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	“CALYPSO” Saturation Diving System	

The SDS “CALYPSO” is a transportable Saturation Diving System model AF05, to be temporarily installed on Vessels of opportunity (DP Multi Purpose Vessels, Crane Barges etc.)

The system is designed, built and maintained in accordance with IMCA guidelines for Offshore Diving Systems D018 and D024.

MAIN CHARACTERISTICS

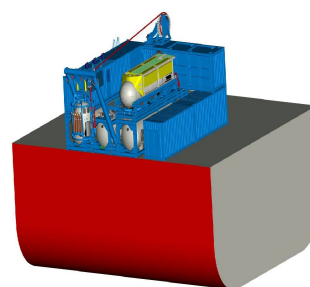
Working depth:	300 msw
Class	ABS
Divers in saturation	15
Divers in bell	3
Design sea state	Beaufort 6



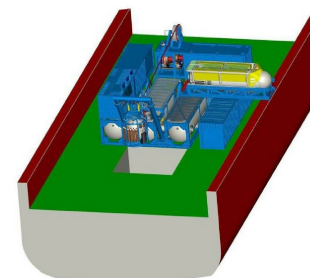
INNOVATIVE DESIGN FEATURES

- Containerized modules with isocorner fittings enable to ship the system worldwide by container ship and to transfer it by road within trunk size.
- Fast deployment: 3 days to be installed on board of vessels of opportunity without counter basement.


Installation on a vessel without moon pool: with the diving bell deployed aside the vessel and the HRC to be self launched from the same side.



Installation on a vessel with moon pool and side defences (up to 3m high) without the need of mezzanine deck and without closing the onboard longitudinal passage from stern to bow.



- Multiple assembly configurations.

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- Dedicated HRC (not used as decompression chamber). Free falling self hydraulic launching system, operative up to 20° of opposite ship listing.
- Entry/Food/Material lock all included within a single manway. The three purpose manway avoids the need of a dedicated foodlock, enabling to fit most of the penetrations in the chamber dish end, where they can be easily operated from inside the container.

DECK DECOMPRESSION CHAMBERS MODULES

The DDCs are each included in a dedicated steelwork frame that collects all the required life support, sanitary equipment, comm/power/video control features.

- 40' Standard ISO HC container CSC shape, complete with lifting lug plates
- Facilities included in each chamber module:
 - Complete ECU (sodasorb replacement, power control box and emergency control included)
 - Complete sanitary water unit (hot and cold water distribution system)
 - Fitting plate that collects every gas and electrical connection between the chamber and the control room

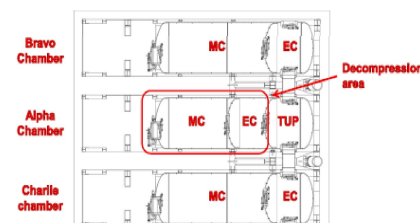
The chambers locks are arranged in order to provide maximum flexibility: One central TUP that communicates with the 3 chamber areas, 2 living/working (6 men each) plus one (3 men) for decompression. Such configuration simply enables an efficient split saturation.


DDCs main characteristics:

Internal volume (6men):	20+8m ³
Internal volume decompression	13+7m ³
Internal volume TUP	8m ³
Internal diameter:	2156mm

All chambers are equipped with:

- Bunks on two levels complete with fire resistant bedding material and curtains, plus one foldable table for each living lock.
- Led lights with IR, magnetic buck led lights and one video camera with IR each lock. Loud speaker and head phone for communications plus emergency sound powered phone.
- Emergency CO₂ scrubbers 24V powered, emergency heat exchangers.



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- Fixed Fire Fighting system with sprinklers. An external tank provides water to the entire hyperbaric habitat.
- BIBS manifold complete with mix and oxygen supply.
- Hyperbaric toilet; washing basin and movable shower fed with hot and cold water.
- Emergency heating exchangers.
- Aluminium checker plate flooring divided in removable parts for easy cleaning.
- Convertible bunk to meet requirement of IMCA DMAC 028.
- D. 610mm Material/Food lock.
- All other requirements of IMCA D024.



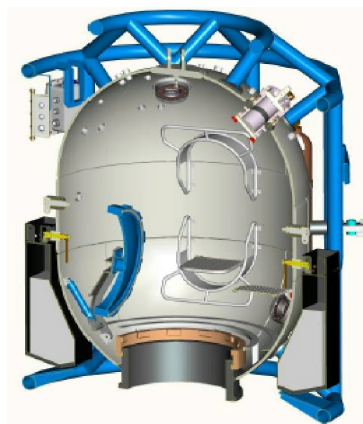
DIVING BELL


The Diving Bell is spherical with a cylindrical equatorial band.

The bell is of positive buoyant type, fitted with two releasable ballast weight with double safety release devices

Diving Bell main characteristics:

Internal volume:	5,3 m ³
Total weight in air:	10 tonnes (including divers, equipment & ballast)
Man way & mating trunk:	1 bottom located ID 800mm
Onboard gas:	10 cylinders 50l 200bar mix.
Onboard oxygen:	2 cylinder 20l 200bar oxygen.
Emergency endurance:	24 hours endurance with batteries.
Diver gas panel	Marapanel Divex
Divers gas reclaim:	Gasmizer Divex
Breathing mask BIBS	4
Bell CO ₂ Scrubbers:	2 24V powered
Bell Heater (hot water):	1 24V powered
External Lights:	4 LED type
Internal Lights:	2 LED type



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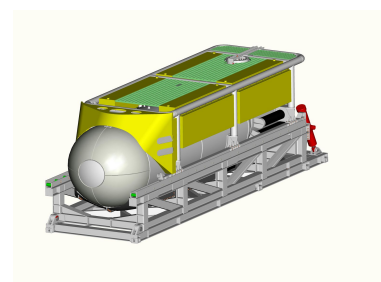
Internal TV camera:	1
Foldable seats	3

HES (HYPERBARIC EVACUATION SYSTEM)

The Hyperbaric Evacuation System includes a free falling Hyperbaric Rescue Chamber (HRC) and its dedicated tilt launching frame.

The system shall be installed on Charlie chamber in two possible configurations without any modification to the connecting trunk and launching equipment. The launching system is capable of successfully launching the HRC up to 20° of opposite list.

The system is hydraulically driven by a dedicated set of accumulators




HRC main characteristics:

Internal volume:	21 m ³
Internal diameter:	2000mm
Total weight in air:	21500kg (floating unit) 31500kg (HRC + Launch frame)
Man way & mating trunk:	1 bottom located ID 800mm
Onboard gas:	10 cylinders 50l 200bar mix.
Onboard oxygen:	6 cylinder 50l 200bar oxygen.
Emergency endurance:	72 hours endurance with batteries.
Breathing mask BIBS	18
Bell CO ₂ Scrubbers:	4 24V powered
Internal Lights:	4 LED type

Internal TV camera:	1
Impact protection seats	15

The HES is completed by the Life Support Package (LSP), a 10' ISO container that can support an emergency recovery and decompression of the HRC in accordance with IMCA requirement. It includes gas quads: HeO₂ mix, O₂ and treatment mix.



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LAUNCH AND RECOVERY SYSTEM

The Bell Launch and Recovery System is composed of a standard A-Frame, two hydraulic winches (bell and anchor weight) a double HPU system and one umbilical powered sheave and relative umbilical basket.

Main bell winch and umbilical powered sheave are equipped with hydraulic auto-tension system to facilitate recovery and deployment operations. All the handling procedures are controlled by a PLC with emergency manual bypass procedures.

Main characteristics:

A-Frame SWL	13700 kg
Bell maximum weight	10700 kg
Anchor weight maximum weight	3000 kg
Umbilical maximum pull line	1800 kg
Bell wire length	360 m
Guide wire length	720 m



DIVE & SATURATION CONTROL CONTAINER

The diving operation and the saturation hyperbaric habitat are controlled from a single container divided in independent sections:

Dive Control

Bell launch and recovery control panel

Bell and Divers control panel

Diver/Bell colour hat camera, video recording and communications system controls


Sat Control

Chambers & HRC control panels

Gas analysis panel

Gas distribution & pressure reduction panel

Chambers camera, video and communications system controls

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Electrical room

Isolated room for main 440V panel, 230V transformers and electrical connections for the entire system.

LIFE SUPPORT AND ANCILLARY EQUIPEMENT

Life support

Each chamber module is equipped with its own life support equipment:

- Environmental control unit model RM-09 – up to 9 diver each
- Sanitary and potable water unit

Hot water unit

N° 2 Divex Kinergetics electric systems (WHE-03)

Up to 45l/min each

Reclaim system

Divex Electric Gasmizer system for two divers


Ancillary equipment

Equipment to be agreed according to specific project requirement

- Emergency generator
- Workshop and store/spare part containers
- HP compressor unit
- Air Diving system

SYSTEM POWER REQUIREMENTS

Type	Specifications	Connections	Notes
Power	600A @ 440V 60Hz Main SDS 250A @440V 60Hz Diver hot water sys		2 independent supplies one main and one emergency from two different generators. A dedicated generator for emergency line can be provided by Rana.
Seawater	450 l/min, filtered		Cooling and diver hot water sys RANA shall provide submersible pumps for purpose
Fresh water	sanitary use		
Sewage	discharge of saturation chambers	1 1/4" hose; hand operated discharge valve	The collecting tank, 2 m ³ capacity at atmospheric pressure, should be connected to the ship's sewage

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Compressed Air	7 bar, 6 m ³ /min	1 1/2" NPT or Atlas type connector for diving basket	system in order to empty it when full or daily
		1 1/2" and 1" NPT for tool basket	2 independent supplies for air diving basket winches, one main and one emergency. A dedicated compressor can be provided by Rana if required.

SYSTEM DIMENSIONS

ID.	Description	Dimensions	Weight
		L x W x H (mm)	(kg)
1	Diving Bell	2400 x 2400 x 2900	10000
2	Alpha DDC & ECU	12200 x 2440 x 2890	38500
3	Bravo DDC & ECU	12200 x 2440 x 2890	35000
4	Charlie DDC & ECU	12200 x 2440 x 2890	35000
5	Winches and hydraulic power pack	9100 x 2350 x 2890	31500
6	A frame (dismantle in 40' open top cont)	12200 x 2440 x 2600	20500
7	Control van & Diving control	12200 x 2440 x 2600	20000
8	Umbilical Powered Sheave	2430 x 1920 x 2150	3000
9	Umbilical Basket	5500 x 2200 x 2000	3000
10	Hyperbaric Lifeboat c/w Davit	9080 x 2440 x 3100	31500
11	Hot Water Unit & Gas Reclaim	5940 x 2430 x 2600	20000

