

**Annex V of the VAC**  
**Technical Specifications for the equipment and dispersants**  
**(Lot 1 - Adriatic Sea)**

**Procurement procedure:** EMSA/CPNEG/1/2019

**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 and dispersants 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**

The oil pollution response 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) KOSEQ Rigid Sweeping Arms (2 x 15 m)
- 2) VIKOMA Booms Hi-sprint 2000 (2 x 250m)
- 3) High-capacity Skimmer Lamor LWS 1300 (LUT 90)
- 4) Slick Detection System MIROS
- 5) Cleaning equipment (hi-pressure cleaning machines)
- 6) Sampling/testing and communication equipment (minilab, flash point tester, gas detector, interface detector, VHF's)

All tenderers will have the opportunity to visually verify the condition of equipment items listed from 1-6 above in the stockpile in Ravenna, Italy, at request. In principle the visit will be organized in week 28. The visit details will be arranged with the requesting tenderer.

The following technical issues regarding the transferred equipment occurred in the past during the previous contract implementation:

- June 2014: During the acceptance drill one of the booms suffered a tear in the skirt measuring approximately 2m in length. The boom was repaired by the manufacturer and no other issues were encountered since then.
- July 2016: During the quarterly drill, one of the seeping arms pumps did not work. Pump was repaired and no other problems were encountered since then.

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

The equipment that will be transferred to the Contractor was purchased between 2012 and 2015 except the oil slick detection system that was purchased in 2008 and upgraded in 2015. At the moment of transfer the age of the equipment will vary from 4 to 7 years, with some components of the oil slick detection system being 11 years old. 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.

Taking into account that during the new contractual period (4+4 years), 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. KOSEQ Rigid Sweeping Arms (2 x 15 m)
2. VIKOMA Booms Hi-sprint 2000 (2 x 250m)
3. High-capacity Skimmer Lamor LWS 1300 (LUT 90)
4. Sampling/testing equipment, (minilab, flash point tester, gas detector, interface detector)

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 sweeping arms/free floating 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 Slick Detection System must be upgraded and updated. The tenderer has to check with the manufacturer (the relevant contact address is provided in Section 5, point 5.4) or an authorised representative whether the existing radar and antenna on board the vessel are compatible with the slick detection system provided by EMSA. In case of incompatibility, then new items must be purchased. The tenderer should foresee the necessary space in the bridge to install it.  
The system must be upgraded regularly throughout the duration of the contract.
3. Dispersant application system, tank container(s) and loading system
  - 2.1 Dispersant application system – to allow dispersant application on the oil polluted sea surface.

2.2 Tank container(s) with a total minimum capacity of 30 m<sup>3</sup> (more capacity will be evaluated higher). These containers are to be filled with dispersant and installed on deck using the existing foundations of the pollution response equipment.

2.3 Loading system – to allow transfer of dispersant from IBC's to the tank containers.

This equipment will be covered by the 1 Euro call option under article IV.4.2 of the VAC.

The EMSA requirements for this equipment are described below. The Contractor will have to consider those requirements to ensure the most adequate adaptation of the equipment to the vessel.

#### 2.1 Dispersant application system

Located on the bow of the vessel, and before the bow wave, the dispersant application system consists of two rigid spray booms, one for each side of the vessel. The spray booms need to be close to the water surface to apply the dispersant effectively to the oil slick. With a bow height of more than five meters it must be possible to lower the spray booms either mechanically/electrically/hydraulically with support beams from the forecastle/main deck to the oil slick. The spray booms are to be positioned in a 90 degree angle to the vessels side. The system should be designed for spraying neat dispersant to oil spills at the sea. The spray booms and the support beams shall be made from stainless steel or aluminium. The nozzles shall be made of non-corrosive material. In order to make the system explosion proof, all electrical parts must be certified for the use in explosive area or to be installed in a safe area. All functions of the system are to be operated by a control cabinet with a remote control panel.

The dispersant application system shall be in line with the below requirements:

- 2 spray booms (minimum length of each one should be 8m);
- the dispersant spraying nozzles shall be of flat jet type with a spray angle adequate to spray evenly the sea surface under the arm. The number of nozzles should be in line with the spray angle to cover the whole length of the spray boom and ensure an even spray pattern;
- the system shall be equipped with strainers and filters to avoid solids clogging the nozzles;
- the spray boom distance from the water shall be easily regulated. The support beams are to be equipped with a suitable installation to lower the spray booms (either mechanically/hydraulically/ electrically);
- the system should have a wide flow adjustment, minimum range to cover from 3 to 7 m<sup>3</sup> per hour, to allow the treatment of different types of oil and variable thickness of the oil layer without modifying the vessel speed;
- dosage control or rate of use should be easily regulated from a control desk equipped with controls for manual adjustment and total flow display. In addition, a remote control panel for the main functions shall be delivered;
- the system shall contain two self-priming pumps for the transfer of the dispersant to the spray booms (or an air ejector fitted in the line) to allow redundancy of the system. Electric pumps may be placed in a non-hazardous safe area or explosion proof pumps may be placed in Zone I, water driven pumps may be placed on deck;
- a flushing and testing connection for water shall be installed at the pump inlet and a check valve shall be fitted at the pump outlet;
- the parts of the equipment are to be designed not to be too heavy for manual handling;
- all necessary hoses and connectors shall be included in the system;
- transport, commissioning and training is also requested to be included in the bid.

Ideally the system should be welded in the forecastle. However, the option of bolting it with clams to the structure is also a possibility.

The system can be stored on board if there is space on the forward part or in another place on deck where the system could be stored properly protected against wave impact while sailing. However, since the dispersant will be loaded on the vessel only if requested in a pollution incident, the equipment can also be stored in the warehouse.

The Contractor shall ensure that the supplier of the dispersant application system on board the vessel provides a detailed operational manual for the use of the equipment, which shall include as a minimum the following information:

- Installation and setting-up of the equipment;
- Equipment testing procedures prior to commencing operations;
- Detailed information on the equipment's spraying capabilities and limitations (neat and/or diluted dispersant, flow rate(s), pumping pressure(s), possibility of regulating pressure and/or flow rate, droplet size of sprayed particles, swath width, etc.);
- Correct operation of each of the system's components;
- Recommended vessel speed(s) while spraying;
- Recommended boom height from water surface;
- Description of system errors/faults and procedures to fix/override them;
- Equipment cleaning/flushing after use;
- Maintenance.

## 2.2 Tank container(s)

The dispersant is to be stored temporarily on the vessel in ISO tank container(s), certified for maritime transport, with standard 20' and/or 10' footprint.

The tank container(s) are to be placed on the foundations of the equipment for oil pollution response (e.g. boom reels, skimmer) with the exception of the sweeping arms system and ancillary equipment which should remain on board as mechanical recovery option. Where the foundations are not 10' or 20' ISO standard size an adaptation frame shall be fabricated and included as part of the pre-fitting works.

The tank container(s) are to be designed to enable the storage of the maximum amount possible of dispersant considering the different foundations on deck.

The ship stability must allow sailing with containers which are only partly loaded (e.g. if weight of the foundations does not allow to fully load the container(s) or due to operational reasons). If this is an issue special tank containers with wash plates could be considered.

The exterior of the tank containers should to be coated with marine quality paint to prevent corrosion. In case of outdoor storage the empty containers have to be covered with protective canvas.

The interior of the tank containers shall be adequate for the storage of dispersants (i.e. stainless steel or other option).

## 2.3 Loading system

The dispersant provided by EMSA will be delivered in standard IBC containers for the storage in the warehouse. In case of a vessel mobilisation for the dispersant spraying service, the contents of the IBC containers need to be transferred into the tank containers. This operation can be performed at the warehouse (full tank containers then transported and loaded on the vessel) or at the pier (transferring directly from the IBCs into the empty tank containers installed on-board the vessel). The Contractor has to purchase the necessary equipment to

be able to perform the operation within the mobilisation time-window and to foresee the necessary arrangements to transfer the dispersant on board the vessel.

The system should as a minimum comprise the following items:

- two pumps to fill two tank containers simultaneously; sufficient amount of hoses with compatible connectors for the IBCs and the tank containers;
  - manifolds to connect several IBC's to the pumps;
  - suitable spill kit to collect accidentally spilled dispersant (for example sorbents and drip trays).
4. 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 container(s). 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.

5. 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 or dispersant spraying with the option to display the alternate system (sweeping arms, boom/skimmer or dispersant spraying system). 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. Dispersants transferred**

The dispersants that the Agency will transfer are stored in Intermediate Bulk Containers (IBCs) of 1 m<sup>3</sup> capacity each (weighing approximately one ton).

The quantity of dispersant to be transferred by EMSA and stored is 200 tons (226 IBCs with dispersants plus 10 empty IBCs, total 236 IBCs).

Detailed information regarding dispersants is contained in point 6 of this document.

## **3. Handover procedure for equipment and dispersants transferred**

The conditions of handover, transportation, storage and insurance of the equipment and dispersants 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.

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

### **3.1. 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 and the dispersants described in point 2 above will be made available for handover and ready for transportation at their storage location in Ravenna (Italy). The handover shall take place after the signature of the contract (e.g. December 2019) and will be mutually agreed by EMSA and the Contractor.

On the handover dates, the Contractor representative shall be present and verify the delivery of the equipment and dispersants 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 and dispersants. By signing the delivery/receipt statement on the handover date, the Contractor representative accepts the equipment and dispersants in its current condition.

### **3.2. Transportation**

The Contractor shall bear all risks involved in transporting (including loading and unloading) for the items listed in point 1.1 and dispersants described in point 2 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 and dispersants 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 and dispersants purchase. Accordingly, the tenderer shall include in its financial offer the estimated transportation costs for the oil pollution response equipment and dispersants.

### **3.3. Storage and insurance**

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

For the purpose of taking out the full risk insurance policy covering the transferred oil pollution response equipment items and dispersants, the value shall be the purchase value as described under in the tables in points 5 and 6 below.

## **4. Use of the oil pollution response equipment and dispersant application system**

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) + Lamor high-capacity skimmer system,
- the oil slick detection system,
- other equipment (minilab, flashpoint tester, etc.)

and their relevant power packs and ancillaries.

This configuration must be tested during three quarterly drills.

**or**

- the sweeping arm system,
- the dispersant application system (including tank container(s) with capacity for dispersant of min. 30 m<sup>3</sup>),
- the oil slick detection system,
- other equipment (minilab, flashpoint tester, etc.)

and their relevant power packs and ancillaries.

This configuration must be tested during one quarterly drill with a minimum one tank container installed on deck.

The tenderer may offer a different proposal to that described above with equivalent performance adapted to the vessel configuration. Such equivalence will be duly justified and motivated.



## 5. List of transferred equipment and description

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.1	<b>Koseq Sweeping Arm (2 x 15m)</b>  Value for insurance: 1,146,442 EUR	5.1.1	Frame	Koseq 15 M. Rigid Sweeping Arm With Foldable End	CCEM362203 or 0328	25/07/2012
			Frame	Koseq 15 M. Rigid Sweeping Arm With Foldable End	CCEM362204 or 0329	
		5.1.2	Weir Module	Weir Skimmer Cassette With Movable Debris Screen	CCEM36314401 or 0330	
			Weir Module	Weir Skimmer Cassette With Movable Debris Screen	CCEM36314402 or 0331	
		5.1.3	Brush Module	Brush Skimmer Cassette With Movable Debris Screen	CCEM36310701 or 0332	
			Brush Module	Brush Skimmer Cassette With Movable Debris Screen	CCEM36310702 or 0333	
		5.1.4	Pump	Mariflex Msp150-63 Screw / Centrifugal Pump, 300 M3/H	CCEM283203 or 0334	
			Pump	Mariflex Msp150-63 Screw / Centrifugal Pump, 300 M3/H	CCEM283204 or 0335	
		5.1.5	Pump	Pdas Pump Desmi Dop 250, 125 M3/H	CCEM283205 or 0336	
			Pump	Pdas Pump Desmi Dop 250, 125 M3/H	CCEM283206 or 0337	
		5.1.6	Crane	Sweeping Arm Crane Including Ancillaries	CCEM131503 or 0340	
			Crane	Sweeping Arm Crane Including Ancillaries	CCEM131504 or 0341	
		5.1.7	Control Desk	Hydraulic Control Desk	CCEM135001 or 0342	
			Control Desk	Hydraulic Control Desk	CCEM135002 or 0343	

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.1	<b>Koseq Sweeping Arm (2 x 15m) continuation</b>	5.1.8	Power Pack	Daewoo Pwpk, Zone 2, 125 Kw	CCEM272203 or 0344	25/07/2012
			Power Pack	Daewoo Pwpk, Zone 2, 125 Kw	CCEM272204 or 0346	
		5.1.9	Hydraulic Hoses	3x20m Hydr Hoses From Pwpk To Crane Pedestal	CCEM223803 or 0350	
			Hydraulic Hoses	3x4m Hydr Return Hoses	CCEM223804 or 0351	
			Hydraulic Hoses	9x10m Or 12m Hydr Hoses For Weir And Brush Skimmer	CCEM223805 or 0352	
			Hydraulic Hoses	3x20m Hydr Hoses From Pwpk To Crane Pedestal	CCEM223806 or 0353	
			Hydraulic Hoses	3x4m Hydr Return Hoses	CCEM223807 or 0354	
			Hydraulic Hoses	9x10m Or 12m Hydr Hoses For Weir And Brush Skimmer	CCEM223808 or 0355	
		5.1.10	Oil Hoses	2x10m OIL HOSES 6" WITH CAMLOCK + 2 ADAPRORS 6" TO 8"	CCEM263813 or 0338	
			Oil Hoses	2x10m OIL HOSES 6" WITH CAMLOCK + 2 ADAPRORS 6" TO 8"	CCEM263814 or 0339	
			Oil Hoses	8 x 8m Oil Hoses, Lay flat, 6"	1862	
			Oil Hoses	2 x 30m Oil Hoses, Lay flat, 38mm	1863	
		5.1.11	Spare Parts	Spare Parts For Pwpk, Crane, Sweep Arm And Skimmer Modules	CCEM343103 or 0348	
			Spare Parts	Spare Parts For Pwpk, Crane, Sweep Arm And Skimmer Modules	CCEM343104 or 0349	

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.2	<b>VIKOMA Booms Hi-Sprint 2000 (2 x 250m)</b>  Value for insurance: 268,598 EUR	5.2.1	Segment	Vikoma Hi-Sprint 2000, 250m, with ASTM connectors and MK12 Valves	<b>1836</b>	14/08/2014
			Segment	Vikoma Hi-Sprint 2000, 250m, with ASTM connectors and MK12 Valves	<b>1837</b>	
		5.2.2	Storage reel	Vikoma 600	<b>1834</b>	
			Storage reel	Vikoma 600	<b>1835</b>	
		5.2.3	Air blower	Airpack inflator (hand start) with spark arrestor and auto shutdown valve	<b>1844</b>	
			Air blower	Airpack inflator (hand start) with spark arrestor and auto shutdown valve	<b>1845</b>	
			Air blower ancillaries	Deflator kit with adaptor for MK 12 valves	<b>1846</b>	
			Air blower ancillaries	Deflator kit with adaptor for MK 12 valves	<b>1847</b>	
			Air hose(s)	Air hoses 76 mm	<b>1841</b>	
		5.2.4	Towing lines set	Tow ropes (220 m x 32 mm)	<b>1838</b>	
			Towing bridles set	Towing bridles	<b>1839</b>	
			Towing bridles set	Towing bridles	<b>1840</b>	
			Towing cross bridle	Boom bridging piece (for open U formation)	<b>1843</b>	
		5.2.5	Cover	Overall weather cover for the boom reel	<b>1848</b>	
			Cover	Overall weather cover for the boom reel	<b>1849</b>	
			Cover	Overall weather cover for airpack inflator	<b>1850</b>	
			Cover	Overall weather cover for airpack inflator	<b>1851</b>	
		5.2.6	Ancillaries	Reel - floor protection material	<b>1842</b>	
			Ancillaries	Twist locks	<b>1854</b>	

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.3	<b>LAMOR High Capacity Skimmer LWS 1300</b>  Value for insurance: 1,126,130 EUR	5.3.1	Storage reel with umbilical hose	Lamor, HC LWS 1300, Umbilical Hose reel LUT 90 with telescopic crane arm on a 20' flat rack	1890	16/01/2015
				LUH, 9 ch, 80 m, 6"	1891	
		5.3.2	Weir module	Lamor, HC LWS 1300, MK II	1897	
			Brush module	Removable debris grade for LMW 1300 MK II	1906	
				Brush adaptor with removable debris grade for LWS 1300 MK II	1907	
				Brush adaptor with removable debris grade for LWS 1300 MK II	1908	
				Brush adaptor with removable debris grade for LWS 1300 MK II	1909	
		5.3.3	Pumps	MSP 150, CENTRIFUGAL	1899	
				GT A 140, PDAS (sn: 1400315)	1900	
				GT A 140, PDAS (sn: 1400299)	1901	
			Water injection flange	For MSP 150	1902	
				For GT A 140	1903	
				For GT A 140	1904	

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.3	<b>LAMOR High Capacity Skimmer LWS 1300</b>  <i>(continuation)</i>	5.3.4	Flow meter	Flow meter with stand	1894	
				Flow meter camlock	1905	
		5.3.5	Cover	Canvas	1895	
		5.3.6	Remote control	Remote Control	1896	
		5.3.7	Power pack	Marflex, DHP-200B, 126 kw, Ex-zone II	1912	
		5.3.8	Hoses	Oil hose, rigid, rubber, 10 m	1892	
				Oil hose, rigid, rubber, 10 m	1893	
				Set of hydraulic hoses	1910	
		5.3.9	Spare parts and ancillaries	Set for LWS 1300 MK II	1911	
				Documentation and Operational Manuals	1953	
		5.3.10	Spare pumps	Lamor, GT A 115, to be used as spare or for transfer/discharging (sn: 1150391)	1936	
				Lamor, GT A 115, to be used as spare or for transfer/discharging (sn: 1150374)	1937	

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.4	<b>Slick detection MIROS</b>  Value for insurance: 150,969 EUR	5.4.1	Computer	Miros, WAVEX OSD SYSTEM	DFHJ201001 or 0712	11/07/2008
			Monitor	DISPLAY 19" RACK	DFHJ202701 or 0713	
		5.4.2	Radar	RADAR FURUNO FR2117BB	DFHJ143301 or 0714	
		5.4.3	Antenna	ANTENNA - 8 feet	DFHJ140301 or 0715	
		5.4.4	Ancillaries	WAVEX EM 129 VIDEO DIGITIZER	DFHJ020201 or 0716	
		5.4.5	Upgraded Computer	Hardware: one SM-145 IACS E10 type approved maritime computer for Wavex/OSD, with keyboard, tracker ball and 19" flat panel EN60945 type approved - one NMEA hardware interfaces to AIS, Gyro, GPS & Wind sensors integrated with computer	1950	16/01/2015
		5.4.6	Wind sensor	Hardware: one SM-134 Wind sensor Gill Wind observer with power and interface unit	1951	

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.5	<b>Cleaning</b>  Value for insurance: 22,736 EUR	5.5.1	Cleaning machine	High pressure, hot water, diesel Nilfisk Alto, Neptune 5-51DE	1875	14/08/2014
				High pressure, hot water, diesel Nilfisk Alto, Neptune 5-51DE	1876	
				High pressure, hot water, diesel Nilfisk Alto, Neptune 5-51DE	1877	

Ref. No	Category	No.	Item	Additional info	ID Code	First Delivery Date
5.6	<b>Sampling/testing and communication</b> Value for insurance: 27,817 EUR	5.6.1	UTI Oil/water interface	Ullage temp	1938	16/01/2015
		5.6.2	Mini lab	For oil viscosity and density	1939	
		5.6.3	Flash point tester	Setaflash series 3 closed cup	1940	
		5.6.4	Gas detector	Gas detector GX-2009B - portable	1941	
		5.6.5	VHF Portable	VHF VXA-220 Pilot VI Air Band H/H	1943	
				VHF VXA-220 Pilot VI Air Band H/H	1944	

## DESCRIPTION OF EQUIPMENT

### 5.1 Sweeping Arm System KOSEQ 15m

**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>  
**Purchase year:** 2012



Set of KOSEQ Sweeping Arm with Foldable Ends consists of:

- 5.1.1 2 Sweeping arm structures
- 5.1.2 2 Weir skimmer cassettes with movable debris screen
- 5.1.3 2 Brush skimmer cassettes with movable debris screen
- 5.1.4 2 Marflex MSP 150-63 Screw centrifugal pumps
- 5.1.5 2 Desmi DOP 250 PDAS pumps
- 5.1.6 2 Sweeping arm cranes
- 5.1.7 2 Hydraulic control desks
- 5.1.8 2 Power packs 125 KW
- 5.1.9 Hydraulic hoses
- 5.1.10 Oil hoses
- 5.1.11 Spare parts

#### 5.1.1 Sweeping arm structures

*(Length 15m, foldable end, including frame, collection chamber and debris screen)*



Fig.1 Rigid sweeping arm pontoon

The sweeping arm pontoons are made of 4 mm steel. The bridge section is of lattice structure and the boarding is of oil resistance PVC.

To reduce the foot print on deck, the end sections of the inner and outer pontoons are foldable. The rigid sweeping arms are placed upon supports, welded to the ship's deck.



On top of the supports ISO twist locks are welded for fixing the rigid sweeping arm to its supports.  
The sweeping arm structure includes the following parts:

a) INNERPONTOON 4 mm steel plating

- 1 x Foldable end with heavy steel hinges, stainless steel pin, bronze bushing, grease nipples and bronze fixing spindles
- 1 x Weir oil collection chamber, including guides, movable pump frame, movable debris screen, and port hole
- 2 x Hydraulic cylinders and hoses for moving the collection chamber and debris screen
- 1 x Boulder
- 3 x Rubber fenders
- 1 x Lifting lug
- 2 x Towing lugs
- 1 x Offshore rated PVC anti slip grating on top
- 1 x Yellow coating RAL 1016
- 1 x Inside preservation

b) OUTERPONTOON 4 mm steel plating

- 1 x Foldable end with heavy steel hinges, stainless steel pin, bronze bushing, grease nipples and bronze fixing spindles
- 1 x Manhole inspection cover
- 1 x Rubber fender
- 2 x Boulder
- 2 x Towing lugs
- 1 x Offshore rated PVC anti slip grating on top
- 1 x Yellow coating RAL 1016 (Paint schedule attached)
- 1 x Inside preservation

c) BRIDGE SECTION

- 1 x Water tight lattice square piping framing
- 2 x Integrated CATCHERS systems
- 9 x Pipe stanchions (106 cm high) with chain and fixings
- 6 x PVC oil resistant boarding 2000 x 114 mm fixed with all stainless steel bolts, rings and nuts
- 2 x PVC oil resistant boarding 2000 x 117 mm fixed with all stainless steel bolts, rings and nuts
- 1 x Offshore rated PVC anti slip grating on top
- 1 x Yellow coating RAL 1016 (Paint schedule attached)

d) TOWING BRIDLE

- 4 x Shackles, galvanized, SWL 3,25 Ton.
- 2 x Chain, galvanized, diameter 16 mm, length 1,1 meter
- 4 x Shackles, galvanized, SWL 4,5 Ton.
- 1 x Steel cable, diameter 16mm, length 8,2 meter
- 1 x Chain, galvanized, diameter 16 mm, length 2 meter
- 1 x Steel cable, diameter 16 mm, length 4,9 meter
- 1 x Shackle, galvanized, SWL 8,5 Ton.

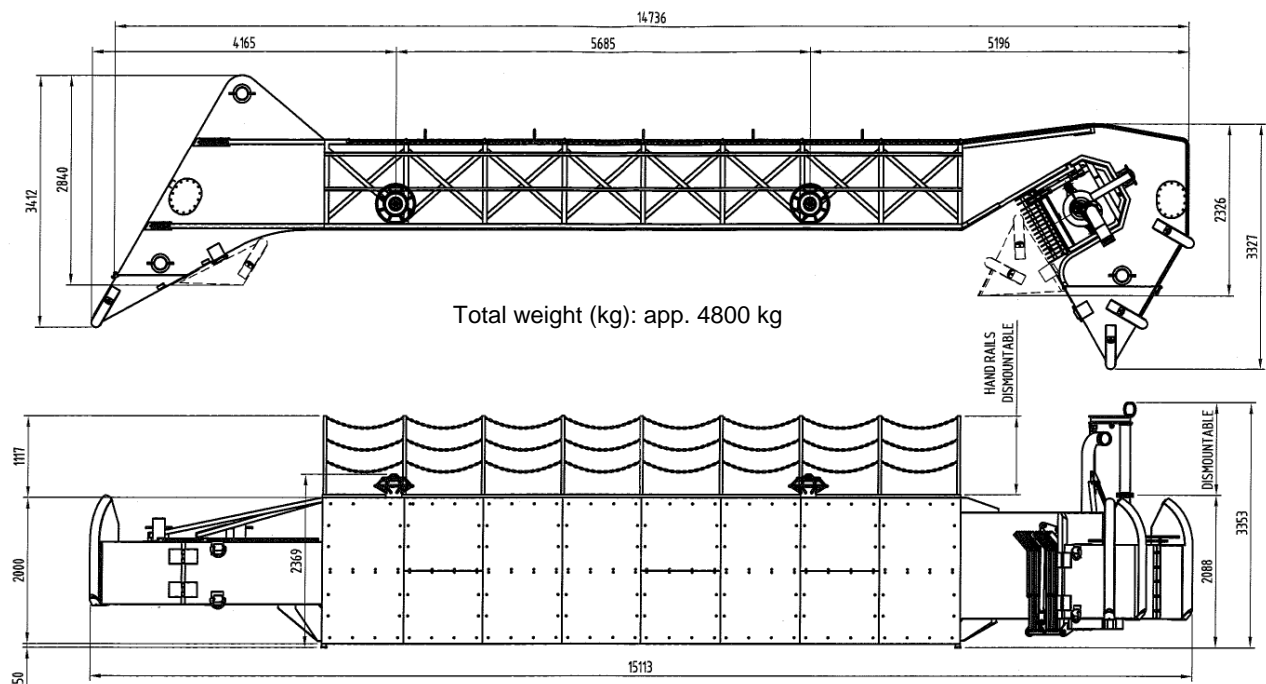


Fig.2 Rigid sweeping arm pontoon – foldable end

### 5.1.2 Weir skimmer cassette with movable debris screen

The weir module consists of an oil collection chamber fitted with a pump.

The height of the oil collecting chamber can be adjusted in order to optimise the flow to the pump.

The optimal height depends on oil viscosity, thickness of the layer etc.

For the operation with the weir skimmer module each sweeping arm is fit with a centrifugal screw impeller pump MSP 150/63 which has a discharging capacity of 300 m<sup>3</sup> per hour.



Fig.3 Weir Skimmer Module

### 5.1.3 Brush skimmer cassette with movable debris screen

This skimmer consists of an aluminium oil collection chamber, brush belt and a pump.

The height of the collection chamber can be adjusted.

For the operation with the brush skimmer module, each sweeping arm is fit with a Desmi DOP 250 pump which has a discharging capacity of 125 m<sup>3</sup> per hour.



Fig.4 Brush Skimmer Cassette

### 5.1.4 Marflex Centrifugal Pump (Light/Medium oil skimmer module)

**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)  
**Purchase year:** 2012

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.



Fig.5 Marflex Pumps

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

Specification:	
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

The pressure, return and drain lines for the hydraulic motor and the discharge line for the pump consist of flexible hoses. All hoses are provided with stainless steel couplings.

Set of hoses consists of:

Hydraulic pressure hose	1 “
Hydraulic return hose	1½ “
Discharge hose	6 “

### 5.1.5 DESMI DOP 250 PDAS Pump (Heavy oil skimmer module)

**Manufacturer:** RO-CLEAN DESMI A/S  
Hestehaven 21 B, DK-5260 Odense S  
**Phone:** +45 6591 0201  
**Fax:** +45 6590 8877  
**E-mail:** [roclean-desmi@desmi.com](mailto:roclean-desmi@desmi.com)  
**Purchase year:** 2012



Fig.6 Desmi DOP 250 Pump

#### Specification

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

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

#### Hydraulic connections

Pressure line:	3/4" - 1" quick coupling male
Return line:	3/4" - 1" quick coupling male
Drain line:	3/8" quick coupling male

### 5.1.6 Lifting crane/davit Lagendijk SK 5/10-5000/1000

**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)  
**Purchase year:** 2012

This crane allows safe and easy handling by one person only. Once the rigid sweeping arm is lifted from its deck supports the arm is fixed into the counter catchers of the crane boom. Now both structures form one unit, thus avoiding any undesired movements of the rigid sweeping arm while lifting and moving the rigid sweeping arm overboard.

The crane design is kept, as simple as possible; one (1) slewing ring at the base flange of the crane and one (1) single hydraulic cylinder moves the crane to its desired angle of 60 degrees, avoiding complex



rotation motors. The crane boom is stiff. This way we are secured that only the rigid sweeping arm with its known weight and outreach is lifted. This is a very important safety factor. The rigid sweeping arm is now lowered into the water and the crane wires are given sufficient slack to allow a free floating situation. The lifting wires are not disconnected from the rigid sweeping arm but kept slack. This way no man has to board the rigid sweeping arm to undo the lifting wires.

**Specification:**

Type:	SK 5/10-5000/1000
Propulsion:	Hydraulic
Lifting capacity:	5000 kg – 5.9 meters / 1000 kg – 10.2 meters
Tilt:	3° max.

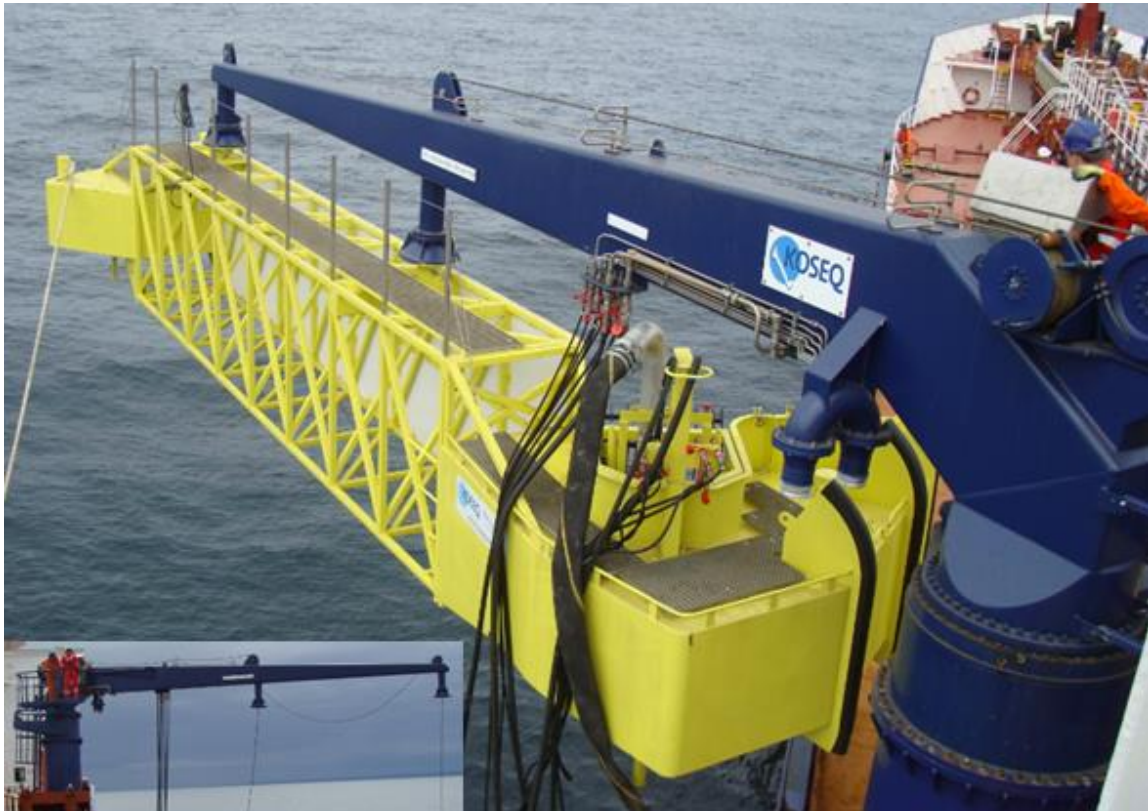
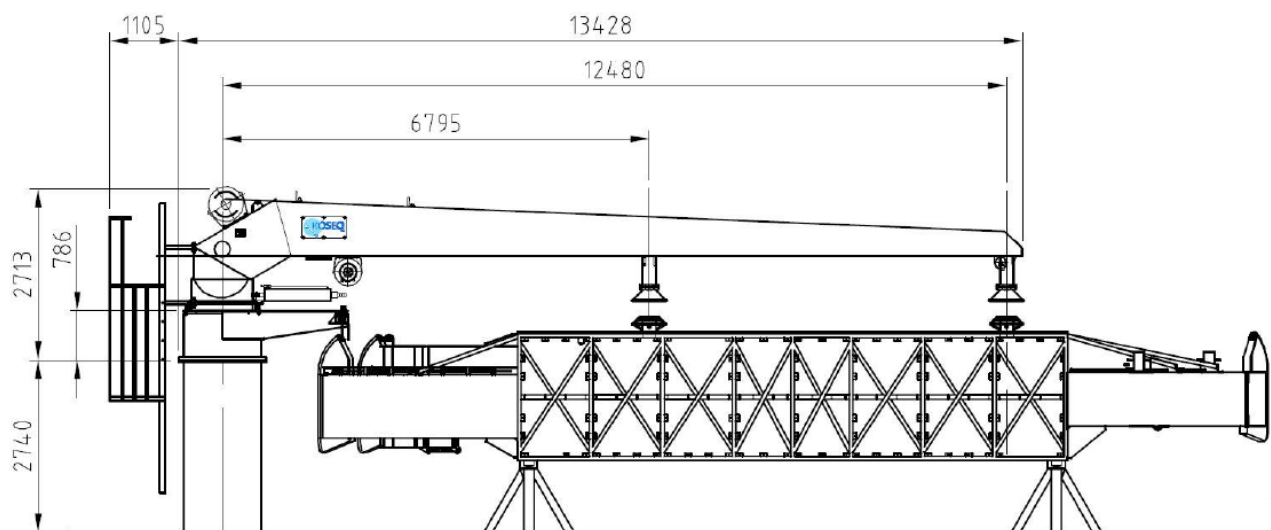


Fig.7 Lifting crane/davit Legendijk SK 5/10-5000/1000



Lifting crane – main dimensions

### 5.1.7 Hydraulic Control Desk

All the functionalities of the sweeping arm system are controlled throughout the control panel attached to the crane foundation pillar.

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

- Sweep. arm pump.
- Sweep. arm weir skimmer height.
- Sweep. arm debris screen.
- Crane winch (1 Ton.)
- Crane winch (5 Ton.)
- Crane Cylinder.



Fig.8 Hydraulic Control Desk

The hydraulic control desk is an integrated part of the crane. It is mounted on top of the crane to have an undisturbed view for operating the crane and rigid sweeping arm.

The operator control desk is made of stainless steel, containing valves for; rotating the crane, operating both crane winches, adjusting the weir oil collection chamber, operating the debris screen and controlling the speed of the submersible pump.

The crane control desk is also prepared for operating the brush skimmer cassette and the Radio Remote Control system.

A pressure gauge is mounted for checking the pressure in the hydraulic system. Just underneath the control desk the manual operated STOP valve is mounted to cut the hydraulic power to the crane control desk in an emergency.

### 5.1.8 Hydraulic power pack

**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>

Purchase year: 2012

Explosion proof, ZONE II certified, diesel driven Hydraulic Power Pack (HPP).



Fig.9 Koseq Hydraulic Power Pack

The HPP is mounted in a rugged frame and are fitted with ISO twist locks to fit the deck mounted frame with counter twist locks for quick and easy seafastening. The Power Pack consists of a variable, displacement, axial piston pump and is driven by the water cooled diesel engine.

**Specification:**

Type	Diesel
Make	Daewoo
Rated power	Approx. 125 KW at 2000 rpm intermittent
Start system	Hydraulic starting equipment, accumulator, recharging hydraulic pump, filter and start handle
Cooling system	Water cooling (coolant)
Fuel system	Double filter incl. water separator
Fuel tank	Basement tank, incl. filler breather filter and level gauge
Air inlet	Dry filter with dust cyclone and visual dirt indicator
Exhaust	Exhaust gasses cooled down by cooling system and Stainless steel Spark arrestor
Make	Pyroban
Indicators	Engine speed, Coolant temperature, Exhaust temperature and lubricant pressure
Protection against	Low pressure of lubricant
High temperature of exhaust gasses	200 °C
High temperature of engine's cooling system	100 °C
Over speed of diesel engine	2000 rpm.
Hand operated emergency stop which is closing the air inlet valve	
Operation temperature	-20 °C to + 50 °C

**Hydraulic system:**

Hydraulic pump	Parker. PV 140 variable axial plunger
Hydraulic system	Open
Hydraulic oil flow	200ltr. At 2000 rpm.
Hydraulic oil pressure	350 bar max.
Cooling system	Water-cooled, thermostat controlled and integrated with diesel engine's cooling system
Indicators	Hydraulic oil and temperature
Protection against	Overpressure by relief valve in pressure system of Power pack (350 bar)
High temperature and low level of hydraulic oil	
Stop button which is indirect blocked the fuel to the fuel pump of the diesel engine	

**Connections:**

Hydraulic high-pressure side	1" quick coupling female.
Hydraulic return side	1½" quick coupling female

**Dimensions /volume weight/colour.**

Length x Width x Height	2200 mm. x 1340 mm. x 2210 mm.
Volume of the diesel fuel tank	400 litres
Volume of hydraulic oil tank	230 litres.
Volume of coolant system	120 litres.
Weight	2200 kg dry, 2830 kg. incl. hydraulic oil and diesel fuel.
Colour	Cadmium yellow, RAL 1016.

The fuel tank is designated to contain fuel for a long time of use and also designed that is possible to mount the diesel engine and hydraulic system of Power Pack in as small as possible frame.

### 5.1.9 Hydraulic hoses, (pressure, return and drain hoses)

**Manufacturer:** DUNLOP INDUSTRIAL HOSES  
Benoni (+27) 011-741-2500  
Howick (+27) 033-239-7200  
e-mail: [marketing@dunlopindustrial.co.za](mailto:marketing@dunlopindustrial.co.za)  
Purchase year: 2012

#### Specification:

a) 3 hydraulic hoses from the HPP to the crane pedestal (Make: Dunlop)

<b>1 pressure hose</b>	
Type:	790 G
Diameter:	1 inch
Length:	20 m
Work/burst pressure:	380 / 1520 Bar
Couplings:	Quick release stainless steel, male/female, PH, V4a, BG6
<b>1 return hose</b>	
Type:	222 T
Diameter:	1 ½ inch
Length:	20 m
Work/burst pressure:	90 / 360 Bar
Couplings:	Quick release stainless steel, male/female, PH, V4a, BG8
<b>1 leak hose</b>	
Type:	241 T
Diameter:	½ inch
Length:	20 meter
Work/burst pressure:	350 / 1400 Bar
Couplings:	Quick release stainless steel, male/female, PH, V4a, BG3

b) 3 hydraulic hoses within the crane pedestal which feed the crane control desk:

Same specification as above, however the length is 4 meters

c) 9 hydraulic hoses run from the crane manifold to the rigid sweeping arm to operate the pump, the weir oil collecting chamber and or the Brush skimmer cassette and debris screen:

When the weir skimmer module is used, 2 hydraulic hoses to run the pump:

1 pressure hose 1 inch  
1 return hose 1 ½ inch  
Length: 12 m

When the weir skimmer module is used, 4 hydraulic hoses to run the weir oil collecting chamber and debris screen:

2 pressure hoses ½ inch  
2 return hoses ½ inch  
Length: 10 m

When the brush skimmer module is used, 1 extra hydraulic hose is connected to run the pump:

1 leak hose ½ inch  
Length: 12 m

When the weir skimmer module is used, 2 extra hydraulic hoses are connected to run the brush skimmer:

1 pressure hoses ½ inch  
1 return hoses ½ inch  
Length: 10 m



### 5.1.10 Oil hoses

**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

**Purchase year:** 2012



Fig.10 Oil Hoses

The set consists of Semi-rigid oil hose, diameter 6 inches, 2 section (10m each), including connectors and adaptors (6 to 8 inches).

#### Specification:

10 meter spiral hose section between ship's manifold and crane elbow

Type	Spiral
Code	Rig Supply HW
Diameter	6 inch
Work pressure	20 bar
Burst pressure	60 bar
Couplings	Female aluminium Camlock and one 6 inch steel flange

10 meter soft wall section between the crane elbow and the pump

Type	Soft wall
Code	200224698
Diameter	6 inch
Work pressure	20 bar
Burst pressure	60 bar
Couplings	Female aluminium Camlocks

In addition, in 2014, the following oil hoses have been purchased:

- 8 x 8 meters, lay-flat type, diameter 6"
- 2 x 30 meters, lay-flat, diameter 38mm

### 5.1.11 Spare parts sets

Two spare parts sets (from 2012) consist of consumables and spare parts for the sweeping arm set - various filters (oil, fuel, air), V-belts, pressure gauge, wrench, flame trap, O rings, valve handle, bearings, grease nipples, bolts and nuts, hydraulic couplings, drive chain, brush chain, bulbs, fuses, seals, etc.

## 5.2 VIKOMA Booms Hi-Sprint 2000 (2 x 250m)

**Manufacturer:** Vikoma International Ltd, Kingston Works  
Kingston Road, East Cowes  
Isle of Wight, PO32 6JS, UK  
**Tel:** +44 (0)1983 200560  
**Fax:** +44 (0)1983 200561  
**Email:** [sales@vikoma.com](mailto:sales@vikoma.com)  
**Purchase year:** 2014

The Set of Vikoma High Sprint Boom 2000 consists of:

- 5.2.1 Vikoma High Sprint Boom 2000 (2 x 250m)
- 5.2.2 Vikoma Type 600 Boom Reels (2 pcs)
- 5.2.3 Air inflation system
- 5.2.4 Towing lines and bridles
- 5.2.5 Protection covers
- 5.2.6 Spare parts and ancillaries

### 5.2.1 Vikoma High Sprint Boom 2000 section



Fig.11 Vikoma High Sprint Boom 2000

The boom is constructed of strong, highly flexible neoprene fabric; with a smooth profile, combined with excellent heave response and high buoyancy to weight ratio providing excellent wave following characteristics. This means it contains oil extremely well, eliminating the vortices and splash-over which may occur with less flexible booms. The flexible nature of the boom also minimises the stresses and weaknesses which can occur with more rigid booms.

It is designed with a continuous inflation cuff running the full length of the boom, with sections joined by a special connector so the whole boom is inflated by a single inflator.

The boom itself is divided by internal bulkheads, every 3 -5 metres, to form independent chambers sealed by one way valves. So if a chamber is damaged, the chambers to each side will support the deflated area and maintain the integrity of the boom.

The galvanised, long link ballast chain in double thickness skirt pocket, provides good underwater profile for maximum oil retention.

**Specification:**

Dimensions	
Length	250 m (50m sections)
Weight	12.68 kg/m
Minimum height	2000 mm
Freeboard	750 mm
Draft	1250mm
Wave following characteristics	
Boom air pressure	0.3 psig
Buoyancy/weight ratio	34.1:1
Fabric construction	
Material	Reinforced double faced Neoprene
Tensile strength	309.75kN
Tear strength	323 N
Ballast chain	19 mm (enclosed)

**5.2.2 Type 600 Boom Reel**

Type 600 reels are intended for the storage, deployment and recovery of oil containment boom.



Fig.12 Type 600 Boom Reel

**Specification:**

L x W x H	195 cm x 364 cm x 233cm
Weight	1400 kg (bare reel)
Hydraulics (reel drive + control)	Double stage planetary gearbox driven by hydraulic motor; Forward and reverse; Dead-man's stop; Low/high torque selection 0-12 rpm
Construction (Reel structure and spool)	Steel tube and box section
Operation (lifting and securing)	Four tested lifting ayes, forklift pockets and ISO blocks
Paint system	Epoxy primer with two part sprayed polyurethane top coat-Orange
Power Pack Requirements	The GP10-2 Diesel/Hydraulic power pack can be used to power this reel

### 5.2.3 Air inflation system

The system is equipped with two air-packs AP/0080 (one for each boom), hand start, inflators. The inflator is used to supply the necessary air inflation during the deployment of the Vikoma HI Sprint Boom and it is supplied with hose kit.

The air-fan is independently driven by its own engine and therefore is not reliable on the constant supply from the vessel. The diesel engine is fitted with over speed shut down device and exhaust spark arrestor. It is key to note that this low pressure, high volume fan will back vent in the event of a blockage to the air cuff. This is a key safety/ equipment lifecycle feature as it means the air fan is physically incapable of overinflating the boom to destruction.



Fig.13 Air pack inflator AP/0080

Deflator kits, with adaptors for MK 12 valves, are also included and they serve to remove the air inside the booms faster during retrieval operation. When the air is expelled from the chamber the flow is stopped and the suction is lost thus automatically detaching the deflator and closing the valve.

#### Specification:

L x W x H	84 cm x 45 cm x 59 cm
Weight	75 kg (dry)
Engine	Single cylinder diesel, air cooled; Electric start
Power	4.1 kW @ 3300 rpm
Safety devices	Overspeed shut down valve; Spark arrestor
Fuel Tank	3.5 l
Air Fan Type	Centrifugal, high volume, low pressure
Air Fan Control	Via engine speed
Construction of frame and belt cover	Marine grade aluminium alloy

### 5.2.4 Towing lines and bridles

The boom set comes equipped with all lines and ropes necessary for its deployment with the assistance of a supporting vessel. Both booms can be interconnected with the supplied bridles/cross-bridle to achieve an open-U configuration. Tow bridles fulfil a vital role in the operation of a boom system. They aid the towing, positioning and mooring of the deployed boom ensuring the most effective response to a containment situation.



Fig.14 Cross-bridle for open-U

Construction	
Tow plates	Marine grade aluminium
Towing strops	Terylene webbing
Towing line	Polypropylene rope

Tow bridles come as standard with bolting locations and thumbscrews and are completely compatible with the Vikoma boom range.

### 5.2.5 Protection covers

The booms reels and air-pack inflators are provided with tailored made canvases (orange color) to protect them from UV radiation and direct exposure to weather elements.

### 5.2.6 Spare parts and ancillaries

Reel – floor protection material  
Twist locks



## 5.3 High-Capacity (HC) Skimmer Lamor LWS 1300

**Manufacturer:** Lamor Corporation Ab  
Urakoitsijantie 12, 06450, Porvoo, Finland  
**Tel:** +358 (0)20 7650 100, +358 19 5767 400  
**Fax:** +358 (0)207 650 129, +358 19 5767 450  
**Email:** [info@lamor.com](mailto:info@lamor.com),  
**Website:** [www.lamor.com](http://www.lamor.com)

**Year of purchase:** 2015

This specific system is built to deploy and house a LWS 1300 MKII weir/brush module skimmer fitted with three oil transfer pumps (two for high and one for low viscosity) off the side of a vessel with limited amount of effort and maximum amount of control.

Through the use of the telescoping crane arm and the rotating turntable, the system allows ease of deployment and control when placing the skimmer in its designated location for oil recovery.

The combination of manoeuvrability provided by the crane and turntable, the ability to control the deployment speed of the umbilical hose from the reel to a significant length, and the use of a radio remote control make this system the perfect package to deploy and retrieve a skimmer in an oil spill response situation.

Main specifications of the 20' Lamor HC Skimmer LWS 1300 (power pack not included)

Length x Width x Height	8940 x 2700 x 3690	mm
Light weight	Ca. 10600	kg
Overall weight	Approx. 13500	kg
Capacity	Hose 90	m
Load at standard reach	1900	kg
Standard reach, total	7,5	m
Lifting capacity	@ 40deg. 3	tons

The LAMOR LWS 1300 HC Skimmer Set consists of:

- 5.4.1 Umbilical Hose Reel LUT 90 with telescopic crane arm on a 20' flat-rack
- 5.4.2 Weir skimmer and brush adaptors
- 5.4.3 Pumps
- 5.4.4 Flow meter with camlock
- 5.4.5 Cover
- 5.4.6 Remote control
- 5.4.7 Power pack
- 5.4.8 Hoses
- 5.4.9 Spare parts and ancillaries
- 5.4.10 Spare pumps

### 5.3.1 Umbilical Hose Reel LUT 90 with telescopic crane arm on a 20' flat-rack

The Lamor Umbilical Hose Reel, with a Telescopic Crane Arm (LUT), has been designed for ease of use by a single operator when time and efficiency are necessary to deploy a skimmer in an oil spill response situation. The LUT 90 is furnished on a 20' flat rack, equipped with a telescopic crane arm, and is mounted on a 360° rotating, hydraulically driven turntable.



Fig.15 Lamor HC Skimmer LWS 1300

The Lamor Umbilical Hose Reel combines all necessary hydraulic and transfer hoses to operate the skimmer in a singular, neatly packaged hose.

### Main components

#### Flat Rack - 20' length

- Removable oil collection drip trays
- Skimmer rack
- Container locks
- Steel container storage roof
- Container corners for ISO containers
- Customized for complete system storage

#### Umbilical Hose Reel Unit

- Compact model
- Mounted on a 360° rotating turntable
- LUH, 9 ch, 80m (27 kg/m)
- 9 hydraulic hoses provide power to the LWS 1300 MKII Skimmer
- 6" rigid rubber oil transfer hose with a L-10M Camlock (female/male)
- Neoprene, weather and wear resistant hose cover

The oil transfer and hydraulic hoses are connected to a manifold at the hub of the reel by pump-through swivel joints to allow the hoses to be energized continuously at any deployed length.

#### Telescopic Crane Arm

- Driven by hydraulic cylinders
- 5 Hose guiding rollers
- Equipped with a diamond guiding screw that provides lateral movement for proper retrieval of the umbilical hose



Fig.16 Flat rack 20'



Fig.17 Umbilical hose reel unit



Fig.18 Telescopic crane arm

### 5.3.2 Weir skimmer LWS1300 and brush adaptors

The Lamor Free-Floating Offshore Weir Skimmer (with Brush Modules), LWS 1300, is a high capacity weir skimmer designed for open ocean oil recovery.

The skimmer is equipped with a floating weir lip that separates and collects the oil into a hopper. The floating weir lip has separate small ballast weights that can be independently adjusted, allowing perfect floatation even in difficult sea conditions. The buoyancy of the skimmer can be adjusted by two on-board ballast tanks.

The skimmer is hydraulically operated and fitted with two thrusters that allow the operator to manoeuvre the skimmer to where oil is the most heavily concentrated.

The radio remote control can be operated from up to a 200 m distance from the skimmer. The hydraulic power is supplied to the skimmer via hydraulic hoses.

The oil on the surface of the water is drawn over the weir lip into the skimmer by gravitational flow combined with the added suction of the screw pump. The skimmer can efficiently recover and pump a wide range of oils from light products to medium viscous, debris-laden emulsions. Recovered oil is discharged from the skimmer to the collecting tank by the transfer hose.

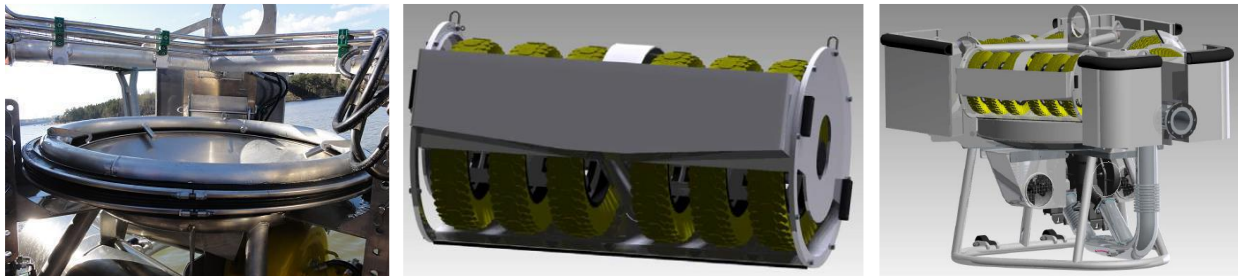


Fig.19 Weir skimmer module with brush adaptors

The skimmer frame is manufactured from aluminium with 3 specially designed aluminium hollow floats with separate internal chambers. The skimmer incorporates a large diameter free floating weir that gives it excellent wave following characteristics. LWS weir skimmers have been specifically designed to work with a wide range of oil transfer pumps. The GTA pumps are suitable for light to high viscosity oils and the MSP for light to medium viscosity oils.

To improve the recovery capability of heavy oils the skimmer is fitted with removable brush attachments. To optimize recovery, the brushes can be rotated in both directions depending on the viscosity of the oil. The function of the brushes is to improve the flow of oil into the weir skimmer hopper and also separate the oil and water before entering the collection hopper. The brush chains have been tested to provide a recovery rate of more than 350m<sup>3</sup>/h.

#### Technical specifications of the Weir Skimmer LWS 1300

Length	2644	mm
Width	2212	mm
Height	1830	mm
Diameter	weir: 1300	mm
Weight	250	kg
Draft	1100	mm
Design capacity	250	m <sup>3</sup> /h
Capacity, certified ASTM	112,2	m <sup>3</sup> /h
Capacity, certified max	360	m <sup>3</sup> /h

#### Hydraulic Thruster Set

Weight	130	kg
Hydraulic flow (skimmer ONLY)	2 x 25	l/min
Hydraulic pressure	150	bar
Power requirement	total 16,5	kW

#### Brush Adapter

Length	2050	mm
Width	1800	mm
Height	570	mm
Weight	220	kg
Hydraulic flow (skimmer ONLY)	20	l/min
Hydraulic pressure	170-200	bar
Power requirement	6.5	kW

### 5.3.3 Pumps

The LWS 1300 high skimmer is fitted with three oil transfer pumps:

- 1 x Lamor MSP 150
- 2 x Lamor GT A 140

The MSP is suitable for light to medium viscosity oils and the GTA pumps are suitable for light to high viscosity oils.

#### Centrifugal Pump Lamor MSP 150

The pump is similar to the one installed in the sweeping arm, therefore please see the description under point 5.1.3.

#### PDAS Pump Lamor GT A 140

The GT A 140 pumps are multipurpose submersible Archimedes positive displacement high performance screw pumps with a pumping capacity of 140 m<sup>3</sup>/h. This type of pumps have been designed for use in skimmers and transfer or offloading pump applications and are able to pump a wide range of liquids ranging from water to the heaviest debris-laden viscous oils.

The pumps can deliver a maximum of 10 bar outlet pressure, benefits from water/steam annular injection flange on the inlet as standard and debris cutting knife to handle solids such as seaweed, plastics and ropes.

The GT A pump range is constructed from robust seawater resistant aluminium for the casings and stainless, acid proof steel internals with special seals that ensure the pump remains “dry”. The pump can handle solids up to 30 mm in diameter, should the pump becomes clogged, and it can be reversed to expel the blockage.

The GT A pump received accreditation from Bureau Veritas confirming their recovery capacities with oils of varying viscosities.

The pump speed can be adjusted freely between 0...100 % from the control panel on the deck. It is capable of pumping oils with viscosities up to 1,000,000 cSt.



Fig.20 Oil Transfer Pump PDA LAMOR GT A 140

**Table 1** Technical specification of the PDAS Pump Lamor GT A 140 (LAMOR Manual)

Length	500 mm
Width	300 mm
Height	598 mm
Weight	71 kg
Capacity	140 m <sup>3</sup> /h
Hydraulic flow	160 max l/min
Hydraulic pressure	210 max bar
Power req.	56 max kW
Discharge pressure	10 bar

Pumps are fitted with water injection flanges in order to significantly increase the ability to deal with high viscos oil.



Fig.21 Water injection inlet (1) and outlet (2)



### 5.3.4 Flow meter with 6" pipe and Camlock connectors

Manufacturer: Krohne  
Web: <https://krohne.com>  
Purchase year: 2015

The OPTISONIC 6300 is an ultrasonic clamp-on flowmeter for permanent mount installation. It is particularly suitable for flow measurement of (non-)conductive liquids at any location where inline measurement is not possible or desirable. The flowmeter consists of a combination of one or two clamp-on sensors and one ultrasonic signal converter.

Its robust clamp-on rail is highly flexible and can be very easily attached to virtually any pipe up to DN4000 / 160".

Typical applications of the clamp-on flowmeter include flow measurement of a broad range of refined hydrocarbons, demineralised water or chemicals as well as measurements in hygienic applications. A clamp-on version for extended temperature ranges up to +200°C / +392°F is also available. The OPTISONIC 6300 has approvals for use in hazardous areas and offers HART® communication capability.



Fig.22 Flow meter

### 5.3.5 Cover

Canvas for Lamor Umibilical hose reel:

- A4 side pocket
- 2 open corners
- Rope in sleeve

### 5.3.6 Remote control

Radio Remote Control 24 V:

- Customized Cavotec transmitter (EX Zone 1)
- Back-up cable connection capability (5 m)
- Allows ease of control and mobility to the user
- Charger

The radio remote control can be operated from up to a 200 m distance from the skimmer.

Length x Width x Height: 340 x 220 x 220 mm

Weight: 2,3 kg



Fig.23 Remote control

### 5.3.7 Power Pack

**Type:** Mariflex DHP-200B Zone II,II 3G IIA T3

**Manufacturer:** MARIFLEX BV  
Maassluisdijk 101, 3133 KA Vlaardingen,  
The Netherlands

Tel. + -31-10 434 44 45

Fax. + -31-10 232 95 00

E-mail: [info@mariflex.net](mailto:info@mariflex.net)

Website: [www.MariFlex.net](http://www.MariFlex.net)

**Year of purchase:** 2015



Fig.24 Power Pack Mariflex DHP-200B

The MariFlex Power Pack is an extremely compact designed diesel engine driven hydraulic unit suitable for operation in hazardous area Zone II.

Therefore several protection devices are fitted on the diesel engine and hydraulic system to make it possible to run the Power Pack in the specified hazardous areas.

The Power Pack consists of a variable, displacement, axial piston pump and is driven by the water cooled diesel engine.

The fuel tank is designed to contain fuel for a long time of use and also designed that it is possible to mount the diesel engine and hydraulic system of Power Pack in an as small as possible frame.

#### Power Pack technical specifications

Diesel engine	
Make/type	DEUTZ / BF6M-1013M
Design	6 cylinder line, water-cooled
Rated power	126 kW at 1900 rpm. Intermittent DIN B 6270
Zone	II 3G IIA T3
Start system	Hydraulic start.
Cooling system :	Water cooling (coolant)
Operation temperature	-20°C. and +50°C
Fuel consumption engine	0,30 ltr / kW / h
Hydraulic system:	
Hydraulic pump, make/type	Parker axial plunger, with variable setting
Hydraulic oil flow set point 1	160ltr at 300bar
Hydraulic oil flow set point 2	320ltr at 210bar
Hydraulic oil pressure	320 bar max
Connections:	
Hydraulic high-pressure side	VVS112GAS-F2 FASTER
Hydraulic return side	T15010RV 1 ½" TEMA
Hydraulic leak line	T5010RV ½" TEMA
Hydraulic load sense	T3801RV 3/8" TEMA
Dimensions/volume/weight	
Length x Wide x Height	2300 x 1400 x 2100 mm
Volume of fuel tank	400 ltr
Volume of lubricant for engine	14 ltr
Volume of hydraulic oil tank	230 ltr
Volume of cooling system	100 ltr
Weight	1950 kg excl. hydraulic oil and diesel fuel
Weight	2643 kg incl. hydraulic oil and diesel fuel

### 5.3.8 Hoses

#### Oil Transfer Hose

- Rigid rubber 6", L-10m, aluminium Camlock F/M
- Working pressure: 16 bar

#### Hydraulic Hose

- 10m set for Umbilical Hose Reel LUT

### 5.3.9 Spare parts and ancillaries

The spares and ancillaries include:

- Repair rubber adhesive, for small repairs and cosmetic patching of the umbilical hose
- Items for field repairs and maintenance for the Oil Transfer Pump GTA 140 & MSP 150
- Kit for Brush Adaptor
- Items for field repairs and maintenance for the Hydraulic Power Pack
- Documentation and Operational Manuals

### 5.3.10 Spare pumps

**Manufacturer:** Lamor Corporation Ab, Mestarintie 25  
FIN-06150 PORVOO, FINLAND  
**Tel:** +358 (0)20 7650 100, +358 19 5767 400  
**Fax:** +358 (0)207 650 129, +358 19 5767 450  
**Email:** [info@lamor.fi](mailto:info@lamor.fi), Website: [www.lamor.fi](http://www.lamor.fi)

**Year of purchase:** 2015

The 2 **Lamor GT A 115** pumps can be used as spares or for transfer/offloading purposes.

The GT A 115 is multipurpose submersible Archimedes screw pump with a pumping capacity of 115 m<sup>3</sup>/h. This type of pump has been designed for use in skimmers and transfer or offloading pump applications and is able to pump a wide range of liquids ranging from water to the heaviest debris-laden viscous oils.



Fig.25 Oil Transfer Pump LAMOR GT A

The pumps can deliver a maximum of 12 bar outlet pressure, benefits from water/steam annular injection flange on the inlet as standard and debris cutting knife to handle solids such as seaweed, plastics and ropes.

The GT A pump range is constructed from robust seawater resistant aluminium for the casings and stainless, acid proof steel internals with special seals that ensure the pump remains "dry". The pump can handle solids up to 30 mm in diameter, should the pump becomes clogged, and it can be reversed to expel the blockage.

The GT A pump received accreditation from Bureau Veritas confirming their recovery capacities with oils of varying viscosities. The pump speed can be adjusted freely between 0...100 % from the control panel on the deck. It is capable of pumping oils with viscosities up to 1,000,000 cSt.

Technical specification of the PDAS Pump Lamor GT A 115 (LAMOR Manual RAMO 0372EU)

Length	500 mm
Width	300 mm
Height	598 mm
Weight	71 kg
Capacity	115 m³/h
Hydraulic flow	160 max l/min
Hydraulic pressure	210 max bar
Power req.	56 max kW
Discharge pressure	12 bar

## 5.4 Slick Detection System MIROS

**Manufacturer:** Miros AS

Solbraveien 20 NO-1383

PO Box 364 NO-1372

Asker, NORWAY

Telephone: +47 66 98 75 00

Fax: +47 66 90 41 70

E-mail: [office@miros.no](mailto:office@miros.no)

Website: [www.miros.no](http://www.miros.no)

Year of purchase: 2008



Fig.26 MIROS display

**The MIROS - Oil Spill Detection System (OSD) consists of:**

- 5.5.1. MIROS Wavex OSD computer system and monitor display
- 5.5.2. Radar Furuno FR2117BB
- 5.5.3. Antenna
- 5.5.4. Wavex EM video digitizer
- 5.5.5. Upgrade

### 5.4.1. MIROS Wavex OSD computer system and monitor display

The OSD system's main objectives are to detect oil spill on the sea surface and to track the oil spill over time.

The system provides help both for those supervising oil fields and those in charge of clean-up operations.

To identify oil spill, the MIROS OSD uses advanced image-processing algorithms on radar images extracted by the Miros Wavex system, which also must be present and operational when the OSD system is in use.

The OSD system hardware comprises the following components:

- A dedicated, type approved maritime computer with a built-in Miros Wavex Special Purpose Radar Data Acquisition Board;
- A flat-screen LCD monitor (19") with Night vision dimming functionality;
- A buffer amplifier and radar interface box;
- A Gyro compass interface;
- A Wind sensor interface;
- A GPS interface.

The OSD system has the ability to detect oil spills in complete darkness enabling 24 hours skimmer operations. Accurate data on position, area and movement of oil on the sea surface is paramount in ensuring that mechanical oil recovery equipment stays within areas of combatable oil at any given time. This capability has to be independent of the prevailing visibility and light conditions.

Oil Spill Detection (OSD) functionality:

- Remote detection and display of oil spill on the sea surface. Ability to detect oil spill of at least 100 litres in wind conditions and sea states corresponding to Beaufort's scale 2-6
- Detection range ( $2 \times \text{Radius}$ ) depends on antenna height but will normally be between 2 and 4 nautical miles;
- Automatic determination of the location and size of an oil spill. And indication of variations of oil thickness;
- Drift prediction of oil spill together with speed and path of drift;
- Display of extent of oil spill in binary visualisation; the oil spill is clearly visualised on the monitor including the oil drift vector (speed and direction);
- Critical parameters are clearly displayed;
- Slick position data may be exported to a map system.
- The OSD system may be operated with a pointer tool and a flat LCD screen on the vessel's bridge;
- Regular snap-shots of the screen may be initiated.



Fig.27 MIROS and Radar display and keyboards

#### 5.4.2. Radar Furuno FR2117BB

The Miros OSD system should be linked to a X-band radar, Min. 6' antenna, operated in Short Pulse Mode (50-80 ns). Pulse repetition frequency, PRF: 1000 Hz or more, dep. upon antenna RPM. In this case is linked to a Furuno FR2117BB which also includes a 20" display.

Radar technical specifications

Frequency	9410 MHz $\pm$ 30 MHz
Output power (Transceiver RTR-078)	12 kW
Bandwidth Short pulse	40 MHz

#### 5.4.3. Antenna

The required antenna is also supplied. The antenna rotation rate is 24 - 48 RPM. The antenna weights between 33 to 42 kg. It is recommended to be mounted 15 – 80 m height above sea level.

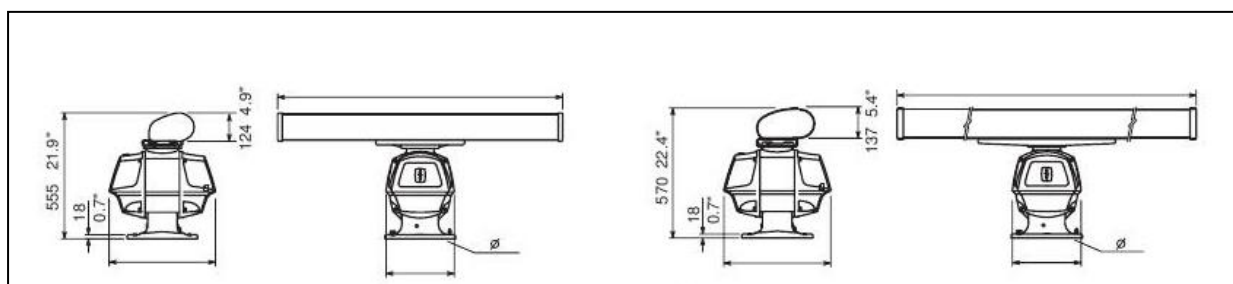


Fig.28 Antenna dimensions XN12AF and XN-20AF



#### 5.4.4. The Wavex EM video digitizer System

The WAVEX system measures surface wave parameters on the basis of digitized sea

clutter images provided by standard navigational X-band (3 cm) marine radar.

Since “a copy” of the raw radar signal is used, the WAVEX system does not interfere or affect the radar signals to the navigation radar display.

By collecting sea clutter data in “sets of images” during a defined time period, the system performs its parameter calculations. The calculated wave parameters are then a representative average of the wave parameters during the data collection period.



Fig.29 MIROS hardware

The WAVEX system consists of the following components:

- Marine Radar (see point 5.5.2)
- Computer
- Keyboard and mouse
- TFT Display
- Radar data acquisition card
- Radar interface module
- Buffer amplifier (optional)

The WAVEX system captures processes and displays sea surface backscatter data from standard non-coherent X-band marine navigation radar. The radar sea-echo amplitude depends on the “roughness” of the sea surface caused by the wind.

Wave, wind and current monitoring are also functionalities of the WAVEX system which displays parameters like (all parameters are compensated for the vessel’s motions.):

- Wave height, wave period and wave direction with trend analysis.
- The sea surface current vector; Current speed and direction.
- The wind vector; Wind speed and direction with trend analysis.

The WAVEX system is operative on location and at all vessel speeds. Gravity waves and currents form images on the radar display because they modulate the sea surface radar cross section by angular modulation, hydrodynamic interaction and shadowing.

WAVEX performance data

PARAMETER	RANGE	RESOLUTION	STD.DEVIATION
Significant wave height	0 - 5 m	0.1 m	0.5 m
	5 - 10 m	0.1 m	10%
	10 - 15 m	0.1 m	20%
Wave period	5 - 13 s	0.1 sec	10%
Wave direction	0 - 360°	1 °	20 °

#### 5.4.5. Upgrade

Hardware and software upgrades were done in January 2015 as follows:

- one SM-145 IACS E10 type approved maritime computer for Wavex/OSD, with keyboard, tracker ball and 19” flat panel fully dimmable EN60945 type approved display unit;
- one NMEA hardware interfaces to AIS, Gyro, GPS & Wind sensors integrated with computer;
- two Signal splitters for serial NMEA;

- one Cable kit for connection between Miros units and radar and sensors;
- one Firmware upgrade of existing EM-129 Miros Radar Interface unit type “Integrated Video Digitizer”;
- one Upgrade to latest version of and User License for Miros OSD System Software, without the full Miros Wavex functionality. Wave and current algorithms required to fulfill the NOFO 2009 standard is included;
- two Wavex/OSD Technical Handbooks in electronic format on USB memory stick;
- SM-134 Wind sensor Gill Windobserver with power and interface unit.

## 5.5 Cleaning equipment

**Manufacturer** Nilfisk  
 Nilfisk-Advance A/S Sognevej 25,  
 DK-2605 Broendby, DENMARK  
**Tel.** +45 43238100  
**Fax** +45 43437700  
**Website** <http://www.nilfisk.com/>  
**Purchase year** 2014

Three Neptune 5-51 DE water portable pressure washers are supplied.

The NEPTUNE 5-51 DE is a heavy duty professional diesel driven hot water pressure washer. It has a compact design, high performance and productivity - a simple and efficient cleaning tool.

It offers a fully mobile cleaning option powered by a 10 HP Yanmar Diesel Engine. Fitted with a high efficiency Ecopower boiler that is 92% efficient, resulting in low running costs and ease of use.



Fig.30 Neptune 5-51 DE pressure washer

### Motor

Manufacturer and type		Yanmar
Power	HK/RPM	10/3600
Fuel type		Diesel
CCM	Cm3	406
Fuel tank capacity	Liter	5,5
Motor RPM, adjusted	RPM	3530
Pulley size	mm	SPZ 80/3
Motor oil type		SAE 15/40
Motor oil capacity	Liter	1,65

### Pump

Type		NP5
Pump pressure	bar	185
Machine outlet pressure	bar	176
Water Quantity, high pressure	l/min	13,5
Water Quantity, low pressure	l/min	15
Suction capacity (feeded)	meter	3
Pump inlet temperature	°C	35-40

## 5.6 Sampling/testing and communication equipment

The sampling/testing and communication equipment set consists of:

- 5.7.1 UTI Oil/water interface
- 5.7.2 Mini lab for oil viscosity and density
- 5.7.3 Flash point tester Setaflash series 3 closed cup
- 5.7.4 Gas detector - GX-2009B - portable
- 5.7.5 / 5.7.6 VHF Portable - VXA-220 Pilot VI Air Band H/H (2 pcs)

### 5.6.1 UTI Oil/water interface

**Manufacturer:** Honeywell / Enraf Tanksystem SA

Rue de l'Industrie 2, 1630, Bulle, Switzerland

Tel: +41 (0)26 919 15 00

Email: [tanksystem@honeywell.com](mailto:tanksystem@honeywell.com)

Web: [www.honeywellenraf.com](http://www.honeywellenraf.com)

**Year of purchase:** 2015

The HERMeTic UTImeter (Ullage – Temperature – Interface detector) Otex is a portable electronic level gauge designed to operate under open conditions resulting in increased reliability and efficiency.

The unit is used for custody transfer, temperature verification, inventory control measurement and free water detection on petroleum and chemical storage tanks. The unit enables 3 (optionally 4) measurements in one single operation, ullage, temperature, oil-water interface level and detection of dip datum plate (viscous version).



Fig.31 UTI meter

### 5.6.2 Mini lab for Oil Viscosity and Density

#### Viscometer

**Manufacturer:** CANNON® Instrument Company

2139 High Tech Road • State College, PA 16803 • USA

Tel.: 814-353-8000

Fax: 814-353-8007

Web: [www.cannoninstrument.com](http://www.cannoninstrument.com)

**Year of purchase:** 2015

The CANNON® Digital Paddle Viscometer (DPV) is designed to measure viscosity of asphalt emulsions, residual oils, slurries, paints, marine fuels, and other similar materials between 30 and 30,000 cP (mPa·s) at temperatures of 40°C, 50°C, 80°C and 100°C (25, 40, 50 and 100°C with cooling coil option). The Digital Paddle Viscometer can also be used for other applications consistent with its temperature control and viscosity measurement capabilities, including the ASTM D 244 consistency test. The Digital Paddle Viscometer can determine the viscosity of lubricating oils, marine fuels and other liquids, yielding results with an accuracy of 5 percent or better for most materials—better than that required by ASTM D 445 for residual oils at 50°C.



Fig.32 Viscometer



## Density Meter

**Manufacturer:** LEMIS Baltic

26 Ganību dambis St.

Rīga LV-1005, LATVIA

Tel.: (+371) 738 3223

Fax: (+371) 738 3270

Email: [sales@lemis-baltic.com](mailto:sales@lemis-baltic.com)

Web: [www.lemis-baltic.com](http://www.lemis-baltic.com)

**Year of purchase:** 2015

The portable laboratory density meter DenDi is designed for both - mobile and indoor laboratories for real density and temperature measurements of liquid in samples.

The operating principle of the device is weighting of the glass float in liquid. It allows measuring real density and temperature of wide range of liquids. The buoyancy force of liquid acts on the float, which has precise weight and volume; the float's movement is transmitted to the beam with balance. Converter processed electrical signal to digital signal. The results of measurements appear on the LCD.



Fig.33 Density meter

### 5.6.3 Flash point tester Setaflash series 3 closed cup

**Manufacturer:** Stanhope-Seta

London Street, Chertsey, Surrey, KT16 8AP

Telephone: +44 (0) 1932 564391

Facsimile: +44 (0) 1932 568363

Email: [info@stanhope-seta.co.uk](mailto:info@stanhope-seta.co.uk)

Web: [www.stanhope-seta.co.uk](http://www.stanhope-seta.co.uk)

**Year of purchase:** 2015

The Setaflash Series 3 Tester is a compact bench top/portable instrument designed to carry out 'flash/no flash' tests or to determine flash point values up to 300°C.

The operating principle of Setaflash Series 3 Testers is that a cup, containing the sample to be tested, is electrically heated to a user set test temperature, then a manual flash test is carried out. On Closed Cup models, a shutter in the lid is opened and a test flame is dipped into the vapour space above the sample. Open Cup models have the test flame swept across the face of the sample cup. It can be determined if a sample has a flash point above or below the test temperature by detecting whether a flash has occurred or not. A sequence of tests at different temperatures can be used to determine the flash point of the sample.



Fig.34 30000-0 Setaflash Series 3  
Closed Cup Flash Point Tester

#### 5.6.4 Gas detector - GX-2009B - portable

**Manufacturer:** Riken Keiki Co., Ltd.

2-7-6 Azusawa, Itabashi-ku, Tokyo, 174-8744, Japan

Telephone: +81-3-3966-1113

Facsimile: +81-3-3558-9110

Email: [intdept@rikenkeiki.co.jp](mailto:intdept@rikenkeiki.co.jp)

Web: [www.rikenkeiki.co.jp](http://www.rikenkeiki.co.jp)

**Year of purchase:** 2015

The Personal Gas Monitor Model GX-2009 is a gas monitor designed to provide continuous exposure monitoring of combustible gas, Oxygen (O<sub>2</sub>), toxic gas (CO, H<sub>2</sub>S etc.) in hazardous environments.



Fig.35 Gas detector GX-2009

Using an advanced detection system consisting of four gas sensors, the GX-2009 personal four-gas monitor detects the presence of combustible gas, oxygen (O<sub>2</sub>), carbon monoxide (CO), and hydrogen sulfide (H<sub>2</sub>S) simultaneously. The GX-2009's compact size and easy-to-use design makes it ideally suited for a wide range of applications, including sewage treatment plants, utility manholes, tunnels, hazardous waste sites, power stations, petrochemical refineries, mines, paper mills, drilling rigs, and fire-fighting stations. The GX-2009 offers a full range of features, including among others:

- Simultaneous four-gas monitoring and display of combustible gases, O<sub>2</sub>, CO, and H<sub>2</sub>S
- Backlit LCD (liquid crystal display) for complete and understandable information at a glance
- Distinctive audible/vibrating alarms for dangerous gas conditions and audible alarms for unit malfunction

#### 5.6.5 & 5.6.6 Communication equipment: 2 x VHF Portable - VXA-220 Pilot VI Air Band H/H

**Manufacturer:** Icom Inc.

1-1-32 Kamiminami, Hirano-ku, Osaka, 547-0003, Japan

Web: [www.icom.co.jp/world/products](http://www.icom.co.jp/world/products)

**Year of purchase:** 2015

Simple one-handed operation is the most essential feature of the IC-A24E/A6E VHF Air Band Transceivers. The well labeled, large keypad provides user friendly operation. The large display shows both letters and numbers and is easy to see, making for fast frequency recognition. The display is backlit, and so is the keypad. The light stays on until you turn it off a very handy feature for flying at night.

Other features

- Stores the last 10 channels used
- 8.33kHz channel spacing (Depending on version)
- IPX4 water resistant construction
- 200 memory channels (20 Ch x 10 banks) with 6 character names
- Dedicated 121.5MHz emergency key
- Side tone function allows you to hear your own voice via an external aviation headset.
- Tag scanning and memory bank scanning
- ANL (Auto Noise Limiter) for noise reduction



Fig.36 VHF Air Band

## 6. List of transferred dispersants and description

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.88	23/11/2018	8434
IBC with dispersant	1	0.88	23/11/2018	8435
IBC with dispersant	1	0.88	23/11/2018	8436
IBC with dispersant	1	0.88	23/11/2018	8437
IBC with dispersant	1	0.88	23/11/2018	8438
IBC with dispersant	1	0.88	23/11/2018	8439
IBC with dispersant	1	0.88	23/11/2018	8440
IBC with dispersant	1	0.88	23/11/2018	8441
IBC with dispersant	1	0.88	23/11/2018	8442
IBC with dispersant	1	0.88	23/11/2018	8443
IBC with dispersant	1	0.88	23/11/2018	8444
IBC with dispersant	1	0.88	23/11/2018	8445
IBC with dispersant	1	0.88	23/11/2018	8446
IBC with dispersant	1	0.88	23/11/2018	8447
IBC with dispersant	1	0.88	23/11/2018	8448
IBC with dispersant	1	0.88	23/11/2018	8449
IBC with dispersant	1	0.88	23/11/2018	8450
IBC with dispersant	1	0.88	23/11/2018	8451
IBC with dispersant	1	0.88	23/11/2018	8452
IBC with dispersant	1	0.88	23/11/2018	8453
IBC with dispersant	1	0.88	23/11/2018	8454
IBC with dispersant	1	0.88	23/11/2018	8455
IBC with dispersant	1	0.88	23/11/2018	8456
IBC with dispersant	1	0.88	23/11/2018	8457
IBC with dispersant	1	0.88	23/11/2018	8458
IBC with dispersant	1	0.88	23/11/2018	8459
IBC with dispersant	1	0.88	23/11/2018	8460
IBC with dispersant	1	0.88	23/11/2018	8461
IBC with dispersant	1	0.88	23/11/2018	8462
IBC with dispersant	1	0.88	23/11/2018	8463
IBC with dispersant	1	0.88	23/11/2018	8464
IBC with dispersant	1	0.88	23/11/2018	8465
IBC with dispersant	1	0.88	23/11/2018	8466
IBC with dispersant	1	0.88	23/11/2018	8467
IBC with dispersant	1	0.88	23/11/2018	8468
IBC with dispersant	1	0.88	23/11/2018	8469
IBC with dispersant	1	0.88	23/11/2018	8470
IBC with dispersant	1	0.88	23/11/2018	8471
IBC with dispersant	1	0.88	23/11/2018	8472
IBC with dispersant	1	0.88	23/11/2018	8473
IBC with dispersant	1	0.88	23/11/2018	8474
IBC with dispersant	1	0.88	23/11/2018	8475
IBC with dispersant	1	0.88	23/11/2018	8476
IBC with dispersant	1	0.88	23/11/2018	8477
IBC with dispersant	1	0.88	23/11/2018	8478
IBC with dispersant	1	0.88	23/11/2018	8479
IBC with dispersant	1	0.88	23/11/2018	8480
IBC with dispersant	1	0.88	23/11/2018	8481
IBC with dispersant	1	0.88	23/11/2018	8482
IBC with dispersant	1	0.88	23/11/2018	8483
IBC with dispersant	1	0.88	23/11/2018	8484
IBC with dispersant	1	0.88	23/11/2018	8485
IBC with dispersant	1	0.88	23/11/2018	8486
IBC with dispersant	1	0.88	23/11/2018	8487
IBC with dispersant	1	0.88	23/11/2018	8488

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.88	23/11/2018	8489
IBC with dispersant	1	0.88	23/11/2018	8490
IBC with dispersant	1	0.88	23/11/2018	8491
IBC with dispersant	1	0.88	23/11/2018	8492
IBC with dispersant	1	0.88	23/11/2018	8493
IBC with dispersant	1	0.88	23/11/2018	8494
IBC with dispersant	1	0.88	23/11/2018	8495
IBC with dispersant	1	0.88	23/11/2018	8496
IBC with dispersant	1	0.88	23/11/2018	8497
IBC with dispersant	1	0.88	23/11/2018	8498
IBC with dispersant	1	0.88	23/11/2018	8499
IBC with dispersant	1	0.88	23/11/2018	8500
IBC with dispersant	1	0.88	23/11/2018	8501
IBC with dispersant	1	0.88	23/11/2018	8502
IBC with dispersant	1	0.88	23/11/2018	8503
IBC with dispersant	1	0.88	23/11/2018	8504
IBC with dispersant	1	0.88	23/11/2018	8505
IBC with dispersant	1	0.88	23/11/2018	8506
IBC with dispersant	1	0.88	23/11/2018	8507
IBC with dispersant	1	0.88	23/11/2018	8508
IBC with dispersant	1	0.88	23/11/2018	8509
IBC with dispersant	1	0.88	23/11/2018	8510
IBC with dispersant	1	0.88	23/11/2018	8511
IBC with dispersant	1	0.88	23/11/2018	8512
IBC with dispersant	1	0.88	23/11/2018	8513
IBC with dispersant	1	0.88	23/11/2018	8514
IBC with dispersant	1	0.88	23/11/2018	8515
IBC with dispersant	1	0.88	23/11/2018	8516
IBC with dispersant	1	0.88	23/11/2018	8517
IBC with dispersant	1	0.88	23/11/2018	8518
IBC with dispersant	1	0.88	23/11/2018	8519
IBC with dispersant	1	0.88	23/11/2018	8520
IBC with dispersant	1	0.88	23/11/2018	8521
IBC with dispersant	1	0.88	23/11/2018	8522
IBC with dispersant	1	0.88	23/11/2018	8523
IBC with dispersant	1	0.88	23/11/2018	8524
IBC with dispersant	1	0.88	23/11/2018	8525
IBC with dispersant	1	0.88	23/11/2018	8526
IBC with dispersant	1	0.88	23/11/2018	8527
IBC with dispersant	1	0.88	23/11/2018	8528
IBC with dispersant	1	0.88	23/11/2018	8529
IBC with dispersant	1	0.88	23/11/2018	8530
IBC with dispersant	1	0.88	23/11/2018	8531
IBC with dispersant	1	0.88	23/11/2018	8532
IBC with dispersant	1	0.88	23/11/2018	8533
IBC with dispersant	1	0.88	23/11/2018	8534
IBC with dispersant	1	0.88	23/11/2018	8535
IBC with dispersant	1	0.88	23/11/2018	8536
IBC with dispersant	1	0.88	23/11/2018	8537
IBC with dispersant	1	0.88	23/11/2018	8538
IBC with dispersant	1	0.88	23/11/2018	8539
IBC with dispersant	1	0.88	23/11/2018	8540
IBC with dispersant	1	0.88	23/11/2018	8541
IBC with dispersant	1	0.88	23/11/2018	8542
IBC with dispersant	1	0.88	23/11/2018	8543
IBC with dispersant	1	0.88	23/11/2018	8544
IBC with dispersant	1	0.88	23/11/2018	8545

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.88	23/11/2018	8546
IBC with dispersant	1	0.88	23/11/2018	8547
IBC with dispersant	1	0.88	23/11/2018	8548
IBC with dispersant	1	0.88	23/11/2018	8549
IBC with dispersant	1	0.88	23/11/2018	8550
IBC with dispersant	1	0.88	23/11/2018	8551
IBC with dispersant	1	0.88	23/11/2018	8552
IBC with dispersant	1	0.88	23/11/2018	8553
IBC with dispersant	1	0.88	23/11/2018	8554
IBC with dispersant	1	0.88	23/11/2018	8555
IBC with dispersant	1	0.88	23/11/2018	8556
IBC with dispersant	1	0.88	23/11/2018	8557
IBC with dispersant	1	0.88	23/11/2018	8558
IBC with dispersant	1	0.88	23/11/2018	8559
IBC with dispersant	1	0.88	23/11/2018	8560
IBC with dispersant	1	0.88	23/11/2018	8561
IBC with dispersant	1	0.88	23/11/2018	8562
IBC with dispersant	1	0.88	23/11/2018	8563
IBC with dispersant	1	0.88	23/11/2018	8564
IBC with dispersant	1	0.88	23/11/2018	8565
IBC with dispersant	1	0.88	23/11/2018	8566
IBC with dispersant	1	0.88	23/11/2018	8567
IBC with dispersant	1	0.88	23/11/2018	8568
IBC with dispersant	1	0.88	23/11/2018	8569
IBC with dispersant	1	0.88	23/11/2018	8570
IBC with dispersant	1	0.88	23/11/2018	8571
IBC with dispersant	1	0.88	23/11/2018	8572
IBC with dispersant	1	0.88	23/11/2018	8573
IBC with dispersant	1	0.88	23/11/2018	8574
IBC with dispersant	1	0.88	23/11/2018	8575
IBC with dispersant	1	0.88	23/11/2018	8576
IBC with dispersant	1	0.88	23/11/2018	8577
IBC with dispersant	1	0.88	23/11/2018	8578
IBC with dispersant	1	0.88	23/11/2018	8579
IBC with dispersant	1	0.88	23/11/2018	8580
IBC with dispersant	1	0.88	23/11/2018	8581
IBC with dispersant	1	0.88	23/11/2018	8582
IBC with dispersant	1	0.88	23/11/2018	8583
IBC with dispersant	1	0.88	23/11/2018	8584
IBC with dispersant	1	0.88	23/11/2018	8585
IBC with dispersant	1	0.88	23/11/2018	8586
IBC with dispersant	1	0.88	23/11/2018	8587
IBC with dispersant	1	0.88	23/11/2018	8588
IBC with dispersant	1	0.88	23/11/2018	8589
IBC with dispersant	1	0.88	23/11/2018	8590
IBC with dispersant	1	0.88	23/11/2018	8591
IBC with dispersant	1	0.88	23/11/2018	8592
IBC with dispersant	1	0.88	23/11/2018	8593
IBC with dispersant	1	0.88	23/11/2018	8594
IBC with dispersant	1	0.88	23/11/2018	8595
IBC with dispersant	1	0.88	23/11/2018	8596
IBC with dispersant	1	0.88	23/11/2018	8597
IBC with dispersant	1	0.88	23/11/2018	8598
IBC with dispersant	1	0.88	23/11/2018	8599
IBC with dispersant	1	0.88	23/11/2018	8600
IBC with dispersant	1	0.88	23/11/2018	8601
IBC with dispersant	1	0.88	23/11/2018	8602

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.88	23/11/2018	8603
IBC with dispersant	1	0.88	23/11/2018	8604
IBC with dispersant	1	0.88	23/11/2018	8605
IBC with dispersant	1	0.88	23/11/2018	8606
IBC with dispersant	1	0.88	23/11/2018	8607
IBC with dispersant	1	0.88	23/11/2018	8608
IBC with dispersant	1	0.88	23/11/2018	8609
IBC with dispersant	1	0.88	23/11/2018	8610
IBC with dispersant	1	0.88	23/11/2018	8611
IBC with dispersant	1	0.88	23/11/2018	8612
IBC with dispersant	1	0.88	23/11/2018	8613
IBC with dispersant	1	0.88	23/11/2018	8614
IBC with dispersant	1	0.88	23/11/2018	8615
IBC with dispersant	1	0.88	23/11/2018	8616
IBC with dispersant	1	0.88	23/11/2018	8617
IBC with dispersant	1	0.88	23/11/2018	8618
IBC with dispersant	1	0.88	23/11/2018	8619
IBC with dispersant	1	0.88	23/11/2018	8620
IBC with dispersant	1	0.88	23/11/2018	8621
IBC with dispersant	1	0.88	23/11/2018	8622
IBC with dispersant	1	0.88	23/11/2018	8623
IBC with dispersant	1	0.88	23/11/2018	8624
IBC with dispersant	1	0.88	23/11/2018	8625
IBC with dispersant	1	0.88	23/11/2018	8626
IBC with dispersant	1	0.88	23/11/2018	8627
IBC with dispersant	1	0.88	23/11/2018	8628
IBC with dispersant	1	0.88	23/11/2018	8629
IBC with dispersant	1	0.88	23/11/2018	8630
IBC with dispersant	1	0.88	23/11/2018	8631
IBC with dispersant	1	0.88	23/11/2018	8632
IBC with dispersant	1	0.88	23/11/2018	8633
IBC with dispersant	1	0.88	23/11/2018	8634
IBC with dispersant	1	0.88	23/11/2018	8635
IBC with dispersant	1	0.88	23/11/2018	8636
IBC with dispersant	1	0.88	23/11/2018	8637
IBC with dispersant	1	0.88	23/11/2018	8638
IBC with dispersant	1	0.88	23/11/2018	8639
IBC with dispersant	1	0.88	23/11/2018	8640
IBC with dispersant	1	0.88	23/11/2018	8641
IBC with dispersant	1	0.88	23/11/2018	8642
IBC with dispersant	1	0.88	23/11/2018	8643
IBC with dispersant	1	0.88	23/11/2018	8644
IBC with dispersant	1	0.88	23/11/2018	8645
IBC with dispersant	1	0.88	23/11/2018	8646
IBC with dispersant	1	0.88	23/11/2018	8647
IBC with dispersant	1	0.88	23/11/2018	8648
IBC with dispersant	1	0.88	23/11/2018	8649
IBC with dispersant	1	0.88	23/11/2018	8650
IBC with dispersant	1	0.88	23/11/2018	8651
IBC with dispersant	1	0.88	23/11/2018	8652
IBC with dispersant	1	0.88	23/11/2018	8653
IBC with dispersant	1	0.88	23/11/2018	8654
IBC with dispersant	1	0.88	23/11/2018	8655
IBC with dispersant	1	0.88	23/11/2018	8656
IBC with dispersant	1	0.88	23/11/2018	8657
IBC with dispersant	1	0.88	23/11/2018	8658
IBC with dispersant	1	0.88	23/11/2018	8659



Item	Pieces	Tons	Reception Date	ID Code
IBC spare (empty)	1		23/11/2018	8660
IBC spare (empty)	1		23/11/2018	8661
IBC spare (empty)	1		23/11/2018	8662
IBC spare (empty)	1		23/11/2018	8663
IBC spare (empty)	1		23/11/2018	8664
IBC spare (empty)	1		23/11/2018	8665
IBC spare (empty)	1		23/11/2018	8666
IBC spare (empty)	1		23/11/2018	8667
IBC spare (empty)	1		23/11/2018	8668
IBC spare (empty)	1		23/11/2018	8669
Total cost of dispersants (for insurance purpose): <b>EUR 667,124</b>				

### 6.1 Dispersant Slickgone NS (F315) – Type 3 and type 2 dispersant

**Manufacturer:** Dasic International OSD Ltd

**Address:** Dasic International OSD Ltd,  
Winchester Hill, Romsey,  
Hampshire, SO51 7YD,  
UK

**Telephone:** +44 1794 512419  
+44 1794 522346

**Email:** [info@dasicinter.com](mailto:info@dasicinter.com)

**Year of purchase:** 2018



I Fig.37 BC's with Slickgone NS

Composition	Aliphatic hydrocarbon solvent, ethoxylated natural fatty acid, sorbitan ester, sodium dioctyl sulphosuccinate and natural fatty acid
Viscosity	30 to 60 mPa.s at 0°C (Brookfield LV)
Flash point	72°C (Pensky Martens Closed Cup)
Cloud point	Below -10°C
Pour point	Below -18°C (ASTM D97)
pH	Neutral
Toxicity	Under the CLP system, classed as Asp. Tox. 1 - H304
Ecotoxicity	Meets the requirements of the UK, French, Norwegian, Australian and other dispersant test protocols.
Biodegradability	Meets the French requirements for dispersant biodegradability (NF.T.90-346)
Other ecological information	Slightly toxic to practically non-toxic (IMO/GESAMP classification)
Efficiency	Typically 80% – 90% under UK Government LR448(OP) protocol
EU regulations	Meets the requirements of REACH. - No SVHCs. Classified according to CLP

**Packing and transport information**

Packing form	1000 litre IBCs with EVOH liner. Headspace nitrogen purged
Transport information	Not classified as dangerous goods under international road, rail, air and sea regulations

**Directions for use**

From aircraft, Slickgone NS should be applied undiluted by suitable spray booms to give a mean droplet diameter about 700 microns. From boats, best applied undiluted through suitable application equipment. Regardless of method, a dose rate of 30 – 50 litres per hectare of spilled oil should be used, equivalent to approximately 1 part Slickgone NS to 25 parts oil, assuming an average oil thickness of 0.1 mm.

**Emergency contact details**

Emergency telephone number (24/7):	+44 1794 512419
Supplier information:	DASIC International Ltd, Winchester Hill, Romsey, Hampshire, SO51 7YD, UK