

Submarine Rescue and Hyperbaric Medical Treatment System – HYMED



The container with the chamber – the view from the front

Purpose and technical specification

HYMED containerized set is intended for the treatment of decompression sickness (DCS - diseases and trauma following the effects of increased hydrostatic pressure) as well as for providing hyperbaric training for submarine crews and divers.

HYMED is an element in the Polish Navy rescue system of maritime medical protection and treatment including:

- life-saving activities within the range of rendering aid to submarine crews
- underwater work to depths of 100 m
- DCS treatment and the use of oxygen therapies
- exercises for qualifying procedures and medical examinations
- divers and submariners pressure training
- other pressure related procedures connected with a person having been subjected to hyperbaric pressure

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The general characteristics of the HYMED

- HYMED is designed for easy loading and transportation by land, sea and air. The size of the set permits the utilisation of typical conveyances on wheels and cranes and lifting devices equipped with accessories for lifting containers (min 10 t.)
- equipped with resources for independent working for a minimum period of 24 hours, being fully equipped with gas and fully charged battery pack
- systems and equipment in the set ensure the treatment of the severest DCS
- also provides the possibility for the introduction of medical staff through the special transfer section of the chamber or the addition of a transportation chamber
- HYMED is designed to use as breathing mediums air, oxygen and other respiratory mixtures (e.g. NITROX, HELIOX, TRIMIX)
- HYMED assures the maintenance of prescribed pressures and respiratory breathing mixtures as well as constant monitoring and control of the atmosphere in the chamber by computerised measuring net
- HYMED assures the monitoring of the medical parameters and technical procedures during operation
- a facility for connecting to external power sources, i.e. electrical energy and respiratory gases
- the set is designed to operate under all climatic conditions
- exchange of most elements and sub-assemblies is easily accomplished thanks to modular design
- the set incorporates standard-hyperbaric transportable chambers and all gas and electrical fittings are in accordance with NATO standards

Technical parameters and main measurements

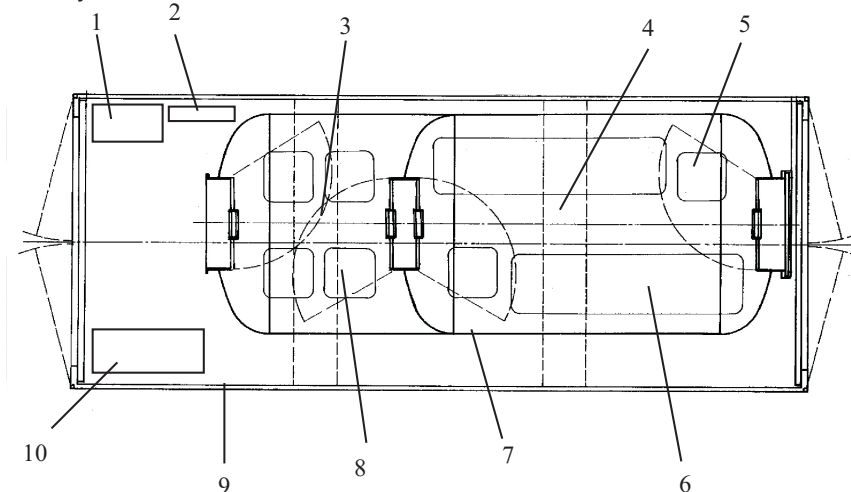
The whole set is installed in the standard-container 1CC having construction and dimensions in accordance with the Regulations for the Construction of Containers.

Basic technical parameters HYMED			
No	Parameters	Values	Remarks
1.	Container measurements	(6058x 2438x 2591)mm	
2.	Electrical power supply	440V /32A	
3.	Total weight including all fitted equipment	<10 t	
4.	Chamber	Two compartments	
5.	Length of chamber	4900 mm	
6.	Internal diameter of chamber	1800 mm	
7.	Total cubic capacity	11,0 m ³	
8.	Cubic capacity of treatment area	7,0 m ³	
9.	Working pressure	1,0 MPa	
10.	Computational temperature of walls	30°C	
11.	Quantity of inhalators	14	4 connections in transfer and 10 in main chamber
12.	Illumination by portholes, and lighting plus manholes at base	11	8 observation, 3 electric lights
13.	Accommodation	14	14 for sitting or 2 laying and 6 sitting persons
14.	Treatment area length	2090 mm	without spherical ends
15.	Transfer area length	1370 mm	without spherical ends
16.	Diameter of manholes	730 mm	
17.	Thickness of hatch covers.	28 mm	
18.	Diameter of hatch joining transport chambers	830 mm	The collar according to STANAG 1079
19.	Number of hatches	4	

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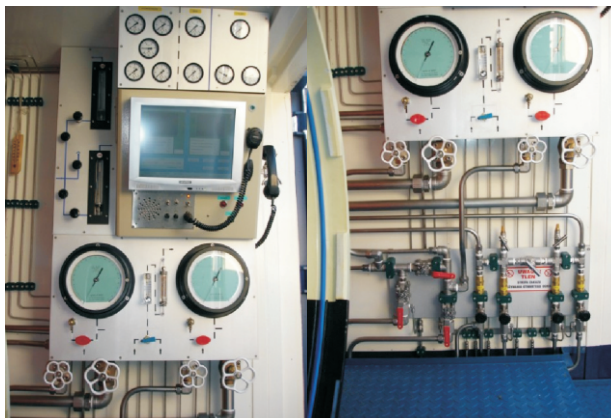
Basic equipment

The basic equipment is shown in lower figure. The chamber as a whole gives the possibility to carry out two different hyperbaric procedures or recompression treatment procedures. Each section of the chamber possesses its own independent service area. The equipment in the set allows for hyperbaric treatment during transportation whether by sea or road.



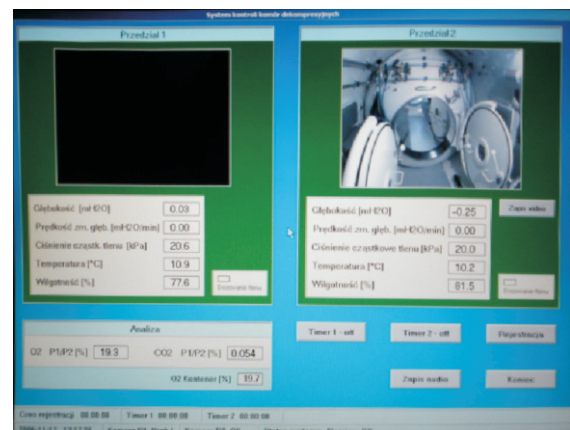
Positioning of basic installed equipment HYMED

1– electrical control panel 2– control panel for respiratory gases: air, oxygen and mixtures 3–transfer section, 4– treatment section, 5– folding seats, 6–berth, 7– chamber, 8– folding chair , 9– container, 10– main control panel



The panel of manometers for the chamber and the set of valves of the pulpit control stand in the chamber

Data displayed on the computer as seen in the chamber



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Operating

The main operating elements are located at the front of the unit on the side wall of the container.

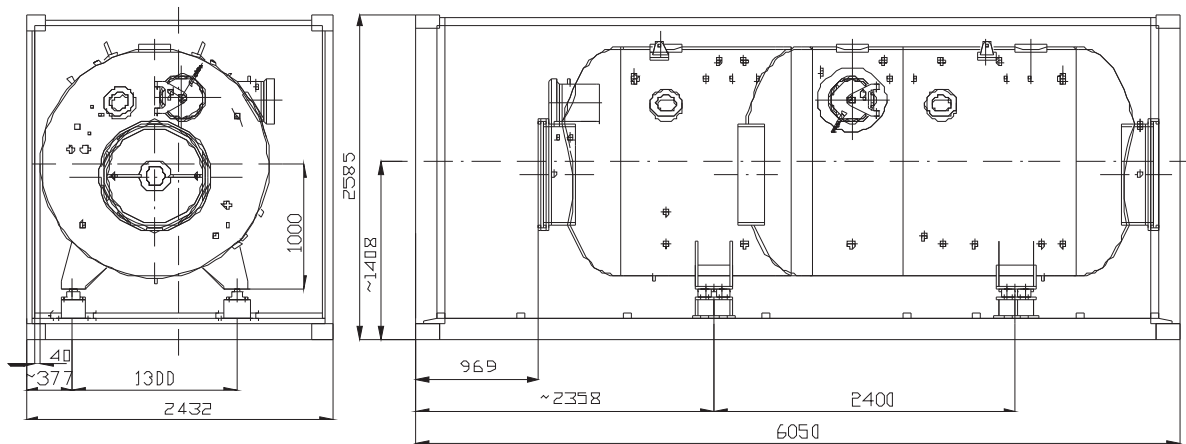
The use of the installed gas service is controlled from the air, oxygen and gas mixture control panel. There is also the oxygen dosing control panel, communication, observation, recording and the main controls equipment.

The purpose and utilisation of the chamber

The HYMED comprises a chamber with 2 compartments designed for the following purposes:

- the treatment compartment, which is the larger of the two compartments, will accommodate 8 to 10 persons sitting, or two persons lying down. This compartment also includes the possibility to give qualified medical treatment for the patients lying down and also the possibility of connecting with the transportation chamber
- the smaller rescue and transfer chamber will accommodate 2 to 4 persons sitting and includes the possibility for entrance and exit of medical personnel

Test showed that in extreme circumstances it is possible to accommodate up to 18 to 20 persons in the chamber (without the possibility of the use of inhalers), but in this instance one ought to have an assured external power supply of respiratory gases, with regard to the high degree of air loss through ventilation of sections, and also must be assured the greater reserve of CO2 absorbent.



Container with chamber installed