



This equipment package includes descriptions of the process lines, the technologies used, and the overall equipment configuration. Processing parameters and conditions are presented in summary form. A process material balance and a list of consumables for a specific process line must be developed through laboratory testing based on the information provided by the customer in the technical specification.

FINE TREATMENT OF LIQUID OIL SLUDGE



Mobile configuration: Each plant module may be fitted with a semitrailer of suitable load capacity for transport on public roads. The plant may also be fitted with equipment for unloading some modules from their transport vehicles during operation.

Time required to prepare the equipment for transport: 1 day.

Stationary configuration: The equipment is supplied with the utility connections needed to link the modules, taking into account possible placement constraints at an industrial site. No transport vehicles are included, but all modules remain mobile.

Time required to prepare the equipment for transport: 2 days.



Processing liquid oil sludge is a common activity in industrial environmental services. In practice, it often overlaps with oil refining: once the valuable light hydrocarbons have been recovered, the remaining sludge, though smaller in volume, can be even more difficult to dispose of.

The equipment is designed to recover more than 95% of the hydrocarbons in liquid oil sludge while substantially reducing the hydrocarbon content of the separated water and solid residue (cake).

Treatment of liquid oil sludge comprises five processing steps performed by two modules.

MODULE 2 — HYDROCAVITATION AND ACOUSTIC TREATMENT

In this configuration, Module 2 begins the treatment line for liquid oil sludge that remains flowable under normal conditions. It prepares the feedstock for efficient water separation, emulsion breaking and breakup of high-molecular-weight hydrocarbon agglomerates.

At the module inlet, the sludge is blended in a vertical extractor with a light hydrocarbon stream, such as emulsified crude oil, oil recovered from traps, liquid oil sludge with a pour point below -10°C , off-specification gas condensate or other liquid hydrocarbon waste.

The oil sludge passes through three stages of combined hydrocavitation and acoustic treatment using acoustic emitters and steam-jet hydrocavitators. Under certain operating conditions, this treatment breaks water–oil emulsions. Demulsifiers are metered into the sludge stream to improve separation of the emulsified components.

After each treatment stage, the light hydrocarbon concentrate is collected in a dedicated compartment and then sent to Module 3 for final treatment.

MODULE 3 — SEPARATION OF PURIFIED OIL PRODUCT FROM THE EMULSION

Module 3 provides final centrifugal treatment of pretreated, concentrated light hydrocarbons.

Final removal of free water and suspended solids from the oil takes place sequentially: first in an elongated horizontal three-phase centrifuge (3,000 rpm) with screw discharge of solids, then in a three-phase disc-stack centrifugal separator (5,000 rpm). Both machines were designed specifically for processing hydrocarbons. The module includes systems for discharging solids from the centrifuge and separator.

A separate control compartment houses automation that maintains operating conditions without continuous operator intervention, as well as power supplies for the acoustic systems and motors. A double sealed partition separates it from the main process compartment. For explosion protection, ventilation maintains positive pressure with clean air in the control compartment.

**TYPES OF WASTE TREATED**

Oil-contaminated water; liquid oil sludge with water–oil emulsions of any concentration, whether hydrophobic or hydrophilic; and oil sludge with high concentrations of sulfur, chloride salts, nitrogen compounds, heavy metals or rare elements.

Module	EQUIPMENT CONFIGURATION FINE TREATMENT OF LIQUID OIL SLUDGE	
Module 2	18.0 t — Hydrocavitation and acoustic treatment (integrated feedstock preparation)	
Module 3	14.0 t — Separation of purified oil product from the emulsion (centrifuge, separator)	
Design processing capacity: <i>Subject to feedstock characteristics</i>	<i>Liquid oil sludge</i>	15 t/h
Feed composition accepted for treatment:	<i>Hydrocarbons</i>	Predominant
	<i>Water</i>	≤80%
	<i>Soil</i>	≤15%
Utility requirements at maximum processing load:	<i>Electric power</i>	80 kW
	<i>Steam</i>	1,200 kg/h
Consumables (indicative values, subject to confirmation):	<i>Demulsifiers</i>	250 g/t
	<i>Flocculants</i>	500 g/t
Achievable parameters for treated hydrocarbon concentrate:	<i>Water</i>	0.5–1%
	<i>Mechanical impurities</i>	0.05–0.1%
Achievable parameters for treated soil:	<i>Hydrocarbons</i>	1–5%
Achievable parameters for treated water:	<i>Hydrocarbons</i>	0.01%
		100 mg/L