

**Annex V of the VAC**  
**Technical Specifications for the equipment**  
**(Lot 1 - Central Mediterranean Sea)**

**Procurement procedure:** EMSA/CPNEG/1/2020

**Title:** Service Contracts for Stand-by Oil Spill Recovery Vessel(s)

Phase II – Invitation to Tender

**All the costs related to the purchase and transport of additional equipment, transportation of transferred equipment as well as servicing of the transferred equipment in line with this Annex and as per below requirements have to be included in the “equipment costs”**

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- 1. General description of the equipment**
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- 3. Use of the oil pollution response equipment**
- 4. List of transferred equipment and description**
- 5. Description of equipment**

## **1. General description of the equipment**

The oil pollution recovery equipment comprises two different at-sea oil recovery systems designed to recover medium to high viscous oils. Those systems will be installed on board when operating as an oil spill recovery vessel although they will not be used at the same time.

The Contractor will receive the set of equipment as listed in Section 4 and described in detail in Section 5 of this document. However, the Contractor will be responsible for the correct functioning of the equipment according to the parameters of its technical specifications.

### **1.1. Equipment Transferred**

The contractor will receive from EMSA the equipment listed below:

1. Sweeping arms, Koseq, 15m
2. Boom Desmi Ro-boom (2x250m)
3. High-capacity skimmer, Normar
4. Spare discharging pump (Marflex MSP 150-63)
5. Sampling/testing equipment (mini lab, flashpoint tester)
6. 2 x VHF
7. 3 x portable cleaning machines

All tenderers will have the opportunity to visually verify the condition of equipment items listed above in the stockpile in Malta, at request. In principle the visit will be organised in week 27. The visit details will be arranged with the requesting tenderer.

There were no technical issues regarding the transferred equipment occurred in the past during the previous contract implementation.

### **1.2. Servicing of the equipment**

The equipment that will be transferred to the Contractor was purchased in 2007 and 2008. It is generally in good condition. It has never been used to recover oil and it has been deployed a few times per year for the purpose of drills and exercises (in average 4 quarterly drills and 1 exercise per year). The equipment has been categorised and appropriately labelled. It has undergone regular maintenance according to the manufacturer's specifications. The maintenance was closely monitored by EMSA. The working condition of the equipment is regularly verified by the Agency during drills. In addition, the following equipment was completely overhauled by the relevant manufacturer: sweeping arms in 2017, boom and high-capacity skimmer in 2018

The Contractor will be responsible for the safe, reliable and sustainable operational use of the equipment, the Contractor should arrange servicing to the equipment after the handover but before expiration of the Preparation Phase. In such a case, each tenderer will include in its financial offer regarding the oil pollution response equipment, the estimated servicing costs. This estimation will be considered as the ceiling that EMSA will reimburse in relation to the equipment servicing.

Detailed report of the service(s) actually carried out on the equipment item(s) shall be included by the Contractor as part of the Completion Report This report should include as a minimum list of works performed, list of parts replaced and/or repaired, photos, etc.

The Servicing might be performed by a third party subcontracted by the contractor.

The contractor should arrange servicing to the following equipment:

1. Sweeping arms, Koseq, 15m
2. Boom Desmi Ro-boom (2x250m)
3. High-capacity skimmer, Normar
4. Spare discharging pump (Marflex MSP 150-63)
5. Sampling/testing equipment (mini lab, flashpoint tester)
6. 3 x portable cleaning machines

The servicing should include the following:

- Check and replace, if necessary, the hydraulic and oil hoses and couplings;
- Check and replace, if necessary, the crane cables, lifting wires, ropes, etc.;
- Check of power packs, change the engine and hydraulic oil, coolant liquid, filters (oil, air, fuel);
- Check the brushes of the skimmer;
- Check and servicing of the pumps, if necessary;
- Check the paint and repaint, if necessary.
- Calibration for the sampling/testing equipment, when applicable.

### 1.3. Additional equipment

Contractor will need to purchase/deliver the following equipment:

1. Flashpoint of the arrangement: As the arrangement must be able to collect and store oil with a flashpoint below 60°C, then additional items may need to be purchased or replaced (e.g. for the power packs, remote controls, etc.) in order to obtain the relevant Class notation for oil pollution response operations.
2. Slick Detection System: The oil encounter rate is improved when the oil layer thickness of the recovery area is larger. The vessel will have a system installed, which, without external aid, is capable of detecting the location of the highest concentration of oil. The system will permit the vessel to continue oil detection in low visibility conditions so that the oil recovery operations are not aborted due to lack of visibility.

The system must be permanently installed onboard. In the case a “pool” of vessels is offered, then each vessel must have a system installed. During data capture, the vessel movement will be compensated in order to ensure the reliability of the information.

The system will be able to provide continuous monitoring of the slick area and, in combination with current and wind data, predict the oil spill trajectory. It will be possible to record the evolution of the spill trajectory in video format. Such a format should be compatible with common media players software.

The system should also provide an estimate of the spill area by size, real time distance measurement to a defined point and will be able to be overlaid with an electronic map. The ability to calculate volume in combination with other data is appreciated. However, a system which measures directly both slick size and thickness is preferred.

The detection range shall be at least 2 nautical miles and will operate efficiently in wind speed of 2m/s or more.

The integration with VHF frequency used in the AIS system is mandatory if such a system is not already installed on the vessel.

The Graphic User Interface shall be user-friendly with a PC-based data processing capability. The layout of display and colour, for use both day and night, will be specially made for

operation on a vessel's bridge. The system must be regularly (annually) updated with the latest software for the system during the whole duration of the contract.

3. Flow-meter: to be used during drills and recovery operations to measure the flow of the pumps installed in the sweeping arms and skimmer.
4. Interface Detection System: When the oil/water mixture is stored in the tanks, the water and the oil is naturally separated due to the difference in density. The tenderer shall provide adequate equipment (fixed or portable) to detect the interface border between the oil and the water so that the quantity of actual oil stored is known.
5. Gas Detector: It will be needed to check the presence of explosive gases.
6. Appropriate fittings/devices for the boom: in order to be able to be deployed in open U configuration.
7. EMSA logo on equipment: At least one EMSA logo must be attached/painted on a visible position on each sweeping arm and crane, skimmer frame (if possible), boom reel, power pack, storage or tank containers. The dimension of the logos shall be in proportion to the items to be marked.

The Contractor will purchase the above listed additional oil pollution response equipment items and will obtain and conserve ownership of them until the Clearance of the Preparation Phase is completed. All provisions of the Contract including article IV.4.3 (transferable call option) shall apply to the additional oil pollution response equipment items.

8. Vessel Model: At the end of the preparation phase, the Contractor will deliver to EMSA, at its premises in Lisbon, a model(s) of the Vessel(s) at (approximate) scale 1/100. All oil pollution response equipment will be displayed, in the appropriate scale, on board the model(s). In particular, one system must be deployed, simulating recovery of oil with the option to display the alternate system (sweeping arms or boom/skimmer systems). The model(s) should be as detailed as possible, preferably made of plastic or metal. The model(s) remains the property of EMSA, only to be used by the Contractor upon request with the agreement of EMSA. Any cost related to the production of the model and its transportation costs shall be borne by the Contractor<sup>1</sup>.

## **2. Handover procedure for equipment transferred**

The conditions of handover, transportation, storage and insurance of the equipment are described below. If any part of the equipment delivered is not used by the Contractor due to the fact that it is not suitable for the vessel offered, the associated costs for the storage, insurance and maintenance shall be borne by the Contractor.

### **2.1. Date and place of the handover**

Prior to the handover, the Contractor shall designate a representative whose name and position shall be communicated in writing to EMSA. The Agency may also designate a representative to witness the handover process.

The items listed in point 1.1 above will be made available for handover and ready for transportation at their relevant storage location as follows:

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<sup>1</sup> The model price should be indicated in the bid for information only.

The handover will be done at a date to be mutually agreed between EMSA and the Contractor and shall not take place earlier than **26 June 2021** and not later than **31 July 2021**.

On the handover dates, the Contractor representative shall be present and verify the delivery of the equipment in question.

A delivery/receipt statement prepared by EMSA will be used in order to acknowledge handover of all the oil pollution response equipment items. By signing the delivery/receipt statement on the handover date, the Contractor representative accepts the equipment in its current condition.

## **2.2. Transportation**

The Contractor shall bear all risks involved in transporting (including loading and unloading) for the items listed above from the handover place to the new storage facilities.

The Contractor shall arrange the packing and preparation of the items for transportation, provision of stevedoring services and lifting resources (e.g. forklifts, mobile cranes, etc.) and all necessary shipment.

The costs related to the transportation (including insurance during transport) of the equipment must be paid initially by the Contractor. However, these costs are, within the contract budget ceiling, reimbursed by EMSA as part of the oil pollution response equipment purchase. Accordingly, the tenderer shall include in its financial offer the estimated transportation costs for the oil pollution response equipment.

## **2.3. Storage and insurance**

Prior to the equipment handover, the Contractor shall arrange for the appropriate storage and insurance of all the oil pollution response equipment.

For the purpose of taking out the full risk insurance policy covering the transferred oil pollution response equipment items, the value shall be the purchase value as described under in the table in point 4 below.

## **3. Use of the oil pollution response equipment**

The equipment that must be installed/carried simultaneously on board for oil pollution response must include, as a minimum, the following configurations:

- the sweeping arm system,
- the boom system (2 x reel) + high-capacity skimmer system,
- the oil slick detection system,
- other equipment (minilab, flashpoint tester, etc.)

and their relevant power packs and ancillaries.

This configuration will be tested during all quarterly drills every year.

#### 4. List of transferred equipment

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
1.	Sweeping arm system (EUR 818,854)	1.1	Frame	Koseq		1	15 meters, rigid, foldable end, with weir skimmer	EIKM362201	<b>0837</b>	17/07/2007
		1.2	Frame	Koseq		1	15 meters, rigid, foldable end, with weir skimmer	EIKM362202	<b>0838</b>	17/07/2007
		1.3	Pump	Marflex	MSP 150-63	1	centrifugal	EIKM283201	<b>0839</b>	17/07/2007
		1.4	Pump	Marflex	MSP 150-63	1	centrifugal	EIKM283202	<b>0840</b>	17/07/2007
		1.5	Oil hose(s)				hoses/hyd./couplings/cables (60 mt)	EIKM263801	<b>0841</b>	17/07/2007
		1.6	Pump ancillaries				outlet inj. flange 6"	EIKM280201	<b>0842</b>	17/07/2007
		1.7	Pump ancillaries				outlet inj. flange 6"	EIKM280202	<b>0843</b>	17/07/2007
		1.8	Pump ancillaries				water inject. pump set	EIKM280203	<b>0844</b>	17/07/2007
		1.9	Pump ancillaries				water inject. pump set	EIKM280204	<b>0845</b>	17/07/2007
		1.10	Water hose(s)				water hoses, 30m	EIKM403801	<b>0846</b>	17/07/2007
		1.11	Water hose(s)				water hoses, 30m	EIKM403802	<b>0847</b>	17/07/2007
		1.12	Hydraulic hose(s)				pressure and return (20 mt)	EIKM223801	<b>0848</b>	17/07/2007
		1.13	Hydraulic hose(s)				pressure and return (20 mt)	EIKM223802	<b>0849</b>	17/07/2007
		1.14	Crane				crane two catchers	EIKM131501	<b>0850</b>	17/07/2007
		1.15	Crane				crane two catchers	EIKM131502	<b>0851</b>	17/07/2007
		1.16	Control desk				control cabinets	EIKM111301	<b>0852</b>	17/07/2007
		1.17	Control desk				control cabinets	EIKM111302	<b>0853</b>	17/07/2007
		1.18	Control desk				remote control for simmer&debris	EIKM111303	<b>0854</b>	17/07/2007
		1.19	Control desk				remote control for simmer&debris	EIKM111304	<b>0855</b>	17/07/2007
		1.20	Power pack	Marflex		1	dhpp120, diesel engine	EIKM272801	<b>0857</b>	17/07/2007
		1.21	Power pack	Marflex		1	dhpp120, diesel engine	EIKM272802	<b>0859</b>	17/07/2007

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
2	<b>Booms</b> (EUR 307,958)	2.1	Segment	Desmi	Ro-boom 2000	1	Heavy duty, total 250 mt, section 4.5mt	EIKA 073601	<b>0860</b>	17/07/2007
		2.2	Segment	Desmi	Ro-boom 2000	1	Heavy duty, total 250 mt, section 4.5mt	EIKA 073602	<b>0861</b>	17/07/2007
		2.3	Towing lines set				towing set	EIKA 373801	<b>0862</b>	17/07/2007
		2.4	Towing lines set				towing set	EIKA 373802	<b>0863</b>	17/07/2007
		2.5	Power pack	Desmi		1	diesel	EIKA 272201	<b>0864</b>	17/07/2007
		2.6	Air blower				remote control stand & blower	EIKA 032901	<b>0866</b>	17/07/2007
		2.7	Storage reel				10' iso flat cont. reel	EIKA 353401	<b>0867</b>	17/07/2007
		2.8	Storage reel				10' iso flat cont. reel	EIKA 353402	<b>0868</b>	17/07/2007
		2.9	Storage container				10' storage container	EIKA 351201	<b>0869</b>	17/07/2007
		2.10	Spare parts				repair kit	EIKA 342501	<b>0870</b>	17/07/2007
Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
3	<b>High capacity Skimmer</b> EUR 610,200	3.1	Frame	Norene	Normar 200 Ti	1	high capacity, 2 thrusters	EIKI302202	<b>0871</b>	12/06/2008
		3.2	Brush module	Norene	Normar 200 Ti	1	brush cassette	EIKI310701	<b>0872</b>	12/06/2008
		3.3	Weir module	Norene	Normar 200 Ti	1	weir cassette	EIKI314401	<b>0873</b>	12/06/2008
		3.4	Pump	Desmi	DOP 250 Dual	1	pdas	EIKI283203	<b>0874</b>	12/06/2008
		3.5	Pump	Desmi	DOP 250 Dual	1	pdas	EIKI283204	<b>0875</b>	12/06/2008
		3.6	Power pack			1	hyd. pressure 210 bar, oil flow 260 l/m, diesel engine	EIKI272802	<b>0877</b>	12/06/2008
		3.7	Storage reel				hydraulic driven reel with 360 degrees turntable and integrated crane 6 tons at 5 m	EIKI353402	<b>0878</b>	12/06/2008
		3.8	Control desk				remote and local control by cable	EIKI111301	<b>0879</b>	12/06/2008
		3.9	Hydraulic hose(s)				50 meters	EIKI223603	<b>0880</b>	12/06/2008
		3.10	Oil hose(s)				50 meters	EIKI26S3602	<b>0881</b>	12/06/2008
		3.11	Ancillaries				tool box	EIKI20201	<b>0882</b>	12/06/2008
		3.12	Spare parts					EIKI343802	<b>0883</b>	12/06/2008

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
4	<b>Discharging</b> (EUR 16,000)		pump	marflex	MSP 150-63	1	centrifugal	EIKE283203	<b>0896</b>	17/07/2007
Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
5	<b>Sampling &amp; testing oil products</b> (EUR 33,820)	5.1	Mini lab	Zematra			Sampling minilab densi-viscometer	EIKH234301	<b>0901</b>	19/07/2007
		5.2	Mini lab	Zematra			Sampling minilab densi-viscometer	EIKH231701	<b>0902</b>	19/07/2007
		5.3	Flash point tester	Petrotest	PMA-4		Flash point tester petrotest PMA-4	EIKH173901	<b>0903</b>	19/07/2007
Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
6	<b>Communication</b> (EUR 3,340)	6.1	VHF Tranceiver	Jotron	Tron Air	2	VHF aeronautical band; two-way transceiver	EIKC392901	<b>0905</b>	17/07/2007
		6.2						EIKC392902	0906	
Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
7	<b>Cleaning</b> (EUR 3,465)	7.1	Cleaning machines			3	High pressure cleaning machines	EIKB092901	0908	2015
		7.2						EIKB092902	0909	2015
		7.3						EIKB092903	0910	2015

## **5. Description of transferred equipment**

### **5.1. Sweeping Arm system**

Manufacturer:

Kampers oil spill equipment B.V.

Oosthavenzijde 5

P.O. Box 5606, 3297 ZG Puttershoek, The Netherlands

Tel: +31 78 6763811 Fax: +31 78 6764853

Email: [design@koseq.com](mailto:design@koseq.com) Website: <http://www.koseq.com>

The Koseq rigid sweeping arm system consists of two 15 meter sweeping arms with foldable ends, oil transfer pumps, pumps ancillaries, control panel, hydraulic system, oil hoses, crane and hydraulic power pack. The sweeping arms are launched by means of cranes to be installed on board the vessel.

The oil/water mixture is guided along the bulkheads of the sweeping arm and the side of the vessel via an adjustable debris screen and skimmer to the oil collecting chamber of the inner pontoon, from which it is removed by a hydraulically driven submersible cargo oil pump and discharged into the collecting tanks via a flexible hose.

The sweeping arm system is supplied with an integrated weir skimmer and centrifugal pump with screw impeller (Marflex MSP150-63), pre-installed with a hot water current radial system to facilitate pumping of high viscosity oil. The system is provided with a remotely controlled self-cleaning grating to prevent debris to obstruct the skimmer and the pump.

The system comprises the following parts:

5.1.1 & 5.1.2 Sweeping arm frames

5.1.3 & 5.1.4 Marflex centrifugal pump MSP150-63

5.1.5 Oil hoses/hydraulic hoses/couplings/cables (for the sweeping arms and the associated cranes)

5.1.6 to 5.1.9 Pump outlet injection flange 6"/water injection pump set

5.1.10 & 5.1.11 Water hoses

5.1.12 & 5.1.13 Hydraulic hoses (pressure and return) for the pump set (see 5.1.4)

5.1.14 & 5.1.15 Lagendijk crane with two catchers

5.1.16 to 5.1.19 Control panel

5.1.20 & 5.1.21 Marflex diesel-hydraulic power pack

### 5.1.1. Sweeping arm frame

### 5.1.2.

#### Description

Each sweeping arm is made up of an outer pontoon, a bridge and an inner pontoon welded together. The inner pontoon contains an adjustable oil collection chamber in which the pump is located.

#### Conditions for oil recovery operations

The vessel equipped with the sweeping arms is capable to remove oil from the sea under the following conditions:

- Wind up to Beaufort 4;
- Current between vessel and oil slick up to 2 knots;
- Forward speed of the vessel maximum 3-4 knots (actual speed depends on sea state conditions and thickness of the oil layer on water surface);
- Forward speed of the vessel maximum 3-4 knots (actual speed depends on sea state conditions and thickness of the oil layer on water surface).

#### Foldable ends

To make transport and storage easier, the sweeping arm pontoons are equipped with foldable ends. When the foldable ends are put into their operational position, they must be secured with stainless steel pins.

Technical specifications	
Function:	Collecting of oil
Year of purchase:	2007
Overall Length:	15115 mm (14740 mm with pontoons folded)
Overall width:	3330 mm (2770 mm with pontoons folded)
Overall height:	3355 mm
Weight (including pump and hoses):	4800 kg.
Type of skimmer:	Integrated weir skimmer
Skimmer pumps:	Centrifugal pump with screw impeller



Fig. 1 Koseq rigid sweeping arm

#### 5.1.3. Marflex centrifugal pump MSP150-63

#### 5.1.4.

#### Manufacturer:

Marflex B.V.

Louis Pasteurstraat 12, 3261 LZ Oud-Beijerland

The Netherlands

Tel: +31 186 89 02 00 - Fax: +31 186 89 02 49

Email: [info@marflex.com](mailto:info@marflex.com)

Website: [www.marflex.com](http://www.marflex.com)



Fig. 2 Marflex pump

The Marflex pump type MSP-150-63 is a hydraulically driven single stage vertical centrifugal pump that has been designed for efficient handling of viscous liquids, bulky solids and shear-sensitive liquids. The MSP 150 pump is based upon a centrifugal screw impeller that combines the properties of a screw pump with those of a centrifugal one.

The pump impeller is keyed directly onto the hydraulic motor shaft. The high-pressure oil is led into the hydraulic motor through the pressure hose; the leak oil connection is connected to the return oil outlet port on the hydraulic motor; the return oil flows back to the main hydraulic system. A special shaft seal arrangement has been developed in the hydraulic motor to segregate the hydraulic and the cargo.

Technical specifications	
Design:	Single stage centrifugal
Capacity/head:	360 m <sup>3</sup> /h – 40 mlc. max.
Viscosity/specific gravity:	1.0 cSt. at 20°C/1.0
Speed:	2000 rpm max.
Required power:	45 kW
Hydraulic motor type:	Axial plunger with mechanical seal
Hydraulic working pressure:	200 bar
Hydraulic pressure, max.:	320 bar
Hydraulic flow, max.:	130 l/min
Maximum outer diameter:	490 mm
Height:	610 mm
Weight, excl. hydraulic hoses:	83 kg

#### 5.1.5. Oil hoses/hydraulic hoses/couplings/cables (for the sweeping arms and the associated cranes)

##### Manufacturer:

Goodyear Engineered Products Europe  
Unit 25 Robins Road,  
Zone 3, Burntwood Business Park,  
Burntwood, Staffordshire  
UK WS7 3XB  
Tel: +44(0)1543 672511  
Fax: +44(0)1543 674917

##### Oil hoses description

Oil hoses to transfer the recovered oil from the sweeping arms to the storage tanks.

Type: Rig supply soft wall  
Size: 6" x 60 metres  
Couplings: Camlock 6"  
Working pressure: 20 bar  
Burst pressure: 60 bar  
Temperature: -40°C + 93°C  
Liner: Nitrile  
Cover: Chloroprene



Fig. 3 Oil hoses

## Hydraulic hoses

### Manufacturer:

Manuli Rubber Industries S.p.A.

Piazza della Repubblica, 14/16

20124 Milano

Italy

Tel.: +39 02 627 131

Website: [www.manulirubber.com](http://www.manulirubber.com)

Email: [info@manulirubber.com](mailto:info@manulirubber.com)



Fig. 4 Hydraulic hoses

### Hydraulic hoses description

The hydraulic hoses link the hydraulic pipelines on the crane with the elements of the sweeping arms operated from the crane control panel. Two sets of hydraulic hoses with stainless steel Tema quick couplings are provided.

#### Hydraulic connections:

2 x 3/8" (pressure and return for sweeping arm debris screen)

2 x 3/8" (pressure and return for sweeping arm weir level)

1 x 1" (pump pressure line)

1 x 1 1/2" (pump return line)

## Cables

### Manufacturer:

Liftal Hijstechniek

Kreeft 22

4401 NZ Yerseke

The Netherlands

Tel: +31 (0) 113 – 571523 - Fax: +31 (0) 113 – 573793

Website: [www.liftal.com](http://www.liftal.com) - Email: [yerseke@liftal.com](mailto:yerseke@liftal.com)



Fig. 5 Cables

Each crane is fitted with a set of two wires, one per winch, for the lowering and lifting of the sweeping arms.

<b>Main winch wire (5000 kg)</b>	
Number of strands x number of wires:	24 x 7
Direction of lay:	Right
Number of cores:	1
Nominal diameter:	18 mm
Core material:	Steel
Length:	24 meters
Tensile grade:	2160 Nmm <sup>2</sup>
Minimum breaking strength:	275 kN
Working load limit:	5.05 tons
Label:	DHY8766

<b>Secondary winch wire (1000 kg)</b>	
Number of strands x number of wires):	35 x 7
Direction of lay:	Right
Number of cores:	1
Nominal diameter:	14 mm
Core material:	Steel
Length:	27 meters
Tensile grade:	1960 Nmm <sup>2</sup>
Minimum breaking strength:	144 kN
Working load limit:	2.64 tons
Label:	DHY8768

#### 5.1.6. Pump outlet injection flange 6"/water injection pump set

5.1.7.

5.1.8.

5.1.9.

#### Manufacturer:

Ro-Clean Desmi A/S  
Hestehaven 21 B  
DK-5260 Odense S  
Denmark  
Tel: +45 6591 0201  
Fax: +45 6590 8877  
Email: [info@ro-cleandesmi.com](mailto:info@ro-cleandesmi.com)

Website: [www.desmi.com](http://www.desmi.com)



Fig. 6 Water injection unit

#### Description

The Desmi annular injection flanges are designed to effectively inject a thin water layer surrounding the column of oil being transported through a 10 metres hose. This small amount of water (5-10% of the pump flow) decreases the friction loss dramatically in the discharge line during high-viscous oil pumping operations. The flanges are equipped with a non-return valve to prevent the pumped media to enter the water supply line. The flanges are very easy to connect to the pump outlet and can be easily dismantled and cleaned after operation.



Fig. 7 Water injection flange

The Desmi water injection unit is a portable hydraulic driven pump set designed for injection of water into the Desmi water injection flanges. The water injection unit is connected to the power supply by means of a hose set. The water injection unit should be placed in such a way that the best possible control of the operation is obtained.

#### 5.1.10. Water hoses

5.1.11.

Length: 30 meters

#### Manufacturer:

Ro-Clean Desmi A/S  
Hestehaven 21 B  
DK-5260 Odense S  
Denmark  
Phone: +45 6591 0201



Fig. 8 Water hoses 3/4" and 5/4"

Fax: +45 6590 8877

Website: [www.desmi.com/ro-cleandesmi](http://www.desmi.com/ro-cleandesmi) -Email: [info@ro-cleandesmi.com](mailto:info@ro-cleandesmi.com)

**5.1.12. Hydraulic hoses (pressure and return)**

**5.1.13.**

These hydraulic hoses are used for the hot water injection pump set (see 5.1.4).

Length: 20 meters

**Manufacturer:**

Ro-Clean Desmi A/S

Hestehaven 21 B

DK-5260 Odense S

Denmark

Phone: +45 6591 0201 -Fax: +45 6590 8877

Website: [www.desmi.com/ro-cleandesmi](http://www.desmi.com/ro-cleandesmi) - Email: [info@ro-cleandesmi.com](mailto:info@ro-cleandesmi.com)

**5.1.14. Lagendijk crane with two catchers**

**5.1.15.**

**Manufacturer:**

Lagendijk Constructie B.V.

Choorhoekseweg 3

4424 NW Wemeldinge

The Netherlands

Tel: +31 (0) 113 621385 - Fax: +31 (0) 113 622591

Email: [info@lagendijk-constructie.nl](mailto:info@lagendijk-constructie.nl) - Website: <http://www.lagendijk-constructie.nl>

The two Lagendijk store cranes are intended for operating the sweeping arms and are specially designed for this purpose.

<b>Technical specifications</b> (Lagendijk SK 7-5000/12.5-1000)	
Maker:	Lagendijk Constructie B.V.
Year of construction:	2007
Type:	SK 7-5000/12.5-1000
Main dimensions:	Length: 13.4 meters - Height: 5.4 meters
Propulsion:	Hydraulic
Lifting capacity:	5000 kg – 7 meters / 1000 kg – 12.5 meters
Tilt:	3° max.

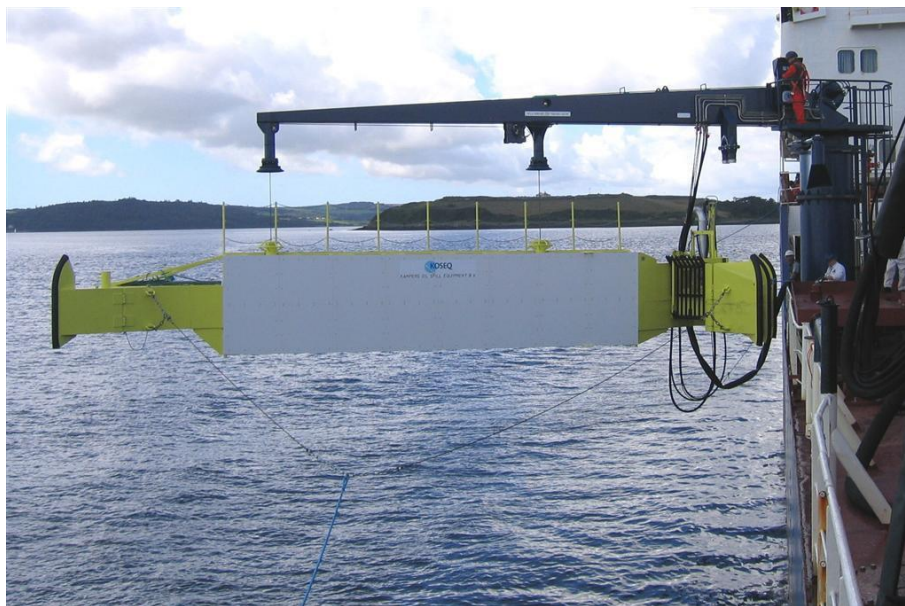


Fig. 9 Lagendijk crane

#### 5.1.16. Control panel

5.1.17.

5.1.18.

5.1.19.

#### Manufacturer:

Lagendijk Constructie B.V.

Choorhoekseweg 3

4424 NW Wemeldinge

The Netherlands

Tel: +31 (0) 113 621385 - Fax: +31 (0) 113 622591

Email: [info@lagendijk-constructie.nl](mailto:info@lagendijk-constructie.nl) - Website: <http://www.lagendijk-constructie.nl>



Fig. 10 Controls

The crane and sweeping arms are operated throughout the control panel, which is on top of the crane pillar.

The panel is made up of 6 handles with which the operator can control the following elements:

- Sweeping arm pump.
- Sweeping arm weir skimmer height
- Sweeping arm debris screen
- Crane winch (1 ton)
- Crane winch (5 ton)
- Crane cylinder

**5.1.20. Marflex diesel-hydraulic power pack**  
**5.1.21.**

**Manufacturer:**

Marflex B.V.

Louis Pasteurstraat 12

3261 LZ Oud-Beijerland

The Netherlands

Tel: +31 186 89 02 00 - Fax: +31 186 89 02 49

Email: [info@marflex.com](mailto:info@marflex.com) - Website: [www.marflex.com](http://www.marflex.com)

**Description**

The Marflex type DHP-120 power pack is a compact diesel engine driven hydraulic unit, suitable for operation in hazardous areas Zone II. Therefore, several protection devices are fitted on the diesel engine and on the hydraulic system to make it possible to run the power pack in the specified hazardous areas.

The power pack incorporates a protection/lifting frame built from high tensile seawater resistant aluminium.

The power pack is driven by the water-cooled diesel engine.

On the power pack a dashboard is mounted equipped with indicators and controls such as:

- Hydraulic oil pressure indicator
- Hydraulic oil temperature indicator
- Lubricant pressure indicator
- Coolant (motor) temperature indicator
- Speed/running hour indicator
- Exhaust temperature indicator
- Pilot control valve to set the hydraulic oil pressure
- Vernier control to adjust the speed of the diesel engine
- Emergency stop handle to stop the air intake of engine
- Stop button to stop the power pack by blocking the fuel supply to the injection pump



Fig. 11 Marflex DHP-120  
power pack

All items in dashboard are indicated with nameplates.

The above-mentioned parts of the dashboard are necessary to operate and control the most important functions of the power pack.

The base of the power pack is equipped with wooden blocks mounted at the bottom of the fuel tank to prevent sparks between the power pack and deck or floor. In order to check the level of fuel, the fuel tank is equipped with a level indicator.

At the frame of the power pack four hoisting eyes are mounted. Hoisting of the power pack is only allowed by using these hoisting eyes.

<b>Technical specifications</b> (Marflex DHP-120 power pack)	
Manufacturer:	Marflex BV, The Netherlands
Intended use:	Hydraulic power generation in Zone II areas
Year of construction:	2006
Operational area:	Zone II
Length:	2200 mm
Width:	1200 mm
Height:	2025 mm
Weight:	1600 kg excl. hydraulic oil and diesel fuel
	2200 kg incl. hydraulic oil and diesel fuel
Diesel engine:	Perkins/1006-6-1552-2600
Rated power:	76.5 kW at 2400 rpm intermittent
Fuel consumption engine:	0.26 l/kW/h
Operational temperature:	-20°C to +50°C (with temperatures below 0°C winter diesel fuel must be used)
Hydraulic pump:	Rexroth A11VO 060 DRG
Hydraulic oil flow:	120 l at 2400 rpm
Hydraulic oil pressure:	320 bar max.
Connections:	1" quick coupling, female (high-pressure side)
	1 ½" quick coupling, female (return side)
Safety devices:	High coolant (motor) temperature High exhaust pressure Low lubricant pressure Overspeed of diesel engine High hydraulic oil temperature Low hydraulic oil level Manual operated stop devices Intake shutdown valve
Volume of fuel tank:	400 l
Volume of lubricant for engine:	13 l
Volume of hydraulic oil tank:	230 l
Volume of cooling system:	80 l

## 5.2. Boom set

The system comprises the following parts:

5.2.1 & 5.2.2 Desmi Ro-boom 2000, 250 meters

5.2.3 & 5.2.4 Towing lines set

5.2.5 Desmi power pack 58 kW

5.2.6 Air blower and remote-control stand

5.2.7 to 5.2.9 10' ISO flat rack reel and 10' ISO container

5.2.10 Spare parts (repair kit for the Ro-boom)

### 5.2.1. Desmi Ro-boom 2000, 250 meters

#### 5.2.2.

#### Manufacturer:

Ro-Clean Desmi A/S  
Hestehaven 21 B  
DK-5260 Odense S  
Denmark  
Phone: +45 6591 0201

Fax: +45 6590 8877

Email: [info@ro-cleandesmi.com](mailto:info@ro-cleandesmi.com)

Website: [www.desmi.com/ro-cleandesmi](http://www.desmi.com/ro-cleandesmi)



Fig. 12 Desmi Ro-boom 2000

#### Description

The Ro-boom 2000 oil containment boom is a heavy-duty boom. It is moulded in a composite of Du Pont Hypalon and neoprene rubber and reinforced with two plies of polyester fabric. The unique construction ensures complete cross vulcanization of the composite materials resulting in a product with high abrasion resistance, peel resistance and tensile strength. The Ro-boom 2000 lies completely flat when deflated allowing easy cleaning, storage, recovery and maintenance. Individual air chambers provide high integrity. Even if one air chamber is deflated the freeboard is maintained by the adjacent air chambers. The Ro-boom 2000 is fitted with stainless steel fittings and hot galvanized ballast/tension chain, secured with reinforced chain attachment points. Internal fibre glass rods with stainless steel brackets ensure optimum skirt profile under tow.

The space required on deck to deploy the boom will be minimum 6 meters. In addition, rollers and guides will be needed for the safe deployment of the boom (see point 4: Requirements for the Vessel).

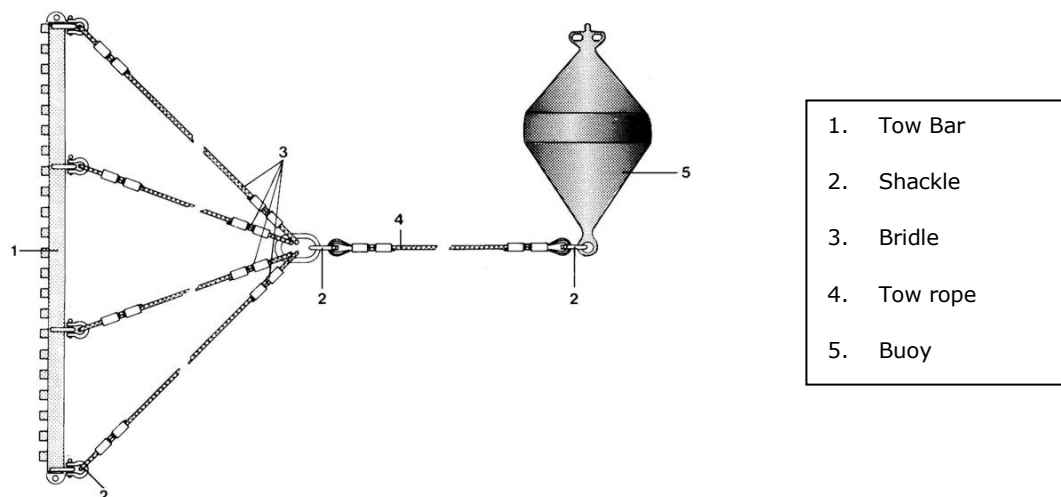
The Ro-boom withstands the effects of the sun, sea and oil, while attachments, such as eyelets and brackets, are made from stainless steel.

Technical specifications (Desmi Ro-boom 2000)	
Boom length:	2 x 250 meters
Purchased:	2007
Freeboard:	0.6 m
Draught:	1.1 m
Length of air chamber:	4.5 m
Section length:	50 m
Weight per metre incl. chain:	13.5 kg
Tensile strength chain:	200 kN
Buoyancy to weight ratio	20:1
Ballast chain:	13 mm
Operational temperature:	-40°C to 60°C
Efficient in waves up to:	4 m
Stable in current up to:	3 knots
Standard connector:	Stainless steel hinge
Maximum in-line towing speed:	10 knots

### 5.2.3. Towing set

### 5.2.4.

The Ro-Boom 2000 is provided with two sets of towing lines.



### Tow Bar

The hinge type tow bar is manufactured from heavy, threaded pipe, sealed at both ends by means of end covers with eyelets for mounting of chain, handling, etc. Tube stubs are mounted along one side of the bar, matching the hinge connectors of the boom. On the other side of the bar, heavy eyelets are welded to connect the bridle. The bar is hot dip galvanized.

### Bridle

The bridle, consisting of polypropylene prongs with thimbles, is assembled with a ring at one end.

## Tow Rope

The tow rope is a polypropylene rope with spliced eyelets in one end and thimble in the other. The eyelet with the thimble has a class 1 shackle and is shackled to the oval ring of the bridle. The opposite end is shackled to a buoy by means of a shackle.

<b>Towing set components</b>	<b>Quantity</b>
Bridle with oval ring - 4 pr. Ø14 x (5000 & 5097)	2
Buoy - 60 litres - Ø450 x 720 mm	2
Tow rope - Ø32 mm x 70 m	2
Shackle - 7/8" class 1 - 6.5 T	4
Tow bar - 170 x 115 x 2000 mm	2
Shackle - 5/8" class 1 – 3.25 T	8
Wire with slip hook - Ø10 mm x 10 m	1
Shackle - ½" type D - 0.5 T	1

### 5.2.5. Desmi power pack 58 kW

#### Manufacturer:

Ro-Clean Desmi A/S  
Hestehaven 21 B  
DK-5260 Odense S  
Denmark  
Phone: +45 6591 0201

Fax: +45 6590 8877

Email: [info@ro-cleandesmi.com](mailto:info@ro-cleandesmi.com) - Website: [www.desmi.com/ro-cleandesmi](http://www.desmi.com/ro-cleandesmi)

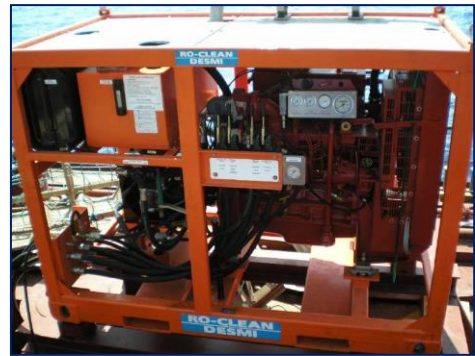


Fig. 13 Desmi power pack

#### Description

The Ro-Clean Desmi power pack, type DSPP 58 kW, is a versatile power unit, designed to operate in areas where hazardous atmospheres may occasionally occur. It is fitted with the necessary safety equipment to meet the safety standard Lloyd's Register Open Deck Zone II Areas and it is designed with ease of operation and maintenance in mind.

The hydraulic control valve and the high-capacity air-blower are built into a moveable remote-control stand. The hydraulic proportional control valve has three independent hydraulic circuits, each controlled by a load-sensing proportional valve, for operating two Desmi boom winders units and the built-in air blower.

Technical Specifications (Desmi DSPP 58 kW power pack)	
Frame Power Pack:	Painted steel frame with ISO corners.
Length:	2015 mm
Width:	1115 mm
Height:	1800 mm
Weight:	Approx. 1310 kg (empty tanks)
	Approx. 1500 kg (full tanks)
Power input:	Water-cooled, naturally aspirated 4 cylinder, 4-stroke diesel engine.
Make:	Power Torque, type: PP 804 GP Zone II, flame protected. Fitted with the necessary safety equipment to meet safety standard for Lloyd's Open Deck Zone II T3 area.
Performance:	58 kW at 2200 rpm according to DIN 6270
Starting equipment:	Spring starter Make: Startwell
Automatic stop:	- Automatic stop in case of low lube oil pressure
	- Automatic stop in case of high coolant water temp.

	- Automatic stop in case of high exhaust temperature
	- Automatic stop in case of engine over-speed.
Instrumentation:	Hydraulic pump pressure gauge
	Tachometer
	Hour meter
	Engine lube oil pressure gauge
	Engine coolant temperature gauge
	Exhaust gauge
Power output:	Pressure-flow compensated hydraulic axial piston pump Make: Sauer Danfoss GRR 090 C
Hydraulic control valve:	Load sensing proportional valve Make: Sauer Danfoss PVG32 four sections
Max. continuous pressure:	210 bar
Flow range:	0-200 l/min
Hydraulic hose connections:	Stainless steel TEMA quick couplings: 2 x 3/4", 2 x 1/2" and one 3"/8" case drain

#### 5.2.6. Air blower and remote-control stand

##### Description

The Desmi remote control stand with built-in air-blower is a movable unit designed for inflation/deflation of oil booms and operation of boom winders in areas where hazardous atmospheres may occasionally occur. The remote-control stand is connected to the power supply by means of a hose set (included in the equipment) with TEMA quick couplings.

The remote-control stand should be placed in such a way that the best possible control of the operation is obtained.



Fig. 14 Desmi air blower

Technical specifications	
Length:	750 mm
Width:	600 mm
Height:	1125 mm
Weight:	95 kg
<u>Hydraulically driven air blower:</u>	Elektor HRD2
Max. air flow:	27 m <sup>3</sup> /h
Max air pressure:	0.086 bar
Max rpm allowed:	5800 rpm
Couplings:	2 x 4" Perrot
<u>Hydraulic control valves:</u>	Danfoss PVG 32 proportional valve
Max. hydr. flow:	100 l/min.
Max. hydr. pressure:	210 bar
Relief valve setting:	240 bar
<u>Hydr. connections:</u>	TEMA type quick couplings

#### 5.2.7. 10' ISO flat rack reel and 10' ISO container

#### 5.2.8.

#### 5.2.9.

The Ro-boom 2000 is delivered on two winders. The winder frame is used for storage, transportation and handling of the Ro-boom. The standard winder frame is manufactured from specially designed steel and standard profiles.

Two frames with bearing housings for a shaft are mounted on the bottom frame. A drum with end flanges is mounted on the shaft and on one end of the shaft a sprocket wheel is mounted between the drum and the bearing housing.

To rotate the drum a gearbox, with hydraulic motor, is mounted on a bracket plate on the bottom frame. The rotating power to the drum is transferred by a roller chain. On hand cranked winders the gear box with crank is placed on the side of the bearing frame.

In order to secure the boom to the drum before winding, the drum is on each side equipped with two eyes to which the two reeling wires are shackled.



Fig. 15 - 10' flat rack reels

The bottom of the winder frame is equipped with two ISO forklift channels and in the corners there are four lifting brackets for strops for lifting by crane. The corners have ISO corner fittings suitable for fixing to the flat rack by ISO twist locks.

Lashing points are provided on the bearing frames by transverse pipes situated under the bearing base plate.

Each winder is delivered with a canvas, which is mounted with rubber strops provided with steel hooks.

The 10' storage container comes equipped with twist locks for transportation, lifting hooks and forklift channels.

Dimensions	
Length:	2991 mm
Width:	2438 mm
Height:	2591 mm

#### 5.2.10. Spare parts (repair kit for the Ro-boom)

The spare parts kit includes items necessary for the field repair and maintenance of the Ro-boom 2000.



Fig. 16 Repair kit for the Ro-boom 2000

### 5.3. Skimmer Set

The system comprises the following parts:

- 5.3.1 Normar 200TI skimmer with two thrusters
- 5.3.2 & 5.3.3 Skimmer modules: weir and brush
- 5.3.4 & 5.3.5 Desmi DOP-250 dual PDAS pump
- 5.3.6 Diesel hydraulic power pack 110 kW
- 5.3.7 Hydraulically driven reel with 360° turntable and integrated crane
- 5.3.8 Remote and local control
- 5.3.9 & 5.3.10 Umbilical hose (including hydraulic and oil hoses)
- 5.3.11 Tool box
- 5.3.12 Spare parts

#### 5.3.1. Normar 200TI skimmer with two thrusters

##### Manufacturer:

AllMaritim AS

Fagernes 4

5043 Bergen

Norway

Phone: +47 55 33 61 60

Fax: +47 55 33 61 61

Email: [post@allmaritim.com](mailto:post@allmaritim.com)

Website: [www.allmaritim.com](http://www.allmaritim.com)



Fig. 17 NorMar 200TI system

##### Description

The NorMar oil recovery and transfer system consists of two interchangeable skimmer heads: a weir skimmer and a high viscosity soft shovel skimmer cassette. The skimmer head is connected to the outer end of the floating umbilical. A dedicated power pack provides the necessary hydraulic supply. The system is a complete integrated unit with a built-in crane arm.

The materials are coated mild steel for the structure, seawater resistant aluminium for the skimmer frame and stainless steel for the hydraulic fittings. The system is all hydraulically operated, and therefore suited for deck operation during an oil spill.

Using two Desmi modified positive displacement Archimedes screw (PDAS) pumps in vertical design, type DOP-250 DUAL, the skimmer is able to efficiently recover light as well as heavy oil, also when mixed with debris normally found in oil spills.

The NorMar skimmer and hose handling system is designed to recover oil and oil emulsions with

medium to high viscosity from the sea surface under calm to rough weather conditions. The skimmer has two thrusters to secure the best recovery position in the floating containment boom. The thrusters are hydraulically driven and controlled from the remote-control box.

The NorMar double barrel free floating transfer hose is designed so that the hydraulic lines inside the transfer hose can easily be inspected or replaced without disturbing the floating transfer hose. The NorMar skimmer system is operated from an operator's platform located at the side of the unit. Each function is controlled by its own proportional valve. In addition to the manual operated proportional valves, the system is also remotely operated via an explosion proof remote control.

The NorMar skimmer is operational under the following weather conditions:

Wind:	15 m/sec
Waves:	up to 4 m
Max towing speed:	4 knots
Temperature air °C:	-40°C to + 50°C
Temperature sea °C:	-2°C to + 40°C

### 5.3.2. Skimmer modules: weir and brush

#### 5.3.3.

#### Weir skimmer

The NorMar weir skimmer is built into a protective frame made from seawater resistant aluminium, ensuring safe operation and low weight. The skimmer frame is equipped with two thrusters 15 hp each. The weir is built with a self-adjusting floating ring. The external skimmer floats can easily be removed for storage, or for hook up of the heavy oil shovel brush cassette. Two Desmi pumps are included in the weir skimmer module (see description in 5.3.3).

Technical specifications	
Length:	2000 mm
Width:	2000 mm
Height:	1500 mm
Weight:	350 kg



Fig. 18 Weir skimmer head

### Brush skimmer

The NorMar brush/disc skimmer is designed to recover oil with viscosities ranging from light to heavy oil. The cassette is equipped with four Archimedes screw soft shovels on all sides giving heavy oil recovery capacities up to 200 m<sup>3</sup>/h. The skimmer is not sensitive to floating debris due to the inlet guard mounted in front of the soft shovel segments.

The skimmer is designed to be operational in 4 meter waves.

The main body comprises:

- Aluminium frame
- Transfer pumps (the brush skimmer head is placed on the same frame as the weir skimmer fitted with the two Desmi pumps, see 5.3.3.)
- Oil sump
- 4" flange coupling for connection to transfer hose
- 4 floats – as an integrated part of the skimmer body
- 4 soft shovel units, each with a max. capacity of 50 m<sup>3</sup>/h

Technical specifications	
Length:	1914 mm
Width:	1914 mm
Height:	1006 mm
Weight:	280 kg



Fig. 19 Brush skimmer head

**5.3.4. Desmi DOP-250 dual PDAS pump**  
**5.3.5.**

**Manufacturer:**

Ro-Clean Desmi A/S  
Hestehaven 21 B  
DK-5260 Odense S  
Denmark  
Phone: +45 6591 0201

Fax: +45 6590 8877  
Email: [info@ro-cleandesmi.com](mailto:info@ro-cleandesmi.com)

Website: [www.desmi.com/ro-cleandesmi](http://www.desmi.com/ro-cleandesmi)



Fig. 20 Desmi DOP-250 dual PDAS pump

**Description**

The NorMar skimmer incorporates two Desmi DOP-250 pumps which deliver a maximum capacity of 200 m<sup>3</sup>/h and can develop discharge pressures up to 10 bar while maintaining nearly maximum flow. Two of these pumps are installed in the common weir/brush skimmer frame.

The Desmi DOP-250 DUAL is in its basic design a modified Archimedes' screw pump. Inside the Desmi DOP-250 DUAL pump the pressure is built up between the screw and the engaging plate wheel. In order to withstand this pressure and the wear caused by abrasive media, the plate wheel is specially designed: a high-tensile steel core carries easily replaceable sectional discs of polyethylene.

Each pump is fitted with a cutting knife that will handle many types of trash found in oil spills.

Technical specifications	
Length:	720 mm
Width:	390 mm
Height:	670 mm
Weight:	78 kg
Max. pressure:	10 bar
Max. capacity:	100 m <sup>3</sup> /h
Viscosity range:	1 to > 1 million cSt
Material specifications	
Screw:	Double-curved Archimedes' screw in cast stainless steel (Ni-Resist), machined in a 5-axis CNC centre.
Casing:	Casing in seawater resistant aluminium, cast iron, or stainless steel. Standard is aluminium. Replaceable polyethylene sealing ring.
Hydraulic system	
Prime mover:	Danfoss hydraulic motor, type OMTS 160

Max. speed:	800 rpm continuously
Max. input power:	47 kW continuously
Max. output power:	38 kW continuously
Max. oil flow:	160 l/min. continuously
Max. inlet pressure:	210 bar continuously
<b>Hydraulic connections</b>	
Pressure line:	3/4" - 1" quick coupling male
Return line:	3/4" - 1" quick coupling male
Drain line:	3/8" quick coupling male

### 5.3.6. Diesel hydraulic power pack 110 kW

The power pack is mounted on the lower foundation of the storage and handling system. The base frame, the tank and the panel are all made from seawater resistant aluminium.



Fig. 21 Diesel-hydraulic power pack

<b>Technical specifications</b>	
Diesel Engine:	Perkins 4 cylinder in-line, or equal. Radiator cooled
Rating:	110 kW at 2400 rpm
Operational area:	Zone II
Length:	2250 mm
Width:	1020 mm
Height:	1420 mm
Weight:	1250 kg (full tanks)
Starting:	Hydraulic starter with accumulator

Exhaust:	Combined silencer/ Spark catcher
Hydraulic pump:	Variable axial piston pump – constant pressure
Hydraulic working pressure:	210 bar
Adjustable pressure:	0-600 bar
Oil flow:	260 l/min
Hydraulic cooler:	Radiator type
Controllers:	Instruments and controllers for both the diesel engine and the hydraulic system are assembled on a common panel
Safety control system	<p>Overload protection by pressure relief valve.</p> <p>Emergency shut-down:</p> <ul style="list-style-type: none"> <li>- Low hydraulic oil level</li> <li>- High hydraulic oil temperature</li> <li>- High engine temperature</li> <li>- Low lubricating oil temperature</li> <li>- Over-speed</li> </ul>
Hydraulic oil tank:	200 litres with sight glass and return filter
Fuel tank:	<p>Built in tank for 6-hour operation.</p> <p>Quick coupling for connection of external fuel supply.</p>

### 5.3.7. Hydraulically driven reel with 360° turntable and integrated crane

The hose reel is designed for storage of 50 meters of Noren 5" floating hose. The reel is hydraulically driven for launching and retrieval of the floating hose and skimmer unit. The hose reel is built together with a crane arm (A-frame) to allow handling and deployment of the skimmer heads over the side of a ship or other barriers.

The crane arm is equipped with an automatic spooling device. The hose reel and crane arm is mounted on a common foundation allowing for 360° rotation. The system is mounted on a common foundation with 20 ft. container footprint with twist locks in each corner.



Fig. 22 NorMar reel

The crane is an integrated part of the hose handling reel, has a capacity of 6 tons and an outreach of 5.5 meters. All hydraulic connections are done via swivel arrangement at the base of the turntable as an integrated part of the unit.

Technical specifications (NorMar TI hose handling system)	
Length:	6058 mm
Width:	2480 mm (2965 mm incl. operator platform)
Height:	2768 mm in stored position (3878 in operation)
Weight:	8000 kg (including crane arm and floating hose)

### 5.3.8. Remote and local control

#### Manufacturer:

Cavotec Micro-control AS

Gevinglia 112

NO-7517, Hell, Norway

Phone: +47 74 83 98 60 - Fax: +47 74 83 01 50

Email: [microcontrol@cavotec.com](mailto:microcontrol@cavotec.com) Website: [www.cavotec.com](http://www.cavotec.com)



Fig. 23 Cavotec remote control

#### Description

The MC-3-series system mainly consists of the following parts:

- Terminal
- Carrying belt/strap
- Rechargeable batteries
- Base unit
- Antenna

All the skimmer's hydraulic functions are remotely operated by radio. A 20 meters cable also connects the terminal to the base unit.

Technical specifications	
Control unit:	MC-3000-Ex
Operational area:	Zone II
Frequency range:	418-474 MHz
Max. operating distance:	200 m
Transmitter weight:	2.2 kg
Transmitter size:	305 x 200 x 190 mm
Control valves:	Danfoss PVG 120-32/9, 24 V 4 – 20 mA
Power supply:	220 V, 50/60 hz

### 5.3.9. Umbilical hose (including hydraulic and oil hoses)

#### 5.3.10.

The NorMar floating umbilical is made as a double barrel umbilical, where replaceable hydraulic lines are in one barrel, and the recovered oil is pumped through the other barrel. A water injection flange is mounted close to the connection between the skimmer head pump flange and the floating umbilical flange for lubrication and friction reduction in the transfer hose during recovery of heavy oils.



Fig. 24 Floating umbilical

#### Complete floating hose components:

##### Oil hose:

Ø 5" x 2 x 50 meter Bunkerflex ST cargo hose with 2 x ND 125 NP 16 flanges and termination plates for service hoses

##### Hydraulic hoses:

Ø 3/4" x 50 m hydraulic pressure hose

Ø 1" x 50 m hydraulic return hose

4 x Ø 1/2" x 50 m hydraulic hose for operation of 2 thrusters

Ø 1/2" x 50 m multipurpose hydraulic hose, to be used depending on the equipment configuration.

All hydraulic hoses are industry standard. All hydraulic couplings and fittings are in AISI 316 stainless steel.

Technical specifications (Noren floating hose)	
Length:	50000 mm
Height:	200 mm

Width:	350 mm
Weight:	26 kg/m
Min. bending radius:	620 mm
Outer layer (skin):	Neoprene 483
Nominal pull strength:	3300 kp
Max. pull strength:	6500 kp
Pressure class:	Working pressure 17 bar
	Burst pressure 52 bar

#### **5.3.11 Tool box**

One tool kit is included.

#### **5.3.12 Spare parts**

A box with spare parts is provided.

## 5.4. Discharging

See 5.1.3 & 5.1.4

## 5.5. Sampling & testing oil products

The system comprises the following parts:

5.5.1 & 5.5.2 Sampling/test kit Zematra-Minilab with densi- and viscosimeter

5.5.3 Flash point tester Petrotest PMA-4

### 5.5.1 Sampling/test kit Zematra-Minilab with densi- and viscosimeter

#### 5.5.2

#### Manufacturer:

Zematra BV,

Steenspil 28,

4661 TZ, Halsteren,

The Netherlands

Phone: +31 (0)164 687770

Fax: +31 (0)164 680512

Website: [www.zematra-marine.com](http://www.zematra-marine.com)



Fig. 25 Zematra Minilab

#### Description

With the Mini-lab it is possible to measure the following parameters from an oil sample:

##### Density

Zematra manufactures a density unit which is fully in accordance with the specifications as mentioned in ASTM D1298 and IP 160. The sample is poured into a density tube and this tube is then placed in a thermostatic controlled heater column to heat up the sample to 50°C.

After checking the temperature, a hydrometer is placed in the sample. Together with the hydrometer reading and a graph, the density of the sample (fuel oil or lube oil) at 15°C can be determined.

##### Pour point

The portable Pour Point Test Kit allows determining the pour point (no-flow point) of oils and oil products by means of a simple but reliable kit of tubes, thermometer and coolant.

##### Water in Oil Test

This test kit enables you to determine the percentage of water in the lube oil/fuel oil. The test is performed by means of the "Calcium Hydride Pressure Test vessel Method". The value obtained can be used as a check on the lube oil separator, any water leakages and operation contamination. With the basic kit approx. 50 tests can be done.

##### Salt in Water Test

Following the water test kit, Zematra has also developed a so-called "Nature Of Water" test. This is a method to determine fresh, brackish or salt nature of water.

##### Compatibility/Stability test

This compatibility/stability test is a modified version of the ASTM D4740-94 method. The test methods list two separate procedures for predicting stability of residual fuel oil and the compatibility of residual fuel oil with a blend stock.

### Zematra TBN (Alkalinity) Test

This test kit is specially developed to check the TBN value (alkalinity) of the engine's lubricating oil. The test is performed by means of a pressure test vessel. With the basic kit approximately 50 tests can be done.

### Viscosity meter by falling sphere method

The Zematra Mini-lab provides a simple way to determine the dynamic viscosity of the fuel. The operator only has to fill the tube for 3/4, add the calibrated (seize) stainless steel ball and top up with the fuel, allow the ball to reach the lower end, turn the meter upside down and measure the time that the ball (sphere) will take to reach the lower end of the calibrated distance and finally multiply the measured time with the given calibration factor and the viscosity in centiPoise is thus found.



Fig. 26 Marine fuel viscometer

Content of the test kit		
Test	Description	Qty
Density	Thermally controlled density heater	1
	Thermometer, ASTM 12C	1
	ASTM Hydrometers in steps of 50	4
	Glass insert	1
	Density heater	1
Pour Point	Conical tube	1
	Test tube with cork	1
	Thermometer 5C	1
	Coolant aerosol	1
Stability	Chromatographic paper, box of 100	1
	Holder for filter paper	1
	Magnetic heater/stirrer	1
	Conical bottle	1
	PTFE/Aluminium oven	1
	Pair of tweezers	1
	Magnets 30x6 mm	2
	Reference spot sheet ASTM D4740	1
	Electrical digital thermometer	1
Water	Reaction vessel complete	1
	Water free diluent	1
	Water test solution, 50 ml	1
Salt	Box of Quantab strips	12
	Separation funnel	1
	Distilled water, 50 ml	1
	Reagent DG, 10 ml	1
	Glass vials	2

<i>Alkalinity(TBN)</i>	Reaction vessel complete	1
	TBN test solution, 500 ml	1
	Magnetic stirrer	1
	Magnets	2
<i>Insoluble Test</i>	Filter paper A4	20
	Perforated template	1
<i>Viscosity</i>	Marine fuel viscometer	1

### 5.5.3 Flash point tester Petrotest PMA-4

#### Manufacturer:

Petrotest Instruments GmbH & Co. KG

Ludwig-Erhard-Ring 13 ·

15827 Dahlewitz

Germany·

Tel.: +49 (0) 33708 56 300

Fax: +49 (0) 33708 56 556

Website: [www.petrotest.com](http://www.petrotest.com)

Email: [info@petrotest.com](mailto:info@petrotest.com)



Fig. 27 Petrotest PM4

#### Description

The Petrotest PMA4 flash-point tester is intended to determinate the flash-point of petroleum products using the Pensky-Martens closed cup flash point test. In this test a brass test cup is filled with a sample of oil that is heated and stirred at specified rates. An ignition source is directed into the cup at regular intervals with simultaneous interruption of stirring until a flash that spreads throughout the inside of the cup is seen. The corresponding temperature is its flash point.

The Petrotest device defines the flash point automatically, all the operator has to do is insert the filled test cup complete with the lid and multi detector, swing the multifunction head into test position, select one of the test methods and set the expected flash-point. All the connections are carried out automatically including the coupling of the stirring motor. The operator of the PMA 4 has the choice to either apply a gas flame or an electrical ignite for each flash test, as the PMA 4 is equipped with both as a standard feature.

The Petrotest PMA4 is manufactured in a high-grade stainless steel housing with two-colour powder coating, touch-key panel and large LC-display, swivel-mounted multi-function-head (One-Twist), two RS232-interfaces for data printer and computer connection, different test-programs, data-transfer and software upgrading through bi-directional interface, automatic barometric pressure correction, automatic overheat protection, power controlled/monitored electric igniter, gas igniter with auto-relighting and safety shut-off and re-cooling fan.

The device is provided with the PC software "PMANet", compatible with OS Windows, for easy handling and storing of data, as well as for program transfer from the PC memory into the PMA4.

The equipment is supplied with:

- 1 cup "PM"
- 1 cover "PM"
- 1 multi-detector "PM"
- 1 gas igniter
- 1 electric igniter
- 1 tong for cup
- 1 tray for cup and multi-detector
- 1 stirrer coupling
- 1 PC software "PMANet"



Fig. 28 Cup and cover



Fig. 29 Gas and electric igniteers

#### Technical Specifications Petrotest PMA-4

Scope:	
Flash-point determination of petroleum products using the Pensky-Martens Method	
Method A: for distillate fuels (diesel, kerosene, heating oil, turbine fuels), new lubricating oils, paints vanishes and other homogeneous liquids.	
Method B: for residual fuel oils, cutback residual, used lubricating oils, non-homogeneous materials like mixtures of petroleum liquids & solids, surface-film building petroleum liquids or liquids with a viscosity above 5.5 cSt at +40°C. Used in shipping & safety regulations to define flammable and combustible materials.	
Temperature Range	
PMA & Sampler:	Approximately +40 to +360 °C
PMA & Chilled	Below +40 to +360 °C
Programs:	(acc. to international standards)
	4x ASTM-Standards
	4x ISO-Standards
	2x Rapid-Heating

	2x Search Run
	2x User Defined
Ignition type:	Gas and electric
Stirring speeds:	60 to 250 rpm (adjustable)
Sensing system:	Differential - thermocouple method
Barometric pressure:	Automatic correction of the measured values
Safety:	Overheat protection, automatic shut-off
Hardware Clock:	Included
Gas Connection:	For propane/butane or natural gas (max. 0.05 bar)
Interface:	RS-232 for printer, RS-232 for computer download
Display:	°C or °F (selectable), large LCD
Dimensions (WxDxH):	
PMA & Sampler:	650 x 470 x 650 mm, weight: 35 kg
PMA & Chilled	1000 x 470 x 650 mm, weight: 66 kg
Power Consumption	Approx. 900 Watts
Power Supply:	230/115 V, 50/60 Hz (selectable)

## 5.6 Communications equipment

### 5.6.1 & 5.6.2 VHF Tranceiver – Jotron – Tron Air

#### Manufacturer:

Jotron AS

P.O.Box 54

3281 Tjodalyng

Norway

Phone: +47 33 13 97 00

Fax: +47 33 12 67 80

Website: [www.jotron.com](http://www.jotron.com)

Email: [sales@jotron.com](mailto:sales@jotron.com)



Fig. 30 Jotron Tron Air

#### Description

The portable VHF air band Jotron Tron Air is a battery operated 200 mW carrier AM transceiver for the VHF air band (118-137 MHz) covering the two frequencies 121.5 MHz and 123.1 MHz. The unit is specially designed and manufactured as emergency two-way transceiver.

The Tron Air comes with a housing made of rough glass and meets the requirements encountered under severe maritime conditions. The equipment is designed to comply with MED 96/98/EC for Maritime VHF distress radio equipment operating on aeronautical frequencies.

The Tron Air is waterproof to a depth of 1 meter for 5 minutes. When the battery pack X-98806 is used, the Tron Air also floats in case of accidental drop into water. The Tron Air is designed to withstand a drop from 1 meter onto a hard surface and is also resistant to seawater, oil and sunlight.

Technical Specifications	
Frequency channels:	121.5 MHz and 123.1 MHz
Frequency stability:	+20 ppm
Modulation:	A3, 300 - 3000 Hz
SW version:	1.10
<b>Receiver</b>	
Sensitivity:	SINAD better than 12 dB for an input signal of 2µV pd (-101 dBm), 30%, 1kHz modulation, according to CCITT
IF selectivity:	-3 dB at +/- 7,5 kHz -70 dB at +/- 25 kHz
IF:	21.4 MHz and 455 kHz.
AGC:	<3 dB audio variation for input signal levels between -101 dBm and -20dBm
Intermodulation:	Two interfering signals of equal amplitude and at least 60 dB more than a desired signal giving 10 dB sinad and at a distance of 100 kHz from the operating frequency will not generate 3rd order intermodulation products, at the receiver output, larger than the desired signal
Radiated spurious	<0.25 nW

components:	
Squelch:	Noise squelch, center frequency 18.75 kHz $\pm$ 6.5 kHz. Adjustable and hysteresis less than 3 dB. Opening/closing < 50ms
S/N ratio:	>35 dB, 100 $\mu$ V, 1 kHz, 70% modulation depth
Audio response:	-3 to +1 dB rel to 1 kHz, 300-3000 Hz. -10dB at 100 Hz and -35 dB at 5 kHz
Audio outputs:	Loudspeaker: Min. 200 mW
Distortion:	Less than 10% with 70% modulation, 1mV input signal
Power supply:	Battery, 6.2 V-7.5 V
<b>Transmitter</b>	
Carrier power:	50-200 mW at 7.2 V battery supply
Distortion:	$\leq$ 10% THD at 85% mod. (AM)
S/N ratio:	$\geq$ 35 dB at 85% mod. (AM)
Frequency response:	300 - 3000 Hz -3 to +1 dB ref 1 kHz. -10 dB at 100 Hz and -35 dB at 5 kHz
Modulation:	Max. 85% AM
Harmonic emission:	Less or equal to 10 $\mu$ W
Spurious emission:	Less or equal to 10 $\mu$ W
Adjacent channel power:	Less or equal to -70 dB
<b>Environmental conditions</b>	
Operating temperature:	-20°C to + 55°C
Water resistant:	Capable of being immersed into water to a depth of 1m for 5 minutes
Environmental resistance:	Not affected by sea water, oil or exposure to sunlight
<b>Materials</b>	
Housing:	Polycarbonate
O-ring :	Rubber
Gaskets:	Silicone rubber
Antenna:	Conical helix, moulded in high gloss, flexible thermoplastic rubber
Dimensions (WxDxH):	70 mm x 50 mm x 195 mm (height without antenna and projections)
Weight:	Approximately 500 g
<b>Charger</b>	Tron CHARGE X-93080
	Jotron dual slot fast charger with trickle charging, wall and table mountable
Voltage:	12–24 DC, or 115/230 VAC with external mains adapter
Dimensions (WxDxH):	155 mm x 83 mm x 69 mm
Weight:	Approx. 300 g

## 5.7 Cleaning equipment

### Manufacturer:

Tecnomec Srl  
Via Canale, 114 - Villalunga  
42013 Casalgrande (Reggio Emilia)

Italy  
Phone: +39 0522 840805  
Fax: +39 0522 849962  
Website: [www.tecnomec.com](http://www.tecnomec.com)  
Email: [tecnomec@tecnomec.com](mailto:tecnomec@tecnomec.com)

### Description

The EURA 10/130 high pressure hot water cleaning machine is a compact professional cleaner, suitable for the daily jobs where an optimal washing power is needed in order to degrease with hot water binding surfaces and surfaces affected by smog, oils and limestone. The EURA is equipped with an external detergent intake device. This cleaner is built with high quality components and high-pressure pumps. The internal boiler can heat up to 11 l/min of water up to an adjustable temperature of 90°C.

### Description

- Axial pump with brass head and 3 ceramic pistons
- Professional pump and motor at 2800 rpm
- Maximum temperature thermostat
- Painted steel boiler
- Double coil
- Safety valve
- Self-extinguish ABS cover
- Low pressure detergent intake



Fig. 31 Eura 10/130 high-pressure cleaning machine

Technical specifications	
Model:	Eura 10/130
Max. pressure:	130 bar.
Capacity:	600 l/h
Motor Power:	3 HP/2.2 kW
Volt:	230 V/50 Hz

Pump:	(Mec -Pump) HS
Hose:	8 mt. R1
Lance:	120 cm.
Dimensions:	90 x 70 x 86 cm (LxWxH)
Weight:	86 kg (net)
	97 kg (with packaging)
R.P.M:	2800