GENERAL INFORMATION ABOUT FREYLIT OIL SEPARATORS

APPLICATIONS FOR OIL SEPARATORS ACCORDING EUROPEAN STANDARD EN858:

SERVICE STATIONS;
GARAGES;
TRAIN; TRAM AND SUBWAY SERVICE CENTERS;
BUS SERVICE CENTERS;
WORK SHOPS;
CAR PARK;
AIRPORTS;
ELECTRIC POWER STATIONS;
OIL DEPOTS & STORAGE FACILITIES;

APPLICATIONS FOR INDUSTRIAL OIL SEPARATORS:

FACTORIES;
METAL WORKING PLANTS;
STEEL MILLS, STEEL MANUFACTURING;
OIL FIELDS & REFINERIES;
OIL PIPE LINES;
AIRPORTS;

homepage: www.freylit.com
APPLICATIONS FOR OIL SEPARATORS WITH POLYPROPYLENE TANKS:

SERVICE STATIONS;
   GARAGES;
BUS SERVICE CENTERS;
WORK SHOPS;
CAR PARK;
AIRPORTS;

APPLICATIONS FOR MOBILE OIL SEPARATORS:

HARBOURS;
SHIP YARDS;
MARINE OIL TERMINALS;
OIL PIPELINES;

APPLICATIONS FOR EFFICIENT OIL SPILL REMEDIAL OIL SEPARATORS:

OIL CONTAMINATED GROUND WATER;
OIL SPILLS;

APPLICATIONS FOR TRAMP OIL SEPARATORS FOR EXTENDING THE LIFETIME OF COOLANTS AND DEGREASING BATHS:

FACTORIES;
METAL WORKING INDUSTRY;

REFERENCE LETTERS
OIL SEPARATOR

GENERAL INFORMATION:
Since 1983 FREYLIT has been producing, installing and maintaining the following products:

**Mineral Oil and Residual Oil Separators**
**Oil Separators for garages and parking lots**
**Wash Water Recycling Systems**

At the heart of our **Mineral Oil and Residual Oil Separators** are the polypropylene coalescent plates developed by Freylit, which reduce the effluent oil content down to below 5 ppm. The **Mineral Oil and Residual Oil Separators** are used at petrol stations, garages, freight forwarders, oil depots, airports, harbours, electric power plants, refineries, steel factories, etc. to separate waste oil from water.

We produce **Mineral Oil and Residual Oil Separators** with flow rates from 2 litres/second up to 1500 litres/second. The separators are made of durable materials to ensure high quality performance over a very long lifetime. For more than 20 years we export to over 30 countries in Europe, USA, Japan, China, Taiwan, and the Middle East. A large number of well known oil corporations, engineering companies, and industrial clients are using Freylit oil separators. All units are tested to conform to the European Norm EN858.

FREYLIT supplies **Mineral Oil and Residual Oil Separators** with tanks made of concrete, steel or polypropylene. Alternatively we can supply only ‘installation kits’, which are all the necessary oil separator components inside the tank, and our clients obtain the corresponding tanks locally, build them on site, or install the ‘installation kit’ into an existing pit. With the “installation kits” we provide the necessary engineering plans and easy installation and operation instructions.

Moreover, we have a second product line making **Wash Water Recycling Systems** used for cleaning waste water from all types of vehicle washing operations, be it cars or trains or even airplanes. The FREYLIT wash water recycling system is recognised as the most efficient state of the art technology by all re-known oil companies worldwide such as Adnoc, Agip, Aral, BP-Amoco, Emarat, Eppco, Esso, Idemitsu, Mobil, OMV, Q8, Shell, Texaco, etc. and also automobile traders such as BMW, Daimler-Chrysler, VW, Ford, Ferrari, Daihatsu, etc. in USA, Asia, Europe and the Middle East. With over 4000 units installed worldwide the FREYLIT system is the system of choice, because of several advantages, including the reclaim of up to 93% of the wash water normally used.
According EN 858 according ON B5101

OIL-WATER SEPARATOR

More than 5000 units in operation!

COALESCENT PLATES

PLATE PACKS

HYDROCARBONS AND RESIDUAL OIL-WATER SEPARATOR

OIL CONTENT IN EFFLUENT WATER AFTER SEPARATOR LESS THAN 5 ppm

CAPACITIES: from 3 litres/second to 600 litres/second
The oily water flows through the PLATE PACK of the separator.

Horizontal, oleophilous, NON-ROTTABLE corrugated plates of polypropylene are used to separate the residual oil. The corrugated plates are stacked on top of each other at a distance of 6 mm (1/4”) or 12 mm (1/2”), by means of cast-on spacers. Accordingly, an oil droplet only needs to move upwards by a maximum of 6 mm (1/4”) or 12 mm (1/2”), before it contacts the next corrugated plate, which traps the droplet.

As soon as an oil droplet touches a corrugated plate it is separated. The droplet adheres to the underside of the corrugated plate and, on account of its specific gravity, it moves along the plate to the apex of the corrugation ridge.

Bore holes in the apices of the corrugation ridges (diameter 12 mm (1/2”)), allow the oil collected in the apices of the ridges to move upward and reach the oil collection layer. Due to the fact that corrugated plates, which are tapered at the corrugation ridges, are stacked on top of each other, the oil-containing water moves along the corrugated plates at varying speed. This results in additional particle collisions (possibility to coalesce) of bigger and smaller oil droplets. The droplets become bigger, on account of these particle collisions, which accelerate their upward movement, so that they are consequently trapped by the corrugated plates. The plates have a length of 590 mm (2’) or 260 mm (10”).
ADVANTAGES of FREYLIT Coalescent Plate Separators:

Freylit oil separators are also known as “Enhanced Gravity Separators” because they speed up the natural process of oil/water separation. In an oil/water mixture, oil having a lower specific gravity than water, will eventually float to the surface. Freylit oil separators use corrugated parallel coalescent plates to enhance this natural process, without the addition of chemicals.

Designed and manufactured in Austria under the strictest quality controls and performance regulation tests.

Low operation cost, needs no power supply. Minimum of maintenance work needed. No spare parts, no changing of filters or coalescent medium.

Exceptionally long working life. 10 years guarantee on coalescent plates.

No mechanical moving parts, therefore eliminating wear and tear associated with other systems.

Special material of coalescent plates and divider spacers on bottom of plates ensures that they will keep their shape and distance between plates in extreme working conditions and temperature ranges. This is crucial for the efficient working of the separation process over long periods of time.

Special surface treatment of coalescent plates for enhanced coalescent effect.

Full engineering, design and technical support for installation, commissioning and operation worldwide.

FREYLIT Modular System:

FREYLIT Oil Separators are designed in a modular plate pack system which allows the building of separators to the exact specifications and flow rates required by our clients. All sizes available for flow rates from 3 l/sec to 100 l/sec for petrol stations, car park, automobile garages, to large industrial oil separators for power stations, oil terminals, fuel depots, steel mills, oil fields, environmental reclamation operations, etc. with flow rates of more than 2000 l/sec.

FREYLIT supplies oil separators with tanks made of concrete, polypropylene, steel or stainless steel. Concrete tanks are necessary at sites where the separator will be installed underground and a high surface load is expected, for example under a driveway. On the other hand, the lighter weight of FREYLIT separators with polypropylene tanks makes them easier and cheaper to transport and handle for installation.
Description and function of the FREYLIT plate pack technology:

The Theory of Enhanced Gravity Oil-Water Separation explains the behaviour of oil droplets in an oil/water mixture. The mathematical relationship that describes the separation process is Stokes’ Law:

\[ V_R = \frac{g \left( P_w - P_o \right) D_o^2}{18 \eta} \]

Where,

- \( V_R \) = rise velocity of the oil droplet in cm/sec
- \( g \) = gravitational constant (980 cm/sec2)
- \( \eta \) = viscosity of water in poise
- \( P_w \) = density (gm/cm3) or specific gravity of the water
- \( P_o \) = density (gm/cm3) or specific gravity of the oil
- \( D_o \) = diameter of the oil droplet in cm

FREYLIT Oil Separators are designed to enhance this natural process by, a- Making oil droplets larger “coalescence” and therefore making them rise faster, and, b- Reducing the time needed for separation by reducing the distance an oil droplet must rise by using horizontal parallel coalescent plates.
OIL SEPARATOR

OIL SEPARATORS ACCORDING EUROPEAN STANDARD EN858:
HYDROCARBONS AND RESIDUAL OIL-WATER SEPARATOR

OIL CONTENT IN EFFLUENT WATER AFTER SEPARATOR LESS THAN 5 ppm

CAPACITIES: from 3 litres/second to 600 litres/second
OIL SEPARATOR INSTALLATION KITS

CONFORMING TO EUROPEAN STANDARD ACCORDING TO EUROPEAN NORM EN858

ALSO FOR ADAPTING EXISTING OIL SEPARATORS

M+R 6 RE

THESE OIL SEPARATOR INSTALLATION KITS FIT INTO ALMOST ANY
STANDARD OR EXISTING TANKS / CONCRETE PITS, OR CAN BE CUSTOMIZED ON REQUEST.
OIL SEPARATOR

INDUSTRIAL OIL SEPARATORS:
HYDROCARBONS AND RESIDUAL OIL-WATER SEPARATOR

OIL WATER CONTENT IN EFFLUENT WATER AFTER SEPARATOR LESS THAN 5 ppm

CAPACITIES: from 3 litres/second to 600 litres/second
LARGE SCALE INDUSTRIAL OIL SEPARATORS

Applications:

Electric Power Stations
Oil Depots & Storage Facilities
Marine Oil Terminals
Oil Pipelines
Steel Manufacturing
Oil fields & Refineries
Harbours & Shipyards
Airports
FREYLIT Large Scale Industrial Oil Separators

The FREYLIT modular plate-pack system the perfect solution for oil separation in large scale industrial oil separators. In many industries process waters are contaminated with oil which needs to be removed before returning the water into the process cycle, for example in steel mills. Coalescent plate pack separators are the most economic method of treating such process waters efficiently. Large scale oil separators are also used for the environmentally friendly disposal of waste waters from power stations, fuel storage facilities, airports, harbours, marine oil terminals, etc. FREYLIT oil separators are also used for the recovery of valuable oil from oil/water mixtures at oil fields.

The separators usually comprise a concrete basin (silt chamber) for the settlement of solid particles followed by concrete cells for the oil separators. FREYLIT designs such systems and supplies the necessary components which are installed inside the concrete basins.

FREYLIT oil separators are designed to the exact specifications and requirements of our clients, and therefore ensure that desired results are achieved with the most economical system solution. Flow rates range from 36 m$^3$/ hour to 10,000 m$^3$/ hour, or even larger. In order to design the correct dimensions FREYLIT receives the project parameters which include: flow rates, specific gravity and nature of the oil, operating temperatures, presence of solids, laminar flow or pumping into the separator, etc. From this information FREYLIT produces the relevant design drawings, which serve as the basis for the civil works, and supplies the necessary components to build the separators. Every system comes with detailed installation instructions and operation and maintenance manuals.
LARGE SCALE INDUSTRIAL OIL SEPARATORS

Projects in China (2002/3):

- Sichuan Dongfang Electric Company 600 m³ / hour
- Wuhan Iron & Steel Corp. of China 4000 m³ / hour
- Lianyuang Steel Company 6000 m³ / hour
- Liujiang Power Plant 15 m³ / hour
- HuangShi Power Plant 15 m³ / hour
- Guizhou Nanyong Power Plant 30 m³ / hour
- Shandong Tengzhou Power Plant 15 m³ / hour
- Shanxi Datang Pingwang Power Plant 10 m³ / hour
- Hainan Petrochemical Incorporation 30 m³ / hour
- Qinghuangdao Marine oil terminal 100 m³ / hour
INFORMATION required to calculate the FREYLIT plate packs is:

- Type of application
- Fluid flow rate
- Temperature range
- Type of oil and specific gravity
- Influent oil levels - normal and maximum - in ppm
- Effluent requirements
- Physical size limitations of installations
- Type of water (fresh, salt) and specific gravity
- Presence and identity of surfactants
- Nature of solids, type and specific gravity
- Gravity or pump flow (make, type and rating of pump)
1. Abdeckung mind. φ600, für Kontrolle und Wartung des Schwimmerkörpers
2. Abdeckung mind. φ600, für Ölabzugseinrichtung
3. Abdeckung mind. 600/1000, für Ausbau und Reinigung der Wellplatten

Maße in mm!
according ON B5101

OIL-WATER SEPARATOR

More than 5000 units in operation!

COALESCENT PLATES

PLATE PACKS

HYDROCARBONS AND RESIDUAL OIL-WATER SEPARATOR

OIL CONTENT IN EFFLUENT WATER AFTER SEPARATOR LESS THAN 5 ppm

CAPACITIES: from 3 litres/second to 600 litres/second
OIL SEPARATORS
WITH POLYPROPYLENE TANK
WITHOUT SILT CHAMBER AND OIL COLLECTION TANK
FREYLIT “P” series oil separators

Oil Separators in Polypropylene (PP) Tank

These units are particularly popular at harbours and ship wharfs for the removal of oils from bilge water generated in ships.

The oily water is transferred by a positive displacement pump (screw pump or diaphragm pump) to the oil separator.

N.B. Do not use impeller or centrifugal pumps for transferring oily water to an oil separator in order to avoid causing emulsions.

The PSF series of oil separators can also be used for the removing and treating spilled oil in harbours. For this application FREYLIT can supply the necessary Floating Oil Skimmer. This oil skimmer floats on the surface of the waste water and collects oily water for transferring by positive displacement pump to the oil separator.

If the oily water is delivered by natural gravity only (laminar flow) it is possible to exceed the nominal flow rate of the separator. For Example, Model M+R6PSF has a nominal flow rate of 2000 litres/hour, if operated using a pump. If the oily water is fed by gravity only the flow rate can be up to 20,000 litres/hour, without compromising effluent water quality.
OIL SEPARATOR

MOBILE OIL SEPARATORS:
according ON B5101

OIL-WATER SEPARATOR

More than 5000 units in operation!

COALESCENT PLATES

PLATE PACKS

HYDROCARBONS AND RESIDUAL OIL-WATER SEPARATOR

OIL CONTENT IN EFFLUENT WATER AFTER SEPARATOR LESS THAN 5 ppm

CAPACITIES: from 3 litres/second to 600 litres/second
OIL SEPARATORS
WITH POLYPROPYLENE TANK
INCLUDING SILT CHAMBER AND
COMPRESSED AIR OPERATED DIAPHRAGM PUMP
FREYLIT “PSF” series oil separators

Oil Separators with Polypropylene (PP) body including Oil Separator Chamber, Silt Chamber, and Oil Collection Tank

These units are particularly popular at harbours and ship wharfs for the removal of oils from bilge water generated in ships. The oily water is transferred by a positive displacement pump (screw pump or diaphragm pump) to the oil separator. The solids (dirt) contained in the waste water is settled in the silt chamber.

N.B. Do not use impeller or centrifugal pumps for transferring oily water to an oil separator in order to avoid causing emulsions.

The PSF series of oil separators can also be used for the removing and treating spilled oil in harbours. For this application FREYLIT can supply the necessary Floating Oil Skimmer. This oil skimmer floats on the surface of the waste water and collects oily water for transferring by positive displacement pump to the oil separator.

If the oily water is delivered by natural gravity only (laminar flow) it is possible to exceed the nominal flow rate of the separator. For Example, Model M-R6PSF has a nominal flow rate of 2000 litres/hour, if operated using a pump. If the oily water is fed by gravity only the flow rate can be up to 20,000 litres/hour, without compromising effluent water quality.
OIL SEPARATOR

EFFICIENT OIL SPILL REMEDIAL OIL SEPARATORS:
according ON B5101

OIL-WATER SEPARATOR

More than 5000 units in operation!

COALESCENT PLATES

PLATE PACKS

HYDROCARBONS AND RESIDUAL OIL-WATER SEPARATOR

OIL CONTENT IN EFFLUENT WATER AFTER SEPARATOR LESS THAN 5 ppm

CAPACITIES: from 3 litres/second to 600 litres/second
Applications of FREYLIT Mobile Oil Separators:

For oil/water separation at sites where a mobile or temporary solution is necessary, for example: factories, harbours, shipyards, metal working plants, or for efficient oil contamination remedial operations, where oil contaminated ground water needs to be cleaned.

Description of the FREYLIT Mobile Oil Separator

The oily water is skimmed off the water surface from a well or sump tank by the FREYLIT-Oil skimmer and delivered into the oil separator by a positive displacement screw pump. A level control float switch is installed inside the well or tank from which the oily water is skimmed to control the operation of the screw pump and avoid dry-run.

The oil/water mixture enters the FREYLIT Mineral Oil and Residual Oil Separator via an inlet pipe. An inlet dam deflects the flow and generates a current in the direction of the oil collection layer (above water surface) to where the big oil drops quickly move upwards. The water which still contains small droplets then flows into the residual oil separator section of the Separator. Horizontal, oleophilous, non-rottable corrugated sheets of polypropylene are used to separate the residual oil. These plates are stacked on top of each other at a distance of 6 mm. Therefore, a small oil droplet only needs to rise a maximum of 6 mm to touch a corrugated sheet.

When an oil droplet touches a corrugated plate, it adheres to it and is separated. On account of its specific gravity, the droplet moves along the sheet towards the apex of a corrugating ridge. Boreholes in the apices of the ridges (diameter 12 mm) transport the accumulated oil to the oil collection layer.

An oil dam before the outlet pipe prevents the oil layer from seeping out. The purified water flows under the oil dam and exits through the outlet pipe.
Oil Accident Reclamation Operations:

If the oil separator is used for an environmental cleanup operation to remove oil from ground water a well with an inner diameter of 1m must be dug and should reach 1 m below the groundwater level.

A geologist or a local civil engineer must be consulted before starting with the digging in order to avoid breaking into another underground watercourse which would then also be contaminated. In case this should happen, there is the possibility of digging a narrower well (only 70-80cm), however, this should also be checked with the geologist.

The well casing must be installed to reach approx. 50cm under and 50cm above the groundwater level. They must have slits and drilled holes (which overlap each other), to allow the oily water outside of the well casing to seep in.

See the attached System Plan diagram No. 55.99.201.

Sizes of FREYLIT Mobile Oil Separators:

Standard sizes:

- Capacity: 1000 litres/hour
- Capacity: 2000 litres/hour
- Capacity: 4000 litres/hour
- Capacity: 6000 litres/hour

Custom sizes can be made to order.
oil accident sanitation unit
in stainless steel

purified water with
oil emission value < 5 mg/liter
trickles away or is
led into the sewer

eccentric
screw pump

well ø min. 100cm

floating skimmer

float switch
for steering pump

OIL ACCIDENT SANITATION UNIT
system plan
MOBILE OIL SEPARATOR
END OF SECTION
OIL SEPARATOR

TRAMP OIL SEPARATORS FOR EXTENDING THE LIFETIME OF COOLANTS AND DEGREASING BATHS:
according ON B5101

OIL-WATER SEPARATOR

More than 5000 units in operation!

COALESCENT PLATES

PLATE PACKS

HYDROCARBONS AND RESIDUAL OIL-WATER SEPARATOR

OIL CONTENT IN EFFLUENT WATER AFTER SEPARATOR LESS THAN 5 ppm

CAPACITIES: from 3 litres/second to 600 litres/second
**FREYLIT Tramp oil separators for extending the lifetime of coolants and degreasing baths:**

The FREYLIT Tramp Oil Separator is a fully automated oil separator which removes tramp oil from metal working coolants and degreasing baths. Tramp oil degrades the quality of the coolant and therefore needs to be removed frequently in order to extent the lifetime of the coolant, while preserving its working properties. The FREYLIT Tramp Oil Separator will extend the lifetime of the coolant manifold and therefore allows significant cost reductions to the operator:

- saving in purchasing new coolant AND
- saving in disposal costs of used coolant.

Coolants are stored either in sump tanks of each individual machine with a capacity of 200-500 litres, or the factory has central sump tank(s) with a volume of several thousand litres, where the coolant is collected from several machines. FREYLIT has different sizes of oil separators to cover all ranges of sump tank volumes.

**Process Description:**

Oily water is transferred by positive displacement pump (screw pump or diaphragm pump) to the oil separator. The heart of the oil separator are the FREYLIT coalescent plate packs.

The oily water flows through the **PLATE PACK** of the separator.

Horizontal, oleophilous, **NON-ROTTABLE** corrugated plates of polypropylene are used to separate the residual oil. The corrugated plates are stacked on top of each other at a distance of 6 mm (1/4"), by means of cast-on spacers. Accordingly, an oil droplet only needs to move upwards by a maximum of 6 mm (1/4"), before it contacts the next corrugated plate, which traps the droplet.

As soon as an oil droplet touches a corrugated plate it is separated. The droplet adheres to the underside of the corrugated plate and, on account of its specific gravity, it moves along the plate to the apex of the corrugation ridge.

Bore holes in the apices of the corrugation ridges (diameter 12 mm (1/2")), allow the oil collected in the apices of the ridges to move upward and reach the oil collection layer. Due to the fact that corrugated plates, which are tapered at the corrugation ridges, are stacked on top of each other, the oil-containing water moves along the corrugated plates at varying speed. This results in additional particle collisions (possibility to coalesce) of bigger and smaller oil droplets. The droplets become bigger, on account of these particle collisions, which accelerate their upward movement, so that they are consequently trapped by the corrugated plates. The plates have a length of 590 mm (2').
Die Oberkante des Abscheiders ist gekantet, Kantenrand 20mm.

Material: Edelstahl - Blech 2 mm

Maße in mm