European Maritime Safety Agency

Annex V of the VAC
Technical Specifications for the equipment

Procurement procedure: EMSA/CPNEG/1/2022

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 overhauling/servicing of the transferred equipment in line with this Annex and as per below requirements have to be included in the ‘‘equipment costs’’

Content:

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 system
2. Boom system
3. Offshore skimmer
4. Cleaning machines
5. Flow meter

All tenderers will have the opportunity to visually verify the condition of equipment items listed above in the stockpile in Ireland, with the exception of the offshore skimmer which could be seen in the EAS Northern Baltic in Finland, at request. In principle the visit will be organised in week 23. The visit details will be arranged with the requesting tenderer. If due to the COVID-19 travel restrictions or other health risk considerations the visits cannot be organised then EMSA will provide tenderers with additional detailed technical information on the transferred equipment including, manuals, pictures and videos.

1.2. Overhauling/Servicing of the equipment

The sweeping arms and the boom system that will be transferred to the Contractor were purchased in 2008, the skimmer in 2010, flow meter in 2012 and cleaning machines in 2014. It is generally in good condition. The sweeping arms, boom and skimmer has never been used to recover oil and have been kept in a warehouse. 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.

The Contractor will be responsible for the safe, reliable and sustainable operational use of the equipment. Therefore, 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 overhauling and 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 overhauling/servicing might be performed by a third party subcontracted by the contractor (e.g. manufacturer of the equipment or a specialised local company).

1.2.1 Equipment to be overhauled

Overhauling of the OSR equipment systems shall include repair or replacement of damaged, defective or worn parts, reassembly, testing and trial-run prior to returning the item to its full operating level. The contractor shall take care also for the proper disposal of the parts to be replaced.

The overhauling works should as a minimum requirement comprise in general the following items:

- Replacement of all worn parts: belts, gaskets, seals, filters, rusty screws and washers, O-rings of all parts of the set;
- Replacement of all fluids: lube oil, hydraulic oil, gear oil, coolant of all parts of the set;
- Replacement of all rubber/flexible hoses and couplings/connections: all hydraulic hoses;
- Cleaning/brushing off rust/limestone/chalky deposits from all parts:

  - bring all the parts to a “new” finish;

  - sandblasting of rusty steel parts;

  - repaint (where applicable) with original or equivalent marine resistant paint (zinc primer, marine epoxy coating, marine epoxy topcoat);

- Grease/lubricate all joints/points.

Based on previous experience, below is the indicative list of the overhauling works to be performed:

a. Koseq Sweeping arms system:

I	No	Description of overhauling works
2 x Sweeping Arm Crane	I.1.1	Brushing off rust and repainting with original or equivalent paint
	I.1.2	Replacement of worn parts of the slewing ring
	I.1.3	Replacement of turning cylinder
	I.1.4	Replacement of cylinder shaft
	I.1.5	Replacement of cable pulleys
	I.1.6	Replacement of all winch cables
	I.1.7	Replacement of screws and bolts of the foundation pillar
	I.1.8	Replacement of all hydraulic valves and levers
	I.1.9	Replacement of all wearing parts from the winches
	I.1.10	Replacement of hydraulic lines/pipes
2 x Frame (15m) (including weir modules)	I.2.1	Brushing off rust and repainting with original or equivalent paint
	I.2.2	Replacement of rubber fenders at each end
	I.2.3	Replacement of hydraulic cylinder for oil collection chamber
	I.2.4	Replacement of hydraulic cylinder for debris screen
	I.2.5	Replacement of debris screen bearing and slide shaft
	I.2.6	Brushing off chalky/limestone deposits and bringing the aluminium parts to a "new" finish
	I.2.7	Replacement of all wearing parts from the hydraulic motor(s) (seals, O-rings, gaskets)
	I.2.8	Replacement of all hydraulic connectors
2 x Pump MSP 150/63	I.3.1	Replacement of seals, O-rings, washers and dust caps
	I.3.2	Replacement of hydraulic connections
	I.3.3	Replacement of all wearing parts from the hydraulic motor(s) (seals, O-rings, gaskets)

	I.3.4	Brushing off rust and repainting the exterior casing with original or equivalent paint
	I.3.5	Replacement of impeller (rotor)
	I.3.6	Renew protective coating of pump casing interior and suction cone interior with original or equivalent paint
2 x Power Pack	I.4.1	Replacement of all fluids, gaskets/seals & filters
	I.4.2	Cleaning of all tanks and radiators
	I.4.3	Replacement of belts
	I.4.4	Replacement of flexible lines
	I.4.5	Replacement of the battery
	I.4.6	Cleaning the exhaust flame trap
	I.4.7	Delivery of a new protection canvas
	I.4.8	Brushing off rust and repainting with original or equivalent paint
	I.4.9	Replacement of all wearing parts of the hydraulic pump (gaskets, O-rings)
	I.4.10	Replacement of all wearing parts from the spring starter

In addition, if the transferred sweeping arms with a length of 15 m are too long to be accommodated onboard the proposed vessel, it is acceptable that their length is reduced to 12 m.

b) Boom system

2 x Boom Reel Vikoma 600P	I.2.1	Replacement of hydraulic connectors
	I.2.2	Changing gear box oil
	I.2.3	Greasing all lubrication points
	I.2.4	Delivery of a new protection canvas
	I.2.5	Replacement of all wearing parts from the hydraulic motor(s) (seals, O-rings, gaskets)
	I.2.6	Replacement of all wearing parts from the reduction gears
	I.2.7	Brushing off rust and repainting with original or equivalent paint
	I.2.8	Replacement of all hydraulic valves and levers
1 x Airpack Inflator	I.3.1	Replacement of the drive belt
	I.3.2	Cleaning the fuel tank
	I.3.3	Replacement of fuel filter
	I.3.4	Replacement of air cleaner element
	I.3.5	Replacement of oil and filter
	I.3.6	Replacement of start plug
	I.3.7	Adjustment of intake and exhaust valve clearance
	I.3.8	Replacement of starting rope and handle
	I.3.9	Brushing off chalky/limestone deposits and bringing the aluminium frame to a "new" finish, repaint parts where applicable

In addition, some items of the transferred boom system will have to be replaced (e.g. boom sections, hoses). More details are presented in point 5.2 of this document.

c) Offshore skimmer Lamor LFF 100C

I	No	Description of overhauling works
Floatation Frame (including brush conveyors & thrusters)	I.1.1	Brushing off chalky/limestone deposits and bringing the aluminium frame and body to a "new" finish
	I.1.2	Cleaning the propellers casing and blades and applying a layer of silicone grease to the shaft and joints
	I.1.3	Replacement of anode
	I.1.4	Replacement of all wearing parts from the thrusters
	I.1.5	Replacement of propeller blades
	I.1.6	Draining the hydraulic oil system from the thrusters, changing the filter and refilling
	I.1.7	Replacement of brushes
	I.1.8	Replacement of hydraulic connectors
	I.1.9	Delivery of a new protection canvas
	I.1.10	Replacement of all wearing parts from the hydraulic motor(s) (seals, O-rings, gaskets)
PDAS Pump **Lamor GT A 115, 115 m3/h**	I.2.1	Replacement of plate wheel sectional discs and wear plates
	I.2.2	Replacement of sealing ring
	I.2.3	Replacement of plate wheel shaft
	I.2.4	Replacement of plate wheel bearing
	I.2.5	Replacement of sealing/bearing discs
	I.2.6	Replacement of V-seal
	I.2.7	Replacement of stator cutting knife
	I.2.8	Replacement of all wearing parts from the hydraulic motor(s) (seals, O-rings, gaskets)
	I.2.9	Brushing off rust and repainting the exterior casing with original or equivalent paint
	I.2.10	Replacement of impeller (rotor)
	I.2.11	Renew protective coating of pump casing interior with original or equivalent paint
Hose Reel	I.3.1	Replacement of hydraulic connectors
	I.3.2	Delivery of a new protection canvas
	I.3.3	Replacement of all wearing parts from the hydraulic motor(s) (seals, O-rings, gaskets)
	I.3.4	Replacement of all wearing parts from the reduction gears
	I.3.5	Replacement of all hydraulic valves and levers
	I.3.6	Brushing off rust and repainting with original or equivalent paint
Power Pack	I.4.1	Replacement of all fluids, gaskets/seals & filters
	I.4.2	Cleaning of all tanks and radiators
	I.4.3	Replacement of belts
	I.4.4	Replacement of flexible lines
	I.4.5	Cleaning the exhaust flame trap
	I.4.6	Replacement of all wearing parts from the hydraulic pump (gaskets, O-rings)
	I.4.7	Delivery of a new protection canvas
	I.4.8	Brushing off rust and repainting with original or equivalent paint
	I.4.9	Replacement of all wearing parts from the spring starter

Ancillaries	I.5.1	Delivery of new 80 meters of compatible hydraulic hoses (8 sets x 10 meters, pressure, return and drain) including couplings
	I.5.2	Delivery of new 4 x10 meters of compatible cargo hoses including couplings
	I.5.3	Replacement of batteries

1.2.2 Equipment to be serviced

The contractor should arrange servicing to the following equipment:

1. Cleaning machines;
2. Flow meter.

The servicing to this equipment should include the following:

- Check hoses of the cleaning machines
- Paint and repaint, if necessary.
- Calibration of the flow meter.

1.3. Additional equipment

Contractor will need to purchase/deliver the following equipment:

1. 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.

2. Adjustments to the Lamor power pack of the skimmer in order to be able to operate the boom system.

3. Communication devices: At sea oil recovery operations require a number of different actors at different locations. In addition to the GMDSS area A3 requirements set in point 15 of Annex IV, the vessel must be able to communicate with aircrafts, so two VHF radiophones, aeronautic band, will be foreseen for recovery operations or exercises.

4. Gas Detector: It will be needed to check the presence of explosive gases

5. 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.

6. Sampling Mini-Lab: The vessel will be equipped with a portable mini-lab and a sampling device to analyse, at least, the density and viscosity of the recovered product. The range of the minilab will be enough to measure a specific density from 0.80 to 1.2 and a kinematic viscosity of at least 100,000cst. The results of the analysis will be expressed in international units.

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[1].

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.

[1] The model price should be indicated in the bid for information only.

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:

1. Sweeping arms system	Vicinity of Cobh, Ireland
2. Boom system	Vicinity of Cobh, Ireland
3. Offshore skimmer	Tolkkinen, Finland
4. Cleaning machines	Vicinity of Cobh, Ireland
5. Flow meter	Vicinity of Cobh, Ireland

The handover will be done at a date to be mutually agreed between EMSA and the Contractor as soon as possible after contract signature**.**
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:

In case the arrangement consists of one vessel or pool of vessels of which one can be mobilised:

- the sweeping arm system,
- the boom system (2 x reel, 250 m each)
- 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.

In case the arrangement consists of primary and secondary vessel, both available for simultaneous mobilisation:

Primary vessel:

- the sweeping arm system, or at least one sweeping arm with a crane, and their relevant power pack(s) and ancillaries.
- the oil slick detection system,
- other equipment (minilab, flashpoint tester, etc.)

Secondary vessel:

- the boom system (2 x reel, 250 each), or at least 1 x reel, 250 m
- skimmer system

and their relevant power pack and ancillaries.

The configuration will be tested every year during 2 quarterly drills for each vessel.

4. List of transferred equipment

Category and price	Item	Item Brand	Item Model	Reception Date	Additional info	ID Code (new)
1.Sweeping arm (EUR 927,415)	Frame	Koseq		05/11/2008	Rigid, foldable end with weir skimmer	0286
	Frame	Koseq		05/11/2008	Rigid, foldable end with weir skimmer	0287
	Pump	Mariflex	MSP 150-63	05/11/2008	SCREW/CENTRIFUGAL	0288
	Pump	Mariflex	MSP 150-63	05/11/2008	SCREW/CENTRIFUGAL	0289
	Ancillaries			05/11/2008	PUMP OUTLET & INLET INJECTION FLANGE 6"	0290
	Ancillaries			05/11/2008	PUMP OUTLET & INLET INJECTION FLANGE 6"	0291
	Hydraulic hose(s)			05/11/2008	FROM PWPK TO CRANE PEDESTAL	0292
	Hydraulic hose(s)			05/11/2008	RETURN	0293
	Hydraulic hose(s)			05/11/2008	RETURN	0294
	Hydraulic hose(s)			05/11/2008	HYDRA. 20 M / WATER HOSES 30 M	0295
	Hydraulic hose(s)			05/11/2008	HYDRA. 20 M / WATER HOSES 30 M	0296
	Water hose(s)			05/11/2008	WATER HOSES 30 M	0297
	Water hose(s)			05/11/2008	WATER HOSES 30 M	0298
	Crane			05/11/2008	SWEEPING ARM CRANE / HYDR WINCH	0299
	Crane			05/11/2008	SWEEPING ARM CRANE / HYDR WINCH	0300
	Control desk			05/11/2008	HYDRAULIC CONTROL	0301
	Control desk			05/11/2008	HYDRAULIC CONTROL	0302
	Power pack			05/11/2008	HSP PWPK, ZONE 2, 125 KW	0304
	Power pack			05/11/2008	HSP PWPK, ZONE 2, 125 KW	0306
	Ancillaries			05/11/2008	WATER INJECTION PUMP SET	0307
	Ancillaries			05/11/2008	WATER INJECTION PUMP SET	0308
	Spare parts			05/11/2008	SPARE PARTS	0309
	Spare parts			05/11/2008	SPARE PARTS	0310
	Oil hose(s)			05/11/2008	CARGO HOSE (150MM) 4.5 M DANTEC WITH CAMLOCK STAINLESS STEEL END	0311
	Oil hose(s)			05/11/2008	CARGO HOSE (150MM) 4.5 M DANTEC WITH CAMLOCK STAINLESS STEEL END	0312
	Oil hose(s)			05/11/2008	CARGO HOSE (150MM) 4.5 M DANTEC WITH CAMLOCK STAINLESS STEEL END	0313
	Oil hose(s)			05/11/2008	CARGO HOSE (150MM) 4.5 M DANTEC WITH CAMLOCK STAINLESS STEEL END	0314
	Oil hose(s)			05/11/2008	BUNKER HOSE LAY FLAT (5-7 BAR) CAMLOCK	0315
	Oil hose(s)			05/11/2008	BUNKER HOSE LAY FLAT (5-7 BAR) CAMLOCK	0316
	Oil hose(s)			05/11/2008	BUNKER HOSE LAY FLAT (5-7 BAR) CAMLOCK	0317
	Oil hose(s)			05/11/2008	BUNKER HOSE LAY FLAT (5-7 BAR) CAMLOCK	0318
	Oil hose(s)			05/11/2008	BUNKER HOSE LAY FLAT (5-7 BAR) CAMLOCK	0319
	Oil hose(s)			05/11/2008	BUNKER HOSE LAY FLAT (5-7 BAR) CAMLOCK	0320

	Oil hose(s)			05/11/2008	HOSE LAYFLAT (38MM) 2X1.5BSP COUPLINGS	0321
	Oil hose(s)			05/11/2008	HOSE LAYFLAT (38MM) 2X1.5BSP COUPLINGS	0322
	Storage flatrack			05/11/2008	TRAILER FOR STORAGE	0323
	Storage flatrack			05/11/2008	TRAILER FOR STORAGE	0324
	Storage flatrack			05/11/2008	TRAILER FOR STORAGE	0325
	Storage flatrack			05/11/2008	TRAILER FOR STORAGE	0326
2. Boom system (EUR 228,212)	Storage reel	Vikoma	600	05/11/2008		0389
	Storage reel	Vikoma	600	05/11/2008		0390
	Towing lines set			05/11/2008	TOW ROPES	0391
	Towing lines set			05/11/2008	TOW ROPES	0392
	Towing bridles set			05/11/2008	BRIDLES	0393
	Towing bridles set			05/11/2008	BRIDLES	0394
	Towing lines set			05/11/2008	TOW ROPE	0395
	Towing lines set			05/11/2008	TOW ROPE	0396
	Towing cross bridle			05/11/2008	CROSS BRIDLE	0397
	Towing cross bridle			05/11/2008	CROSS BRIDLE	0398
	Air blower			05/11/2008	AIRPACK INFLATOR AP/0080 /	**0399**
	Air blower			05/11/2008	BOOM DEFLATOR KIT	0400
	Air blower			05/11/2008	AIRPACK INFLATOR AP/0080 /	**0401**
	Air blower			05/11/2008	BOOM DEFLATOR KIT	0402
	Segment	Vikoma	Hi Sprint 2000	05/11/2008	Heavy duty single point inflation with ASTM connectors	0403
	Segment	Vikoma	Hi Sprint 2000	05/11/2008	Heavy duty single point inflation with ASTM connectors	0404
3. Skimmer (EUR 196,628)	Brush module	Lamor	LFF 100 2C	14/07/2010	2V*4 chain	1393
	Oil hose(s)			14/07/2010	SET FOR LFF 100 2C (UMBILICAL CHORD)	1394
	Storage reel			14/07/2010	REEL FOR HOSE SET	1395
	Pump	Lamor	GT A 140	14/07/2010	OIL TRANSFER (12 BAR)	1396
	Ancillaries			14/07/2010	WATER INJECTION KIT 3/4” GT A 140/INLET	1397
	Remote control			14/07/2010	RADIO REMOTE CONTROL 3-6 EXZONE 1	1398
	Ancillaries			14/07/2010	SEA CATCH / RELEASE SET FOR SKIMMER	1399
	Cover			14/07/2010	CANVAS FOR BRUSH MODULE	1368
	Cover			14/07/2010	CANVAS FOR HOSE REEL	1369
	Storage flatrack			14/07/2010	FLAT RACK CONTAINER 20 FT	2863
	Oil hose(s)			23/05/2006	FOR GT A 115	0081
	Spare parts			14/07/2010	SPARE PART KIT FOR SKIMMER	1401
	Spare parts			14/07/2010	SPARE PART KIT FOR PUMP GT A 140	1402
	Power pack	Lamor	LPP 90 CU	12/07/2012	Diesel hydraulic	0029
4. Discharging (EUR 12,100)	Flow meter			23/06/2012	KROHNE UFM 3030	0361

5. Cleaning machines (EUR 14,976)	Cleaning machine	Nilfisk Alto	Neptune 5-51DE	13/06/2014	High pressure, Hot water, Diesel	0418
	Cleaning machine	Nilfisk Alto	Neptune 5-51DE	13/06/2014	High pressure, Hot water, Diesel	0419

Disclaimer

Any specifications and/or graphic material must not be understood as a commercial endorsement by the Agency of any given piece of equipment and/or manufacturer/supplier.

If there is a contradiction between this Enclosure and the manufacturers' manuals, the manufacturers' manuals take precedence.

5. Description of the Equipment

The equipment to be transferred from the expiring contract, as described in this section, consist of the following sets:

5.1 Set of KOSEQ Sweeping Arm

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
Website: http://www.koseq.com

Purchase year: 2008

Set of KOSEQ Sweeping Arm consists of:

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:

1) Sweeping arm

2) Marflex centrifugal pump MSP150-63

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

4) Water injection pump set

5) Water Hoses

6) Lagendijk crane with two catchers

7) Control panel

8) diesel-hydraulic power pack

9) Flat rack trailers

5.1.1 Sweeping arm structure (length 15m,) including frame, collection chamber and debris screen.

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
1x Weir oil collection chamber, including guides, movable pump frame, movable debris screen, and port hole.
2x Hydraulic cylinders and hoses for moving the collection chamber and debris screen.
1x Boulder.
3x Rubber fenders.
1x Lifting lug
2x Towing lugs.
1x Offshore rated PVC anti slip grating on top.
1x Yellow coating RAL 1016
1x Inside preservation.

b) OUTERPONTOON 4 mm steel plating
1x Man hole inspection cover.
1x Rubber fender.
2x Boulder.
2x Towing lugs.
1x Offshore rated PVC anti slip grating on top.
1x Yellow coating RAL 1016 (Paint schedule attached)
1x Inside preservation.

c) BRIDGE SECTION
1x Water tight lattice square piping framing.
2x Integrated CATCHERS systems.
9x Pipe stanchions (106 cm high) with chain and fixings.
6x PVC oil resistant boarding 2000 x 114 mm fixed with all stainless steel bolts, rings and nuts.

2x PVC oil resistant boarding 2000 x 117 mm fixed with all stainless steel bolts, rings and nuts.
1x Offshore rated PVC anti slip grating on top.
1x Yellow coating RAL 1016 (Paint schedule attached)

Koseq Rigid Sweeping Arm

5.1.2 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
Website: www.marflex.com

Purchase year: 2008

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.

Specification:

Design:	Single stage centrifugal
Capacity/head:	360 m^3/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 “

Marflex Pumps

5.1.3 Set of Oil and hydraulic 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: 2008

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

Specification:

Oil hoses:

Cargo hose (150MM) 4.5 M DANTEC with camlock
Cargo hose (150MM) 4.5 M DANTEC with camlock
Cargo hose (150MM) 4.5 M DANTEC with camlock
Cargo hose (150MM) 4.5 M DANTEC with camlock
Bunker hose (6") 8M Lay flat (5-7 BAR) with camlock
Bunker hose (6") 8M Lay flat (5-7 BAR) with camlock
Bunker hose (6") 8M Lay flat (5-7 BAR) with camlock
Bunker hose (6") 8M Lay flat (5-7 BAR) with camlock
Bunker hose (6") 8M Lay flat (5-7 BAR) with camlock
Bunker hose (6") 8M Lay flat (5-7 BAR) with camlock
Hose layflat (38MM) 30 M 2X1.5BSP couplings
Hose layflat (38MM) 30 M 2X1.5BSP couplings

Oil Hoses

Hydraulic hoses:

a) 3 hydraulic hoses from the HPP to the crane pedestal:
1 pressure hose:
Make: Dunlop
Type: 790 G
Diameter: 1 inch
Length: 20 m
Work pressure: 380 Bar
Burst pressure: 1520 Bar

Couplings: Quick release stainless steel, male/female, PH, V4a, BG6
Make: Dunlop
Type: 222 T
Diameter: 1 ½ inch
Length: 20 m
Work pressure: 90 Bar
Burst pressure: 360 Bar
Couplings: Quick release stainless steel, male/female, PH, V4a, BG8
1 leak hose:
Make: Dunlop
Type: 241 T
Diameter: ½ inch
Length: 20 meter
Work pressure: 350 Bar
Burst pressure: 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

5.1.4 Water injection pump set

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

Purchase year: 2008

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.

Water injection unit

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.

5.1.5 Water hoses

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

Purchase year: 2008

Length: 30 meters

Water hoses

5.1.6 Hydraulic hoses (pressure and return)

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

Purchase year: 2008

These hydraulic hoses are used for the hot water injection pump set

Length: 20 meters

5.1.7 Lifting crane/davit Lagendijk SK 5/10-5000/1000

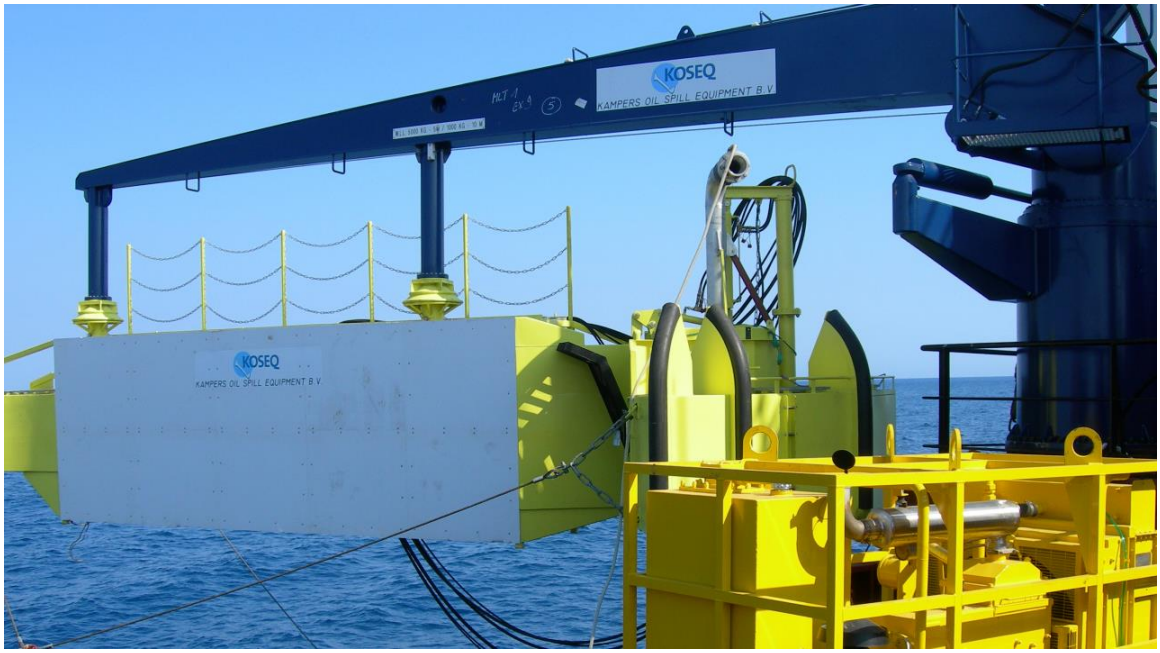
Manufacturer:

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

Purchase year: 2008

Specification:

Type:	SK 5/10-5000/1000
Main dimensions:	Length: 13.43 – Width: 1.8 – height: 4.1 meters
Propulsion:	Hydraulic
Lifting capacity:	5000 kg – 5.9 meters / 1000 kg – 10.2 meters
Tilt:	3º max.



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

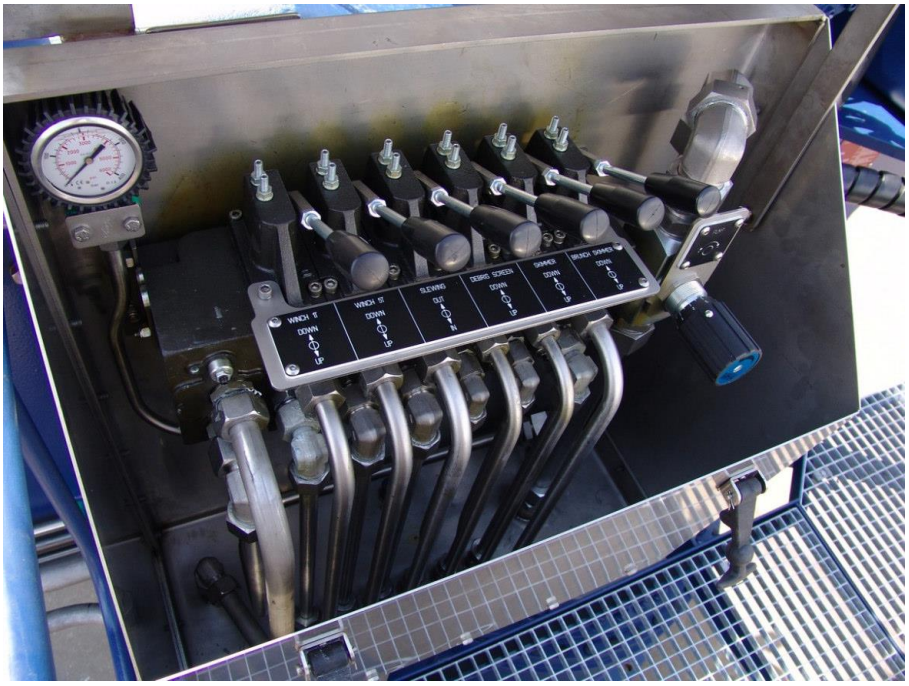
5.1.8 Hydraulic Control Desk

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:

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

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.



Hydraulic Control Desk

5.1.9 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
Website: http://www.koseq.com

Purchase year: 2008

Explosion proof, ZONE II certified, diesel driven Hydraulic Power Packs (HPP). The HPP's are 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
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 ºC
High temperature of engine's cooling system,100 ºC.
Over speed of diesel engine 2000 rpm.
Hand operated emergency stop which is closing the air inlet valve.
Operation temperature: -20 ºC. to + 50 ºC.

Hydraulic system:
Hydraulic pump: Parker. PV 140 variable axial plunger.
Hydraulic system: Open.
Hydraulic oil flow: 200l 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: 2200 mm.
Width: 1340 mm.
Height: 2210 mm.
Volume of the diesel fuel tank: 400 litres
Volume of hydraulic oil tank: 230 l.
Volume of coolant system: 120 l.
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.

Koseq Hydraulic Power Pack

5.1.10 Flat rack trailers

There are 4 flat rack two 40 ft. trailers for transportation of the equipment. The equipment is distributed as follows:

Two 40 ft. trailers are used for transportation of one 15 meter rigid sweeping arm, one handling crane, one HPP and two wooden boxes with ancillary equipment.
One trailer: for one 15-meter rigid sweeping arm
One trailer: for one handling crane, one hydraulic power pack, one heavy oil skimmer with brush and two wooden boxes for the hydraulic hoses, wires ancillary equipment.
These trailers do not have ABS system and therefore cannot be used outside port areas.

Flat Rack Trailers

5.1.11 Spare parts sets

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
Website: http://www.koseq.com

Purchase year: 2008

Two spare parts sets consist of consumables and spare parts for the sweeping arm set.

5.2 Vikoma boom system

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

Purchase year: 2008

The Set of Vikoma High Sprint Boom 2000 consists of:
2 x 250m Vikoma High Sprint Boom 2000 sections
2 Vikoma Type 600 Boom Reels
2 Sets of towing ropes and bridles
2 Air pack inflators AP/0080 with boom deflator kit

5.2.1 Vikoma High Sprint Boom 2000 section (to be replaced with new ones)

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)

Vikoma High Sprint Boom 2000 section

The disposal of the replaced boom sections should be done to a proper facility in environmentally friendly way.

5.2.2 Type 600 Boom Reel (<u>to be overhauled</u>)

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

Specification:

Dimensions	
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

Type 600 Boom Reel

5.2.3 Towing bridle and ropes set (<u>to be replaced</u>)

Specification:

Towing bar	Marine grade aluminium, self-buoyant
Strops	High integrity webbing (no metal)
Rope	Polypropylene self-buoyant

5.2.4 Air pack inflator AP/0080 with boom deflator kit (<u>to be overhauled</u>)

Specification:

Dimensions	
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
Control	Via engine speed
Construction	
Frame and belt cover	Marine grade aluminium alloy

Air pack inflator AP/0080

5.3.1. Skimmer frame and Brush Module

The Lamor free floating offshore Skimmer LFF 100 2C is a skimmer designed for open ocean oil recovery operations.

The LFF 100 2C is fitted with two V-chain-pocket- brush type conveyors for efficient collection of all types of floating oil from light to high viscosity oils and emulsion. Each brush chain conveyor consists of four brush chains. LFF 100 2C is equipped as standard pump outlet of 5'' and Micro-control MC-3-5 Electric actuator PVEA 157B4735.

Lamor Skimmer LFF 100 2C

The skimmer is hydraulically operated and fitted with two thrusters to allow the operator to manoeuvre the skimmer to where oil is most heavily concentrated. The skimmer is designed to collect these heavy materials floating on the water surface or submerged below the surface and feed the oil into a Lamor Archimedes screw pump.

A mechanical feeder skimmer lifts or drags - by means of more than just adhesion – the oil out of the water to a position above the water surface, and feeds or drops it into a collection tank and to the oil transfer pump. The mechanical feeder principle results in a significantly increased performance regarding high viscosity oils, debris, and low water recovered content.

Skimmer deployment

Technical specifications

Length	2290 mm
Width	2250 mm
Height	1946 mm

Weight of the skimmer head	750 kg
Weight with the pump	830 kg
Design capacity	140 m3/h
Cap. Certified (1 mill cSt)	102,6 m3/h
Max tested capacity	202 m3/h
Hydraulic flow (skimmer only)	40-60 l/min
Hydraulic pressure	210 bar
Power requirement	30 kW
Free water collected	< 2 %

The skimmer operation requires a crane with enough lifting capacity and range to place the unit in the water from the storage position.

The Lammor LFF 100 2C is fitted with a “sea catch” quick-release hook to facilitate the deployment. In addition an especial hook facilitates the retrieval of the unit.

5.3.2. Oil Hoses

The standard Lamor hose set is designed not only to support the hydraulic and transfer hoses but also to act as an oil boom supporting and feeding the skimmer with oil during operation. Electric cable powering the EX PVG valves and the radio remote control are also included.

The floating hose set includes the following components:

3 x Layflat 5’’ transfer hose length 20 m each, totally 60m

2 x hydraulic hoses 1’’ length 60m

1 x hydraulic hoses 3/8’’ length 60m

1 x hydraulic hoses 1/4’’ length 60m

1 x water injection hose 3/4’’ length 60m

1 x electric cable for radio remote control, length 60m as back-up for the remote control.

5.3.3 Storage reel

The light weight reel frame is manufactured in steel and the spool in marine grade aluminium. The reel frame comprises fork lift channels and 4-point lifting points as standard for easy handling both on and offshore. The reel is equipped with Stainless Steel rotary swivel mounted in the reel drum for hose connection.

The winder frame comprises fork lift channels and 4-point lifting points. The reel is driven by 1 hydraulic motor.

Standard hydraulic connectors: Tema 3811/3821

5.3.4 Oil Transfer Pumps: Lamor PDAS GT A 140

This item is the same as the item described under point 5.1.7

5.3.5 Water Injection Kit ¾'' GT A 140/inlet

This item is the same as the item described under point 5.1.19

5.3.6 Remote Control

The remote control allows the operator to control all the different elements of the skimmer.

It is a 24V Ex Proof design: Receiver EEX d/e IIB T5, remote control terminal EEx ib T4. The controls typically include:

- 1 pc remote terminal MC-3-6 ATEX approved zone 1
- 1 pc electric control terminal for ZONE 1
- Base unit RX Ex zone 1 T4
- charger 230VAC and 24 VDC (not Ex)
- cable for emergency use if error with remote control 5m

Length: 340 mm

Width: 220 mm

Height: 220 mm

Weight: 2,3 kg

LFF 100 2C remote control

5.3.7 Sea catch/ Release Set for Skimmer

Off-shore Skimmer deploying and retrieving is easily and safely carried out by using the Sea Catch Release unit.

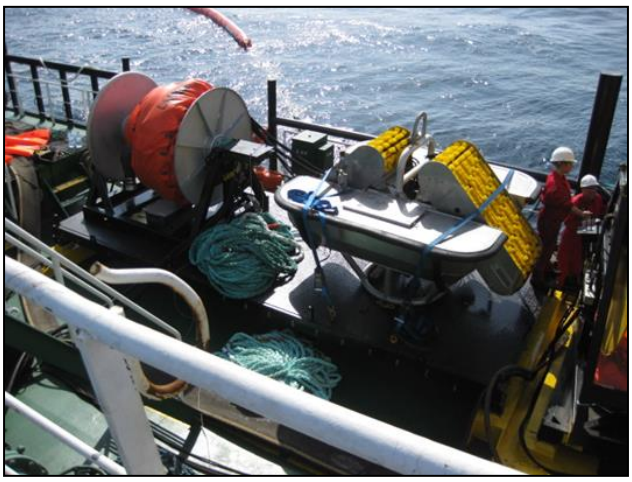
The following elements are included in the Catch/Release Set:

- SeaCatch TR 7 LM hook
- Aluminium lifting stick with support for S424 hook, L-5m
- Lifting hook S424 aluminium
- Duplex webbing lifting sling 60 mm 2T L-2m
- Lifting ring 2,2T (60x110) 8-7 NOR87
- Shackle 22mm, bow-type
- Shackle 19mm, bow-type

5.3.8 Storage Container 20 ft

The 20 ft. ISO standard container come equipped with twist locks for transportation, lifting hooks and forklift channels as standard.

The flat rack container is fitted with anti-slip floor for safety and brackets for equipment to be safely secured.



Skimmer and winder on the flat rack

5.3.9 – 5.3. 10 Spare Parts

Includes spare parts for skimmer and for GT A 140 pump.

5.3.10 Hydraulic Power Pack LPP 90 Cu

Hydraulic Power Pack LPP 90 Cu

The Lamor Power Pack LPP 90 Cu is powered by a water cooled Cummins turbocharged/intercooled diesel engine and serves as a high capacity multipurpose powerpack designed for the flexible operation of many types of hydraulically operated oil spill clean-up equipment.

The 4-cylinder engine is an in-line design with full-authority electronic controls and combines powerful performance with cost effectiveness. A High Pressure Common Rail (HPCR) fuel system delivers greater power at every rpm. Together with vertically centered fuel injection and a symmetrical cylinder bowl, it produces exceptional low-end torque and power with reduced emissions and increased fuel efficiency. Additional torque and faster throttle response make it the perfect choice for many applications. The engine is certified according to the following emission certificates: U.S. EPA Tier 3,

CARB Tier 3 and EU Stage IIIA.

Equipped with 3-11 hydraulic circuits the Lamor LPP 119 Cu can be used to power multiple users such as a skimmer and boom winder consecutively. The Lamor LPP 119 Cu is containerized within a steel frame designed to ensure a good circulation for the air cooled diesel engine.

The Lamor LPP 90 Cu is equipped with electric start and incorporates control panel and hydraulic oil cooler in the framework. The Lamor LPP 90 Cu utilizes a Danfoss PVG-100 Proportional Hydraulic Valve System making it possible to easily adjust the flow of oil to the supplied components. The flow will always remain set even when the pressure varies according to consumption.

The Lamor LPP 90 Cu is equipped with 4 point lifting rings and forklift channels making it easy to handle on land or offshore. For safety the LPP 90 Cu power pack is equipped with an automatic shut down system, also the power pack can be equipped with a spark arrestor or Chalwyn safety shut down valve.

Technical Specifications

Length:	ca 2300 mm
Width:	ca 1400 mm
Height:	ca 1800 mm
Weight:	ca 2000 kg
Power:	90 kW
Hydraulic flow;	320 l/min
Hydraulic pressure:	210 bar
Fuel tank capacity:	200 l
Hydraulic oil tank capacity:	400 l
Speed:	2200 rpm

4. Flow meter

KROHNE UFM 3030 is a universal 3-beam in-line ultrasonic flowmeter for liquids

- Independent of conductivity, viscosity, temperature, density and pressure
- No moving or intruding parts, therefore no pressure loss or wear
- Minimal operational and maintenance costs

UFM 3030 is a 3-beam ultrasonic flowmeter for liquids. UFM 3030 measures independent of conductivity, viscosity, temperature, density and pressure.

Highlights

- Three beams generate a measurement effectively independent of flow profile
- Major performance improvement by applying innovative electronics and digital signal processing (DSP)
- Easy to install and operate
- No moving or intruding parts, no wear, no drift, therefore no additional pressure loss
- No material build-up as unobstructed flow sensor with smooth surface finish
- Insensitive to corrosive or abrasive products

5. Cleaning machines

NILFISK ALTO NEPTUNE 5-51 DE (MH 5M-200/1000 DE) Heavy Duty Professional Diesel Driven Hot Water Pressure Washer

Compact design, high performance and productivity - a simple and efficient cleaning tool.

The NEPTUNE 5-51 DE offers a fully mobile cleaning option powered by a Yanmar Diesel Engine. Ideal for use in the construction or industrial segments and by contract cleaners.
Fitted with a high efficiency Ecopower boiler that is 92% efficient, resulting in low running costs and ease of use. A truly portable machine for hot and cold water usages, delivering 900 ltrs/hr water flow at 200 bar max pressure.

Technical characteristics

NEPTUNE DE			NEPTUNE 5-51DE
Motor	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
Heat exchanger	Fuel pressure	bar	10
	Fuel consumption dt = 45°c	kg/h	3,9
	CO_2 content (min.)	%	10,5
	Soot rating		0
	Efficiency	%	92
	Onboard fuel tank	Litre	57
	Heater rating	kW	81
	Delta T @ working pressure	°C	81
Generator	Type		t16W-75
	Effect	W	1000
	RPM @ HP and Boiler	RPM	2825
	Pulley Size		SPZ 63/1 - 6 Nm
	Belt dimension Motor/Gen.		SPZ 670
Dimensions and weight	Length	mm	970
	Width	mm	780
	Height	mm	1000
	Weight	kg	220
Miscellaneous	Sound power level CE, Lwa	Db	110
	High-pressure hose DN8	m	15
	HP nozzle		0450