LEADERGRATE
GRP PRODUCTS

Fabricated by
المستقبل
AL MUSTAQBAL FIBERGLASS IND.

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CERTIFIED

FIBREGLASS
OIL/WATER SEPARATOR

Because we should help protecting Earth's natural resources and beauty

FIBREGLASS
OIL/WATER SEPARATOR
TANKS
FOR ALL INDUSTRIES

CONTENT

GENERAL INFORMATION

To address new environmental regulations in Gulf countries, Leadergrate offers a wide range and sizes of fiberglass underground double wall and aboveground single wall oil/water separators for engineering companies and industrial clients for the treatment of oily process waters at oil & gas fields, refineries, steel plants, power stations, marine oil terminals, petrol stations, airports, harbours etc..

Quality Manufactured Product

Leadergrate is an ISO 9001 certified company , The tanks are manufactured in fiberglass complying with The following standards:

- ASTM D3299
- ASTM D4021
- UL 1316
- BS EN 858-2: 2003
- Stokes Law
- BS EN 858-1: 2002
- BS EN 976-1: 1997,
- BS 4994:1987,
- PPG3.

Every tank is subjected to a number of quality assurance inspections .Complete traceability of resin batches and the glass is maintained and can be provided as needed .Chemical resistant tests and hydrostatic water /pressure/ vacuum tests are routinely performed.

Capacities and Tank Construction Method

- Influent flow rates from 0 to more than 4,000 USG per minute. (252 l/s)
- Size from 600 USG to 50,000 USG.
- **Contact Molded Tank**: The open mold process frequently utilizes a surface coating called a gelcoat or topcoat. The gelcoat is applied directly to the mold using a spray process or manual which results in a high quality durable surface. After the coating is applied, the back-up reinforcement and binder resin is applied, either by spray or manual application. Entrapped air is removed from the resin/reinforcement mixtures, and additional layers of laminate are added to build thickness and strength as desired.
- **Filament Wound Tank**: Continuous, resin-impregnated fibers or roving are wound on a rotating mandrel in a predetermined pattern, providing maximum control over fiber placement and uniformity of structure. In the wet method, the fiber picks up the low-viscosity resin either by passing through a trough or from a metered application system. In the dry method, the reinforcement is impregnated with resin prior to winding.
- **Single Wall Tank**: Fiberglass single wall tanks are used for aboveground application and are formulated to be compatible with petroleum-fuel products, including alcohols and alcohol-gasoline mixtures .
- **Double Wall Tank**: Fiberglass double-wall tanks are used for underground application . Two walls of protection allow for maximum security in the unlikely event of a leak in the primary wall. The interstice between the two tank walls is filled at the factory with a monitoring fluid. The monitoring fluid also partially fills a reservoir on the top of the tank. This creates a hydrostatic pressure that enables the operator to monitor the walls of both the primary tank and the secondary tank. An electronic reservoir-monitoring probe alarms when the fluid level either falls below or rises above the acceptable level within the reservoir.

IMPORTANT FEATURES

1. Corrosion Resistant:

Fiberglass material is resistant to more than 1000 chemicals and combination of chemicals from -4˚C to 148˚C . Unlike Steel or concrete, GRP does not require coating . The corrosion resistance is achieved by the choice of the resin and is enhanced by adding chemical resistant surface veil to the inner Liner in contact with chemicals . LG uses vinylester resin being the most corrosion resistant resin in the industry.

2. Light weight:

Fiberglass OWS weighs 1/3 the weight of steel , resulting in lower installations cost.

3. Expansion and Contraction:

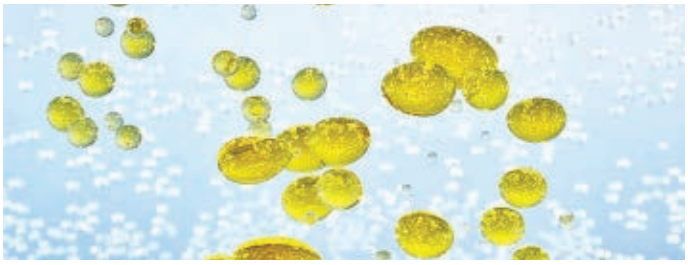
Concrete expands and contracts causing corrosion and cracks over time. Fiberglass does not expand or contract.

4. Maintenance free:

GRP does not require any blasting or coating.

5. Electronic Monitoring System:

Our Oil / Water Separator are equipped with Radar level transmitter to monitor the oil level and electronic leak – detection systems for double walled separators.



IMPORTANT FEATURES

6. Internal baffle walls:

The internal fiberglass baffle is designed to prevent heavy sludge from entering the coalescer area.

7. Unique fiberglass design & Construction Method:

Fiberglass OWS ranging from 600 Gallon to 40,000 gallon can be made from single wall tank or double wall tank . Double wall tanks are recommended for underground application allowing for maximum security in the unlikely event of a leak in the primary wall . Monitoring device can be installed in the space inherent in double wall tanks.

8. Performance features:

Removes free floating oils and settleable solids for oil/water mixtures to achieve an effluent quality not to exceed 5 ppm (mg/L) of free hydrocarbons based on the following system parameters:

- Influent by gravity fed to prevent over pressurizing of the tank and mechanical emulsification of the stored product.
- Maximum influent shall be 1,000 ppm of free oil and oil specific gravity must be between 0.68 and 0.95.
- Influent oil/water mixture temperatures must be between 5 °C and 65 °C.
- Separator must be vented at all times.
- An interceptor tank must be installed prior to the OWS inlet to collect heavy debris.
- The OWS must be installed strictly as per LG installation manual.
- The OWS must be periodically maintained in accordance with LG operating & maintenance manual.

9. Installation time:

Fiberglass OWS can be transported on a single truck and are delivered to the site as a finished product making installation easier and faster.

10. Service life:

30 years against structural failure and internal /external corrosion.

Standard Note: The Ows will not separate alcohols , solvents or soapy solutions . Solvents may not be compatible with the tank or coalescer corrugated plates.

AREA OF APPLICATIONS 1

There are many activities were oil products are used . In practice , it is impossible to avoid oil spills in the watercourse and drainage system . New regulations in GCC market requires a modern and efficient oil separation technology to prevent pollution of the environment . The application of Oil water separators from the following industries is mainly for

Harbor & Fuel Depots

Refineries & Petrochemical

Oil Fields & Gas Fields

Steel Mills & Industry

Power Stations

Rainwater Runoff

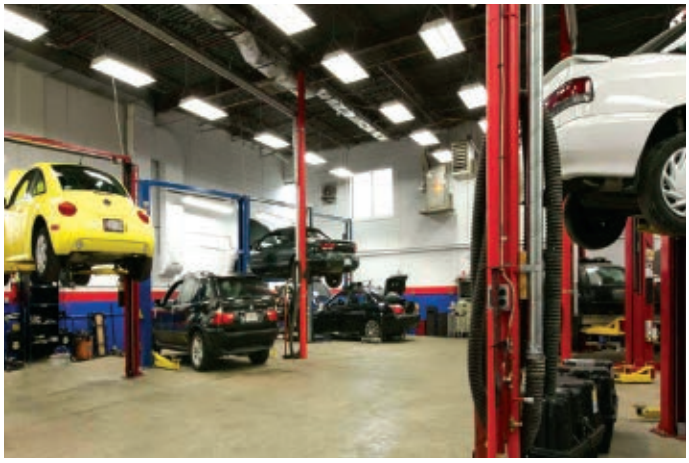
AREA OF APPLICATIONS 2

Service Stations

Work shops

Car Parks

Garages



Airports

Process wastewater

PRINCIPLE OF OIL SEPARATION

Most physical mixtures of oil and water will separate by gravity eventually. Due to lower specific gravity hydrocarbon will eventually float to water's surface. Nevertheless, the separation of small oil droplets will take a very long time (see the chart below). As a result, huge volumes of separation tanks will be required.

The relationship between oil droplet size and it's rise velocity is described by the Stokes' Law:

$$VR = \frac{D2 \cdot g \cdot (\rho w - \rho o)}{18 \cdot \eta}$$

VR is the rise velocity of oil droplet in m/s.
D is the oil droplet diameter in m.
g is the gravitational acceleration (9,81 m2/s).
η is the viscosity of water (0,001 kg/m.s).
ρw is the density of water in kg/m3.
ρo is the density of oil in kg/m3.

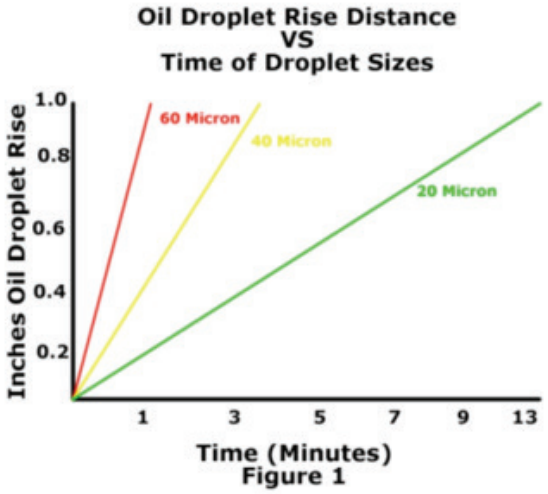


Figure 1

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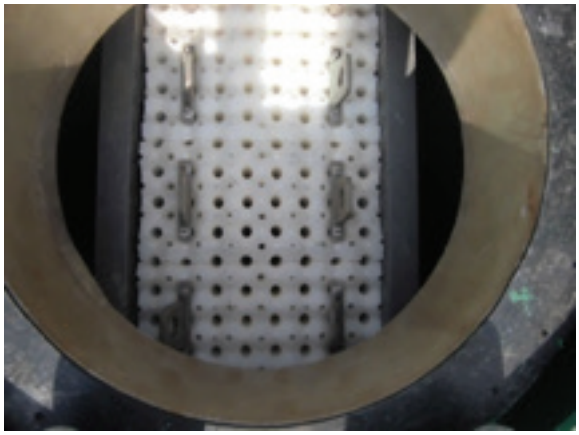
Coalescing material – enhanced gravity separation

The main objective of the oil water separator is the increase of the droplet size as quickly as possible , thereby decreasing the cost & volume of oil separator. The choice of coalescent material is very efficiently managing the task. The methodology follows Stoke's Law based on the difference in specific gravity (buoyancy) of admixed water comprising water and oil, and the fluidity of admixed water according to gravity. Through this system, oil droplets and sludge have a certain fluid velocity while admixed water passes through the EPS pack, and in this case, the oil gathers in the crests of the egg cup shapes due to the difference in specific gravity (buoyancy) and rises to the water's surface through the oil holes, while the sludge gathered in valleys of the cups falls into the sedimentation area.



CHOICE OF OIL/WATER SEPARATOR

A. CLASS OF OIL SEPARATOR (CLASS I AND CLASS II)

BS EN 858 refers to two 'classes' of separator, based on performance under standard test conditions.

1. CLASS 1 SEPARATOR

They are designed to achieve a discharge concentration of less than 5 mg/liter of oil under standard test conditions. These separators are required for discharges to surface water drains and the water environment. Many Class 1 separators contain coalescing devices, which draw the oil droplets together and facilitate the separation.

2. CLASS 2 SEPARATOR

They are designed to achieve a discharge concentration of less than 100 mg/litre of oil under standard test conditions. They are suitable for dealing with discharges where a lower quality requirement applies such as discharges to the foul sewer .

B. BYPASS OIL SEPARATOR AND FULL RETENTION OIL SEPARATOR .

1. BY-PASS SEPARATOR

Fiberglass by-Pass Separator are the most widely used separator where it is acceptable to treat the infrequent light contamination flows according to the nominal size (NSB) generated by rainfall rates up to 6.5 mm/hour . Any Excess rainfall is by-passed without treatment . Bypass interceptors can be used in areas where the catchment area may be large but the risk of spillage is low e.g. car parks.

2. FULL RETENTION SEPARATOR

Fiberglass full retention Separator model is equipped with automatic closure device to close off the separator when the container oil exceeds the maximum oil storage volume .Full retention separators treat the full flow that can be delivered by the drainage system. The 'full flow' is normally equivalent to the flow generated by a rainfall intensity of 65 mm/hour .

SIZING OF SEPARATOR

The sizing of light liquid separators shall be based on the nature and flow rate of the liquids.

The nominal size of full retention oil separator shall be calculated from the following formula:

NS = (Qr + 2.Qs)fd

- NS is the nominal size of the separator.
- Qr is the maximum rainwater flow rate in l/s.
- Qs is the maximum wastewater flow rate in l/s.
- fd is the density factor for the relevant light fluid.

Density of light liquid in g/cm3	< 0.85	0.85<X<0.90	0.90<X<0.95
Density factory fd	1	1.5	2.0

Rainwater flow rate shall be calculated from the following formula:

Qr = C.I.A

- C is the run-off coefficient (in most cases C=1).
- I is the rainfall intensity, in l/s · ha
- A is the area receiving rainfall, in ha

PROCESS WASTEWATER FLOW

Recommendation for process wastewater flow rate selection

= 2 l/s for each carwash place/high pressure unit.

= 1 l/s for each additional car wash place / high pressure unit.

Standard note: If a separator is receiving rainwater and wastewater,e.g from vehicle washing, and the two maximum flows are not expected to occur simultaneously , then the separator can be sized for the higher flow rate.

SIZING OF SLUDGE TRAP

According to EN858-2 standard, separator systems shall incorporate a sludge trap either as separate unit or as an integral part of the separator. In most models the sludge trap is integrated in the same tank with oil separator.

The volume of the sludge trap can be determined as given in the table below:

Volume of sludge trap	Quantity of sludge	Application
Ns.100 / fd	Small	- All rainwater collecting areas with small amount of silt - Processing wastewater with defined small sludge volume
Ns.200/fd	Medium	- filling stations , carwash by hand - bus washing places - waste water from garages, vehicle parking lots - power plants , machinery plants.
Ns.300/fd	High	- washing plants for site vehicles, site machines, farm machines. - truck wash places - automatic car washes i.e roll over , drive through

SIZING OF SEPARATOR

1. NOMINAL SIZE (NS)

Oil Water Separators are tested in accordance with the standard test procedure in the European Standard. BS EN 858-1 & 2: 2002. Each separator is allocated a nominal size (NS) on the basis of the test results. Full retention and bypass separators are referred to as NS and NSB, respectively.

Type of Separator	Full retention separator	Bypass separator
Nominal Size	NS = 0.018 x A (in m2)	NSB = 0.0018 x A (in m2)

2. SILT STORAGE CAPACITY

Silt storage capacity is provided as an integral part of the Oil water separator or as a separate upstream unit .

Type of Separator	Full retention separator	Bypass separator
Silt storage	CS = NS x 100 (in litres)	CS = NSB x 100 (in litres)

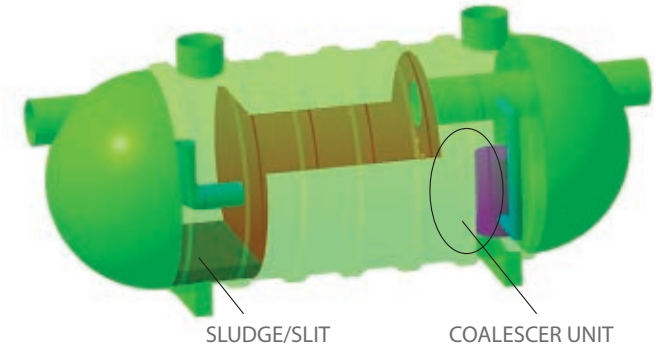
3. OIL STORAGE CAPACITY

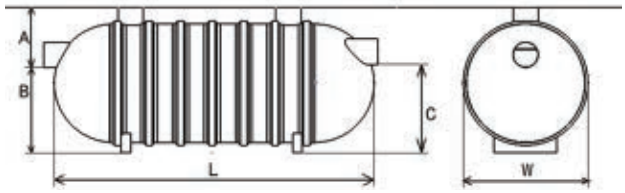
The oil storage capacity is defined as the volume of separated oil that can be stored in the separator without any of the stored oil entering the inlet or outlet of the separator. The oil storage volume (V) is given by the following

Type of Separator	Full retention separator	Bypass separator
Oil Storage	V = NS x 10 (in litres)	CS = NSB x 15 (in litres)

BYPASS SEPARATOR - CLASS 1

Bypass separators fully treat all flows generated by rainfall rates of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

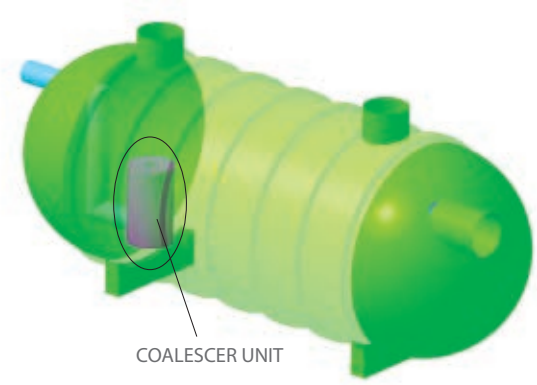


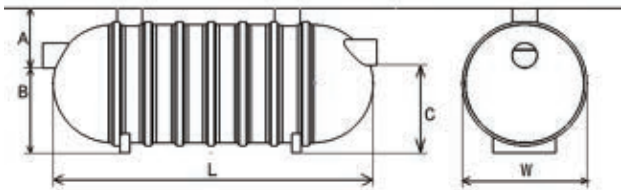


Product Code	Nominal Size (NSB)	Peak flow Rate (l/s)	Drainage Area (m2)	Silt Storage capacity (ltrs)	Oil Storage Capacity (ltrs)	Diameter (mm) W	Length (mm) L	Inlet Invert (mm) A	Base inlet Invert (mm) B	Base To Outlet Invert (mm) C	Max Inlet/ outlet Pipe Dia (mm)
LG-BP003	3	30	1,667	300	45	1,300	1550	500	1,015	965	160
LG-BP004	4	40	2,222	400	60	1,200	1,860	560	1,350	1,300	300
LG-BP006	6	60	3,333	600	90	1,200	2,100	560	1,350	1,300	300
LG-BP008	8	80	4,444	800	120	1,200	2,300	560	1,350	1,300	300
LG-BP010	10	100	5,556	1,000	150	1,200	3,000	560	1,350	1,300	300
LG-BP015	15	150	8,333	1,500	225	1,200	4,300	560	1,350	1,300	400
LG-BP018	18	180	10,000	1,800	270	1,800	3,300	700	1,450	1,350	600
LG-BP020	20	200	11,111	2,000	300	1,800	3,600	700	1,450	1,350	600
LG-BP025	25	250	13,889	2,500	375	1,800	4,500	700	1,450	1,350	600
LG-BP030	30	300	16,667	3,000	450	1,800	5,100	700	1,450	1,350	600
LG-BP040	40	400	22,222	4,000	600	1,800	7,100	740	1,410	1,310	600
LG-BP045	45	450	25,000	4,500	675	1,800	7,700	740	1,410	1,310	600
LG-BP050	50	500	27,778	5,000	750	1,800	8,300	740	1,410	1,310	600
LG-BP060	60	600	33,333	6,000	900	2700	4,400	950	2,100	2,000	750
LG-BP070	70	700	38,889	7,000	1,050	2700	5,250	950	2,100	2,000	750
LG-BP080	80	800	44,444	8,000	1,200	2700	6,170	950	2,100	2,000	750
LG-BP100	100	1,000	55,556	10,000	1,500	2700	7,400	1,100	1,950	1,850	900
LG-BP125	125	1,250	69,444	12,500	1,875	2700	9,050	1,100	1,950	1,850	900

FULL RETENTION SEPARATOR
CLASS 1

Our full retention separators can be used in car parks, roadways, fuel distribution depots, vehicle workshops and forecourts. Full retention separators treat the full flow that can be delivered by the drainage system. This is normally equivalent to the flow generated by a rainfall intensity of 65mm/hr.





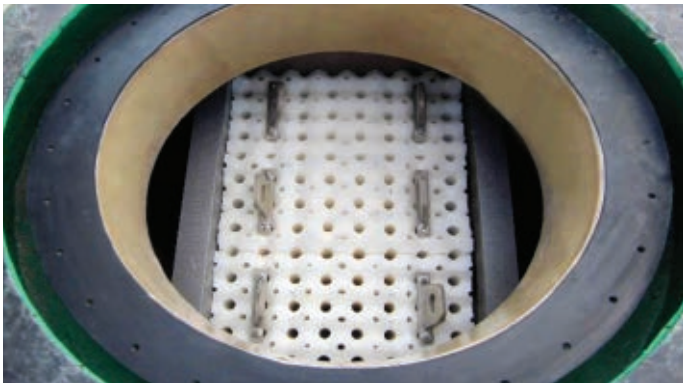
Product Code	Nominal Size (NSB)	Peak flow Rate (l/s)	Drainage Area (m2)	Silt Storage capacity (ltrs)	Oil Storage Capacity (ltrs)	Diameter (mm) W	Length (mm) L	Inlet Invert (mm) A	Base inlet Invert (mm) B	Base To Outlet Invert (mm) C	Max Inlet/ outlet Pipe Dia (mm)
LG-FR004	4	40	222	400	40	1200	1750	540	1200	1140	160
LG-FR006	6	60	333	600	60	1200	2,300	540	1200	1140	160
LG-FR010	10	100	556	1000	100	1200	3,500	540	1200	1140	160
LG-FR015	15	150	833	1500	150	1800	3,200	350	1800	1740	225
LG-FR020	20	200	1111	2000	200	1,800	3,600	350	1800	1740	225
LG-FR030	30	300	1667	3000	300	1,800	4,500	390	1760	1700	300
LG-FR040	40	400	2222	4000	400	1,800	5,800	390	1760	1700	300
LG-FR050	50	500	2780	5000	500	1,800	7,100	390	1760	1700	300
LG-FR065	65	650	3611	6500	650	2,700	4,800	425	2625	2525	300
LG-FR080	80	800	4444	8000	800	2,700	5,700	425	2625	2525	300
LG-FR100	100	1000	5555	10000	1000	2,700	7,400	475	2575	2475	400
LG-FR125	125	1250	6944	12500	1250	2,700	8,600	475	2575	2475	400
LG-FR150	150	1500	8333	15000	1500	2,700	10,180	475	2575	2475	400

ACCESSORIES

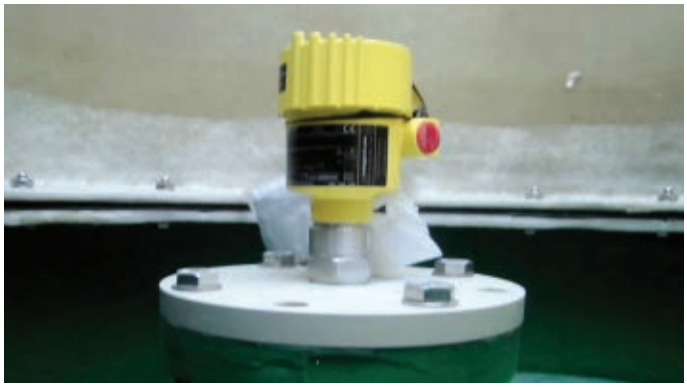
Each Oil water separator is equipped with accessories supplied by Leadergrate according to project specification and client requirement:

- **SS 316/A4 lifting lugs are designed to withstand weight of separator with safety factor 2:1.**
- **Polyester/ GRP Anchor straps with GI Turnbuckles.**
- **GRP containment Sump is optional and is constructed of fiberglass with min φ 1200-1500 mm.**
- **GRP Internal ladder is optional and is standard pultruded ladder .**
- **GRP manhole extension is optional and of H varying from 1000 to 2100 mm.**
- **GRP sludge baffle are designed to hold the coalescer packs inside the separator.**
- **Double walled tanks are supplied with factory filled monitoring fluid inside the interstice and a fiberglass reservoir mounted on top of the separator .**
- **Electronic monitoring equipments are supplied as per client demand such as Radar level transmitter , leak detector sensor, pressure gauge and temperature gauge.**
- **Alarm system: According to the Environment Agency's PPG3 guidelines, all separators must be provided with a robust device to provide visual and audible warning (if necessary to a remotely located supervisory point) when the level of oil reaches 90% of the oil storage volume.**

ACCESSORIES



Coalescent Corrugated Media



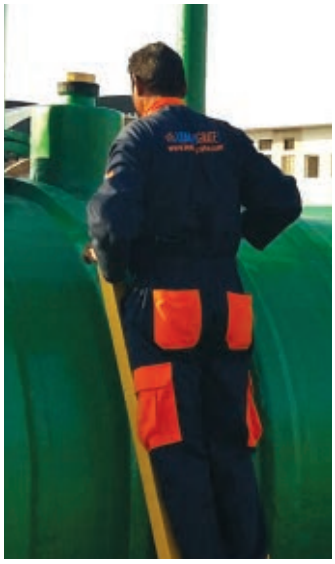
Oil Level Transmitter

Polyester Hold Down Straps

Pressure and Temp Gauge

GRP Manhole Extension

GRP Containment Sump



Monitoring Fluid Reservoir

Alarm System

LEADERGRATE®
GRP PRODUCTS

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