



YOUR PARTNER IN VACUUM
TECHNOLOGY



WORP[®] Series

Waste Oil Recycling Plant

Hering - VPT GmbH
www.hering-vpt.com

HERING – Vacuum Process Technology

Invaluable experience and customized solutions powered by German Engineering

HERING VPT has specialized in oil processing equipment for used lube oils and transformer oils. Already in 1909 the first HERING oil purification plant was built. This was the starting point for a number of inventions leading to a broad range of products for the oil processing and transformer industries. With this **experience collected in over 100 years of successful operation**, continuous efficiency improvements of our plants were made. Today, we offer specialized oil treatment plants to produce good as new oils from all kinds of used oils including lube & transformer oils.

HERING Systems are remarkable for their efficient and robust design, as well as their ease of operation and maintenance. We install **only high quality components from Germany**, respected Western European & Northern American brand manufacturers. Our systems are designed for **long lifetime, reliability** and effective operation. Each plant is **custom-made** and delivered with all required aggregates to leave nothing to be desired.

Together, we will develop the perfect solution for you and your company. We are looking forward to serving you!



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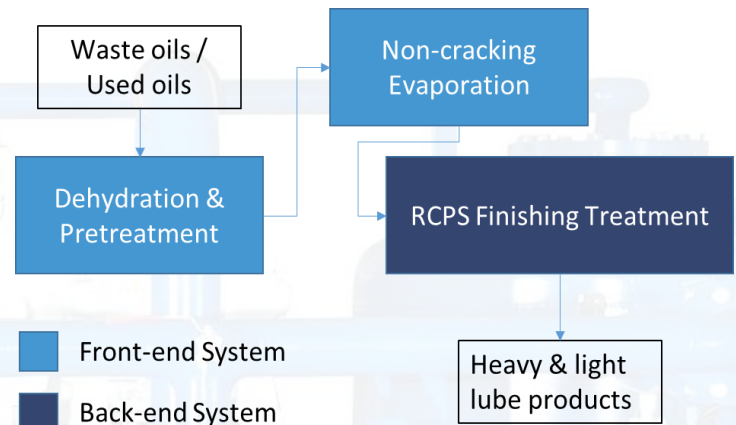


HERING – Vacuum Process Technology

WORP® creates high quality heavy & light lube oil products from waste oil inputs

The WORP® Series of waste oil & used oil recycling plants from HERING has been specifically designed to transform used oil into quality base oil. The HERING WORP® is an **economical way of waste oil re-refining** which not only is beneficial from an investment perspective, but also from an environmental one.

We have **perfected** the combination of various **primary, separation and finishing treatment steps** and incorporated them into the front-end and back-end systems of the HERING WORP® waste oil recycling plants. The front-end ensures proper dehydration and pretreatment of the used oil, such that it can then be high vacuum distilled to avoid cracking in the **HERING NCE® non-cracking evaporation unit**.



Our back-end system, the **HERING RCPS® Series** reactivation clay polishing unit, **improves** the waste oil distillates in terms of **color, sulfur content and odor** and, thus, leads to a **valuable output oil product**. This finishing treatment uses an **adsorption type process** to remove any unwanted chemical substances from the treated oil. The RCPS® has the ability to **eliminate sulfur** from 2000 PPM to <300 PPM in a single pass. Processing used oil through our WORP® waste oil re-refining plant results in an oil that is **stable against oxidation over any measured timescale** and fulfills the **highest refining standards of output oils**.

HERING – Vacuum Process Technology Front-end NCE® Non-Cracking Evaporator creates ideal input oils for polishing stage

Our complete lube oil recycling plant consists of a front-end evaporation and a back-end RCPS® for finishing treatments. The front-end system uses a **variety of pretreatment, primary treatment and separation treatment steps** to create ideal input oil streams for the RCPS® reactivation clay polishing system. After filtration, pretreatment and dehydration stages, the used oil stream enters the evaporation stage of the front-end system. This evaporation part of the front-end uses the **HERING NCE® non-cracking evaporator to avoid viscosity degradation.**



Project #:	Base Stock	BEFORE	AFTER
Client ID #:	300N		
Matrix:	Liquid		
Parameter	Method	Results	
Ash	ASTM D482	<0.01%	<0.01%
Flash Point	ASTM 1010	>93°C	>200°F
Specific Gravity	ASTM D1298	0.8571	0.8581
Sulfur, Wt%	ASTM D2622	0.2029%	0.036%
Viscosity cSt@40°C	ASTM D445	32.67	33.1
Viscosity cSt@100°C	ASTM D445	5.68	5.74
Viscosity Index	ASTM D2270	113	114
Carbon Conradson Residue	ASTM 189	<0.5%	<0.1%
Clay-Gel, Vol%	ASTM D2007		
Saturates		97.6%	99.2%
Polar Compounds		2.4%	0.8%
Aromatics		<1.0%	<0.2%
Pour Point, °F	ASTM D97	-23°C	-6°F

Smearing an ultra-thin layer of used oil onto the inside of a vessel wall under high vacuum allows for an extremely **energy-efficient means of vapourising** the various constituents that make up the feedstock. Subsequent condensation and separation into **light, medium and/or heavy molecular weight lube oils** leads to various oil distillate streams as input for the RCPS® back-end unit.



HERING – Vacuum Process Technology RCPS® Series significantly outperforms conventional base oil finishing treatments

The RCPS® is based upon banks of active columns that contain our specially manufactured HERING PHÖNIX® clay. The physical characteristics of this modified clay allow it to be reactivated once saturated, and thereby permitting several hundred cycles to be run before being replaced. Once exhausted, typically after 6 months to a year of continuous operation, the clay is disposed of in a conventional landfill site as a dry non-hazardous waste.

The reusability of the HERING PHÖNIX® adsorbent is a major advantage compared to conventional bleaching earth treatments. Our system brings down operating costs and eliminates environmental problems. Average lifetime cost of clay per gallon of oil processed is US 2 cents at 2017 prices. Therefore, the HERING RCPS® Series is an excellent economic & environmental feature of the HERING WORP® waste oil recycling system.



Virtual multi-pass operations can be achieved by a single pass through the RCPS® as it is designed to switch from parallel to series mode operation via the custom SCADA supplied with every system. HERING uses the unique ROTAPRO® mode of operation which provides a seamless switching between four banks of columns, bringing the freshly reactivated bank in as the last in a continuously moving series operation. The RCPS® allows to easily switch between different processing modes for each reclaimed oil stream.

HERING – Vacuum Process Technology

Economic and operational benefits make HERING WORP® Series the perfect choice

Recycling you used oils with the HERING WORP® Series provides you with:

- **Low operating costs and initial capital investments** compared to other waste oil re-refining processes
- **Flexible operating modes of finishing treatment** – Enables adaptation to different input oil qualities. Parallel mode operation is single-pass, fastest processing. Series mode operation simulates triple-pass, better quality oil.
- **Modular system** ensures flexible layouts while all modules can be shipped inside a 40-foot high cube container
- **Full client involvement** during the manufacture, from engineering approval through to start-up
- **All global voltages and frequencies available**
- **Low oil losses** as part of waste becomes feedstock for front-end system
- **All waste created by WORP® is classified as standard industrial waste** leading to low environmental costs
- **Customizable plant sizes** – Oil processing capacities ranging from 50 liters per hour for a laboratory setup to 27,000 liters per hour for a re-refinery



Unattended Oil Polishing Operation of the HERING RCPS® back-end system



Complete WORP® Waste Oil Re-refining Plant including Front-end and Back-end Systems

HERING – Vacuum Process Technology

Provides complementary training services for your benefit

HERING VPT offers its costumers in the context of the order fulfillment **free training, commissioning, start-up and custom process optimization** with each HERING WORP® Series Waste Oil Recycling system to help you get the maximum out of your system.

To ensure a proper operation of your system HERING VPT recommends an **on-site service**. This will be coordinated directly by HERING VPT and partly carried out with qualified partners.

Plants older than 30 years fall naturally under the plant service.



We are available for you **24 hours** a day, **7 days a week** in order to help you with your plant problems.

HERING – Vacuum Process Technology

The standard in oil purification and insulation treatment solutions



- ◆ Vacuum Oil Purifying Plants
- ◆ Transformer Oil Regeneration Systems
- ◆ PCB Removal Systems
- ◆ Vacuum Drying Plants
- ◆ Waste/Lube Oil Re-refining Plants (Front-end & Back-end Solutions)
- ◆ Base Oil/Recycled Oil Polishing Systems
- ◆ Vacuum Pumping Stations
- ◆ Bushing Dryers
- ◆ Oil Storing and Filling Plants
- ◆ Hot Oil Spraying Systems
- ◆ Vacuum Pressure Impregnation Plants



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