

Appendix 1 to the Invitation to Tender
Procurement procedure EMSA NEG/23/2015
Storage of Oil Pollution Response Equipment in Copenhagen

List of Equipment

Ref. Nº ¹	CATEGORY	Ref. Nº	SUB-CATEGORY	DESCRIPTION	ID CODE	Unit
1.1	SWEEPING ARM SET	1.1.1	SWEEPING ARM	LAMOR STIFF LJS 12m. RIGID SW.ARM	AOBM362201	ITEM
				LAMOR STIFF LJS 12m. RIGID SW.ARM	AOBM362202	ITEM
		1.1.2	SKIMMER MODULE	BRUSH	AOBM310701	ITEM
				BRUSH	AOBM310702	ITEM
		1.1.3	SKIMMER MODULE	WEIR	AOBM314401	ITEM
				WEIR	AOBM314402	ITEM
		1.1.4	PUMP	MARFLEX CENT. PUMP MSP150 300M3/H	AOBM313201	ITEM
				MARFLEX CENT. PUMP MSP150 300M3/H	AOBM313202	ITEM
		1.1.5	CRANE	DAVIT CRANE SYSTEM HIDROACAR	AOBM131501	ITEM
				DAVIT CRANE SYSTEM HIDROACAR	AOBM131502	ITEM
		1.1.6	TOWING LINES SET	ROPES AND CHAINS FOR SWEEPING ARM	AOBM374201	SET
				ROPES AND CHAINS FOR SWEEPING ARM	AOBM374202	SET
				ROPES AND CHAINS FOR SWEEPING ARM	AOBM374203	SET
				ROPES AND CHAINS FOR SWEEPING ARM	AOBM374204	SET
		1.1.7	HYDRAULIC HOSES	HYD. HOSE FOR BRUSH AND WEIR SKIMMER	AOBM223801	SET
				HYD. HOSE FOR BRUSH AND WEIR SKIMMER	AOBM223802	SET
				HYD. HOSE FOR MSP 150	AOBM223803	SET
				HYD. HOSE FOR MSP 150	AOBM223804	SET
		1.1.8	OIL HOSES	SEMI RIGID CAMLOCK	AOBM263601	SET
				SEMI RIGID CAMLOCK	AOBM263602	SET
				SEMI RIGID CAMLOCK	AOBM263603	SET
				SEMI RIGID CAMLOCK	AOBM263604	SET
		1.1.9	STORAGE REEL	HOSE WINDER LHW 40/2-AL	AOBM353401	SET
				HOSE WINDER LHW 40/2-AL	AOBM353401	SET
		1.1.10	POWER PACK	POWER PACK LAMOR LPP 90 CU	AOBM272801	SET
				POWER PACK LAMOR LPP 90 CU	AOBM272802	SET
				POWER PACK LAMOR LPP 90 CU	AOBM272803	SET
		1.1.11	ANCILLARIES	COVER FOR POWER PACK	AOBM271401	ITEM
				COVER FOR POWER PACK	AOBM271402	ITEM

¹ The reference numbers correspond to the relevant paragraphs of the equipment description in section 5 of this document

				COVER FOR POWER PACK	AOBM271403	ITEM
				SPARE PARTS FOR MSP 150	AOBM343101	SET
				SPARE PARTS FOR LPP90 CU	AOBM343102	SET
				CANVAS FOR BRUSH MODULE	AOBM351401	ITEM
				CANVAS FOR BRUSH MODULE	AOBM351402	ITEM

Ref. N°	CATEGORY	Ref. N°	SUB-CATEGORY	DESCRIPTION	ID CODE	Unit
1.2	BRUSH SKIMMER LFF 400W	1.2.1	SKIMMER MODULE	BRUSH SKIMMER LFF 400 W	AACI310701	ITEM
		1.2.2	SKIMMER THRUST.	RADIO CONTROLLED THRUSTERS	AACI324101	ITEM
			SKIMMER THRUST.	RADIO CONTROLLED THRUSTERS	AACI324102	ITEM
		1.2.3	PUMP	OIL TRANSFER PDAS PUMP GT A 115	AACI283201	ITEM
		1.2.4	HYDRAULIC HOSE	HYD. HOSE SET FOR LFF 400 W	AACI223801	SET
			OIL HOSES	UMBILICAL CHORD - OIL HOSES 5" (60 meters)	AACI263801	SET
		1.2.5	REEL	HOSE WINDER	AACI353401	ITEM
		1.2.6	REMOTE CONTROL	REMOTE CONTROLL FOR SKIMMER	ACCI291301	ITEM
1.3	BRUSH ARCTIC SKIMMER LAS 125 W/P	1.2.7	FLAT RACK	FLAT RACK CONTAINER 20 ft. FOR SKIMMER	AACI352001	ITEM
		1.2.8	SPARE PARTS	SPARES KIT FOR LFF 400 W	AACI343101	SET
		1.3.1	SKIMMER MODULE	BRUSH ARTIC SKIM. LAS 125 W/P	AACI310703	ITEM
		1.3.2	SKIMMER FRAME	FLOAT FOR LAS	AACI302201	SET
			SKIMMER FRAME	FLOAT FOR LAS	AACI302202	SET
		1.3.3	OIL HOSE	OIL HOSES FOR LAS 125	AACI263802	SET
			HYDRAULIC HOSE	HYD. HOSES FOR LAS 125	AACI223802	SET
		1.3.4	REEL	HOSE WINDER	AACI353403	ITEM
		1.3.5	PUMP	OIL TRANSFER PDAS PUMP GT A 115	AACI283202	ITEM
		1.3.6	FLAT RACK	FLAT RACK CONTAINER 20 ft. FOR LAS 125	AACI352002	ITEM
		1.3.7	SPARE PARTS	SPARES KIT FOR LAS 125	AACI343102	SET

Ref. N°	CATEGORY	Ref. N°	SUB-CATEGORY	DESCRIPTION	ID CODE	Unit
1.4	NORMAR 250 TI SKIMMER SET	1.4.1	BRUSH/DISC SKIMMER MODULE	NORMAR BRUSH-/DISC SKIMMER, FRAME, THRUSTERS AND CUTTING DEVICE FOR DEBRIS	CMPI310702	SET
		1.4.2	PUMP 2	DESMI DOP DUAL PDAS PUMP 125 M ³ /hr	CMPI280005	ITEM
				DESMI DOP DUAL PDAS PUMP 125 M ³ /hr	CMPI280006	ITEM
		1.4.3	WEIR SKIMMER MODULE	NORMAR WEIR SKIMMER WITH 4 FLOATS, FRAME, 2 THRUSTERS , HYDRAULIC DRIVEN PUMP WITH CUTTING DEVICE FOR DEBRIS, DEBRIS SCREEN	CMPI314402	SET
		1.4.4	PUMP 1	MARIFLEX MSP-150 CENTRIFUGAL PUMP 300 M ³ /hr	CMPI280004	ITEM
		1.4.5	POWER PACK	NORMAR DIESEL POWERPACK EX 3G ZONE II, 107KW AT 2100RPM AND 120KW AT 2400RPM	CMPI270001	SET
		1.4.6	REEL WITH INTEGRATED CRANE AND UMBILICAL HOSE	HYDRAULIC STORAGE REEL INTEGRATED UMBILICAL, DN150 FLOATING HOSE, LENGTH 80M, DIAMETER 6" AND FLOWMETER INTEGRATED TELESCOPIC CRANE, SAFETY FACTOR 2	CMPI130001	SET
		1.4.7	STORAGE FLAT RACK	20' FLAT RACK ISO CORNERS FOR STORAGE AND TRANSPORTATION OF THE NORMAR SKIMMER	CMPI352002	ITEM
		1.4.8	ANCILALARIES	LIFTING ARRANGEMENT AND PROTECTIVE CANVAS FOR BRUSH SKIMMER HEADS	CMPI120002	ITEM
				LIFTING ARRANGEMENT AND PROTECTIVE CANVAS FOR WEIR SKIMMER HEAD	CMPI120001	ITEM
				LIFTING ARRANGEMENT AND PROTECTIVE CANVAS FOR HOSE REEL	CMPI120003	ITEM
		1.4.9	REMOTE CONTROL	CAVOTEC REMOTE MICRO-CONTROL MC-3 SERIES, OPERATING RANGE 100-1000M,EX PROOF	CMPI290002	ITEM
		1.4.10	HYDRAULIC HOSES SET	HYDRAULIC HOSES SET, 3*20M	CMPI223806	SET
		1.4.11	OIL HOSES SET	OIL HOSE 5", 2x6"10M	CMPI263802	SET
		1.4.12	SPARE PARTS	SPARE PARTS	CMPI343103	SET

Ref. N°	CATEGORY	Ref. N°	SUB-CATEGORY	DESCRIPTION	ID CODE	Unit
1.5	SLICK DETECTION SYSTEM SEADARQ	1.5.1	SEADARQ SOFTWARE	SEADARQ	AACJ333501	ITEM
		1.5.2	RADAR	RADAR X-BAND	AACJ143301	ITEM
		1.5.3	ANTENNA	8 FEET ANTENNA	AACJ140301	ITEM
		1.5.4	INTERFACE BOX	INTERFACE KIT	AACJ332301	ITEM
		1.5.5	MONITOR	DISPLAY 19" RACK	AACJ202701	ITEM
		1.5.6	JUNCTION BOX	JUNCTION BOX	AACJ332401	ITEM
		1.5.7	STORAGE	WHEELED STORAGE BOXES FOR HARDWARE	AACL352901	ITEM
				STORAGE BOX FOR RADAR	AACL352902	ITEM

Ref. N°	CATEGORY	Ref. N°	SUB-CATEGORY	DESCRIPTION	ID CODE	Unit
1.6	DISCHARGE SYSTEM	1.6.1	PUMP	PDAS PUMP GT A 115	AACE 283203	ITEM
		1.6.2	HYDRAULIC HOSE	HYD. HOSE FOR GT A 115	AACE 223803	SET
			OIL HOSE	OIL TRANSFER HOSE FOR GT A 115	AACE 263803	SET
		1.6.3	SPARE PARTS	SPARES FOR PUMP GT A 115	AACE 343101	SET
1.7	OIL IN WATER MONITOR	1.7.1	ODME	PPM READER HYDROSENSE 2410	AACD243001	SET
			ODME	PPM READER HYDROSENSE 2410	AACD243002	SET
		1.7.2	ANCILLARIES	STAND FOR PPM READER	AACD020201	ITEM
			ANCILLARIES	STAND FOR PPM READER	AACD020202	ITEM

Ref. N°	CATEGORY	Ref. N°	SUB-CATEGORY	DESCRIPTION	ID CODE	Unit
1.8	BOOM NO 450 S	1.8.1	BOOM	SELF INF. BOOM NORLENSE 450-S (400 m.)	AACA073601	SET
		1.8.2	AIR HOSES	AIR SUPP. /BACK UP AIR HOSES (30 m.)	AACA053601	SET
			AIR HOSES	AIR SUPP. /BACK UP AIR HOSES (30 m.)	AACA053602	SET
		1.8.3	TOWING LINES	TOW ROPE	AACA374201	SET
			TOWING LINES	TOW ROPE	AACA374203	SET
		1.8.4	HYDRAULIC HOSES	HYD. HOSES FOR BOOM	AACA223803	SET
		1.8.5	STORAGE REEL	BOOM REEL	AACA353401	SET
		1.8.6	AIR COMPRESSOR	HYD. COMPRESSOR HKL 4100/8-113	AACA042901	SET
		1.8.7	POWER PACK FRAME	HYD. PW-PK LPP 30	AACA272201	Item
			POWER PACK MOTOR	HYD. PW-PK LPP 30	AACA272801	Item
		1.8.8	SPARE PARTS	SPARES FOR HYD. POWER PACK	AACA343101	SET

1. DESCRIPTION OF EQUIPMENT

1.1 Sweeping Arm System

Manufacturer:

Lamor Corporation Ab
Urakoitsijantie 12
06450 Porvoo

Finland Tel: +358 (0)20 7650 100

Fax: +358 (0)207 650 129

Email: info@lamor.fi, Website: www.lamor.fi

Year of purchase: 2012



Fig. 1 LAMOR Stiff Sweeping Arm system LSS 12m

The sweeping arm system is supplied with an integrated weir skimmer and a brush module skimmer that can be assembled to the arm for recovery operations of high viscous oils. The skimmer may be equipped with a centrifugal pump with screw impeller, Marflex MSP150-63 or with a LAMOR PDAS GT A 115 pump. The sweeping system includes the following components:

- Rigid Sweeping Arm Structure
- Brush Skimmer Module

- Weir Skimmer Module
- Pump Marflex Centrifugal MSP150-63
- Davit Crane System
- Towing lines set
- Hydraulic Hoses
- Oil Transfer Hoses
- Storage reel
- Power Pack LPP 90 CU
- Ancillaries: spare parts and canvas

1.1.1 LAMOR Stiff Sweeping Arms LSS 12m

Each sweeping arm consists of an outer pontoon, a bridge and an inner pontoon welded together. The inner pontoon contains the weir collection chamber in which the pump (centrifugal or PDAS) is fitted. In this inner pontoon may be fitted the Brush skimmer module.

Sweeping arm dimensions

Width:	approx. 3300 mm
Length:	approx. 12000 mm
Height:	approx. 1900 mm
Weight:	approx. 4000 kg

The construction is made of aluminium and steel. The oil guiding plate is of polyethylene, an easy to clean, glossy surface where the oil does not stick.

Sweeping arm performance parameters

Significant wave height:	1.5 m to 2 m
Recovery speed:	up to 3 knots
Sweeping width:	20 m + vessel beam
Recovered water:	< 5 % of total recovered volume (Brush skimmer pack)
Type of Oil to recover:	All grades and ages, including debris, seaweed and tar balls.
Min air temperature:	- 20 °C
Min water temperature:	0 °C

Max operating temperature:

+ 60 °C

1.1.2 Brush Skimmer

The 5 Chain LAMOR Brush Conveyor Belt is a removable recovery system for oil spills on the water surface. The Brush Pack consists of 5 parallel brush chains, driven by a hydraulic motor and controlled by a control panel. The “brush conveyor” is supported and protected within a stainless steel frame. The brush cleaning mechanism is a comb-like device mounted at the upper end of the brush conveyor. During operation, the cleaner is positioned below the top axle of the conveyor, to allow recovered oil and debris to drop directly into the discharge chamber from which it is transferred to a storage tank on board by the oil transfer pumps. The conveyor belt is mounted in the apex of the Stiff arm and is removable.

The sweeping arms may be equipped with the LAMOR GT A 115 PDAS pumps as they are more adequate to handle high viscous oils and the pumping rate meets the feeding capacity of the brush chains.



Fig. 2 LAMOR Stiff Sweeping Arm LSS 12m – brush skimmer module

Technical Specifications

Operational Sea State:

Effective in 2 meter significant waves and wind driven chop. This is highly depending also on

	the vessel size used.
Viscosity Range:	0 to > 3,000,000 cSt
Dimensions:	5 Brush Chains mounted in steel frame approx. 2000 mm long (between shafts)
Brush Cleaner:	Patented cleaner/comb installed at upper end for gravity discharge of oil and debris into collection hopper.
Hydraulic Motor:	Danfoss type, Installed and fitted with Quick Disconnects.

Once dismantled the sweeping arm recover the oil directly with the weir skimmer.

1.1.3 Weir Skimmer

The brush conveyor belt can be removed from the skimmer apex to create a weir type skimming system. The weir module consist of a stainless steel hopper in which bottom is fitted the oil pump. In the fore part of the hopper is assembled a plate that hinges up and down depending on the oil-water inflow rate. For the operation with the weir skimmer the sweeping arms may be fit with the Centrifugal screw impeller pumps MSP 150.



Fig. 3 LAMOR Stiff Sweeping Arm LSS 12m – weir skimmer module

1.1.4 Marflex Centrifugal Pump MSP150

Manufacturer:

Marflex B.V.

Postal Address:

Louis Pasteurstraat 12

3261 LZ Oud-Beijerland

The Netherlands

Phone: +31 186 89 02 00

Fax: +31 186 89 02 49

E-mail: info@marflex.com

www.marflex.com

Year of purchase: 2012

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

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



Fig. 4 Marflex Centrifugal Pump MSP150

Technical Specifications

Design:	Single stage centrifugal
Capacity/Head:	360m ³ /h-40 mcl
Viscosity/Specific Gravity:	1.0 Cst. At 20°C/1.0
Speed:	2000 rpm. maximum
Hydraulic Motor Type:	Axial Plunger with Mechanical Seal.
Hydraulic working Pressure:	200 bar
Maximum Pressure:	320 bar
Maximum Return Pressure:	6 bar
Maximum oil flow:	130 l/min
Outer Diameter:	490 mm
Height:	610 mm
Weight excluding hoses:	85 kg
Hydraulic connections (Tema quick couplings):	1" Tema 10021, 3/4" Tema 7511, drain 3/8" aroequip.
Power required:	50 kW
Discharge connector:	6" Camlock or flange (included adaptor to 5")
Materials:	Housing – Aluminium Impeller – Nodular Cast Iron Seals – Nitrile Hydraulic Motor – Cast Steel Quick Couplings – Yellow Passivated Steel

1.1.5 Davit Crane System Hidroacar

Manufacturer:

Hidroacar Ind. Machinery Industry&Trade Ltd. Co

Soganlik Yeni Mah. Balikesir Cad.No.6 Uprise Elit Residence K.17 D.154, Kartal,

Turkey

Telephone: 90-216-2901330

Fax: 90-216-2901332

Mobile: 90-5334138739

Year of purchase: 2012



Fig. 5 Davit Crane System Hidroacar

The Rigid Sweeping Arm Deployment Crane fulfils the requirements of the CE directive (Finnish Government Decree 400/2008, machinery directive 2006/42/EC and Government Decree on the Safe Use and Inspection of Work Equipment 403/2008).

Technical Specifications

Capacity (SWL):	6 tons at 5,7 m 4,5 tons at 12,7 m
Length of Jib (radius):	12,7 m
Height of mounting pedestal:	3074 mm
Construction material:	DIN 17100 ST-52-3, EN 10025 S355J2G3
Hinge pins:	Stainless steel
Hydraulic pipes and fittings:	Stainless steel
Revolution angle:	180 degrees
Capacity of Hoisting Drum:	1. Hoisting Drum : 6 ton, single wire with 8.5t 2. Hoisting Drum : 4,5 ton, single wire with 8.5t
Hoisting speed;	3 meters/min
Crane class:	A-3
Machinery class:	M-4
Weight:	~ 8.000 kg
Hydraulic operation pressure:	max 210 bar

The crane is mounted on the foundation which is fastened to the deck by twist locks.

1.1.6 Towing lines and chains set

The Towing lines and chains set consists of:

- 50 meter / 40 mm ropes for securing the LSS sweep arm;
- Towing chains and slings for securing the LSS sweep arm.

1.1.7 Sweeping Arms hydraulic hoses and couplings

The equipment is supplied with all necessary hydraulic hoses and some spares. The hoses are manufactured in a durable material for long service and supplied with reliable stainless steel "Tema" connectors for secure linkages.

Technical Specifications

Tube:	oil resistant synthetic rubber
Reinforcement:	2 high tensile steel wires braid
Cover:	abrasion and weather resistant synthetic rubber
Temperature range:	-40 C to +100 C (+120 C max)

1.1.8 Oil hoses

The equipment is supplied with 4 Semi-Rigid Oil Transfer Hose 6" x 10m, Camlock

Technical Specifications

Inner tube:	oil and petrol resistant NBR, black. smooth
Reinforcement:	synthetic textile, braids with embedded steel helix
Cover:	oil and weather resistant CR, black
Temperature range:	-40 C to +100 C
Electrical properties:	conductive tube
Standard/Approval:	: EN 1761, EN 12115
Inner diameter:	152 mm
Outer diameter:	170 mm
Bending radius:	1220 mm
Working pressure:	15 bar
Weight (total operational):	5,2 kg/m
Length:	10000 mm



Fig. 6 LSS 12m, oil hose connected to weir skimmer module

1.1.9 Hose Winder LHW 40/2-AL

The Lamor Hose Reel is designed to store hydraulic and oil transfer hoses. The frame is produced in steel protected with marine grade painting. The reels are sea water resistant aluminium. The construction allows the transfer hoses and the hydraulic hoses to be winded and locked separately. The frame is equipped with 4-point lifting points and forklift channels.



Fig. 7 2 Hose Winders LHW 40/2-AL with hydraulic hoses for LSS 12m

Technical Specifications

Max. capacity:	40 m hydraulic hoses and 200 m layflat hose (alternatively approx. 40 m rigid transfer hose).
Hose reel package weight:	40 m Hydraulic hose weight approx. 40 kg 200 m Layflat oil transfer hose weight approx. 450 kg With the hose winder (110 kg) the whole package weight is approx. 600 kg.
Length:	1300 mm
Width:	1300 mm
Height:	1535 mm
Weight:	110 kg
Capacity:	40+200 m
Reel diameter:	1300 mm

1.1.10 Hydraulic Power Pack LPP 90 Cu



Fig. 8 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

1.1.11 Ancillaries: spare parts and canvas

The set of ancillaries consists of:

- Canvas for the power pack LPP 90 Cu

Dimensions:

2350x1450x1850 mm.

- Spare part kit for MSP 150
- Spare part Kit for the power pack LPP 90 Cu

The Lamor spare parts kits include all necessary items for field repair and maintenance.

1.2. Brush Skimmer LFF 400 W

Manufacturer:

Lamor Corporation Ab
Mestarintie 25
06150 PORVOO
FINLAND

Tel: +358 (0)20 7650 100,

Fax: +358 (0)207 650 129

Email: info@lamor.fi

Year of purchase:

2006

The Lamor Free Floating Offshore Skimmer (LFF 400) is a high capacity skimmer designed for open ocean oil recovery operations. LFF 400 is fitted with two hydraulic thrusters, allowing the operator to manoeuvre the system. The radio remote control system, included as standard to the skimmer system, can operate the skimmer functions from a distance of up to 200 m. Surface water and oil are drawn into the skimmer by the downward rotation of the oleophilic brush wheels on all four sides of the skimmer head. Oil adheres to the rotating brush wheels, and is separated and cleaned from the brushes into a collection sump. Oil collected in the sump is then offloaded by the Lamor GT A pump and transferred via a floating hose. The LFF 400 brush wheels collect all oil types, including diesel, fresh crude, high viscosity bunker oil and emulsions. The skimmer set consists of: brush module with thrusters, integrated oil transfer PDAS pump Lamor GTA 115, hydraulic hose set, hose winder (60 m), radio (Remote Control) box for the skimmer / thrusters, flat rack container (20 ft) and spare parts set.

1.2.1 Skimmer brush module

The LFF 400 brush wheels collect all oil types, including diesel, fresh crude, high viscosity bunker oil and emulsions. LFF 400 is fitted with two hydraulic thrusters, allowing the operator to manoeuvre the system.



Fig.9 Brush Skimmer LFF 400 W

Technical Specifications

Length:	2280 mm
Width:	2280 mm
Height;	1955 mm
Weight	750 kg
Capacity:	250 m ³ /h
Hydraulic flow:	40 – 60 l/min
Hydraulic pressure:	100 – 200 bar
Power req.:	10 – 20 kW

1.2.2 Skimmer Thrusters

The LFF 400 is fitted with two hydraulic thrusters, allowing the operator to manoeuvre the system to where oil is most heavily concentrated. The remote control system is included as standard to the skimmer system.

1.2.3 Oil Transfer PDAS Pump Lamor GTA 115

The pump is a multi-purpose submersible Archimedes screw pump with a pumping capacity of 115 m³/h. The skimmer is fitted with one pump.

The pump is constructed from seawater resistant aluminium for the casings and stainless, acid proof steel internals with special seals that ensure the pump remains “dry”. The hydraulically driven, positive displacement pump with low screw speed avoids further emulsification of the recovery product thus making further separation more efficient. The pump can handle solids up to 30 mm in diameter, should the pump becomes clogged it can be reversed to expel the blockage.

Technical Specifications

Length:	500 mm
Width:	300 mm
Height:	598 mm
Weight:	71 kg
Capacity:	115 m ³ /h
Hydraulic flow:	160 max l/min
Hydraulic pressure:	210 max bar
Power req.:	56 max kW
Discharge pressure:	12 bar



Fig. 10 Oil Transfer PDAS Pump Lamor GTA 115

1.2.4 Hydraulic and Oil Hose Set for LFF 400 W

Components included in one set:

- Hydraulic Hoses: 60 m Q/R Tema 10000 - 3 pcs
- Lay Flat Hose 5": 20 m Kamlock - 3 pcs
- LFF 400 Hose floats: - 4 pcs



Fig. 11 Hydraulic and Oil Hose Set for LFF 400 W, on a hose winder

1.2.5 Hose Winder

The hose winder is designed to store hydraulic and oil transfer hoses. The frame is produced in steel protected with marine grade painting. The reels are sea water resistant aluminium. The construction allows the transfer hoses and the hydraulic hoses to be winded and locked separately. The frame is equipped with 4-point lifting points and forklift channels.

Technical Specifications

Length:	900 mm
Diameter:	750 mm
Height:	860 mm

Weight: 34 kg

Capacity: 60 m

1.2.6 Skimmer Remote Control Box



Fig. 12 Skimmer Remote Control

1.2.7 Flat Rack Container 20'



Fig. 13 Flat Rack Container 20' with the skimmer set

The containers, ISO standardised, are equipped with twist locks for transportation, lifting hooks and forklift channels as standard.

The container is an open type, tarpaulin covered flat rack type unit to enable easy deployment of the system. The containers come equipped with twist lock for transportation, lifting hooks and forklifts channels as standard. There is an anti-slip floor for safety and brackets and shelves for equipment to be safety secured.

Technical Specifications

Length:	6050 mm
Width:	2440 mm
Height:	2590 mm
Weight:	1250 kg

1.2.8 The spare parts kit for LFF 400 W

1.3 Brush Arctic Skimmer LAS 125 W/P

Manufacturer:

Lamor Corporation Ab
Mestarintie 25
06150 Porvoo
FINLAND

Tel: +358 (0)20 7650 100,

Fax: +358 (0)207 650 129

Email: info@lamor.fi

Year of purchase: 2006



Fig. 14 Brush Arctic Skimmer LAS 125 W/P with floaters

This skimmer is a special purpose oil recovery skimming system designed for operation in extreme cold and broken ice conditions. LAS 125 skimmer is normally deployed by crane or davit but it is also equipped with floats. The skimmer incorporates static ice deflection pipes and rotating brush wheels for oil separation and collection. The two brushes wheels collect and separate the oil from the water, any encountered ice pieces are crushed by the ice crushing screws inside the hopper and these screws also feed the oil to the efficient built-in Lamor GT A 115 PDAS type oil transfer pump.

1.3.1 Skimmer module



Fig. 15 Brush Arctic Skimmer LAS 125 W/P brush module

Technical Specifications

Length:	2980 mm
Width:	3110 mm
Height:	2182 mm
Weight:	830 kg
Weight with floats:	1160 kg
Capacity:	115 m ³ /h
Hydraulic flow (skimmer):	25 max l/min

Hydraulic pressure: 150 - 200 bar

Power req.: 20 - 30 kW

Discharge pressure: 12 bar

Note: The above weights are without GT A pump.

1.3.2 Floats for LAS 125 Skimmer

The sea water resistant aluminium floats can be attached to the skimmer. This way it can be transformed from a crane operated skimmer to a free floating offshore skimmer. The floats are shaped to guide the oil into the brush skimmer. The floats are equipped with four point lifting eyes.



Fig. 16 Floats for LAS 125 Skimmer (2 sets)

Technical Specifications

Length: 2980 mm

Width: 790 mm

Height: 900 mm

Weight: 165 kg each

1.3.3 Hydraulic and Oil Hoses for LAS 125 W/P Skimmer

The hydraulic hose set includes:

- 2x20 m hydraulic hoses for transfer pump,
- 2x20 m hydraulic hoses for brush wheels,
- 2x20 m oil transfer hoses 4",
- 2x20 m Steam hose $\frac{3}{4}$.

Weight: 270 kg.



Fig. 17 Hose Winder for LAS 125 W/P Skimmer with oil and hydraulic hoses

1.3.4 Hose Winder for LAS 125 W/P Skimmer

The Lamor Arctic Skimmer Hose Winder is designed to store hydraulic and the oil transfer hoses. The winder frame is produced is steel protected with marine grade painting. The winders are sea water resistant aluminium. The construction allows the transfer hoses and the hydraulic hoses to be winded and locked separately. The frame is equipped with 4-point lifting points forklift channels.

Technical Specifications

Length:	1300 mm
Width:	1300 mm
Height:	1535 mm
Weight:	110 kg
Capacity:	40 m

1.3.5 Oil Transfer PDAS Pump Lamor GTA 115

See description under the point 1.2.3

1.3.6 Flat Rack Container 20'

See description under the point 1.2.7



Fig. 18 Flat Rack Container 20'

1.3.7 The spare parts kit for LAS 125

1.4 NorMar 250 TI High Capacity Skimmer Set

Manufacturer:

NOREN Bergen AS

Sørehavnveien 41

5179 Godvik

NORWAY

www.noren.no

Tel: +47 55 50 86 70

AllMaritim AS

Postboks 51

5812 Bergen

NORWAY

www.allmaritim.com

Tel: +47 55 33 61 60

Fax: +47 55 33 61 61

Year of purchase: 2012



Fig. 19 NorMar 250 TI High Capacity Skimmer Set

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

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

The NorMar skimmer and hose handling system is designed to recover oil and oil emulsions with medium to high viscosity from the sea surface under calm to rough weather conditions. The skimmer has two thrusters to secure the best recovery position in the floating containment boom. The thrusters are hydraulically driven and controlled from the remote control box.

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

Operational weather conditions

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

1.4.1 Brush/Disc Skimmer module



Fig. 20 NorMar 250 TI High Capacity Skimmer Set. Brush/disc skimmer head.

The NorMar brush/disc skimmer is designed to recover oil with viscosities ranging from light to heavy oil. The cassette is equipped with four Archimedes screw soft shovels on all sides giving heavy oil recovery capacities up to 250 m³/h. The skimmer is not sensitive to floating debris due to the inlet guard mounted in front of the soft shovel segments. The skimmer is designed to be operational in 4 meter waves.

Technical specifications

Frame:	Aluminum
Transfer pumps:	2 x Desmi DOP-250 dual PDAS pump
Coupling:	6" flange coupling for floating hose
Floats:	4 x floats
Thrusters:	2 x 15 hp thrusters
Capacity:	250 m ³ /h
Discharge Pressure:	10 Bar
Skimmer:	4 soft shovel units
Length:	1910 mm
Width:	1910 mm
Height:	1600mm
Weight:	550 kg

1.4.2 Desmi DOP-250 dual PDAS pump

Manufacturer:

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

Fax: +45 6590 8877

Email: info@ro-cleandesmi.com

Website: www.desmi.com/ro-cleandesmi



Fig. 21 Desmi DOP-250 dual PDAS pump

The NorMar brush/disc skimmer incorporates two Desmi DOP-250 pumps which deliver a maximum capacity of 250 m³/h and can develop discharge pressures up to 10 bar while maintaining nearly maximum flow. Two of these pumps are installed in the common brush/disc skimmer frame.

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

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

Technical specifications

Length:	720 mm
Width:	390 mm
Height:	670 mm
Weight:	78 kg
Max. pressure:	10 bar
Max. capacity:	100 m ³ /h
Viscosity range:	1 to > 1 million cSt

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

1.4.3 Weir Skimmer module



Fig. 22 NorMar 250 TI High Capacity Skimmer Set. Weir skimmer head.

The NorMar weir skimmer is built into a protective frame made from seawater resistant aluminium, ensuring safe operation and low weight. The skimmer frame is equipped with two thrusters 15 hp each. The weir is built with a self-adjusting floating ring. The external skimmer floats can easily be removed for storage, or for hook up of the heavy oil shovel brush cassette. The weir skimmer incorporates one Mariflex MSP 150 pump.

Technical Specifications

Frame:	Aluminum
Pump:	1 x Pump Mariflex MSP-150
Coupling:	6" flange coupling for floating hose
Floats:	4 x floats
Weir:	Floating ring with skirt
Thrusters:	2 x 15 hp thrusters
Capacity:	300 m ³ /h
Discharge Pressure:	10 Bar
Length:	1825 mm
Width:	1825 mm
Height:	1810 mm
Weight:	280 kg.

1.4.4 Pump Mariflex MSP-150

Manufacturer:

Mariflex Group

Maassluisdijk 101

3133 KA Vlaardingen

Harbour no. 738

The Netherlands

Phone +31 10 - 434 44 45

Fax +31 10 - 232 95 00

www.mariflex.net



Fig. 23 Pump Mariflex MSP-150

The MariFlex MSP-150, a compact high capacity hydraulic driven centrifugal screw pump. Slow liquids speeds and low shear forces in the cargo are a direct consequence of the shape of the impeller, this makes the pump suitable for liquids which have to be handled carefully and without excessive motion and turbulence. This special quality of the pump makes it perfect for oil recovery operations.

Technical Specifications

Design .:	Single stage centrifugal
Capacity / head :	300 m ³ /hr - 35 mwc max.
Viscosity / Specific gravity :	1.0 Cst. at 20 degr. / 1.0.
Speed :	3380 rpm max.
Materials casing :	Seawater resistant aluminium.
Impeller :	Nodular cast iron.
Hydraulic motor :	Built on, axial plunger.
Hydraulic pressure :	320 bar max.
Hydraulic oil flow :	140 l/min. max.
Discharge connection :	6 inch - 150 mm with adaptor to 6 inch quick coupling.

Max. outer diameter :	490 mm.
Height :	610 mm.
Weight excluding hoses:	83 kg

1.4.5 Diesel Hydraulic Power Pack NorMar DHPP



Fig. 24 Diesel Hydraulic Power Pack NorMar DHPP

Technical Specifications

Length:	2300 mm
Width:	1070 mm
Height:	1740 mm
Weight (dry):	1 950 kgs
Category:	EX 3G
Zone:	2
Gas Group:	IIB
Temp. Class:	T3

Power:	107 kW @ 2100 rpm, 120 kW @ 2400 rpm
Flow/Pressure:	320 ltr./min./210 bar
Engine:	Type Iveco PP7675 Si
Fuel tank capacity	330 l.
Fuel Consumption:	30 l/h.

1.4.6 Hydraulically driven reel with 360° turntable, umbilical hose and integrated crane

The hose reel is designed for storage of 80 meters of Noren 6" floating hose. The reel is hydraulically driven for launching and retrieval of the floating hose and skimmer unit. The hose reel is built together with a crane arm (A-frame) to allow handling and deployment of the skimmer heads over the side of a ship or other barriers. The crane arm is equipped with an automatic spooling device. The hose reel and crane arm is mounted on a common foundation allowing for 360° rotation. The system is mounted on a common foundation with 20 ft. container footprint with twist locks in each corner.

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



Fig. 25 Hydraulically driven reel with 360° turntable, umbilical hose and integrated crane

Technical specifications

Length:	6241mm
---------	--------

Width:	2480 mm (2965 mm incl. operator platform)
Height:	2768 mm in stored position (3995 in operation)
Weight:	9000 kg (including crane arm and floating hose)

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

1.4.7 Storage Flat rack 20'

The skimmer is integrated with the 20' flat rack for storage and operation.



Fig. 26 Storage Flat rack 20' with the skimmer system

1.4.8 Ancillaries

NorMar 250 TI skimmer set includes ancillaries:

- Lifting arrangement and protective canvas for weir skimmer head;
- Lifting arrangement and protective canvas for brush/disc skimmer head;
- Lifting arrangement and protective canvas for hose reel.

1.4.9 Remote control

Manufacturer:

Cavotec Micro-control AS

Gevinglia 112

NO-7517, Hell

Norway

Phone: +47 74 83 98 60

Fax: +47 74 83 01 50

Email: microcontrol@cavotec.com

Website: www.cavotec.com



Fig. 27 Remote control for NorMar 250 TI High Capacity Skimmer

All the skimmer's hydraulic functions are remotely operated by radio. A 20 meters cable also connects the terminal to the base unit. The remote control unit MC-3-series system mainly consists of the following parts:

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

Technical specifications

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

1.4.10 Hydraulic hoses set

Set of hydraulic hoses consists of 20 m of hydraulic hoses with connectors.



Fig. 28 Hydraulic hoses set connected to NorMar DHHP

1.4.11 Oil hoses set

Oil hoses set consists of 2 x 10 m sections of the semi rigid 6" oil hose.



Fig. 29 Semi rigid 6" oil hose

1.4.12 Spare parts

The spare part box contains skimmer discs and a short list of spare parts for the Normar 250 TI skimmer.



Fig. 30 Spare parts box for NorMar 250 TI High Capacity Skimmer

1.5 SEADARQ Oil Slick Detection System

Manufacturer:

SeaDarQ B.V.

Nijverheidsstraat 66

3371 XE Hardinxveld-

Giessendam

The Netherlands

Phone: +31 (0)184 616699

Fax : +31 (0)184 615451

E-mail : info@seadarq.com

<http://www.seadarq.com/>

Year of purchase: 2006

The hardware for the Seadarq products are composed of high performance commercially available computer components. For the real time data acquisition from navigation radar commercial available PC boards are applied. The functionality is achieved by the different software packages operating on the same hardware. The system is capable to handle all the radar data and mix that with information from other sensors and store that real time on disc or ram. This gives the possibility to measure and process radar images in time.

The platform is based on a Microsoft environment and all kinds of connection to the system are possible. Network support offers functionality control on a distance and interchange of data with other platforms.

The images are displaced in layers. Layers can be switched on and off. The layers are free accessible. One layer can be a map the next layer can be the radar image or current or Oil spill etc. Etc. The colours and transparency between the layers can be modified.



Fig. 31 SEADARQ Portable Oil Slick Detection System

1.5.1 SeaDarq Software

A back-up copy of the software installed on the SeaDarq system is stored on a CD.

1.5.2 Detection – Radar X-Band

Required navigation radar system specifications

Frequency:	X-Band
Antenna length:	8 feet or longer
Minimum antenna height above water surface:	5 meters (range = 300 x antenna height)
Polarization:	Horizontal / Vertical
Field of view:	Range: >2500 m
	Azimuth: 360°
Pulse Width:	50 ns / 250 ns / 1µs
Peak Power:	25 kW
PRF:	1800 Hz / 1300 Hz / 650 Hz
Rotation speed:	48 RPM
Receiver:	No clutter suppression
GPS/DGPS:	NMEA RS232/RS422 OUTPUT
Heading. (optional: Speed/Water depth):	NMEA RS232/RS422 OUTPUT

1.5.3. Antenna 8 Feet



Fig. 32 Seadarq Antenna

1.5.4 Hardware & Software – Interface Kit

Technical specification

Video Input	0-1 Volt* Analog, 75 Ohm
Trigger Input	TTL*
Azimuth Input	TTL/RS422* pulses, up to 4096 pulses/revolution
North Reset Input	TTL/RS422*
Data Communications	RS232/RS422*

* Signal levels can be adapted to actual needs

1.5.5 Monitor

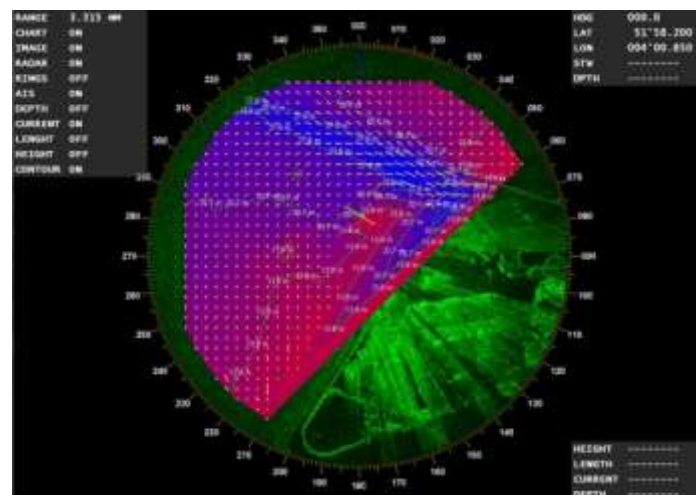


Fig. 33 SeaDarq Monitor

The display is mounted on a collapsible arm for optimal operator viewing and handling of the system.

1.5.6 Junction Box



Fig. 35 SeaDarq Junction Box

Technical specifications

Size:	(H x W x D) 180 x 430 x 515 mm (4U 19"-chassis)
Detection Range:	0.1-3.5 km distance
Detection Resolution:	better than 3.75 m (short pulse mode)
Operational wind speed:	>2 m/s
Application:	Oil slick detection in bad visibility conditions
Weather limitations:	The equipment is not effective when the surface of the sea is flat.
Complexity of the structure:	Portable electronic equipment transported in boxes.
Crew skills required to operate equipment:	Specialised skills, training by the Manufacturer necessary, Radar operating skills
Serviceability:	Equipment used only for short periods during drills and exercises. Operational so far.
Safety of operation:	Safe
Maintenance:	Should be conducted by the manufacturer. The contractor has no agreement with the manufacturer on the equipment maintenance.
Operational constraints in achieving:	So far not operated with oil. Real capabilities not recognised by the experience of the EMSA vessels crews.

1.5.7 SeaDarq Storage Boxes

Seadarq is a portable system. The Deck Hardware is installed in 2 wheeled storage boxes. The radar is stored in a stainless steel box.

1.6 Discharging system

1.6.1 Oil Transfer PDAS Pump GT A 115

Manufacturer:

Lamor Corporation Ab
Mestarintie 25
06150 PORVOO
FINLAND

Tel: +358 (0)20 7650 100,

Fax: +358 (0)207 650 129

Email: info@lamor.fi

Purchase year 2006

The pump is multi - purpose submersible Archimedes screw pumps with a pumping capacity of 115 m³/h accordingly. 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 12 bar outlet pressure, benefits from water/steam annular injection 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 range has been extensively tested in the field and has 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 3,000,000 cSt.

Technical Specifications

Length:	500 mm
Width:	300 mm
Height:	598 mm
Weight:	71 kg
Capacity:	115 m ³ /h
Hydraulic flow:	160 max l/min

Hydraulic pressure: 210 max bar

Power req.: 56 max kW

Discharge pressure: 12 bar

See details under the point 1.2.3

1.6.2 Hydraulic Hose for GT A 115

Components included in the set:

- Hydraulic Hose 1" x 15m Q/R Tema 10000 - 1 pc
- Hydraulic Hose 3/4" x 15m Q/R Tema 7500 - 1 pc
- Hydraulic Hose 3/8" x 15m DRAIN ISO75242 - 1 pc

1.6.3 Oil Transfer Hose for GT A 115

Components included in the set:

- Semi-Rigid Hose 5" x 10m, Kamlock - 2 pc(s)

1.6.4 Spares Pump GT A 115

The Lamor spare parts kit 2 includes all necessary items for field repair and maintenance.

1.7. On-line Oil in Water Monitor Hydrosense 2410

Manufacturer:

Arjay Engineering Ltd.

Oakville (Toronto),

Canada, L6H 6C9

Phone: +1 (905) 829-2418

Fax: +1 (905) 829-4701

E-mail: arjay@arjayeng.com

www.arjayeng.com

Purchased: 2008

1.7.1 Oil in Water Monitor

The HydroSense 2410 uses a UV fluorescence technique to target the aromatic component of the oil contamination. Through a site calibration this aromatic tag provides an indication relative to total oil.

A continuous sample flow is tapped or pumped off the process line and directed through the HydroSense chamber. It passes behind the non-contacting UV light source and is targeted with filtered light energy. The soluble and emulsified oils in the water will excite from this light energy and fluorescent light energy back out of the water at a signature wavelength. The intensity of light energy at this wavelength is measured to provide an indication of the ppm concentration.

The performance is based on the site calibration to a known hydrocarbon concentration in stable background water. Changes in hydrocarbon make-up and background stability may affect the output. Through a simple calibration, this unit correlates well with laboratory ISO and EPA methods.

Performance Technical Specifications

Range:	User selectable 0-10 to 0-300 ppm linear, trending from 300 ppm to 1,000 ppm
Display Resolution:	0.1 ppm
Instrument Accuracy:	+/- 0.1 ppm
Process Accuracy:	+/- 1.0 ppm under stable conditions
Ambient Operating Temperature:	10°C to 50°C
Ambient Process Temperature:	0°C to 40°C
Power Input:	24 vdc or 110 vac or 220 vac
Alarm Relays:	4 x 10 amp, SPDT, dry
Output:	4-20 mA, Isolated
Interface:	RS-485 Modbus (optional HART)
Standards:	UL, CSA, CE, ABS, CSA Div 2, T3C ; Groups A,B,C,D, Zone 2. Pressurization/Purge available for use in Zone 2. NFPA/ATEX
Enclosure:	316 SS, Type 4X, IP65

1.7.2 Oil in Water Monitor Ancillaries – Stand for PPM Reader



Fig. 36 On-line Oil in Water Monitor on a stand

1.8 Lamor - Norlense boom NO-450 S

Manufacturer:

Lamor Corporation Ab
Mestarintie 25
06150 PORVOO
FINLAND

Tel: +358 (0)20 7650 100,

Fax: +358 (0)207 650 129

Email: info@lamor.fi Website: www.lamor.fi

Year of purchase: 2006

The Lamor-Norlense NO 450-S Boom is manufactured as a continuous tube, 400 meters long and has been designed for quick response with the minimum of manpower requirements. The boom is stored on reels and can be deployed by one operator, which increase significantly the crew safety.

The boom inflates automatically and up to 400 m can be deployed in 10 to 20 minutes. Thus, it is an excellent choice for field duty, since very little deck space is necessary in order to deploy the boom. Rapid mobilization is thus possible even with the vessel carrying cargo on deck.

Inside the freeboard there are round, heavy duty hoses in the form of rings or a spiral depending of the size of the boom. The purposes of these spirals are to form the freeboard fabric into a round configuration during the deployment of the boom and retain the shape of the freeboard.

The boom set includes:

- Boom section,

- Air supply/back up air hoses for the NO-450 S,
- Hydraulic hoses,
- Boom reel,
- Hydraulic compressor HKL/8-113,
- Hydraulic power pack LPP 30 D,
- Spare parts for the power pack LPP 30 D.

1.8.1 Boom section

Technical Specifications – Norlense Rough Weather Boom NO-450 S

Section length of 50 m steps	400 m
Freeboard	450 mm
Draft	680 mm
Total height	1130 mm
Weight (total operational)	7.1 kg/m
Ballast weight	2.15 kg/m
Combined tensile strength	24.5 kN
Working temp. range	-30°C + 80 °C
Base fabric Spiral	PVC
Coating	PVC
Buoyancy ratio	23:1
Efficient in waves	2 m
Inflation pressure	6 bar



Fig. 37 Lamor-Norlense boom NO-450 S

1.8.2 Air supply/back up air hoses for the NO-450 S

Air supply/Back up air hoses

2 x 30 m

1.8.3 Towing set

The Towing Set includes all necessary parts for effective and safe deployment of the boom. All Tow sets come complete with connectors, shackles, rope and buoy.

The following components are included:

- 3 pcs connecting split links to the boom end,
- 9 m connecting ropes (2 x 12 mm, 1 x 18 mm)
- 1 pc braided polypropylene rope 26 mm/50 m with 3.25 Tn Shackle,
- 1 pc buoy 400 mm

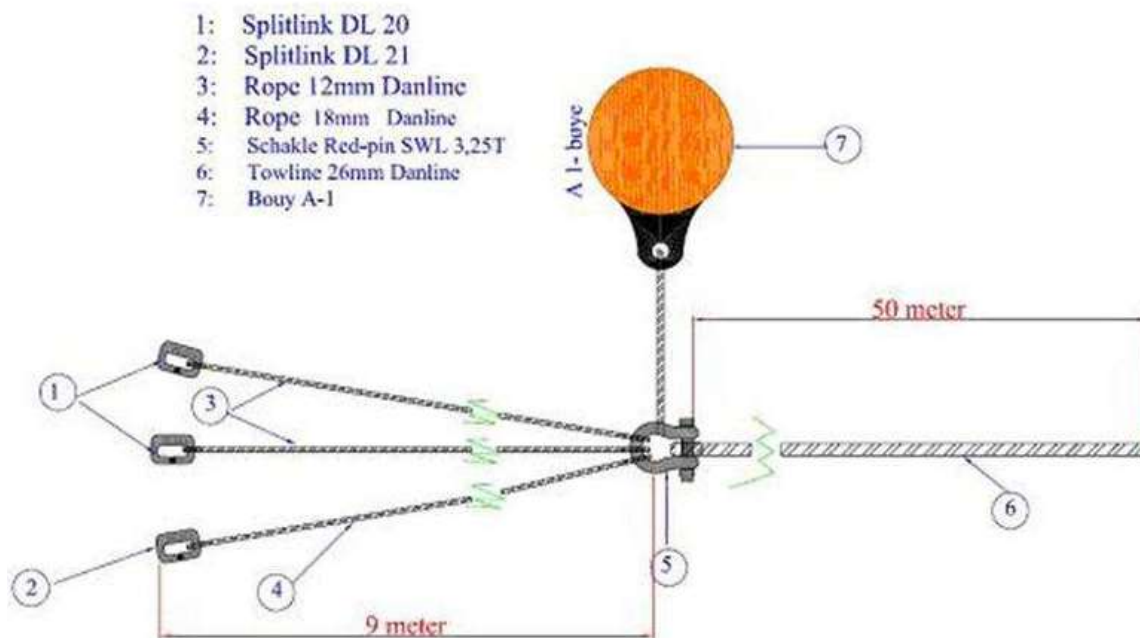


Fig. 38 Towing set (Source: Lamor)

1.8.4. Hydraulic hoses

Set of hydraulic hoses for the Power pack PPL 30 D.

1.8.5 Boom reel

Construction: Base and drum built-up of steel profiles/plates. The winch can be turned 20 degrees to each side through a vertical axis. The winch is arranged with pad eyes for lifting sling.

Technical Specifications - boom reel LW 10.14

Length	appr. 3150 mm
Width	2400 mm
Height	appr. 3060 mm
Drum size	508 mm
Flange dia.	2400 mm
Drum capacity	10 m ³
Power requirement	22 kW
Drive	Hydraulic motor with reduction gear and automatic hydraulic brake. Brake force stronger than pulling force.
Manoeuvring	Control valve and double brake mounted permanently
Hydraulic connection - pressure	Ø20 mm
Hydraulic connection - return	Ø22 mm
Hydraulic connection - drain	Ø12 mm
Air connection	1 ½" Cam-Lock male
Pull	Full drum - 1200 kp
Hauling speed	0 - 15 m/min at empty drum
Oil flow	62 l/min
Oil pressure	Oil pressure: 210 bar
Weight	2600 kg

1.8.6 Hydraulic compressor HKL/8-113

Manufacturer:

Dynaset OY

Menotie 3

FI-33470 Ylojarvi

Finland

Tel: +358 3 3488 200,

Fax: +358 3 3488 222

Email: info@dynaset.com Website : www.dynaset.com

Year of purchase: 2006

The hydraulic Compressor HKL 4100/8-113 is a hydraulically driven compressor that transforms the hydraulic power into a quality air pressure and which also can be easily connected to any working tool and the hydraulic line thereof.

The hydraulic compressors of HK-range are completed with piston block. HK-unit comprises frame integrated pressure reservoir, relief and safety valves, pressure gauge as well as automatic rotation speed control valve.

HK-compressors are designed to meet basic compressed air requirements such as energizing of pneumatic spill equipment in explosion hazardous areas, hand tools, cleaning devices, air flushing or small drilling tools. They are completed with rotary van block. The units are provided with cooled lubrication system, oil separator and relief valve on the air intake.



Fig. 39 Hydraulic compressor HKL/8-113

Technical Specifications - hydraulic compressor HKL/8-113

Type	Lamella compressor
Length	870 mm
Width	495 mm
Height	770 mm
Weight	185 kg
Capacity	4100 l/min
Pressure	8 bar
Hydraulic flow	113 l/min
Hydraulic pressure	210 bar nominal
Hydraulic pressure	180 bar minimum
Hydraulic pressure	250 bar maximum
Air flow	4100 l/min at 8 bar
Weight	Approx 185 kg

1.8.7 Hydraulic power pack LPP 30 D

Manufacturer:

Lamor Corporation Ab
Mestarintie 25
06150 PORVOO
FINLAND

Tel: +358 (0)20 7650 100,

Fax: +358 (0)207 650 129

Email: info@lamor.fi, Website: www.lamor.fi

Year of purchase:

2006

The LPP 30 D power pack is powered by a Deutz 35 kW diesel engine and serves as a multipurpose power pack designed for the flexible operation of many types of hydraulically operated oil spill clean-up equipment. Equipped with 3 hydraulic circuits the Lamor LPP 30 D can be used to power multiply users such as a skimmer and boom winder consecutively.

LPP 30 D is containerised within a steel frame designed to ensure a good circulation for the air cooled diesel engine. The power pack is equipped with electric start and incorporates control panel and hydraulic oil cooler into the framework. The LPP 30 D Power Pack utilizes a Sauer-Danfoss 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 power pack is equipped 4 point lifting rings and forklift channels making it easy to handle on land or offshore. For safety the hydraulic pump is equipped with an automatic shut-down system.



Fig. 40 Hydraulic power pack LPP 30 D

Technical Specifications - Hydraulic power pack LPP 30 D

Length	1345 mm
Width	810 mm
Height	1100 mm
Weight	600 kg
Hydraulic circuits	3 pcs
Hydraulic flow	106 l/min
Hydraulic pressure	180 bar
Power	35 kW
Oil tank capacity	70 l
Fuel tank capacity	25 l

1.8.8 Spare parts for the power pack LPP 30 D

The Lamor spare parts kit for LPP 30 D includes items necessary for field repair and maintenance.