



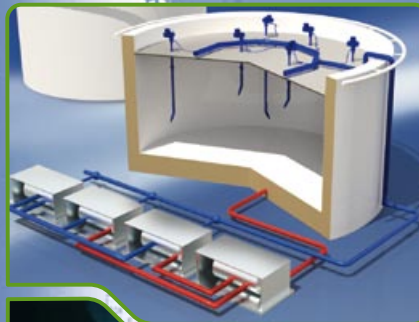
**SCHÄFER & URBACH**

System and High Pressure Technology

**High-pressure technology**

# Tank cleaning systems

Complete tank cleaning solutions



Pump units ◀

High pressure technology ◀

Water hydraulics ◀

Service/After Sales ◀

# Systems out of conviction

*„If life has no vision to strive or long for, no vision to realize, then there is no motive for making any effort.“ (Translation of a quotation from Erich Fromm)*

## At SCHÄFER & URBACH, we live our corporate philosophy

Individually developed systems combined with standardized components manufactured by ourselves form the pivot of our corporate activities.

Systems solutions cannot be realized without a systematic, holistic approach. We look at them as an entirety of elements. At SCHÄFER & URBACH these individual elements are linked together in the value chain to form a systems solution tailored to a specific task, purpose or intention.

Self-confidence, trustworthiness and mutual trust form the basis for collaboration in people-oriented, value creating companies. These values are the foundations on which we build our customer-focused business. Quality and continuing learning are the central pillars of our economic success.

As a people-oriented, value creating and systematic enterprise, good team spirit and a high culture of discussion and communication are our key attributes. SCHÄFER & URBACH is result and customer oriented. Internal frictional loss is very low. The ethical responsibility of our employees towards our customers, other team members, the society and the environment sets the guidelines for our planning for the future and our everyday doing.

## Tradition as basis – high-pressure as motivation

For more than 80 years SCHÄFER & URBACH have developed and supplied equipment and components for systems and high-pressure plants to customers throughout the world. All of the supplied equipment is manufactured at the SCHÄFER & URBACH workshop.

The company assumes responsibility, as it supplies complete high-pressure and systems solutions made up of components which all fit together seamlessly – forming a perfect match and being

**...all from one source.**



▶ Design    ▶ Manufacture    ▶ Commissioning    ▶ After sales service



**SCHÄFER & URBACH**

System and high-pressure technology

As specialists for sophisticated solutions SCHÄFER & URBACH have become renowned in the following areas.

▶ **Pump Units**

High-pressure pumps HDP  
Process pumps PPK  
Mud pumps BT  
Slurry-Pumps SPL  
Steam- and Duplex pumps  
Special pumps

▶ **High-pressure technology**

Tank- and industrial cleaning systems  
HP Cleaning systems  
HP Cleaning accessories

▶ **Water hydraulics**

Descaling systems  
Drive systems for presses

▶ **Service / After Sales**

Engineering  
Welding technology  
Commissioning



**Components and competences  
– complete service!**

Our experienced, competent and flexible staff is available to our customers throughout the world for all service activities. Even large-scale maintenance and repair work can be performed independent of the weather conditions in our spacious assembly facilities. SCHÄFER & URBACH's crane for payloads up to 25 t enables safe handling of the systems and components.

We have on stock parts and components, such as pistons and seals, for our standard products to guarantee 24 h service. SCHÄFER & URBACH's state-of-the-art workshop enables fast and flexible machining of repair parts such as spray headers or valves.

- ▶ Service and handling
- ▶ Spare parts storage for „Just-in-Time“-works
- ▶ Modern machinery
- ▶ Vehicle fleet for assembling and delivery



# Modular tank flushing system – the freely configurable system

The innovative, modular crude oil tank flushing system developed by SCHÄFER & URBACH complies with the requirements of EU Guidelines 94/9/EG (ATEX) and 97/23/EG (DGRL). It is designed for cleaning mineral oil tanks with a maximum diameter of 100 m. The cleaning medium is mineral oil.

**Depending on the required conditions of use, the individual modules can be configured to form a mineral oil tank purging system.**

- ▶ Vacuum module
- ▶ Pump module
- ▶ Heat exchanger module
- ▶ Service module
- ▶ Control module (optional for automatic mode)

**All modules can be:**

- ▶ individually operated
- ▶ freely configured
- ▶ operated in automatic mode
- ▶ used as mobile units

## Flushing of mineral oil tanks

The flushing of crude oil tanks is performed by a closed system according to ATEX standard (ATEX 95), zone 1. There is no need for any personnel to be inside the tank during flushing. The underlying principle of the process is the dynamic liquefaction of the sludges by injecting heated mineral oil into the inerted tank by means of special lances installed in the sealed tank roof.

## Summary of advantages:

- ▶ No personnel inside the sealed, inerted tank
- ▶ Optimization /Reduction of the gaseous atmosphere for fine cleaning
- ▶ Emission of gases is minimized as the system is completely closed
- ▶ Waste reduction and crude oil recycling
- ▶ Time and cost savings



Pump module



Vacuum module



Heat exchanger module



**This is how it works:**

**Sludge liquefying by heated crude oil**

Before the tank can be emptied for setting the roof into the repair position, it is necessary to remove as many roof support legs as required to accommodate the cleaning lances. When the tank roof is in the repair position, the bottom sludges are measured and the lances installed. Then emptying is continued while the interior of the tank is being inerted.

The cleaning operation requires the availability of crude oil from a second storage tank. The amount of mineral oil required for the sludge removal is sucked out of the second tank, heated up and injected into the tank to be cleaned via the lances. The injected mineral oil and the liquefied bottom sludges are sucked off by a dedicated suction unit and pumped back into the second tank. Special filters prevent inorganic substances such as sand or rust from being pumped into the tank.

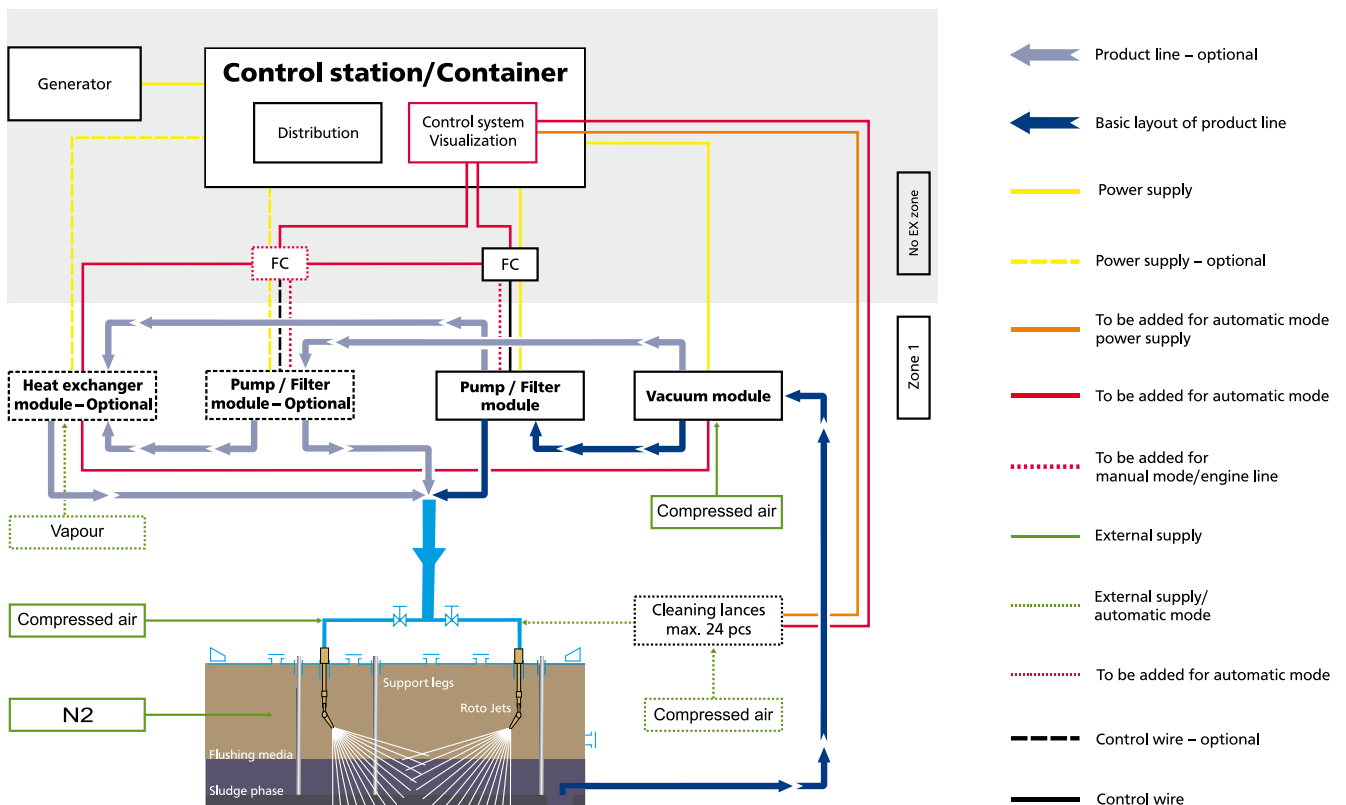
The second storage tank can be used for regular refining operation throughout the cleaning process.

Flushing by crude oil is followed by gas oil flushing, which leads to the complete liquefaction of the sludges. The gases are reduced further, having a maximal hydrodynamic cleaning effect on the roof, wall and bottom of the tank.

After the hydrodynamic cleaning operation, the tank is opened to remove the residual inorganic solids and complete the interior cleaning of the tank.



Modules at container



# Tank cleaning systems

## Mobile tank flushing and cleaning vehicle for product storage tanks.

The mobile inside tank cleaning process is designed for small, decentralized storage tanks, e.g. at petrol stations, with maximum diameters of 25 m. The flushing medium is Diesel or hot water. A special cleaning lance cleans the tank without the need for personnel being inside the tank.

### Summary of advantages:

- ▶ No personnel inside the tank
- ▶ Avoidance of emissions
- ▶ Time savings and high safety standard
- ▶ All equipment needed for the tank cleaning operation is integrated into one vehicle





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**This is how it works:** For the cleaning operation, a cleaning lance is installed in the tank using a special manhole cover. While the flushing process is going on, the removed sludge is separated from the cleaning medium. The medium is recirculated back into the flushing cycle.

When the purging operation is complete and the sludge has been removed, the tank can be washed out with hot water. For this, approx. 3 m<sup>3</sup> of water are available in two dedicated storage tanks. After ventilating the tank it is ready for being inspected or repaired.

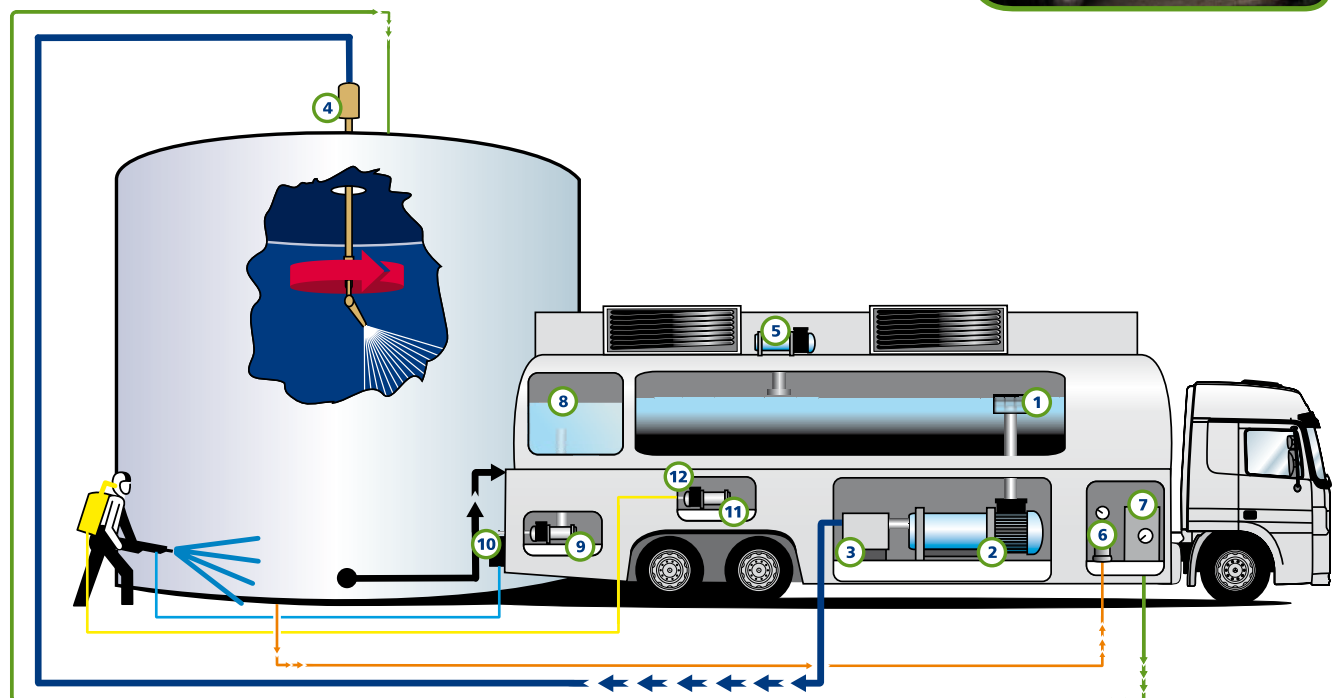
In the case of flammable products the tank is inerted and the atmosphere is monitored online by means of a control station.

The individual assemblies and sub-assemblies (vacuum pump, flushing pump, high-pressure pump, nitrogen generator with air compressor and respiratory equipment, hose reels etc) are all driven by the auxiliary drive of the vehicle and can be infinitely regulated at the control unit.

For disposing off the tank content or the cleaning medium externally, a 12 m<sup>3</sup> container is provided to handle the transport.



Individual developed vehicle



- |                  |                                      |                      |                                  |
|------------------|--------------------------------------|----------------------|----------------------------------|
| ① Filter         | ④ Cleaning lance / tank flushing jet | ⑦ Nitrogen generator | ⑩ High-pressure connection / gun |
| ② Flushing pump  | ⑤ Vacuum pump                        | ⑧ Water tank         | ⑪ Breathable air supply          |
| ③ Heat exchanger | ⑥ Nitrogen controller                | ⑨ High-pressure pump | ⑫ Compressor                     |

# Spray cannon

## – for state-of-art cleaning of product storage tanks

The mobile, automated inside tank cleaning process using the innovative spray cannon is suitable for tanks with a maximum diameter of 40 m. Suitable cleaning media are water or light crude oil.

The spray cannon unit is a highly valuable alternative to the previously common practice of manual cleaning, which involves high safety risks and major physical and mental strain for the personnel.

### Summary of advantages:

- ▶ Replaces manual cleaning
- ▶ Minimizes safety hazards
- ▶ No personnel inside the tank
- ▶ Reduces cleaning times





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**This is how it works:** The spray cannon unit comprises a cleaning lance, a video camera and a lamp. It is mounted outside the tank at a cleaning aperture (manhole). It can be swivelled both horizontally and vertically through 180°.

The pump unit is installed inside the container vehicle. The energy for the spray cannon as well as for the operating and control room is supplied by a generator driven by the Diesel engine of the high-pressure pump (it is also possible to connect an external power supply). The hydraulik unit for swivelling the spray cannon is driven in the same way.

The container vehicle provides sufficient space for accommodating the spray cannon and the required cleaning equipment during transport.

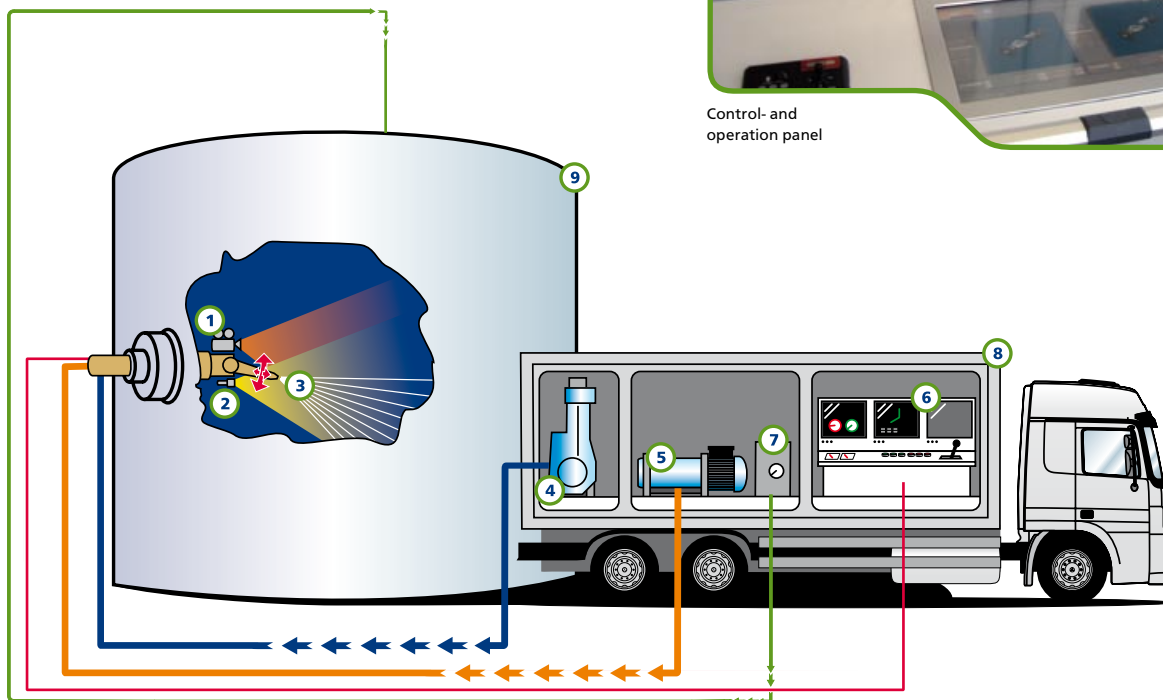
The complete cleaning process is controlled and performed from the control room inside the container vehicle. It is also possible to document the cleaning process by storing it on a DVD using the recorder which is part of the standard supply package.



Hydraulic unit



Control- and operation panel



① Camera

② Light

③ Swivelling spray cannon (V/H)

④ Flushing pump

⑤ Hydraulic unit for energy supply

⑥ Control panel with displays

⑦ Nitrogen controller

⑧ Container 20''

⑨ Product tank

# Cleaning lances

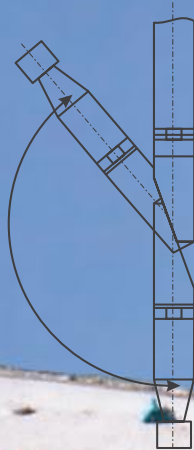
## – versatility in motion

Cleaning lances according to ATEX 97/23/EG are used for cleaning oil tanks or similar containers. The impinging liquid jet breaks up and loosens the deposited oil sludge, maximizing the amount of recyclable material.

### The 5 cleaning programmes

We differentiate between the following 5 cleaning programmes:

- ▶ Complete cleaning
- ▶ Spot cleaning
- ▶ Bottom cleaning
- ▶ Roof cleaning
- ▶ Sector cleaning



### Summary of advantages:

- ▶ 5 adjustable cleaning programmes
- ▶ Nozzle movement is displayed
- ▶ Simple changing between cleaning modes
- ▶ Usable in explosive atmospheres



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## Any more high-pressure

### High-pressure pumps S&U HDP

The high-pressure pumps, type S&U HDP are 3- resp. 5-cylinder plunger pumps with a drive capacity of up to 750 kW and a max. working pressure of 3000 bar. The laying of the pumps occur corresponding to the rules and standards, amongst others EN 809 and EN ISO 16330 respectively DIN EN 1829 part 1 and part 2.

### Heat exchanger cleaning

„jet-liner inro and exro 1200“ were developed by SCHÄFER & URBACH for professional cleaning of tube bundle heat exchangers. Through constant collaboration with leading users, these semiautomatic systems are always kept at the latest state of the art.

### Grid cleaning

Designed and developed in constant collaboration with the equipment users, the complete solutions offered by SCHÄFER & URBACH incorporate cleaning systems and high-pressure plants operating at up to 2000 bar and 35 l/min.

### Cleaning of rotary air preheaters (LUVO)

- ▶ Application: Cleaning of rotary air preheaters in power plants
- ▶ Cleaning parameters: approx. 400 bar at about 500 l/min (distributed over 2 spray headers each, which are arranged below and above the lamellae to be cleaned)
- ▶ Cleaning time: depends on diameter and speed of the heat exchanger, radial forward feed is about 5 mm / revolution

### Cleaning accessories

Designed and developed in constant collaboration with the equipment users, the turnkey cleaning solutions and plants offered by SCHÄFER & URBACH operate at up to 3000 bar.

### Nozzles, available complete with nozzle holding devices and various fittings:

- ▶ Round and flat nozzles, rotary nozzles, mono-jet nozzles for gunning operations.

### Sewer cleaning nozzles

#### Hoses

- ▶ Hydraulic hoses, water high-pressure hoses in any diameter and for all pressure stages (rubber and plastic hoses); can be delivered complete with fittings.

#### Spray guns

- ▶ available in different pressure stages up to 2500 bar; mechanical or electrical (galvanized or ex-proof).

#### Foot valves / Foot switches

- ▶ Foot operated valves up to 1000 bar, also electrically actuated; foot operated switches in galvanized or ex-proof design.

#### Remote controls

- ▶ for remote control of various high-pressure water devices: available in different versions (range of functions, design, switching mode).

#### Tank cleaning heads

- ▶ various pressure stages up to 1500 bar, various geometric shapes, various materials.

#### Additional equipment

- ▶ High-pressure screwed connections, manometers
- ▶ High-pressure valves and fittings (ball valves, throttle valves, etc.)
- ▶ High-pressure lances
- ▶ Swivel joints, rotary penetrations
- ▶ Safety valves
- ▶ Bursting discs
- ▶ Pulsation dampeners, suction flow stabilizers
- ▶ Protective clothing (proof resistant up to 2000 bar)
- ▶ and much more



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**Tradition as basis – high-pressure as motivation**



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- DIN EN ISO 9001:2008 ◀
- EU Guidelines: 97/23/EG pressure equipment ◀
- EU Guidelines: 94/9/EG ATEX for cleaning lances and high-pressure equipment ◀
- EU Guidelines: ZH 1/406 for liquid jets ◀
- Qualification according to DIN 18800 Part 7 ◀
- Certificate according to DIN EN 3834-2 for welded structures ◀
- Certificate according to AD Guidelines HP 0 (TRB 200), TRD and TRR 100 ◀
- Specialist firm according to §19 WHG ◀