to Vessel: Phone, PA, Vessel Alarms Etc:

3.2.7 Principle Dimensions

Main Module:	6.65m L x 2.5m W x 3.8m H x 21 tonnes
Second Living Chamber / HRC:	4.5m L x 2.5m W x 2.8m H x 11 tonnes
Control Van:	6.4m L x 2.4m W x 2.4m H x 5 tonnes
Machinery Van 1: (Regeneration Units)	6.4m L x 2.4m W x 2.4m H x 11 tonnes
Machinery Van 1: (Hotwater Units, chiller units And Diver Gas Reclaim Unit)	6.4m L x 2.4m W x 2.4m H x 5 tonnes

4. SPECIFICATIONS

- Road transportable
- 200mtr Capability
- Facilities for 6 divers
- 2 x Living Chambers
- 2 x Transfer Chambers
- 8 man Hyperbaric Rescue Chamber
- 2 Man diving Bell
- Electro Hydraulic Bell Handling System
- Pneumatic Emergency Bell Handling System

Diver Heating Electric Calorifier

- Diver Gas Recovery. Air Powered Gas Reclaim System

Power and Services Required

SATURATION SPREAD 2

1. Scope

The scope of this document is to give a short description of the equipment known as the 12 Man Portable Saturation Dive System. It is not intended to be a set of operating instructions nor a detailed breakdown of system components.

2. Introduction

This short introduction has been structured to include a general description and specifications of the unit involved.

3. Description

3.1 MAIN PARTICULARS AND FEATURES

Certification	:	Various, a Combination of ABS, Lloyds & DNV
Location	:	Singapore
Saturation Diving System	:	
Configuration	:	3 Main Modules + Sundry items
Design Rating	:	200 MSW
Depth Rating	:	200 MSW
Manning Level	:	12 Divers
Chamber Complex	:	2 x Living Chambers
	:	2 x Transfer Chambers
Diver Rescue (SPHL)	:	12 Man Hyperbaric Rescue Lifeboat
Diving Bell (Side Mating)	:	4.5 Cu Mtr 3 Man Diving Bell
System Floodable Volume (aprox)	:	65 Cu Mtr
Bell Deployment Frame	:	Fully articulated, Suitable for Moonpool or Over the Side
Bell Handling System	:	Electro Hydraulic (incl. Pneumatic Lateral Translation Trolley)
Emergency Bell Handling	:	Diesel Hydraulic
Diver Heating	:	Electrically Powered (Calorifier)
Diver Gas Recovery	:	Yes
ECU Systems	:	External
Life Support Package (LSP)	:	Containerised, c/w Heating, Cooling, Gas Management etc.
Gas Management System	:	N/A
In Built Gas Storage	:	N/A

3.2 SATURATION DIVING SYSTEM

The Saturation Diving System is Fully Certified, it supports up to 12 divers in saturation at depths of up to 200 MSW, it also conforms to all the legislation requirements of the UK HSE and IMCA.

The diving system pressure envelope comprises a 9 man, 32 Cu Mt, single lock chamber, a 3 man, twin lock chamber, a vertical transfer lock, a 12 Man SelfPropelled Hyperbaric Lifeboat (SPHL) and a side mating 3 man Bell.

The basic layout of the diving system & chambers are mounted on 2 large lifting frames (Bell Handling Module & Chamber Module) + lifeboat davit & support frame, all suitable for installation on an open deck.

The complex allows for up to 4 teams of divers to operate at the same or different depths optionally 3 teams whilst a fourth team is simultaneously decompressing.

The **3 Man diving Bell** is deployed by means of a fully articulated A Frame c/w lateral translation trolley. Each team of divers has access to the diving bell via the transfer lock

The **Diving System Chamber Complex** is monitored and controlled from a 2-compartment purpose built containerised control room. The control room is located on the upper level of the Bell handling module, here the environment in each chamber compartment is monitored. Decompression, pressure monitoring, analysis; communications etc are also controlled from dedicated panels & instruments in this control room. In addition a central communications station is provided allowing full connections with all the chamber compartments

The accommodation compartments of the chambers are outfitted with bunks & curtains, seating and table as well as fire fighting equipment, BIBS, emergency life support equipment incl. internal monitoring. Additionally all divers inside have access to individual bunk lights, talk back speakers and monitoring equipment. An audio entertainment system is provided for diver comfort

The **transfer locks** are outfitted with toilet, hand basin and showering facilities, these compartments are also provided with emergency equipment similar to the main compartments. Pre-regulated cold & heated sanitary water is provided to each of the transfer locks.

Life support and environmental control for the chamber complex is provided both internally and externally by means of specialised proprietary equipment. Over capacity in this area ensures redundancy in the case of breakdown or maintenance requirement. The ECU Eqpt is housed in purpose built containers and are located on the upper level of the Chamber Module

The **diving bell** has a volume of 4.5 m3 and is outfitted for 3 divers. The diving bell has double acting bayonet action single doors on the side and bottom; these seal both internally & externally. The bell is negatively buoyant and has a passive telescopic retractable work stage incorporated into its crash frame to ensure that there is a fixed stand off. Procedures for Emergency Seabed Intervention will require to be developed by users

Dive Control is housed in the second compartment of the Containerised Control Room; it has windows from which diving bell deployments may be observed, it houses all monitors, indicators and other essential services necessary to ensure safe efficient bell diving operations. Diving bell hoisting operations are controlled from this location. Emergency intervention air diver is catered for.

The Diving Bell Handling System is fully articulated and suitable for operation over the side or in conjunction with a moonpool. The Diving bell is connected to the handling system via the non rotating hoist wire, there is a composite umbilical which allows all normal and essential services to support the bell and its occupants, and the diving bell has through water communications. The diving bell is outfitted internally with all necessary safety and emergency equipment, including an industry standard Diver Gas Recovery System, the diving bell

external outfit is also fully compliant with all ruling regulations and requirements, and includes facilities and connections for hook up of an emergency umbilical.
Hydraulically Powered Winches are employed for hoisting & lowering the bell and for the deployment & recovery of the Guide Weight and the Composite Umbilical.
Diver heating is accomplished by means of a large capacity electrically powered **calorifier system**. A stored volume of water ensures a good factor of redundancy.
A 12 man **SelfPropelled Hyperbaric Rescue Lifeboat (SPHL)** is provided for the emergency escape or transfer of divers. The SPHL is handled overboard by means of a dedicated Pivot Arm "Gravity" Davit Handling System with built-in stored energy. The SPHL hull, machinery, equipment, manoeuvrability and seagoing properties comply with the relevant MSA & SOLAS codes and it can provide life support for up to 72 hours, once recovered this duration can be further extended if need be with the aid of an Emergency Support Package. The lifeboat cockpit has space for all essential personnel inc"l the coxswain, a Technician and a chamber operator.
Access to the SPHL Chamber is achieved by means of a trunking connected to one of the chamber spare manways. The SPHL chamber has a self contained heating system, and a cooling system is powered from the lifeboat engine. The SPHL has the benefit of a recent Thermal Evaluation, heating & cooling capacities comply with the requirements of the current IMCA Guidelines. The SPHL chamber has a provisioning lock, viewport & all-necessary safety and emergency facilities required for preserving life. During normal operation the SPHL chamber is controlled from a panel in Saturation Control and is interfaced with the diving system by means of a quick connect umbilical. In emergency it operates autonomously. The SPHL carries reserves of Heliox& Metabolic Oxygen Gasses, as well as all necessary safety and emergency facilities required for the preservation of life

Typical Support Services Required

Main Power 440v x 60hz x 500Kva:
Emgy Power 440v x 60hz x 250Kva:
Utility Air 500 CFM @ 6 Bar:
Salt Water 15 Imp Gal/Min @ 3 Bar Min:
Potable Water 150Imp Gal/Day:
Hook up to Vessel: Phone, PA, Vessel Alarms Etc:

System Lift Weight and Dimensions

Dimension	Bell Module	Chamber Module	SPHL with Transit Frame	SPHL Deployment Frame
Length	13.74 m	8.40 m	9.80 m	8.98 m
Width	4.82 m	7.92 m	3.70 m	3.75 m
Height	9 m	8 m	3.44 m	10 m
Lift Weight	90 MT	60 MT	12.2 MT	22 MT

Chamber Volume	DDC 1 (9 man)	DDC 2 (3 man)	TUP	SDC	SPHL
Cu. M	32.8	11	7.26	4.5	6.38

Diving System Floodable Volume: 65 Cu Mtr
Bell bottomManway: 700mm Dia

4. Specifications

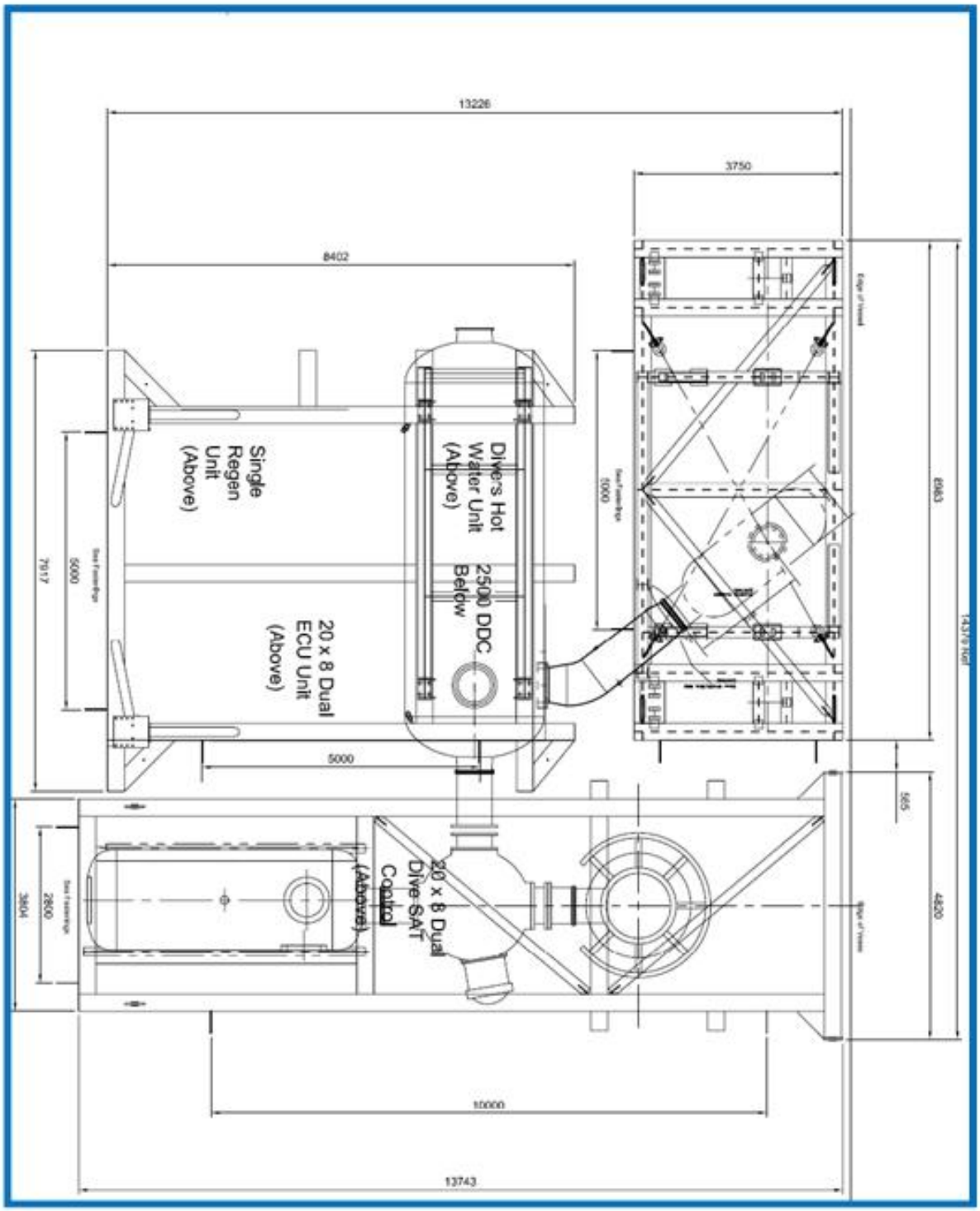
- Not Road transportable
- 200mtr Capability
- Facilities for 12 divers
- 2 x Living Chambers
- 2 x Transfer Chambers
- 12 man Hyperbaric Rescue Lifeboat (SPHL)
- 3 Man diving Bell
- Electro Hydraulic Bell Handling System
- Diesel Hydraulic Emergency Bell Handling System

Diver Heating Electric Calorifier

- Diver Gas Recovery. Air Powered Gas Reclaim System

Power and Services Required

5. Basic layout of the system



SATURATION SPREAD 3

1. INTRODUCTION

This introduction has been structured to include a general description and specifications of the unit involved.

2. DESCRIPTION

2.1 MAIN PARTICULARS AND FEATURES

Saturation Diving System	**:**	
Configuration	:	3 Main Modules + 3 20' Container + Sundry items
Test Rating	:	300 MSW
Depth Rating	:	200 MSW
Manning Level	:	12 Divers
Chamber Complex	:	2 x Living Chambers
	:	1 x Transfer Chambers
Diver Rescue	:	3men Living /12 Men HRC
Diving Bell (Side Mating)	:	3 Man Diving Bell
Bell Deployment Frame Suitable for Moonpool and side launching.	:	Fully articulated,
Bell Handling System	:	Hydraulic
Emergency Bell Handling	:	Pneumo
Diver Heating	:	Electrically Powered
Diver Gas Recovery	:	Yes (Gas Services)
ECU Systems	:	Three external units
Life Support Package (LSP)	:	Containerized, c/w Heating, Cooling, Gas, Management etc.

2.2 SATURATION DIVING SYSTEM

The Saturation Diving System is Fully Certified by ABS Certification Society, it supports up to 12 divers in saturation at depths of up to 200 MSW, it also confirms to all the legislation requirements of the UK HSE and IMCA.

The diving system pressure envelope comprises a 6 man, single lock chamber, a 3 men, single lock chamber, 5.5 Cu Mt transfer lock, a 3 men living/ 12men, Hyperbaric Rescue Chamber and a side mating, 5.85 Cu Mt, 3 men Bell.

The basic layout of the diving system & chambers are mounted on 2 large lifting frames (Bell Handling Module & Chamber Module) + HRC, all suitable for installation on an open deck.

The complex allows for up to 4 teams of divers to operate at the same or different depths optionally 3 teams whilst a fourth team is simultaneously decompressing.

The 3 Men diving Bell is deployed by means of a fully articulated A Frame c/w lateral translation trolley. Each team of divers has access to the diving bell via the transfer lock

The Diving System & Chamber Complex is monitored and controlled from a purpose built containerized control rooms. Decompression, pressure monitoring, analysis; communications etc are also

controlled from dedicated panels & instruments in this control room. In addition a central communications station is provided allowing full connections with all the chamber compartments

The accommodation compartments of the chambers are outfitted with bunks & curtains, seating and table as well as fire fighting equipment, BIBS, emergency life support equipment incl. internal monitoring. Additionally all divers inside have access to individual bunk lights, talk back speakers and monitoring equipment. An audio entertainment system is provided for diver comfort.

The transfer locks are outfitted with toilet, hand basin and showering facilities, these compartments are also provided with emergency equipment similar to the main compartments. Pre-regulated cold & heated sanitary water is provided to each of the transfer locks.

Life support and environmental control for the chamber complex is provided both internally and externally by means of specialized proprietary equipment. Over capacity in this area ensures redundancy in the case of breakdown or maintenance requirement. The ECU is housed in purpose built containers.

The diving bell outfitted for 3 divers. The diving bell has double acting bayonet action single doors on the side and bottom; these seal both internally & externally. Procedures for Emergency Seabed Intervention will require to be developed by users

Dive Control is housed in Containerized Control Room; it has windows from which diving bell deployments may be observed, it houses all monitors, indicators and other essential services necessary to ensure safe efficient bell diving operations. Diving bell hoisting operations are controlled from this location. Emergency intervention air diver is catered for.

The Diving Bell Handling System is fully articulated and suitable for moon pool or side launch. The Diving bell is connected to the handling system via the non rotating hoist wire, there is a composite umbilical which allows all normal and essential services to support the bell and its occupants, and the diving bell has through water communications. The diving bell is outfitted internally with all necessary safety and emergency equipment, including an industry standard Diver Gas Recovery System, the diving bell external outfit is also fully compliant with all ruling regulations and requirements, and includes facilities and connections for hook up of an emergency umbilical.

Hydraulically Powered Winches are employed for hoisting & lowering the bell and for the deployment & recovery of the Guide Weight and the Composite Umbilical.

Diver heating is accomplished by means of a electrically powered system.

A 12 man HRC is provided for the emergency escape or transfer of divers. Once recovered this duration can be further extended if need be with the aid of an Emergency Support Package.

Access to the HRC is achieved by means of a trunking connected to TUP manway. The HRC has a self contained heating system, and a cooling system is powered from Battery Pack. The HRC has the benefit of a recent Thermal Evaluation, heating & cooling capacities comply with the requirements of the current IMCA Guidelines. The HRC chamber has a provisioning lock, viewport & all necessary safety and emergency facilities required for preserving life. During normal operation the HRC is controlled from a panel in Saturation Control and is interfaced with the diving system by means of a quick connect umbilical.. The HRC carries reserves of Heliox& Metabolic Oxygen Gasses, as well as all necessary safety and emergency facilities required for the preservation of life

Typical Support Services Required

Main Power	:	440v x 60hz x 500Kva
Emgy Power	:	440v x 60hz x 250Kva
Utility Air	:	500 CFM @ 6 Bar
Salt Water	:	15 Imp Gal/Min @ 3 Bar Min
Potable Water	:	150Imp Gal/Day
Hook up to Vessel:		Phone, PA, Vessel Alarms Etc

3. SPECIFICATIONS

- Road transportable
- 200mtr Capability
- Facilities for 12 divers
- 3 x Living Chambers
- 1 x Transfer Chambers
- 12 Hyperbaric Rescue Chamber
- 3 Man diving Bell
- Pneumatic Hydraulic Emergency Bell Handling System
- Diver Heating Electric
- Diver Gas Recovery. Air Powered Gas Reclaim System
- Power and Services Required

4. ENVIRONMENTAL CONTROL UNITS (CMU)

Three Kinergetics CMU-2 external units are installed, one for Chamber 2 and two for Chamber 1. Quick disconnect hose connections and a patch panel for the sensor connections are fitted for convenience of changeover. Remote control of the ECS is available on the chamber environmental control panel in the saturation control room in respect of temperature and humidity. The TUP and work chamber are supplied heated fluid from the emergency environmental system.

The environmental control system (ECS) consists of 2 major assemblies:

- Control Master Unit (CMU).
- Habitat Conditioning Unit (HCU)

The CMU's provides fluid for temperature (primary circuit) and humidity (secondary circuit) control. The CMU comprises a condensing refrigeration system, a fluid heating system, primary fluid pump, secondary fluid pump, associated mixing valves and electronic controls to allow automation.

The HCU's are installed in the chamber and translate fluid input into

heating, cooling and dehumidification functions. Gas is circulated through the HCU by means of electrically powered blowers, the primary electrical fan blows gas across the primary heat exchanger and on through the soda lime canister. The secondary electrical blower blows gas across the secondary heat exchanger to dehumidify the gas. A water trap is situated under the unit to catch condensed water for locking out of the chamber.

Note: The units fitted are modified Kinergetics HCU-3-4 units; the normal water driven motor is replaced by 2 electrically powered motors. The modification was designed and carried out by Clearbrook Engineering.

5. VOLUME TANKS FOR HOT & COLD WATER

Each chamber is supplied with both hot and cold water from the domestic hot and cold water tanks. There is 1 hot water tank and 1 cold water tank in the chamber complex; the tanks are supplied from the water main. Once the tanks are filled, regulated gas is used to pressurise the tank forcing the water out the bottom of the tank into the chamber. The hot water tank has an immersion heater, with thermostat, fitted to heat the water. Check valves are fitted to prevent back pressurising the water main. The cold water tank also supplies the humidifier in the work chamber. The water is supplied to the chamber sinks and shower through isolation valves.

6. VOLUME TANK FOR SANITARY SYSTEM

6.1 SANITATION

All toilet waste is piped to the waste holding tank which is used to vent off the pressure and then emptied into an external waste tank.

6.2 BILGE DRAINS

All the bilge and sink drains are piped to the same waste holding tank as the sanitation waste.