

Annex V of the VAC
Technical Specifications for the equipment and dispersants
(Lot 3 - Central Mediterranean Sea)

Procurement procedure: EMSA/CPNEG/1/2019

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

Phase II – Invitation to Tender

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

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1. General description of the equipment

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

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

1.1. Equipment Transferred

The contractor will receive from EMSA the equipment listed below:

1. Koseq Rigid Sweeping Arms;
2. Lamor High capacity skimmer;
3. Dispersant application system (Jason spraying system, tank containers, loading system);
4. Discharging equipment;
5. Sampling/testing equipment (minilab, flash point tester, gas detector, interface detector);
6. Communications and safety equipment ;
7. Cleaning equipment;
8. Flow-meter;
9. Boom system;

All tenderers will have the opportunity to visually verify the condition of equipment items listed above in the stockpiles in Malta and Ravenna, at request (please see relevant location of each item in the table in point 3.1 below). In principle the visit will be organised in week 28. The visit details will be arranged with the requesting tenderer.

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

1.2. Servicing of the equipment

The equipment that will be transferred to the Contractor was purchased in 2006 except the dispersant application system purchased in 2015. It is generally in good condition. It has never been used to recover oil and it has been deployed a few times per year for the purpose of drills and exercises (in average 4 quarterly drills and 1 exercise per year). The equipment has been categorised and appropriately labelled. It has undergone regular maintenance according to the manufacturer's specifications. The maintenance was closely monitored by EMSA. The working condition of the equipment is regularly verified by the Agency during drills. The equipment was serviced in 2012 (with exception of the dispersant spraying system). In addition, the sweeping arms were completely overhauled in 2016.

Taking into account that during the new contractual period (4+4 years), the Contractor will be responsible for the safe, reliable and sustainable operational use of the equipment, the Contractor should arrange servicing to the equipment after the handover but before expiration of the Preparation Phase. In such a case, each tenderer will include in its financial offer regarding the oil pollution response equipment, the estimated servicing costs. This estimation will be considered as the ceiling that EMSA will reimburse in relation to the equipment servicing.

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

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

The contractor should arrange servicing to the following equipment:

1. Koseq Rigid Sweeping Arms;
2. Dispersant application system (Jason spraying system, tank containers, loading system);
3. Discharging equipment;
4. Sampling/testing equipment (minilab, flash point tester, gas detector, interface detector);
5. Boom system.

The servicing should include the following:

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

In addition, some items of the transferred boom system will have to be replaced (e.g. boom sections, hoses, compressor, spares, etc). More details are presented in point 5.9 of this document.

1.3. Additional equipment

Contractor will need to purchase/deliver the following equipment:

1. Flashpoint of the arrangement: As the arrangement must be able to collect and store oil with a flashpoint below 60°C, then additional items may need to be purchased or replaced (e.g. for the power packs, remote controls, etc.) in order to obtain the relevant Class notation for oil pollution response operations.
2. Adjustments to the power pack: Adjustments to the hydraulic system of one of the power packs (e.g. purchase of a hydraulic control panel) in order to be able to operate the boom system according to its technical specifications. Alternative proposals duly justified (e.g. use of ship's hydraulic system) can also be considered.
3. 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.

4. **EMSA logo on equipment:** At least one EMSA logo must be attached/painted on a visible position on each sweeping arm and crane, skimmer frame (if possible), boom reel, power pack, storage or tank 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.

5. **Vessel Model:** At the end of the preparation phase, the Contractor will deliver to EMSA, at its premises in Lisbon, a model(s) of the Vessel(s) at (approximate) scale 1/100. All oil pollution response equipment will be displayed, in the appropriate scale, on board the model(s). In particular, one system must be deployed, simulating recovery of oil 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 Contractor¹.

2. Dispersants transferred

The dispersants that the Agency will transfer are stored in Intermediate Bulk Containers (IBCs) of 1 m³ capacity each (weighing approximately one tonne).

The quantity of dispersant to be transferred by EMSA and stored is 183.6 tons (194 IBCs with dispersants plus 11 empty IBCs, total 205 IBCs).

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

3. Handover procedure for equipment and dispersants transferred

The conditions of handover, transportation, storage and insurance of the equipment and dispersants are described below. If any part of the equipment delivered is not used by the Contractor due to the

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

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.

3.1. Date and place of the handover

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

The items listed in point 1.1 and the dispersants described in point 2 above will be made available for handover and ready for transportation at their relevant storage location as follows:

Equipment	Location
Sweeping arms, Koseq, 12m	Valletta, Malta
High-capacity skimmer, Lamor LUT	Ravenna, Italy
200 tons dispersant, Radiagreen	Valletta, Malta
Storage containers for dispersant	Valletta, Malta
Dispersant spraying system Jason	Valletta, Malta
Discharging equipment	Valletta, Malta
Sampling mini-lab	Valletta, Malta
Interface detector	Valletta, Malta
Gas detector	Valletta, Malta
Flow meter	Ravenna, Italy
Flashpoint Tester	Valletta, Malta
VHF	Valletta, Malta
VHF	Ravenna, Italy
3 x portable cleaning machines	Valletta, Malta
Boom system	Ravenna, Italy
Dispersants stock	Valletta, Malta

The handover will be done at a date to be mutually agreed between EMSA and the Contractor and shall not take place earlier than **15 May 2020** and not later than **30 June 2020**.

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

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

3.2. Transportation

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

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

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

3.3. Storage and insurance

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

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

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

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

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

and their relevant power packs and ancillaries.

This configuration must be tested during three quarterly drills.

or

- the sweeping arm system,
- the dispersant application system (including tank containers) ,
- the oil slick detection system,
- other equipment (minilab, flashpoint tester, etc.)

and their relevant power packs and ancillaries.

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

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

5. List of transferred equipment and description

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
1.	Sweeping arm system (EUR 697,686)	1.1	Frame	Koseq		1	12.0 meters Rigid, foldable end with weir skimmer	EHJM362201	0914	17/08/2006
		1.2	Frame	Koseq		1	12.0 meters Rigid, foldable end with weir skimmer	EHJM362202	0915	17/08/2006
		1.3	Pump	Marflex	MSP 150-63	1	360 m ³ /h centrifugal	EHJM283201	0916	17/08/2006
		1.4	Pump	Marflex	MSP 150-63	1	360 m ³ /h centrifugal	EHJM283202	0917	17/08/2006
		1.5	Pump ancillaries			1	OUTLET INJ. FLANGE 6"	EHJM280201	0918	17/08/2006
		1.6	Pump ancillaries			1	OUTLET INJ. FLANGE 6"	EHJM280202	0919	17/08/2006
		1.7	Pump ancillaries			1	WATER INJECT. PUMP SET	EHJM280203	0920	17/08/2006
		1.8	Pump ancillaries			1	WATER INJECT. PUMP SET	EHJM280204	0921	17/08/2006
		1.9	Water hose(s)				30.0 meters	EHJM403601	0922	17/08/2006
		1.10	Water hose(s)				30.0 meters	EHJM403602	0923	17/08/2006
		1.11	Hydraulic hose(s)				20.0 meters	EHJM223601	0924	17/08/2006
		1.12	Hydraulic hose(s)				20.0 meters	EHJM223602	0925	17/08/2006
		1.13	Oil hose(s)			6	10.0 meters	EHJM263601	0926	17/08/2006
		1.14	Crane			1	SWEEPING ARM CRANE, HYD. WINCH	EHJM131501	0927	17/08/2006
		1.15	Crane			1	SWEEPING ARM CRANE, HYD. WINCH	EHJM131502	0928	17/08/2006
		1.16	Control desk			1	HYDRAULIC CONTROL	EHJM111301	0929	17/08/2006
		1.17	Control desk			1	HYDRAULIC CONTROL	EHJM111302	0930	17/08/2006
		1.18	Power pack	Marflex		1	DHP 120, DIESEL ENGINE, Including Canvas	EHJM272801	0932	17/08/2006
		1.19	Power pack	Marflex		1	DHP 120, DIESEL ENGINE, Including canvas	EHJM272802	0934	17/08/2006

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
2.	High capacity Skimmer (EUR 807,998)	2.1	Power reel	Lamor	LUT 5 80	1	Umbilical Hose Reel Telescopic LUT 5/80 on a 10' flat rack footprint		2733	28/09/2018
		2.2	Umbilical hose			1	Umbilical Hose LUH 5" 80m, 11 Ch, Anti static		2734	28/09/2018
		2.3	Remote control			1	Radio Remote Control MC-3-6 EX M36-EX501058 with Receiver Base Units 1 (LWS 1300) 2 (UHW)		2735	28/09/2018
		2.4	Flow meter		DP65/ED	1	AISI316 DN125, PN16 20-135 m3/h - integrated		2736	28/09/2018
		2.5	Hydraulic hose(s)				Set 10m, SS for Umbilical Hose Reel, incl. Water Injection Hose SS, 10m		2737	28/09/2018
		2.6	Weir module	Lamor	HC LWS 1300	1	With hydraulic thruster set		2738	28/09/2018
		2.7	Ancillaries			1	Removable Debris Screen for LWS 1300 MkII		2739	28/09/2018
		2.8	Ancillaries			1	Water injection outlet assembly, DIN 5" flange D125 PN 16 SS, TEMA 5011 RFV SS, for LWS 1300 Mk II skimmer		2740	28/09/2018
		2.9	Brush module			1	Brush adaptor with removable debris screen		2741	28/09/2018
		2.10	Brush module			1	Brush adaptor with removable debris screen		2742	28/09/2018
		2.11	Brush module			1	Brush adaptor with removable debris screen		2743	28/09/2018
		2.12	Pump	Lamor	GT A 140	1	Cargo pump with water injection kit, inlet 3/4"		2744	28/09/2018
		2.13	Pump	Lamor	LIP 400 IP	1	Water injection pump for HC skimmer and PDAS pump		2745	28/09/2018
		2.14	Ancillaries			1	Ancillaries for the water injection pump 1 x water suction hose semi rigid Apollo 2 1/2" L-5m; 1 x suction stainer & check valve camlock 2 1/2" SS 1 adapter camlock 2 1/2" -TEMA 1/2" SS 2 x water injection hose 20m, SS 2 x hydraulic hose 1/2" x 15m, SS TEMA 5000		2746	28/09/2018

		2.15	Power Pack	Lamor	LPP 95	1	Diesel driven, hydraulic start, battery 70 Ah Installed inside of a 10' ISO closed container		2747	28/09/2018
		2.16	Oil hose(s)			2	Semi Rigid, multi-oil blue heavy duty 5", 2 x L-10m, anti static		2748	28/09/2018
		2.17	Cover				20' Steel container storage roof with side door for 2 x 10' flat-racks (power reel and LWS 1300 skimmer) including 8 lashing twist locks		2749	28/09/2018
		2.18	Spare parts				Spk1 for GTA; Kit rubber adhesive for LUH; Spk1 for weir skimmer; Spk1 for Brush adapter; Spk1 for LPP 95; 1 Hydraulic Hose set between LUH and LWS; 1 hydraulic hose set 10m for power reel; paint repair kit		2750	28/09/2018

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
3.	Dispersant application system (EUR 126,175)	3.1	Pump	Grundfos	Centrifugal	1	Includes: 2 pipe adaptors, 2 non-return valves, 1 press. gauge, 1 orifice (T-40.0188 to avoid pump overheating when running with nozzles closed) and 2 couplings	n/a	1954	07/05/2015
		3.2	Pump	Grundfos	Centrifugal	1	Includes: 2 pipe adaptors, 2 non-return valves, 1 press. gauge, 1 orifice (T-40.0188 to avoid pump overheating when running with nozzles closed) and 2 couplings	n/a	1955	07/05/2015
		3.3	Frequency convertor			1		n/a	1956	07/05/2015
		3.4	Frequency convertor			1		n/a	1957	07/05/2015
		3.5	Pressure transmitter			1		n/a	1958	07/05/2015
		3.6	Actuator			1	For 1 1/4" ballvalve; S-20.0226	n/a	1959	07/05/2015
		3.7	Actuator			1	For 1 1/4" ballvalve; S-20.0226	n/a	1960	07/05/2015
		3.8	Actuator			1	For 1 1/4" ballvalve; S-20.0226	n/a	1961	07/05/2015
		3.9	Actuator			1	For 1 1/4" ballvalve; S-20.0226	n/a	1962	07/05/2015
		3.10	Eductor			1	Non self-priming pumps	n/a	1963	07/05/2015

3.11	Eductor			1	Non self-priming pumps	n/a	1964	07/05/2015
3.12	Vacuum meter			1		n/a	1965	07/05/2015
3.13	Hydraulic power unit			1	Includes: control unit & 8 hydr. hoses (2 sections=8+8)	n/a	1966	07/05/2015
3.14	Electro control cabinet	Jason		1		n/a	1967	07/05/2015
3.15	Electro control cabinet	Jason		1		n/a	1968	07/05/2015
3.16	Remote control	Jason		1	Wireless remote control box	n/a	1969	07/05/2015
3.17	Winch			1	Hydraulic motor driven winch with 20m of nylon rope	n/a	1970	07/05/2015
3.18	Winch			1	Hydraulic motor driven winch with 20m of nylon rope	n/a	1971	07/05/2015
3.19	Winch			1	Hydraulic motor driven winch with 20m of nylon rope	n/a	1972	07/05/2015
3.20	Winch			1	Hydraulic motor driven winch with 20m of nylon rope	n/a	1973	07/05/2015
3.21	Support boom	Jason		1		n/a	1974	07/05/2015
3.22	Support boom	Jason		1		n/a	1975	07/05/2015
3.23	Spray boom	Jason		1	12 nozzles (twin system: 2 lines x 6 nozzles)	n/a	1976	07/05/2015
3.24	Spray boom	Jason		1	12 nozzles (twin system: 2 lines x 6 nozzles)	n/a	1977	07/05/2015
3.25	Dispersant hose			1	Includes: quick release coupling-male and quick release hat	n/a	1978	07/05/2015
3.26	Dispersant hose			1	Includes: quick release coupling-male and quick release hat	n/a	1979	07/05/2015
3.27	Dispersant hose			1	Includes: quick release coupling-male and quick release hat	n/a	1980	07/05/2015
3.28	Dispersant hose			1	Includes: quick release coupling-male and quick release hat	n/a	1981	07/05/2015
3.29	Dispersant hose			1	Includes: quick release coupling-male and quick release hat	n/a	1982	07/05/2015
3.30	Dispersant hose			1	Includes: quick release coupling-male and quick release hat	n/a	1983	07/05/2015
3.31	Flow meter			1		n/a	1984	07/05/2015
3.32	Tank container		T11 316L	1	10' tank container - 10.000 litres / EMSA logo (new)	n/a	1985	07/05/2015

		3.33	Tank container		T11 316L	1	20' tank container - 23.000 litres / EMSA logo (2nd hand – refurbished)	n/a	1986	07/05/2015
		3.36	Cover			1	Cover for 10' tank container	n/a	1992	07/05/2015
		3.37	Cover			1	Cover for 20' tank container	n/a	1993	07/05/2015
		3.40	Pump			1	Pumping system to load tank container	n/a	1987	07/05/2015
		3.41	Pump			1	Pumping system to load tank container	n/a	1988	07/05/2015
		3.42	Manifold			1	Manifold to connect 10 IBCs	n/a	1989	07/05/2015
		3.43	Manifold			1	Manifold to connect 10 IBCs	n/a	1990	07/05/2015
		3.44	Spill kit			1	set	n/a	1991	07/05/2015

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
4	Discharging equipment (EUR 62,152)	4.1	Pump	Desmi	DOP 160		PDAS 30 m3/h	EHJE283201	0970	17/08/2006
		4.2	Pump	Desmi	DOP 160		PDAS 30 m3/h	EHJE283202	0971	17/08/2006
		4.3	Pump	Desmi	DOP 250 DUAL		PDAS 100 m3/h	EHJE283203	0972	17/08/2006
		4.4	Pump ancillaries				SPECIAL FLANGE	EHJE280201	0973	17/08/2006
		4.5	Pump ancillaries				SPECIAL FLANGE	EHJE280202	0974	17/08/2006
		4.6	Pump ancillaries				WATER INJECT. PUMP SET	EHJE280203	0975	17/08/2006
		4.7	Pump ancillaries				WATER INJECT. PUMP SET	EHJE280204	0976	17/08/2006
		4.8	Oil hose(s)				OROFLEX OIL HOSES 60 meters 3' diameter	EHJE263601	0979	17/08/2006
		4.9	Hydraulic hose(s)				HOSES	EHJE223601	0980	17/08/2006
		4.10	Water hose(s)				WATER HOSES	EHJE403601	0981	17/08/2006
		4.11	Hydraulic hose(s)				HOSES	EHJE223602	0982	17/08/2006
		4.12	Water hose(s)				WATER HOSES	EHJE403602	0983	17/08/2006
		4.13	Spare parts				SPARE FLANGE	EHJE343101	0984	17/08/2006
		4.14	Spare parts				SPARES KIT	EHJE342501	0985	17/08/2006
		4.15	Pump spare parts				PUMP SPARES KIT	EHJE342502	0986	17/08/2006

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
5.	Sampling/ testing (EUR 29,794)	5.1	Mini lab				SAMPLING MINILAB Densi-VISCOMETER	EHJH232901	0987	17/08/2006
		5.2	Flash point tester				FLASH POINT TESTER	EHJH172901	0988	17/08/2006
		5.3	Gas detector/explosi meter				GAS DETECTOR	EHJH192901	0989	17/08/2006
		5.4	UTI Oil/water interface				MMC OIL/WATER INTERFACE	EHJH382901	0990	17/08/2006
		5.5	Mini lab				TEST KIT	EHJH232501	0991	17/08/2006

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
6	Communication (EUR 2,093)	6.1	VHF Portable	Jotron			VHF AERONAU BAND	EHJC392901	0992	17/08/2006
		6.2	VHF Portable	ICOM	IC-A-24 Pro		VHF airband transceiver, water resistant	n.a.	1874	14/08/2014

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
7	Cleaning (EUR 3,375)	7.1	Cleaning machine				High pressure cleaning machine	EHJB092901	0997	17/08/2006
		7.2	Cleaning machine				High pressure cleaning machine	EHJB092902	0998	17/08/2006
		7.3	Cleaning machine				High pressure cleaning machine	EHJB092903	0999	17/08/2006

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
8	Flow meter (EUR 12,105)	8.1	Flow meter	Krohne	UFM3030 K		Ultrasonic		1867	14/08/2014

Ref. No.	Category and purchase value	No	Item	Item Brand	Item Model	No of Pcs	Additional info	ID Code (old)	ID Code (new)	First Delivery Date
9	Boom system (EUR 124,600 is price of reels)	9.1	Segment PVC	Markleen	X1900	1	250 meters Uniboom, single point inflation	DFHA073601	0688	11/07/2008
		9.2	Segment PVC	Markleen	X1900	1	250 meters Uniboom, single point inflation	DFHA073602	0689	11/07/2008
		9.3	Towing lines set				towing lines set	DFHA374201	0690	11/07/2008
		9.4	Towing lines set				towing lines set	DFHA374202	0691	11/07/2008
		9.5	Towing cross bridle				cross bridle for J configuration	DFHA371601	0692	11/07/2008
		9.6	Towing cross bridle				cross bridle for J configuration	DFHA371602	0693	11/07/2008
		9.7	Storage reel			1	unireel 16 m3	DFHA353401	0694	11/07/2008
		9.8	Storage reel			1	unireel 16 m3	DFHA353402	0695	11/07/2008
		9.9	Hydraulic hose(s)				hyd. hoses for boom	DFHA223801	0696	11/07/2008
		9.10	Storage flatrack			1	flat rack for unireel (LxWxH: 4073x2438x3450)	DFHA352001	0697	11/07/2008
		9.11	Storage flatrack			1	flat rack for unireel (LxWxH : 4073x2438x3450)	DFHA352002	0698	11/07/2008
		9.12	Spare parts				spare parts and maintenance kit may not be completed	DFHA342501	0699	11/07/2008
		9.13	Spare parts				spare parts and maintenance kit may not be completed	DFHA342502	0700	11/07/2008
		9.14	Towing cross bridle				to deploy booms in "open-U" configuration		1898	16/01/2015

DESCRIPTION OF EQUIPMENT

5.1. Rigid Koseq Sweeping Arm system

Manufacturer:

KAMPERS OIL SPILL EQUIPMENT B.V

Web-site: <http://www.koseq.com>

Year of purchase: 2006

The Koseq Rigid Sweeping Arm System consists of two 12 meter Sweeping Arm Structure with foldable end, oil transfer pumps, pumps ancillaries, control panel, hydraulic system, oil hoses, crane and hydraulic power pack.

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 pump.

5.1.1. Sweeping Arms (1.1-1.2 from list above)

Conditions for oil recovery operations

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

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

Description

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

Foldable ends: To facilitate transport and storage, the sweeping arm pontoons are equipped with foldable ends.

Table 1 Description summary - Rigid Koseq Sweeping Arm System

Function:	Collecting of oil
Year of purchase:	2006
Overall Length:	12074 mm
Overall width:	3412 mm
Overall height:	3355 mm
Weight (including pump and hoses):	4400 kg.
Type of skimmer:	integrated weir skimmer
Skimmer pumps:	centrifugal pump with screw impeller



Figure 1 Koseq Rigid Sweeping Arm

5.1.2. Marflex Centrifugal Pump MSP150-63 (sweeping arms)

Manufacturer:

Web-Site: www.marflex.com

The Marflex pump type MSP-150-63 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.



Figure 2 Marflex Pump

5.1.3.Oil hoses/hydraulic hoses and cables (sweeping arms and associated cranes)

Manufacturer:

Goodyear Engineered Products Europe

Oil hoses Description

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

Type: Rig Supply Soft Wall

Size: 6" X 60 metres.

Couplings: Kamlock 6"

Working pressure: 20 bar

Burst pressure:60 bar

Temperature: -40°C + 93°C

Liner: Nitrile, colour black

Cover: Chloroprene, colour black

Branding: GOODYEAR RIG SUPPLY SW WP BAR-M-

Hydraulic Hoses

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

Cables

Each crane is fitted with a set of two wires, 1 per winch, for the lowering and lifting of sweeping arms.



Figure 3 Oil hoses

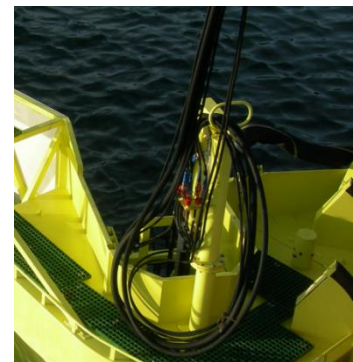


Figure 4 hydraulic hoses

5.1.4.Water injection system

Manufacturer:

RO-CLEAN DESMI A/S

Web-Site: <https://www.desmi.com>

Flanges 6" inlet / outlet description:

The 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 in the discharge line during high-viscous oil pumping. The flanges are equipped with a non-return valve to prevent the pumped media to enter the water line.



Figure 5 Flanges

Water injection-pump description:

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 by means of a hose set (water and hydraulic hoses).



Figure 6 Water pump

5.1.5.Sweeping arms cranes, Lagendijk SK 5/10-5000/1000

Manufacturer:

Web-Site: www.lagendijk-constructie.nl

These Lagendijk store cranes are intended for operating the sweeping for which specially purpose were designed.

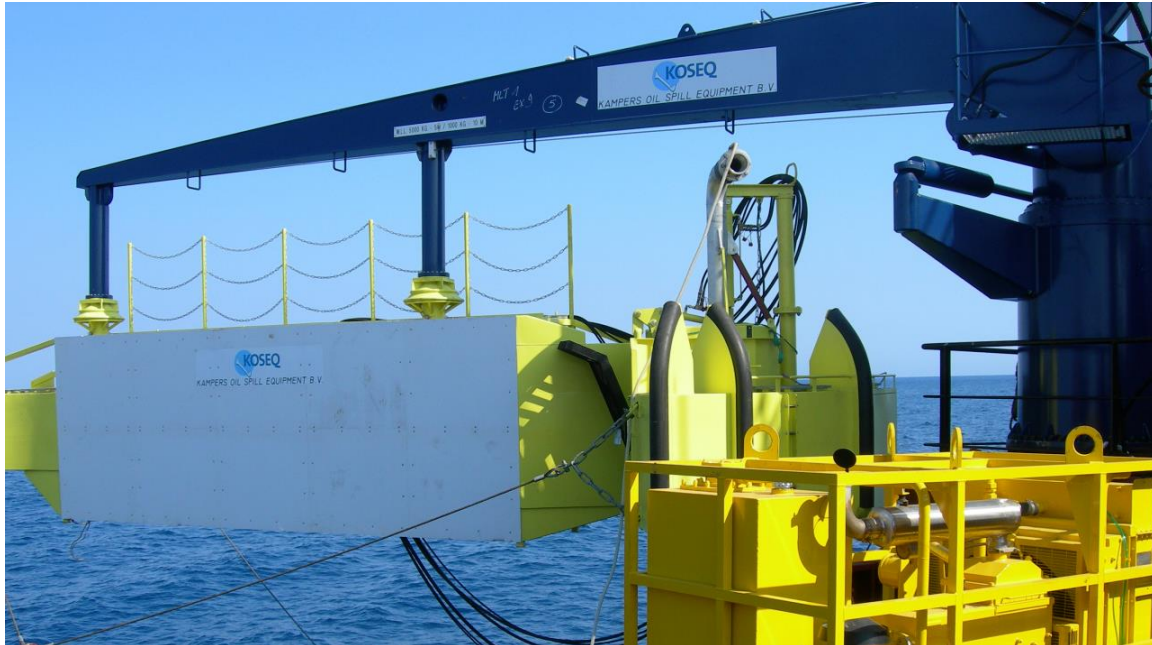


Figure 7 Sweeping Arm Crane

Table 2 Description summary Lagendijk SK 5/10-5000/1000

Maker:	Lagendijk Constructie B.V.
Year of construction:	2006
Type:	SK 5/10-5000/1000
Main dimensions:	Length: 11.2 – Width: 1.8 – height: 4.1 meters
Propulsion:	Hydraulic
Lifting capacity:	5000 kg – 5.9 meters / 1000 kg – 10.2 meters
Tilt:	3° max.

5.1.6.Control cabinets and control panel

Manufacturer:

Web-Site: www.lagendijk-constructie.nl

The crane and sweeping arms are operated 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: pump, weir skimmer height, debris screen, crane winches (1 & 5 Ton), and crane Cylinder



Figure 8 Controls

5.1.7. Marflex diesel-hydraulic Power pack type DHP-120, Zone 2

Description

The Marflex type DHP-120 Power Pack is an extremely compact designed diesel engine driven hydraulic unit suitable for operation in hazardous area zone 2.

Therefore several protection devices are fitted on the diesel engine and hydraulic system to make it possible to run the Power Pack in the specified hazardous areas. The Power Pack incorporates a protection/ lifting frame built from high tensile seawater resistant aluminium and coated with two-component paint, colour RAL no. 1021 (cadmium yellow).

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

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

To prevent sparks between the Power Pack and deck or floor the base of Power Pack is equipped with wooden blocks mounted at the bottom of fuel tank.

To check the level of fuel, the fuel tank is equipped with a level indicator.

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



Figure 9 Power-Pack

Table 3 Technical Specifications Marflex diesel-hydraulic Power pack type DHP-120

Manufacturer:	MARFLEX bv, The Netherlands
Intended use:	Hydraulic power generation in zone 2
Year build:	2007
Serial n°	460729-01
Operational area	Zone-2
Diesel engine	Perkins/1006-6-1552-2600
Rated power	76.5 kW at 240 rpm intermittent
Fuel consumption engine	0.26 ltr kW/h
Hydraulic pump	Rexroth A11VO 060 DRG
Hydraulic oil flow	120 ltr at 2400 rpm
Hydraulic oil pressure	320 bar max.
Connections	1" quick coupling, female (high-pressure side) ½" quick coupling, female (return side)
Safety devices:	High coolant (motor) temperature High exhaust pressure Overspeed of diesel engine High hydraulic oil temperature Low hydraulic oil level Manual operated stop devices Intake shutdown valve
indicators	Hydraulic oil pressure indicator Hydraulic oil temperature indicator Lubricant pressure indicator Coolant temperature indicator

	Speed/running hour indicator Exhaust temperature indicator Pilot control valve to set the hydraulic oil pressure Vernier control to adjust the speed of diesel engine Emergency stop handle to stop the air intake of engine Stop button to stop the power pack by blocking the fuel supply to injection pump.
Volume of fuel tank	400 ltr.
Volume of lubricant for engine	13 ltr.
Volume of hydraulic oil tank	230 ltr.
Volume of cooling system	80 ltr.
Length	2200
Wide	1200
Height	2025
Weight	1600 kg excl. hydraulic oil and diesel fuel
Weight	2200 kg incl. hydraulic oil and diesel fuel.
Colour	Cadmium yellow RAL 1021
Operational manual	available

5.2. High Capacity Skimmer

Manufacturer: Lamor Corporation Ab

Website: www.lamor.com

Year of purchase: 2018

5.2.1. Lamor Umbilical Hose Reel (LUT) 580

The Lamor Umbilical Hose Reel (LUT) 580 has been designed as a single system to easily and efficiently deploy a large oil skimmer off a vessel in an emergency oil spill response operation. The LUT provides control and ease of use by a single operator.

This LUT system includes the following features:

- Crane arm (additional telescoping and vertical lifting cylinders available)
- 360° turntable
- Single 10' flat rack
- Container cover for storage or transport
- Radio Remote control
- Mooring function

LUT system is furnished on a 10' (ISO 668) flat rack base. This compact sized platform allows installation of the system onto a limited work space. When combined with the 10' skimmer base and the 20' roof module, the equipment is containerized for storage and transport.

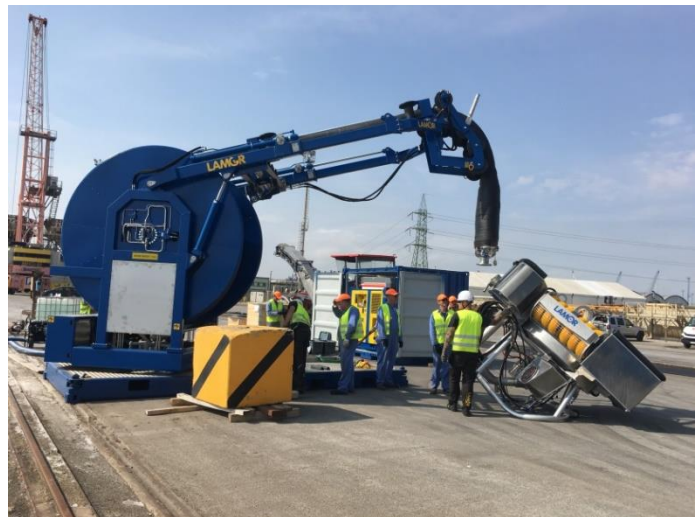


Figure 10 Lamor Umbilical Hose Reel (LUT) 580

LUT systems are designed to deploy the Lamor Free Floating (LFF) 100. The umbilical hose and skimmer is supported during deployment by a crane arm integrated to the reel. The crane arm includes a telescoping system and vertical lifting cylinders.

The system is mounted on a 360° rotating, hydraulically driven turntable increasing control and the range of the operation.

The hose reel itself combines all necessary hydraulic and transfer hoses needed to operate the skimmer in a neatly packaged hose. The oil transfer and hydraulic hoses are connected to manifolds at the hub of the reel by pump-through swivel joints allowing the hydraulic hoses to be continuously energized and providing uninhibited flow in the oil transfer hose at any deployed length.

LUT system EX Zone II has designed according 2014/34/eu ATEX directive. The corresponding ATEX-code is II 3 G Ex h IIB T4 Gc.

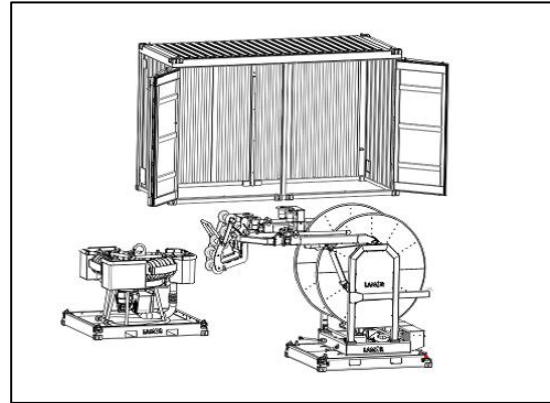


Figure 12 System drawing



Figure 11 System assembled in a 20' container

Table 4 System technical specifications

Components:	Description/Material:
System assembled	Assembled system of two flat racks and roof dimensions are: Width 2.438 m / 8' 0" Height 4 m / 13' 2" Length 6.058 m / 19' 10.5" Weight (dry) 14 tonnes (Weight wet 15 tonnes)
Umbilical hose reel on flat rack	Foot print 10ft container Length 2990 mm Width 2437 mm Height 3950 mm Weight (dry) 10 000 kg (Weight wet 11 000 kg) System pressure 210 bar
Skimmer flat	Length 2990 mm Width 2437 mm Height 2650 mm (Skimmer with flat rack) Weight (with skimmer) 1500 kg
The reel and skimmer flat racks are to be coupled into one 20 ft footprint flat rack (ISO 668)	
Container roof	Length 6058 mm Width 2438 mm Height 3685 mm Weight 2500 kg System is non-stackable
Painting	Blue RAL 5010 Teknos K27e

5.2.2.Flow-meter DP65/ED

The system is fitted with a flowmeter.

5.2.3.Weir Skimmer HC LWS 1300 Ex Zone II with brush adaptor LBA and water injection system (pump LIP 400 IP)

The Lamor Free-Floating Offshore Weir Skimmer, LWS 1300, is a high capacity weir skimmer designed for open ocean oil recovery. The skimmer is equipped with a floating weir lip that separates and collects the oil into a hopper. The floating weir lip has separate small ballast weights that can be independently adjusted, allowing perfect floatation even in difficult sea conditions. The floating level of the skimmer can be adjusted by moving the pontoons up or down on the skimmer frame.

The skimmer is hydraulically operated and fitted with two thrusters that allow the operator to manoeuvre the skimmer to where oil is the most heavily concentrated. An radio remote control can be operated from up to a 200m distance from the hose reel. The hydraulic power is supplied to the skimmer via hydraulic hoses.

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



Figure 13 Skimmer head

The skimmer frame is manufactured from aluminium with 3 specially designed aluminium air tight floats. The skimmer incorporates a large diameter free floating weir-lip that gives it excellent wave following characteristics. LWS weir skimmers have been specifically designed to work with a wide range of optional oil transfer pumps. The GTA pump is suitable for light to high viscosity oils. Please note that the pump will be specified separately.

The Lamor Brush Adaptor LBA 1300 Mk II is a brush-type oil recovery module designed to fit quickly and easily onto the hopper of the Off-Shore Weir Skimmer Lamor LWS 1300 Mk II. The purpose of the device is to improve the overall recovery efficiency (reduce free water recovered with oil) and to improve the performance in very high viscosity oils.

The three LBA brush banks are mounted within a sturdy aluminum frame with a center-lifting eye. The brushes are driven by one hydraulic motor, which is powered by a single hydraulic circuit.

The LBA can be easily installed on the Lamor LWS 1300 skimmer hopper in place of the weir bellow, and be secured with stainless steel clamps.

Total system operational weight including Weir Skimmer, Brush Adapter, Thrusters and Pump is 820kg.

Table 5 Weir skimmer technical specifications

Technical Parameter:	
Length (mm)	2644
Width (mm)	2212
Height (mm)	1830
Weight (kg)	280
Weir Lip Diameter (mm)	1300
Capacity (m ³ /h)	360
Frame, Floats, Hopper, & Weir Lip	Marine-Grade Aluminum
Bellows	Reinforced Neoprene Rubber
Draft	1100

Table 6 Brush adaptor technical specifications

Technical Parameter:	Specification:
Length	2050 mm (80.7 in)
Width	1800 mm (70.8 in)
Height	570 mm (22.5 in)
Weight	220 kg (485 lbs)
Maximum Certified Capacity*	3 x 74 m ³ /h (326 gpm)
Design Capacity*	3 x 60 m ³ /h (264 gpm)
Free Water Content	<2%
Hydraulic Flow	10 l/min (5.28 gpm)
Hydraulic Pressure	170-200 bar (2466-2901 psi)
Power Requirement	6.5 kW (8.7 hp)
Brush Base	Polyethylene
Stiff Bristle	Polypropylene
Brush Cleaner	Marine Grade Stainless Steel
Brush Wheel Speed	0-60 rpm
Plastic clips and slides	Antistatic POM ELS
Drive Motor	Danfoss 11159803 OMR 200 ATEX

5.2.4.Pump GT A 140

The GTA series pumps is a multi-purpose submersible Archimedes positive displacement high performance screw pump that have a capacity of 140 m³/h. In addition to being a primary oil transfer pump, the GTA pump can be utilized for numerous applications such as offloading emergency pumping of heavy crude, bitumen, tank cleaning, pipeline maintenance, sludge removal etc.

The GTA pump design promotes a smooth pumping action and easy flow control that will not emulsify oily water and reduces cavitation ensuring a constant flow. The efficiency of the GTA pump is increased with a built-in annular water injection (AWI) flange at the pump outlet, which assist the flow of viscous materials, decreases the pressure while reducing friction in the oil transfer hoses thus making operations safer and more efficient.

The GTA ATEX pump casing is compact and made of duplex stainless steel casting. Moreover, all internal components are made of acid proof steel with specialized seals. The GTA has a debris grid and a cutting knife fitted on the inlet.

5.2.5. Water Injection Pump, Hydraulic LIP 400 XP EX ZONE II

The LIP 400 is built in a wheel frame and is powered by a hydraulic power pack,

Lamor LIP 400 IP ATEX EX Zone II has designed according 2014/34/EU ATEX directive. The LIP 400 IP EX ATEX-code is II 2 G e IIA T3 Gb.

Table 7 Water injection pump technical specifications

Technical Parameter:	LIP 400
Pump Capacity	10 m ³ /h
Length	920 mm
Width	850 mm
Height	770 mm
Weight	150 kg
Discharge Outlet	2" Male Camlock

5.2.6. Lamor Power pack LPP 95



Figure 14 Lamor Power pack LPP 95

The Lamor Power pack LPP 95 is a diesel engine driven hydraulic unit suitable for operation in hazardous area Zone II.

A Flame protection system is fitted to the diesel engine in such a way that the outside temperature of diesel engine and even the exhaust system and other hotspots of diesel engine never exceeds beyond the conditions which are guilty for above mentioned protection group.

Several safety devices are fitted on the Power Pack and diesel engine and will do stop the Power Pack and the diesel engine in case of dangerous situations or mechanical failures.

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

This Power Pack is designed to use on open hydraulic systems only. The hydraulic pump is a variable displacement hydraulic pump of axial piston swashplate design, for open circuit hydraulic systems.

Lamor Power Pack Type LPP 95J EX Zone II has designed according 2014/34/eu ATEX directive. The LPP 95J EX ATEX-code is II 3 G Ex h IIA T3 EPL Gc.

The power pack is installed in a **10 ft container** designed to be used for stowing and running Lamor Oil Spill equipment. The container is ISO 668:2013 compliant and has dedicated fittings for Lamor LPP 95 J, EX Zone II Power Pack. It also has an Earthing Point, one at blank side and second for internal connections. the 10 ft Container is designed to be used in hazardous area Zone II as described in 2014/34/eu ATEX directive.

Table 8 Lamor Power pack LPP 95 operational specifications

Technical Parameter	Parameter value
Make/type	JCB 444 / PP1254
Design	4 cylinder line, water-cooled
Rated power	93 kW at 2200 rpm
Zone	II 3G IIA T3
Start system	Hydraulic start
Cooling system	Water cooling (coolant)
Coolant type	774F OEM RED, -39°C
Fuel system	Dual filter incl. water separator
Fuel type	EN 590 diesel fuel, (additive recommended when in storage) see JCB User's manual
Fuel consumption	N 225 g / kW / h (@ 2 200 r/min, max load)
Fuel tank	Basement tank, incl. filler breather filter and level gauge
Lubricant type (engine oil)	See JCB User's Manual MOBIL DELVAC 15W40 or equivalent
Air inlet	Dry filter with dust cyclone and safety element. Flame arrestor installed in inlet system
Exhaust	Exhaust gasses cools down by cooling system and Stainless steel Flame/Spark arrester is in-stalled in exhaust system
Indicators	Engine speed, Water temperature, Exhaust temperature, Oil pressure, Hydraulic oil pressure and Hydraulic oil temperature
Protection against	1. Low pressure (0,75 bar, 10,9 psi) of lubricant 2. High temperature of exhaust gasses, 200°C 3. High temperature of engine(coolant), 100°C 4. Overspeed of diesel engine. 2300 rpm 5. Hand operated emergency stop which is closing the air inlet valve.
Operating temperature	Between -20 °C and +50 °C
Starting temperature	Min -20 °C, Requires Winter or Arctic type fuel, engine oil and hydraulic oil i.e. Neste Oil Neste diesel -29/-34 °C, or better
Storing temperature	-40 °C to +50 °C

Table 9 Lamor Power pack LPP 95 technical specifications**Table 10** Lamor Power pack LPP 95 technical specifications and dimensions

Technical Parameter	Parameter value
Length	1500 mm
Width	2 050 mm
Height	1750 mm
Volume of fuel tank	210 liters
Volume of lubricant for engine	14 liters
Volume of hydraulic oil tank	260 liters
Volume of cooling system	22 liters
Weight	1800 kg dry weight excluding hydraulic oil and diesel fuel
Weight	2300 kg including hydraulic oil and diesel fuel
Color	Lamor colors, Main frame RAL 5010. Doors, tank RAL 1023.

Table 11 Technical data 10' container

Technical Parameter:	LIP 400
Length	2291 mm (91 in)
Width	2438 mm (96 in)
Height	2591 mm (30 in)
Weight	3500 kg (7720 lbs)
Painting system	EN ISO 12944 C5-M (Marine) EPZnEPPUR200/4- Fe Sa2½ Exteriors: Blue RAL 5010 Interior: Gray RAL 7001

5.3. Dispersant application system

Manufacturer:

Jason engineering AS

Web-Site: <http://jason.no/>

Year of purchase: 2015

The system is designed for spraying dispersant from a vessel to oil spill on the sea surface.

**Figure 15** Centrifugal pump Grundfos

5.3.1.Pumping system

Table 12 Technical specification pumping system

Pump:	multistage non-self priming centrifugal Grundfos
Speed for pump data:	3514 rpm
Actual calculated flow:	12 m³/h
Resulting head of the pump:	57.6 m
Impellers:	05
Power (P2) required by pump:	3 kW
Mains frequency:	60 Hz
Rated voltage:	3 x 380-480 V
Rated current:	6,20-5,00 A
Gross weight:	65 kg

5.3.2. Hydraulic Power Unit

Hydraulic Power Unit consists of electric motor (1.5 kW), oil tank (14 l), pump, and solenoid directional valves

5.3.3. Electric Control Cabinet and Remote Control

The control cabinet can be operated in remote by radio Control box.



Figure 16 Hydraulic Power Unit

5.3.4. Support and Spray nozzle manifold with winches

The hydraulic winch allows regulation of the distance from the water to the spraying boom by means of two ropes, jacking wheels and hydraulic motor. Weight of the winch assembly is approx. 50 kg. Two support booms of 7.2 m with nozzle manifolds of 10.2 m each one, are located port and starboard. Soft rubber hoses with quick couplings act as dispersant supply lines from the support boom down to the manifold. The support arm is fitted with “hook on” hinges for easy and quick mounting. The weight of the supporting arm is approx. 60 kg.



Figure 17 Support Boom

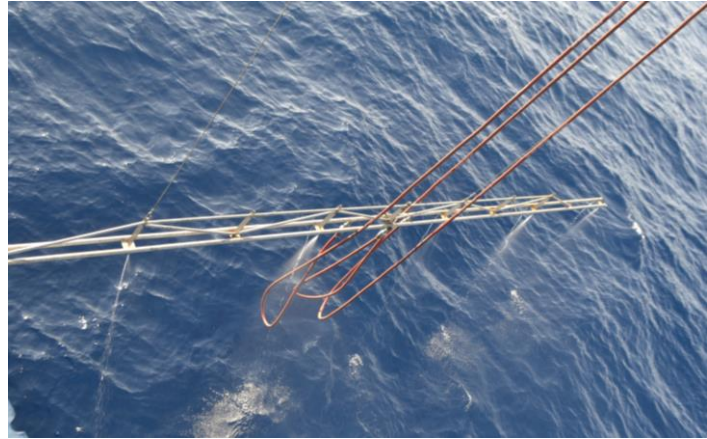


Figure 18 Spray nozzle manifold

The dispersant spray nozzles are flat jet type with spray angle of approx. 45 degrees. Several nozzles are covering the whole length of the spray boom ensuring an even spray pattern. The spray nozzle manifold can be lowered or uploaded and therefore the distance from the water should be easily regulated. Nozzle flow rate is approx. 10 and 2.5 litres/min at 2 bars inlet pressure and can be adjusted increasing or decreasing the frequency in the control cabinet and flow control.

5.3.5. 10' Dispersant tank container 10 m³ with canvas

Table 13 10' Tank container technical specifications

Capacity:	10000 l
Overall dimensions (L x W x H):	2991 mm x 2438 x 2591
Tare weight:	2800 kg



Figure 19 Dispersant tank container 10 m³

5.3.6. 20' Dispersant tank container 23 m³ with canvas

Table 14 20' Tank container technical specifications

Capacity:	23000 l
Overall dimensions (L x W x H):	6058 mm x 2438 x 2438
Tare weight:	3780 kg

5.3.7. Dispersant loading system (hoses, pump and manifold)

Two electrical driven pumps (50m³/hr each) fitted with two manifolds to connect 10 IBCs through 2" rigid plastic pipes and adaptors

5.3.8. Spill kit

Absorbent granules and pads

5.4. Discharging equipment

5.4.1. DESMI DOP-160

Manufacturer:

RO-CLEAN DESMI A/S

Web-Site: <https://www.desmi.com>

Year of purchase: 2006

The DESMI DOP-160 Submersible Screw pumps are hydraulically driven positive displacement Archimedes design. The pump screw interfaces with a rotating sealing plate wheel with sleeves of high-density polyethylene. Inside the 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.

The Pump is designed to allow manual deployment of multiple units in an oil spill, pumping the oil at reduced hydraulic power and hose size. Weighing 55 pounds, the DOP-160 is a positive-displacement pump with a cutting knife fitted to the leading edge of the screw for handling debris. The knife will cut plastics, rope, and other materials that often lurk in the oil.

The pump capacity is 30 m³/h at discharge pressures of 10 bar for a range of light or heavy liquids.. This system can swallow slugs of water while pumping extremely viscous fluids without losing its prime. The 160 features a single-piece pump casing. The action of the DESMI pump is designed to prevent the emulsification of oil and water when pumping.



Figure 20 Dispersant tank container 24 m³



Figure 21 Dispersants loading system

Table 15 Technical Specifications DESMI DOP-160

Pump capacity	27.5 m³/h / 121 US gpm
Max. discharge pressure	10 bar / 145 psi max.
Dimensions	390 x 240 x 520 mm / 15" x 9.5" x 20.5"
Minimum manhole diameter	400 mm / 16"
Pump inlet	160 mm / 6"
Viscosity range	1 to > 1 million cSt
Discharge connections	3" Camlock, flange.
Standard materials	
• Screw:	Double-curved Archimedes' screw in cast stainless steel (Ni-Resist), machined in a 5-axis CNC center
• Casing	Seawater resistant aluminium or stainless steel. Standard is aluminium. Replaceable polyethylene sealing ring.
• Plate wheel	High-tensile steel core with replaceable sealing discs of polyethylene HD.
• Bearings	SKF heavy duty conical roller bearings
• Screw shaft:	Heat treatable steel
Prime mover	DANFOSS hydraulic motor, type OMSS 80
Max. speed	960 rpm continuously
Max. oil flow	80 litres per min. / 21 US gpm
Max. inlet pressure	210 bar / 3050 psi
Weight	31 kg / 68 lbs
Hydraulic connections	3/4" supply and return, 3/8" drain

5.4.2. Hose set discharge & hydraulic hoses for DESMI DOP160 Pump

The set is made up of the oil resistant antistatic offloading hose including camlock connections and the hydraulic hose set and hose with the quick couplings ¾" pressure and return and 3/8" drain.

5.4.3. Water injection system

Flanges 6" inlet / outlet description:

The DESMI annular injection flanges are designed to effectively inject a thin water layer surrounding the column of oil that is being discharged. 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.

Water injection pump set description

The DESMI water injection unit is a portable hydraulic driven pump set designed for injection of water into the DESMI water injection flanges fitted at the DESMI DOP 160



Figure 22 Pump with water injection flange

pumps. The water injection unit is connected to the hydraulic power supply (DESMI Power pack type DSPP 58 Kw) by means of a hose set. The water injection unit is connected by means of a hose set (water and hydraulic hoses)

The pump set is the same model that was described above in the Sweeping arms section.

5.4.4.Desmi power pack

This power pack supplies hydraulic power to the DESMI DOP-160 pumps. The Power pack is a compact and robust unit provided with fork lift tunnels and lifting points and protected with marine grade paints to resist

This unit is driven by a diesel engine which moves a hydraulic gear pump. The pump will be coupled to the motor using an integral close coupled configuration, delivering variable flow. This hydraulic power unit consists of two vertical reservoirs (hydraulic oil and fuel). The hydraulic tank incorporates sump drain, oil level gauge,

Filler/breather assembly and return connections. The fuel tank incorporates drain and fuel level indicator. It is provided with an ergonomic control panel that makes possible the operator controls the principal operational parameters from the engine.

The Power pack is provided with an ergonomic control panel that makes possible the operator controls the principal operational parameters from the engine.

Table 16 Technical Specifications Markleen DHPP 60 Power pack

Length	2010 mm
Height	1673 mm
Width	1160 mm

5.4.5.Spare parts set for Desmi Dop 160

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

5.4.6.Off-Loading pump Desmi Dop-250 Dual

The DESMI DOP-250 DUAL is in its basic design a modified Archimedes screw pump that has been specially developed and for handling liquids of an extremely high viscosity, like heavy crude oil or molasses, as well as low viscosity liquids as diesel fuel or water, and it will cope with debris normally found in oil spill sites. The pump will handle any medium very gently, without mixing or emulsifying e.g. oil and water.

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 made up of a high-tensile steel core that carries replaceable sectional discs of polyethylene.

The DOP-250 DUAL off-loading pump is designed with no bearings on the inlet side. This design makes it easy for the screw to “catch” even extremely high-viscosity media.

To seal between the screw and the pump casing and to withstand abrasive media, the casing is equipped with a replaceable polyethylene sealing ring.

This pump is like the ones that are installed in the Tarantula offshore skimmer. The detailed description can be found in the above offshore skimmer section (item 5.2.3 above).

5.4.7. Hydraulic and oil hose set for Desmi Dop-250 Dual pump

Hydraulic and oil hoses needed for normal operation of the system.

5.4.8. Spare parts for Desmi Dop-250 Dual pump.

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

5.5. Sampling and Testing System

5.5.1. Sampling-Test Kit Zematra-Minilab.

Manufacturer:

Zematra BV,

Web-Site: www.zematra-marine.com

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

- Density

Zematra manufactures a density unit which is fully in accordance with the specifications as mentioned in ASTM D1298 and IP 160.



Figure 23 Minilab

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

- Pour point

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

- Water in Oil Test

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

- Salt in Water Test

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

- Compatibility/Stability test

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

- Zematra TBN (Alkalinity) Test

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

- Viscosity meter by falling sphere method

The Zematra Mini-lab provides a simple way to determine the dynamic viscosity of the fuel.

5.5.2. Oil water interface detector MMC D-2401-2

Manufacturer:

MMC International Corporation

Web-Site: <http://www.mmcintl.com>

The MMC D-2401-2 is a portable measuring device that incorporates extremely accurate instrumentation able to provide three measurements:

- Measurement of surface ullage level of oil or other fluids to an accuracy and repeatability of $\pm 1/8$ inch.
- Determination of the exact location of the ullage level of the interface layer when an oil-water mixture is contained within the same tank.
- Measurement in either degrees F or degrees C of the fluid temperature at any desired ullage level. Measurement is given to the nearest 0.1 degree and is accurate to $\pm 0.2^{\circ}\text{F}$ over the calibrated temperature ranges given in the specifications.



Figure 24 MMC D-2410-2

The MMC system utilizes a sensor suspended at the end of a fluoro-polymer covered gauging tape wound on a reel assembly. The plastic covered steel gauging tape contains two isolated side conductors to carry the signal and power the electronic circuit within the sensor barrel. The plastic surface of the tape has been treated to make it sufficiently conductive to prevent the build-up of static charges. Temperature indication is provided by a large digital liquid crystal display housed within a sealed reel driving assembly.

Ullage and interface detection is provided by an audible signal obtained from a horn in the reel driving hub, when the bottom "U" gap in the sonic sensor is immersed in fluid. The audible signal heard, will be a continuous tone in a non-conductive fluid such as oil, gasoline, kerosene, etc., but will change to an interrupted tone when immersed in and fluid which is electrically conductive, such as water.

The system is certified as intrinsically safe for electrical equipment in hazardous atmospheres by Factory Mutual, BASEEFA /SIRA, CSA, and SAA.

The triple function temperature, interface, and ullage sensor is powered by a single 9 volt battery contained within the hub assembly. Battery drain is extremely low, (Approximately 1-1/4 Mili-amperes in either ullage, interface or the temperature mode), insuring very long operation, without battery replacement. Low battery warning is provided at the upper left corner of the temperature display LCD, when the battery voltage has dropped to a level that would, with further operation, cause excessive errors in temperature readings.

5.5.3. Stanhope seta flash point tester 13661-3

Manufacturer:

STANHOPE SETA LTD

Web-Site: www.stanhope-seta.co.uk

The Stanhope Seta FP tester 13661-3 is intended to determinate the flash-point of petroleum products using the Pensky-Martens closed cup flash point test. In this test a brass



Figure 25 Flash Point Tester

test cup is filled with a sample of oil that is heated and stirred at specified rates. An ignition source is directed into the cup at regular intervals with simultaneous interruption of stirring until a flash that spreads throughout the inside of the cup is seen. The corresponding temperature is its flash point.

The system is equipped with an electrically heated cup, adjustable temperature ramp rate, and two speed stirrers (for ASTM D93-IP34 Methods A & B).

5.5.4. Gas detector RKI GX 2003

Manufacturer:

RKI Instruments, Inc.

Web-Site: <http://www.rkiinstruments.com>

Description

The instrument includes the case, sensors, LCD, control buttons, printed circuit boards, alarm LED's, infrared communication port, buzzers, vibrator, batteries, pump, flow chamber, and inlet filter holder.

Built around high-quality micro-sensor technology, the GX-2003 is a personal 4-in-1 gas monitor with a built in sample pump.

Weighing only 310 grams, it can monitor the standard confined space gases (LEL combustibles, Oxygen content, Carbon Monoxide, and Hydrogen Sulfide), and it can also measure 100% volume Methane and dynamically display either % LEL, or % volume with its auto-ranging ability.

Calibration intervals and reminders are user adjustable and can be set to either go into alarm or to lock the user out of normal measurement mode once a calibration period has expired. Calibrations can be performed automatically or individually in single calibration mode. The GX-2003 is also compatible with the economical SM-2003 single channel calibration station.

Features

- Three operating modes: Normal, Bar Hole, and Leak Check
- Monitors LEL, and % volume methane, O₂, and CO (optional H₂S)
- Leak detect mode offers high sensitivity tests for ppm level natural gas leaks
- Auto-ranging display of % volume and % LEL
- Calibration reminder with lock out option
- Quick charge (complete charge in 90 minutes)
- Up to 600 hours of data logging with alarm trends
- Auto calibration or single calibration
- TWA and STEL readings with lunch-break mode
- Intrinsically safe, CSA, C/US classified



Figure 26 Gas Detector

5.6. Communications and Safety equipment

5.6.1. Hand portable VHF Air Band JOTRON Tron Air

Manufacturer:

Jotron AS

Web-Site: <https://jotron.com/>

Description

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

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

Tron AIR is waterproof to a depth of 1 meter for 5 minutes. Using battery pack X-98806, it also floats in case of accidental drop into water. Tron AIR is designed to resist a drop from 1 meter onto a hard surface. It is also resistant to seawater, oil and sunlight, and is not unduly affected by this.

Charger: X-93080, Tron CHARGE, Jotron made dual slot fast charger with trickle charging.

Operates on 12 –24 DC, or 115/230VAC with external mains adapter. Wall and table mountable.

Size, WHD: 155mm x 69mm x 83mm Weight: Approx. 300g

5.6.2. Hand portable VHF Air Band IC-A24 VHF

Manufacturer: Icom Inc.

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

Web: www.icom.co.jp/world/products

Year of purchase: 2014

Simple one-handed operation is the most essential feature of the IC-A24 VHF Air Band Transceivers. The well labeled, large keypad provides user friendly operation. The large display shows both letters and numbers and is easy to see, making for fast frequency recognition. The display is backlit, and so is the keypad. The light stays on until you turn it off a very handy feature for flying at night.

Other features

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

5.7. Cleaning equipment: High pressure hot water cleaning machine Lavor LKX4

Manufacturer:

LAVORWASH S.p.A.

Web-Site: <http://en.lavorwash.com/>

Description

Lavor LKX4 is a hot water compact professional cleaner. This hot water high-pressure washer is a mid sized machine and very compact. The LKX 4 has a built-in detergent tank for direct injection, high pressure detergent delivery and the ability to produce steam. See more images below.

Specifications

- Model: Lavor LKX4
- Max Pressure: 30-110 bar, 435-1595 psi
- Max Delivery Rate: 330-660 ltr/h
- Max Temp: 140°C
- ABS Power: 3000 W
- RPM: 1450 rpm
- Weight: 120 Kg, 264.32 lbs

Features

- 4 poles electrical motor (1450 RPM) and thermal protection
- Three ceramic pistons, brass linear pump head with built-in by-pass valve
- Suction and delivery S/S valves
- Max water inlet temperature 40°C
- Safety valve
- Delayed and 24V-low voltage AUTOMATIC STOP system
- Adjustable detergent built-in tank for direct suction
- Power cable (m 5)
- Auxiliary motor for burner air-cooling and two way fuel pump
- Temperature regulation gauge
- Glycerine pressure gauge
- Vertical burner with high thermal efficiency steel coil
- Low fuel cut-out lamp
- Gun with water flow regulation for steam function
- Ergonomic handles and impact resistant covers
- Accessories holder

5.8. Flow meter Krohne UFM3030 K Ultrasonic

Year of purchase 2014

Table 17 Flow-meter technical specifications

Meter type Pulse	
Flow Rate Ranges (Liters Per Minute):	Above 5 cPs 10 to 250 Below 5 cPs 15 to 235
Accuracy- Within (Of Reading)	+/-0,5%
Repeatability:	0,03%
Maximum Viscosity (Of Standard Model):	1000 Centipoise (> 1000 Hi Vis Rotors)

Maximum Operating Pressure:	5500 kpa
Pulses Per Litre:	14,5
Max. Operating Temperature:	80°C
Recommended Mesh Strainer Size:	60 Mesh

5.9. Markleen Containment Boom System – Uniboom X 1900

Manufacturer:

MARKLEEN TERRA, S.L.U.

Website <http://markleen.com>

Year of purchase: 2008

The system includes 2 self-inflatable containment booms of 250m each stored on 2 turntable reels with all necessary deployment equipment: hydraulic air compressor, relevant hydraulic and air hoses, towing lines, cross bridles and spares.

The Markleen Uniboom X 1900 set includes the following components:

- 2 Containment boom sections (~250m each) – to be replaced;
- 2 Storage turntable reels (Unireel 16m³);
- Air compressor (Lamor LHC 5000 F) – to be replaced;
- Towing set including cross-bridle – to be replaced;
- Spare parts and maintenance kit – to be replaced;
- Air and hydraulic hoses – to be replaced.

5.9.1. Containment boom sections (to be replaced) – 2 pcs (2 x 250m)

Table 18 Technical Specifications of Markleen Uniboom X1900 containment barriers

Operational parameters	
Maximum wave height [m]	5
Wind force maximum [m/s]	20
Towing speed, recovery (relative to water) [kts]	1
Maximum towing force [kN]	60
Inflation system	Self-inflatable, single-point inflation
Required personnel during deployment (on oil recovery vessel)	1
Physical parameters	
Freeboard diameter [mm]	800
Skirt depth [mm]	1100
Freeboard, operational [mm]	740
Draft	1160
Primary inflation	Inflatable double spiral
Chamber length [mm]	5000
Weight [kg/m]	19
Breaking strength, bottom tension member [kN]	> 160
Breaking strength, top/centre tension member [kN]	> 60
Ballast, bottom tension line	Galvanised chain
Buoyancy/weight ratio	28:1

Material	
Boom fabric	PVC coated polyester 1400 g/m2
Primary inflation, spiral system	Special woven spiral hose
Secondary inflation, back-up system	PVC hose
Tension member, top and centre	Polyester
Bottom tension member	Galvanised steel
Requirements	
Air pressure, primary (spirals) [bar/psi]	min. 5 / 73
Air pressure, secondary (back-up) [bar/psi]	min. 5 / 73
Air volume, secondary (back-up) [m3/min.]	5 @ 5 bar

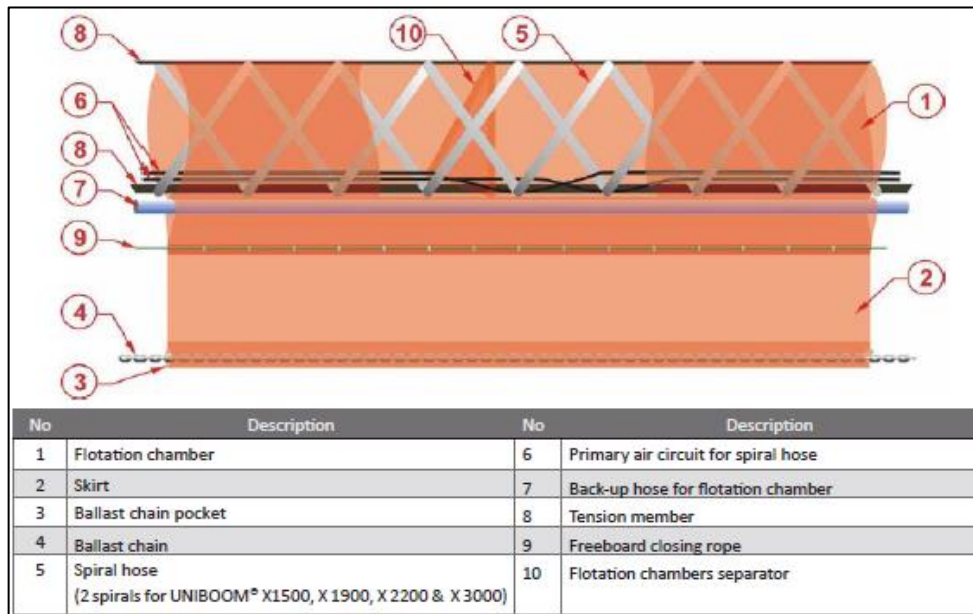


Figure 27 Boom specifications

5.9.2. Boom storage reels (to be serviced)

The UNIBOOM® X barriers are stowed on turntable reels ($\pm 20^\circ$) with a hydraulic system for deployment and recovery. These UNIREEL® reels are characterised by including an automatic inflation system for the barriers and a rotating base that facilitates recovery and stowage.

The reels have variable speed operation and a compact design with the reduction gear installed inside the hub of the drum. The drum is provided with inspection holes to guarantee access for maintenance. The entire structure is painted with a high quality marine grade coating to protect against corrosion for increased product durability and minimum maintenance in marine environments.

Markleen UNIREEL® is fitted with ISO forklift tunnels, 4 hoisting points on the frame and 4 anchoring points for fixing the base of the reel to a dockside, ship deck or container bottom.



Figure 28 Boom reel

Safety of operation of Markleen UNIREEL® is maximised due to a control panel featuring a distributor valve which controls direction of rotation, rotational speed of base and drum (adjustable between 0 and 12 rpm) and the hydraulic brake.

Key features:

- Rotational base that makes easier the containment booms stowage and deployment;
- Integrated delivering air system for the MARKLEEN UNIBOOM® X Series containment booms;
- Automatic hydraulic brake counteracts excessive external pulling forces.

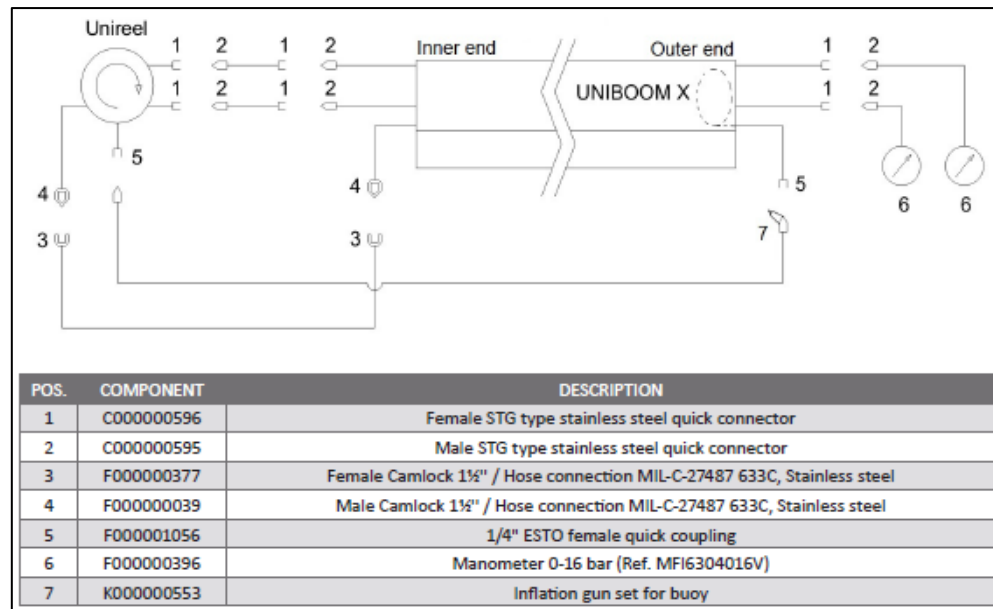


Figure 30 Inflation diagram: UNIREEL / Uniboom X Series connections

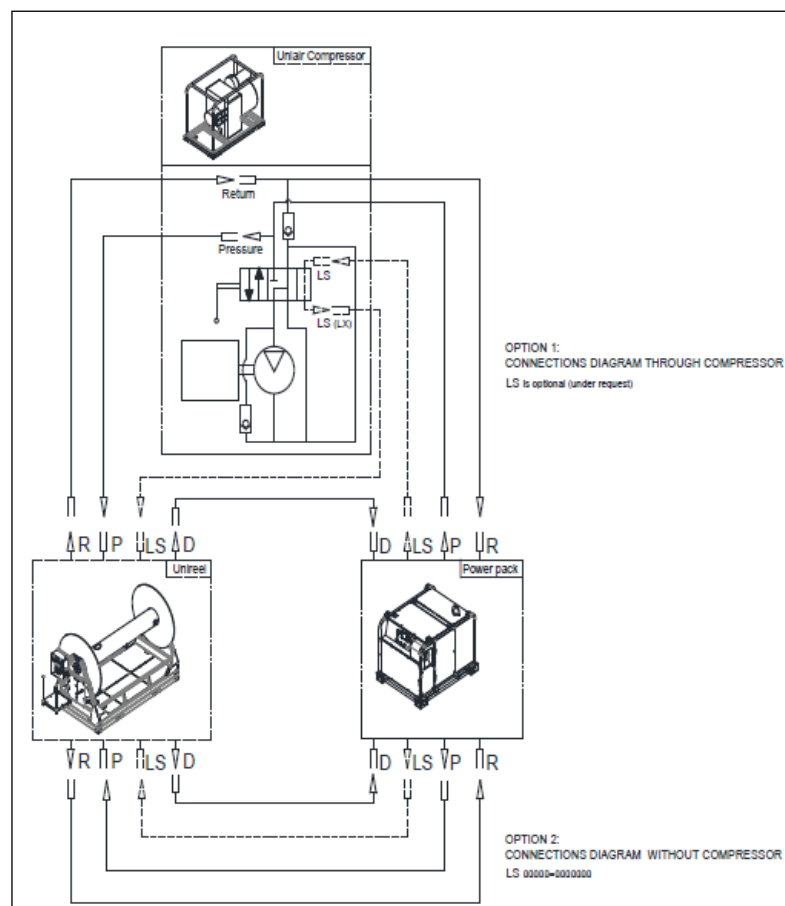
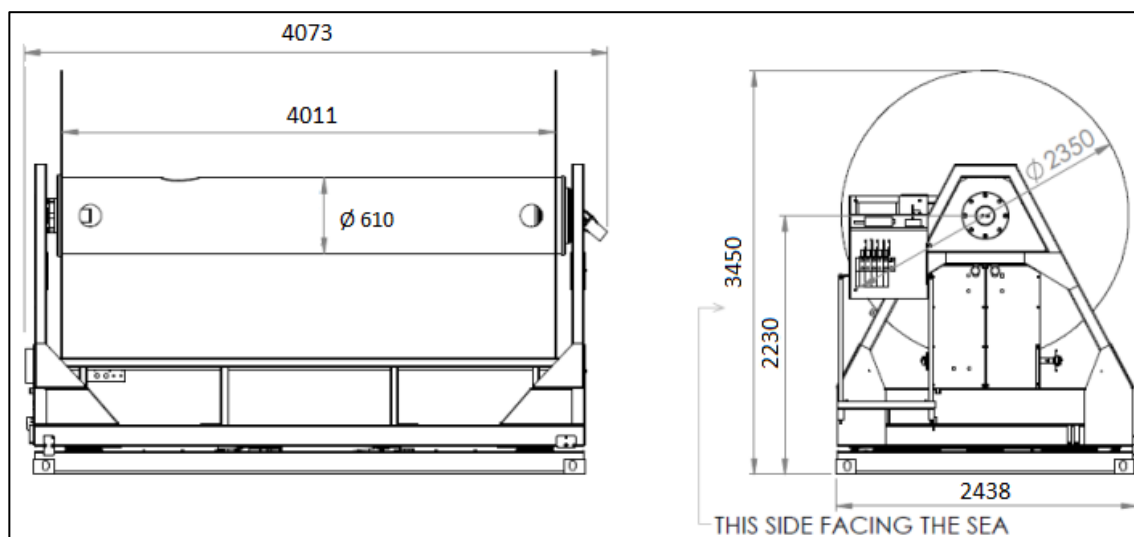


Figure 29 Options of hydraulic connections with power pack and compressor

Table 19 Technical Specifications – Boom reel – UNIREEL 16m³

UNIREEL 16	
Construction	Frame, discs and drum made of corrosion protected carbon steel
Net volume [m ³]	16,3
Hydraulic motor & reducer	Brevini
Brake	Pressure loss hydraulic disc, negative hydraulic brake.
Max. hydraulic pressure [bar]	200
Max. hydraulic flow [l/min]	65
Bearing	Seat with rotating bearing
Max. pull [kgf]	3600
Braking capacity	Greater than max. pull
Operating speed	0 - 12 rpm depending on flow rate
Hydraulic connectors type (*)	Serie B ISO 7241-1
Pressure / Return / Drain	Female 1" / Male 1" / Male 3/8"
LS signal (optional)	Female 1/4"
Max. working air pressure (bar)	6
Recommended air flow (l/min)	5000 (**)
Air circuits connectors	1 1/2" male Camlock

**Figure 31** Boom reel dimensions

5.9.3. Hydraulic Air Compressor – LAMOR LHC 5000 F – (to be replaced)

A new compatible air inflator needs to be included in the offer and will replace the existing air compressor (LAMOR LHC 5000 F).

5.9.4. Towing set and connexion for “open U” formation (to be replaced)

New ancillaries (e.g. towing lines/ropes, net, bridles, etc.) necessary for the boom sections deployment/retrieval and manoeuver in open sea must be provided.

“J” configuration using one boom section (250m) and “open U” configuration using both boom sections (2x250m) must be possible.

5.9.5. Spare parts, maintenance kit (to be replaced)

A new kit for repairs and service spare parts must be provided.

5.9.6. Hydraulic and air hose(s) (to be replaced)

A new set of compatible hydraulic hoses to the new air inflator need to be supplied. The path length from the power pack to the existing air compressor is ~15 meters. The hydraulic couplings fitted on the power pack to power the existing air compressor are: Pressure TEMA 7500 male 3/4" - Return TEMA 10000 female 1".

New compatible air hose(s) from the air inflator to the boom reels need to be supplied in order to replace the existing one. The path length from the existing air compressor to the booms is ~30 meters.

Remarks:

- The components of the boom system indicated above as “to be replaced” might be substituted by any suitable model/manufacturer provided that they are operationally compatible with the transferred reels and the vessel layout.
- The contractor should also take care about the dismantling of the old equipment components to be replaced and their disposal. The cost of the disposal, including transport of the old equipment components to the waste management facility, must be foreseen by the tenderer.

6. List of transferred dispersants and description

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.95	21/01/2015	5223
IBC with dispersant	1	0.95	21/01/2015	5224
IBC with dispersant	1	0.95	21/01/2015	5225
IBC with dispersant	1	0.95	21/01/2015	5226
IBC with dispersant	1	0.95	21/01/2015	5227
IBC with dispersant	1	0.95	21/01/2015	5228
IBC with dispersant	1	0.95	21/01/2015	5229
IBC with dispersant	1	0.95	21/01/2015	5230
IBC with dispersant	1	0.95	21/01/2015	5231
IBC with dispersant	1	0.95	21/01/2015	5232
IBC with dispersant	1	0.95	21/01/2015	5233
IBC with dispersant	1	0.95	21/01/2015	5234
IBC with dispersant	1	0.95	21/01/2015	5235
IBC with dispersant	1	0.95	21/01/2015	5236
IBC with dispersant	1	0.95	21/01/2015	5237
IBC with dispersant	1	0.95	21/01/2015	5238
IBC with dispersant	1	0.95	21/01/2015	5239
IBC with dispersant	1	0.95	21/01/2015	5240
IBC with dispersant	1	0.95	21/01/2015	5241
IBC with dispersant	1	0.95	21/01/2015	5242
IBC with dispersant	1	0.95	21/01/2015	5246
IBC with dispersant	1	0.95	21/01/2015	5248
IBC with dispersant	1	0.95	21/01/2015	5249
IBC with dispersant	1	0.95	21/01/2015	5252
IBC with dispersant	1	0.95	21/01/2015	5258
IBC with dispersant	1	0.95	21/01/2015	5259
IBC with dispersant	1	0.95	21/01/2015	5260
IBC with dispersant	1	0.95	21/01/2015	5261
IBC with dispersant	1	0.95	21/01/2015	5263
IBC with dispersant	1	0.95	21/01/2015	5264
IBC with dispersant	1	0.95	21/01/2015	5265
IBC with dispersant	1	0.95	21/01/2015	5266
IBC with dispersant	1	0.95	21/01/2015	5267
IBC with dispersant	1	0.95	21/01/2015	5268
IBC with dispersant	1	0.95	21/01/2015	5269
IBC with dispersant	1	0.95	21/01/2015	5270
IBC with dispersant	1	0.95	21/01/2015	5271
IBC with dispersant	1	0.95	21/01/2015	5272
IBC with dispersant	1	0.95	21/01/2015	5273
IBC with dispersant	1	0.95	21/01/2015	5274
IBC with dispersant	1	0.95	21/01/2015	5275
IBC with dispersant	1	0.95	21/01/2015	5276
IBC with dispersant	1	0.95	21/01/2015	5277
IBC with dispersant	1	0.95	21/01/2015	5278
IBC with dispersant	1	0.95	21/01/2015	5279
IBC with dispersant	1	0.95	21/01/2015	5280
IBC with dispersant	1	0.95	21/01/2015	5281
IBC with dispersant	1	0.95	21/01/2015	5282
IBC with dispersant	1	0.95	21/01/2015	5283
IBC with dispersant	1	0.95	21/01/2015	5284
IBC with dispersant	1	0.95	21/01/2015	5285
IBC with dispersant	1	0.95	21/01/2015	5286
IBC with dispersant	1	0.95	21/01/2015	5287

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.95	21/01/2015	5288
IBC with dispersant	1	0.95	21/01/2015	5289
IBC with dispersant	1	0.95	21/01/2015	5290
IBC with dispersant	1	0.95	21/01/2015	5291
IBC with dispersant	1	0.95	21/01/2015	5292
IBC with dispersant	1	0.95	21/01/2015	5293
IBC with dispersant	1	0.95	21/01/2015	5294
IBC with dispersant	1	0.95	21/01/2015	5295
IBC with dispersant	1	0.95	21/01/2015	5296
IBC with dispersant	1	0.95	21/01/2015	5297
IBC with dispersant	1	0.95	21/01/2015	5298
IBC with dispersant	1	0.95	21/01/2015	5299
IBC with dispersant	1	0.95	21/01/2015	5300
IBC with dispersant	1	0.95	21/01/2015	5301
IBC with dispersant	1	0.95	21/01/2015	5302
IBC with dispersant	1	0.95	21/01/2015	5303
IBC with dispersant	1	0.95	21/01/2015	5304
IBC with dispersant	1	0.95	21/01/2015	5305
IBC with dispersant	1	0.95	21/01/2015	5306
IBC with dispersant	1	0.95	21/01/2015	5307
IBC with dispersant	1	0.25	21/01/2015	5308
IBC with dispersant	1	0.95	21/01/2015	5309
IBC with dispersant	1	0.95	21/01/2015	5310
IBC with dispersant	1	0.95	21/01/2015	5311
IBC with dispersant	1	0.95	21/01/2015	5318
IBC with dispersant	1	0.95	21/01/2015	5319
IBC with dispersant	1	0.95	21/01/2015	5320
IBC with dispersant	1	0.95	21/01/2015	5321
IBC with dispersant	1	0.95	21/01/2015	5322
IBC with dispersant	1	0.95	21/01/2015	5323
IBC with dispersant	1	0.95	21/01/2015	5324
IBC with dispersant	1	0.95	21/01/2015	5325
IBC with dispersant	1	0.95	21/01/2015	5326
IBC with dispersant	1	0.95	21/01/2015	5327
IBC with dispersant	1	0.95	21/01/2015	5328
IBC spare (empty)	1	0	21/01/2015	5329
IBC spare (empty)	1	0	21/01/2015	5330
IBC spare (empty)	1	0	21/01/2015	5331
IBC spare (empty)	1	0	21/01/2015	5332
IBC spare (empty)	1	0	21/01/2015	5333
IBC with dispersant	1	0.95	18/03/2015	5334
IBC with dispersant	1	0.95	18/03/2015	5335
IBC with dispersant	1	0.95	18/03/2015	5336
IBC with dispersant	1	0.95	18/03/2015	5337
IBC with dispersant	1	0.95	18/03/2015	5338
IBC with dispersant	1	0.95	18/03/2015	5339
IBC with dispersant	1	0.95	18/03/2015	5340
IBC with dispersant	1	0.95	18/03/2015	5341
IBC with dispersant	1	0.95	18/03/2015	5342
IBC with dispersant	1	0.95	18/03/2015	5343
IBC with dispersant	1	0.95	18/03/2015	5344
IBC with dispersant	1	0.95	18/03/2015	5345
IBC with dispersant	1	0.95	18/03/2015	5346
IBC with dispersant	1	0.95	18/03/2015	5347
IBC with dispersant	1	0.95	18/03/2015	5348
IBC with dispersant	1	0.95	18/03/2015	5349
IBC with dispersant	1	0.95	18/03/2015	5350

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.95	18/03/2015	5351
IBC with dispersant	1	0.95	18/03/2015	5352
IBC with dispersant	1	0.95	18/03/2015	5353
IBC with dispersant	1	0.95	18/03/2015	5354
IBC with dispersant	1	0.95	18/03/2015	5355
IBC with dispersant	1	0.95	18/03/2015	5356
IBC with dispersant	1	0.95	18/03/2015	5357
IBC with dispersant	1	0.95	18/03/2015	5358
IBC with dispersant	1	0.95	18/03/2015	5359
IBC with dispersant	1	0.95	18/03/2015	5360
IBC with dispersant	1	0.95	18/03/2015	5361
IBC with dispersant	1	0.95	18/03/2015	5362
IBC with dispersant	1	0.95	18/03/2015	5363
IBC with dispersant	1	0.95	18/03/2015	5364
IBC with dispersant	1	0.95	18/03/2015	5365
IBC with dispersant	1	0.95	18/03/2015	5366
IBC with dispersant	1	0.95	18/03/2015	5367
IBC with dispersant	1	0.95	18/03/2015	5368
IBC with dispersant	1	0.95	18/03/2015	5369
IBC with dispersant	1	0.95	18/03/2015	5370
IBC with dispersant	1	0.95	18/03/2015	5371
IBC with dispersant	1	0.95	18/03/2015	5372
IBC with dispersant	1	0.95	18/03/2015	5373
IBC with dispersant	1	0.95	18/03/2015	5374
IBC with dispersant	1	0.95	18/03/2015	5375
IBC with dispersant	1	0.95	18/03/2015	5376
IBC with dispersant	1	0.95	18/03/2015	5377
IBC with dispersant	1	0.95	18/03/2015	5378
IBC with dispersant	1	0.95	18/03/2015	5379
IBC with dispersant	1	0.95	18/03/2015	5380
IBC with dispersant	1	0.95	18/03/2015	5381
IBC with dispersant	1	0.95	18/03/2015	5382
IBC with dispersant	1	0.95	18/03/2015	5383
IBC with dispersant	1	0.95	18/03/2015	5384
IBC with dispersant	1	0.95	18/03/2015	5385
IBC with dispersant	1	0.95	18/03/2015	5386
IBC with dispersant	1	0.95	18/03/2015	5387
IBC with dispersant	1	0.95	18/03/2015	5388
IBC with dispersant	1	0.95	18/03/2015	5389
IBC with dispersant	1	0.95	18/03/2015	5390
IBC with dispersant	1	0.95	18/03/2015	5391
IBC with dispersant	1	0.95	18/03/2015	5392
IBC with dispersant	1	0.95	18/03/2015	5393
IBC with dispersant	1	0.95	18/03/2015	5394
IBC with dispersant	1	0.95	18/03/2015	5395
IBC with dispersant	1	0.95	18/03/2015	5396
IBC with dispersant	1	0.95	18/03/2015	5397
IBC with dispersant	1	0.95	18/03/2015	5398
IBC with dispersant	1	0.95	18/03/2015	5399
IBC with dispersant	1	0.95	18/03/2015	5400
IBC with dispersant	1	0.95	18/03/2015	5401
IBC with dispersant	1	0.95	18/03/2015	5402
IBC with dispersant	1	0.95	18/03/2015	5403
IBC with dispersant	1	0.95	18/03/2015	5404
IBC with dispersant	1	0.95	18/03/2015	5405
IBC with dispersant	1	0.95	18/03/2015	5406
IBC with dispersant	1	0.95	18/03/2015	5407

Item	Pieces	Tons	Reception Date	ID Code
IBC with dispersant	1	0.95	18/03/2015	5408
IBC with dispersant	1	0.95	18/03/2015	5409
IBC with dispersant	1	0.95	18/03/2015	5410
IBC with dispersant	1	0.95	18/03/2015	5411
IBC with dispersant	1	0.95	18/03/2015	5412
IBC with dispersant	1	0.95	18/03/2015	5443
IBC with dispersant	1	0.95	18/03/2015	5444
IBC with dispersant	1	0.95	18/03/2015	5445
IBC with dispersant	1	0.95	18/03/2015	5441
IBC with dispersant	1	0.95	18/03/2015	5442
IBC with dispersant	1	0.95	18/03/2015	5440
IBC with dispersant	1	0.95	18/03/2015	5419
IBC with dispersant	1	0.95	18/03/2015	5420
IBC with dispersant	1	0.95	18/03/2015	5421
IBC with dispersant	1	0.95	18/03/2015	5422
IBC with dispersant	1	0.95	18/03/2015	5423
IBC with dispersant	1	0.95	18/03/2015	5424
IBC with dispersant	1	0.95	18/03/2015	5425
IBC with dispersant	1	0.95	18/03/2015	5426
IBC with dispersant	1	0.95	18/03/2015	5427
IBC with dispersant	1	0.95	18/03/2015	5428
IBC with dispersant	1	0.95	18/03/2015	5429
IBC with dispersant	1	0.95	18/03/2015	5430
IBC with dispersant	1	0.95	18/03/2015	5431
IBC with dispersant	1	0.95	18/03/2015	5432
IBC with dispersant	1	0.95	18/03/2015	5433
IBC with dispersant	1	0.95	18/03/2015	5434
IBC with dispersant	1	0.95	18/03/2015	5435
IBC with dispersant	1	0.95	18/03/2015	5436
IBC with dispersant	1	0.95	18/03/2015	5437
IBC with dispersant	1	0.95	18/03/2015	5438
IBC with dispersant	1	0.95	18/03/2015	5439
IBC spare (empty)	1	0	18/03/2015	5413
IBC spare (empty)	1	0	18/03/2015	5414
IBC spare (empty)	1	0	18/03/2015	5415
IBC spare (empty)	1	0	18/03/2015	5416
IBC spare (empty)	1	0	18/03/2015	5417
IBC spare (empty)	1	0	18/03/2015	5418
Total cost of dispersants (for insurance purpose): EUR 490,191				

6.1 Dispersant Radiagreen OSD

Manufacturer:

Oleon NV

Web-Site <http://www.oleon.com/>

Year of purchase: 2015

Radiagreen OSD is a concentrated blend of natural surfactants and solvents.

Due to its high solvency power, Radiagreen OSD will easily penetrate into the oil slick as a result of which the surfactants will be incorporated rapidly. The surfactants will reduce the interfacial tension

between oil and water, allowing it to divide the hydrocarbons in droplets of such a size that the physical and bacterial action is accelerated, leading to a faster degradation.

Radiagreen OSD (free of aromates) has been engineered for a large number of spills. We differentiate:

- Cleaning of oil spills (crude oil, diesel, gasoil, vegetable oil, other oils);
- Oil spills on warehouse floors, port quays, sea, bulkhead areas;
- Rocks and beaches;
- Oil and fats on machines and mechanical parts.

Flammable: Flash-point-ASTMD 93: >110°C

Maximum storage Temperature: 60°C

Minimum Temperature: -20°C

Optimal storage Temperature: 5 - 35 °C

The product will have a shelf life of minimum 5 years if the storage conditions are respected.

Radiagreen OSD is stored in standard IBC's with the following indicative external dimensions: Length 1.2 m x Width 1.0 m x Height 1.16 m.



Figure 32 IBC's with Radiagreen OSD