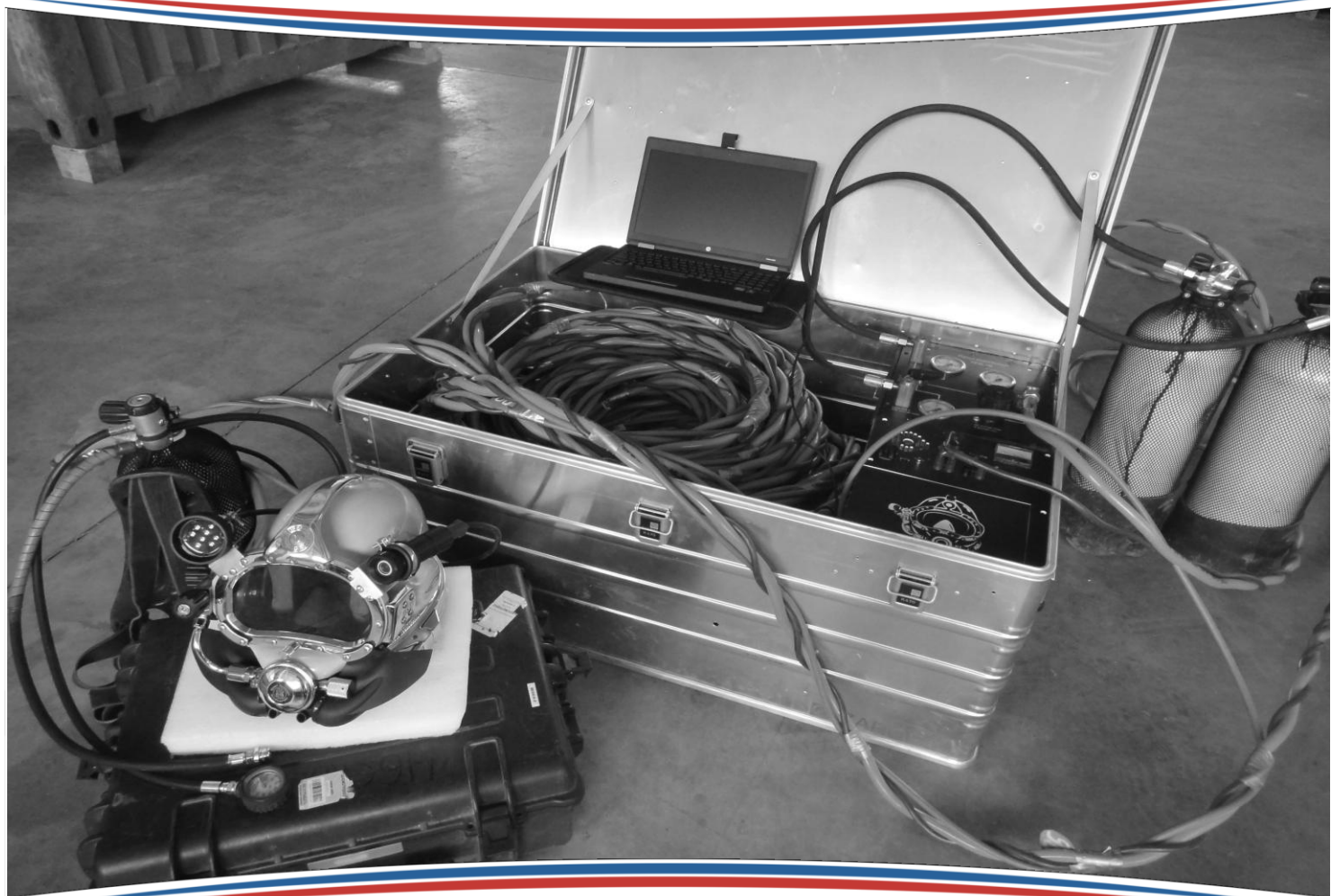




**FERTOING**



## **Mobile Diving Complex Demonstration Materials**

**St. Petersburg  
2012**

## 1. Introduction

This demonstration contains information on the Mobile Diving Complex (hereinafter referred as MDC).

The MDC was designed and manufactured in January 2012 by our own diving specialists for diving works at 12m depth from the shore and MSVs.

## 2. MDC Technical Specifications

Mobile Diving Complex (MDC) is a light-weight container (box) equipped with the HP air supply system.

Fixed MDC installations are as follows:

- Air control system (single diver);
- Combox (single diver);
- Helmet camera and lighting PCU;
- Mastech HY 3005D single-output DC power supply.

The MDC is equipped with a video recording system and hose piping.

Air supply is performed in 2 modes using:

- Diving cylinders 2x15 l, 230 kg/cm<sup>2</sup> or 2x40 l, 150 kg/cm<sup>2</sup>;
- MP Diving Compressor.

### MDC Technical Specifications

Diving depth .....	12 m*
Number of working divers .....	1
Weight in the air without additional equipment .....	80kg
Max. length .....	1180 mm
Width .....	790 mm
Height .....	500 mm
Power supply .....	220V, 2-phase, ground
Air storage system .....	diving cylinders 2x15 l, 230 kg/cm <sup>2</sup> or 2x40 l, 150 kg/cm <sup>2</sup>
Air control system .....	ACS-1(ППВ-1)
Diver Intercom .....	Combox
Video control system .....	helmet videocamera KP-1with a light
Recording device.....	HP lap-top, with Dezll video card and Pinnacle Studio software
Major equipment .....	SL-27 diving helmet, umbilical (100m)

\* - without a decompression chamber.

### 3. General Description and Performance

3.1. The MDC consists of the following elements (see Appendix 1):

- light-weight container (box);
- air control system of rust-free materials, WP = 230 bar;
- cylinders 2x15 l, 230 kg/cm<sup>2</sup> or 2x40 l, 150 kg/cm<sup>2</sup>;
- diver intercom - Combox;
- video control system;
- recording device: HP lap-top, with Dezll video card and Pinnacle Studio software;
- DC power supply for Combox and ancillary equipment~ 220 V/12 V;
- SL-27 diving helmet, umbilical (100m).

3.2. A shore or vessel supply unit (~220V/ 50 Hz) is used for power supply of the MDC via cabling with an outer pressure seal connector, all system grounded.

For emergency power supply a free-running petrol engine GEKO 110 / 3,7 kVA S10000E – EISEMANN is used, its internal DC source up to 200A can be used for welding.

3.3. To ensure video control of the operation the helmet video camera KP-1 with an underwater LED is installed onto the SL-27 helmet. The camera is controlled by the power supply unit with a function of light adjustment that has a video output for external recorder and is powered from an external source (~220V/12V).

3.4. HP lap-top with Dezll video card and Pinnacle Studio software is used as an external recorder. The above mentioned software allows processing of received video and overlaying titles and additional information on a picture. Recording is carried out on a real-time basis.

3.5. To major diving equipment belong the Viking/Bare dry suit and the helmet SL-27. Air is supplied from 2 small diving HP cylinders (15l) or from 2x40 l transportation cylinders using the air control system.

The ACS is designed for setting HP air parameters and supplying it to a diver through the umbilical. A 7.5 l aluminum bailout cylinder with WP of 230 bar is integrated into diving equipment for emergency air supply.

Storage air cylinders are filled from the independent Bauer Poseidon HP air compressor with a petrol drive and 230 bar WP. Air storage in HP cylinders and air control system fully provide an operation at the depth of 12m.

3.6. The second variant is air supply directly from the MP air compressor ABAC B 5900 B/100 CT 5,5.

The compressor is equipped with electric motor, 100 l receiver and fine filtration system. A diving hose is connected directly to the coupling at the filtration system outlet.

Air compressor technical specifications are given in the Appendix 1.

The filtration system consists of the following components:

1. Main line filter AFF 8C-F04D-T:

- can remove impurities such as oil, water and foreign matter in compressed air;
- nominal filtration rating - 3  $\mu\text{m}$ ;
- element life - 2 years.

2. Water separator AMG350C-F04D:

- can remove water droplets in compressed air, including water mist;
- water removal rate – 99%;
- element life - 2 years.

3. Micro mist separator with pre-filter AMH350C-F04-T:

- can separate and remove aerosol state oil mist in compressed air and remove particles;
- nominal filtration density - 0,01  $\mu\text{m}$ ;
- oil mist density at outlet (at 30 mg/m<sup>3</sup> blown out by compressor) – max. 0.1 mg/m<sup>3</sup> (before saturated with oil, less than 0.01);
- element life - 2 years.

4. Super mist separator AME350C-F04:

- can remove oil mist in compressed air, designed for use in medical and pharmaceutical areas where oil mists must be avoided;
- nominal filtration rating - 0,01  $\mu\text{m}$ ;
- element life - 2 years.

5. Odor removal AMF350C-F04:

- designed for use in medical and food processing and pharmaceutical areas where odors must be avoided;
- oil mist density at outlet – max. 0,004 mg/m<sup>3</sup>;
- element life - 2 years.

If used with a decompression chamber, the operational depth with air supply from the HP air cylinders increases up to 12msw.

3.7. The MDC has mobile structure and is easily mobilized and installed onto different objects such as special host-vessels, barges, floating cranes and other onshore objects.

The following conditions are necessary for MDC transportation and installation at an offshore site:

- enough free space;
- power supply 220 / 50Hz, 0.75 kW;
- conditions for MCDC installation and operation according to the applicable safe sea practice.

MDC equipment is manufactured to fit into minimal space limits this giving an advantage to provide transportation not only by railway and sea transport but by motor transport.

# Appendices

# Appendix 1

## MDC Configuration and Technical Specifications

No	Attribute	Value	
1.	Year of commissioning	2012	
2.	Depth range	12 m; 20 m with decompression chamber	
3.	Dimensions (L/W/H)	1180x790x500 mm	
4.	Weight in the air without additional equipment	80kg	
5.	Power supply	~220 / 50Hz, 0.75 kW;	
6.	Number of working divers	1	
<b>Compressor:</b>			
1.	Type	Bauer Poseidon P-100	
2.	Drive	petrol	
3.	WP	230 bar	
4.	Drive power	5.5 HP	
<b>Air storage &amp; control system:</b>			
1.	Capacity	2x15 l	2 x40 l
2.	WP	230 bar	150 bar
3.	MP air compressor	Type – MP air compressor; Purpose – working diver air supply; Manuf.& model – ABAC B 5900 B/100 CT 5.5; Version – mobile; Drive – 1x V-belt; Tubing head type – B5900B; Receiver volume – 100 l; Intake capacity – 653 l/min; Motor – 5.5 HP/4,1 kW; 1370 rpm Voltage – 380V/50Hz, 3-phase; WP – 11 bar; Dimensions – 1520mm × 590mm × 1260mm	
<b>Air control system:</b>			
1.	Type	ACS -1 (ППВ-1)	
2.	Max HP pressure	230 bar	
3.	Allowable umbilical pressure	8-17 bar	
<b>Diver intercom:</b>			
1.	Type	Combox	
2.	Frequency range	600-12000 Hz	
3.	Output power	11W	
4.	Supply voltage	12V	
5.	Outputs for external devices	- audio recorder output; - external power supply input, 12V; - headset connector.	
6.	Number of working divers	1	
<b>Video control system:</b>			
1.	Type	KP-1 (КП-1)	
2.	Recorder	HP lap-top, with Dezll video card and Pinnacle Studio software	



4.	Video camera KP-1 (КП-1)	- resolution – 480 TVL; - response – 0.1 lux-sec; - focus – 3.6 mm; - depth – 100 m.
5.	Underwater light SP-5 (СП-5)	- supply voltage - 12-14V; - lamp – Gh12-0.36, LED 50W; - depth – 100 m.
<b>Major diving equipment:</b>		
1.	Type	Superlite 27 diving helmet
2.	Pressure range	6.9–15.9 atm.
3.	Pressure control valve	6.9–15.5 kgf/cm <sup>2</sup>
4.	Weight in air	3.1kg
5.	Umbilical	3-part, with connection cable and video/lighting cables, 100m
6.	Suit	Viking/Bare, dry
<b>Additional equipment:</b>		
Free-running petrol engine GEKO 110 / 3,7 kVA S10000E – EISEMANN		
1.	Model	S 10000 E
	Version	Open frame
	Noise level (7m)	71dB
	Dimensions	900 x 645 x 615mm
	Weight	160kg
	Engine manuf. & type	Briggs & Stratton, 380447
	Number of cylinders	2
	Operation time 75% load	5.7 h
	Fuel capacity	20 l
	Fuel type	Petrol
	Generator	Sincro (Italy)
	Genset type	synchronous
	Output voltage	230V (1-phase), 400V (3-phase)
	Electrical capacity (1-phase / 3-phase)	3.7 / 8.0 kVA
	Welding current	Current range – up to 300A; Closed-circuit voltage - 84V; Arc voltage - 21, 6÷30V.
Single-channel DC power supply Mastech HY 3005D		
2.	Purpose	Combox supply
	Number of channels	1
	Output voltage per channel	0÷30V DC
	Output current per channel	0÷5A DC
	Voltage and current indication accuracy	LCD
	Input voltage	220V/110V ± 10% 50Hz/60Hz ± 2Hz
	Dimensions	206×153×110mm

Compressed air analyzer PTS Test-komplekt-5 (ПТС Тест-комплект-5)	
3.	<p>Application</p> <p>измерение содержания в сжатом воздухе следующих веществ:            - CO;            - CO<sub>2</sub>;            - hydrocarbons (oils);            - NO<sub>x</sub>;            - H<sub>2</sub>O, water mist.</p>
	<p>Measurement range</p> <p>- CO, ppm.....2,5 ÷ 150            - CO<sub>2</sub>, ppm.....100 ÷ 3000            - NO<sub>x</sub>, ppm.....0,5 ÷ 10            - oil, mg/m<sup>3</sup>.....0,1 ÷ 1,0            - H<sub>2</sub>O, mg/m<sup>3</sup>.....20 ÷ 50</p>

## **Appendix 2**

### **MDC Pictures**



**Pic. 1. Mobile Diving Station**



**Pic. 2. Video recorder & control system**



**Pic. 3. MDC with MP compressor air supply**