

## EP-UF 416

Ultrafiltration membrane module

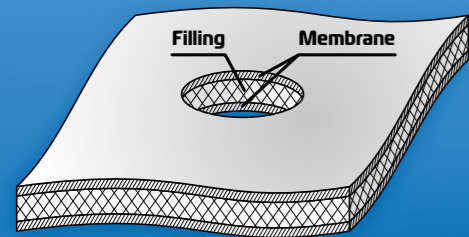
- Exclusive supplier ENVI-PUR, s.r.o.

### Basic characteristics:

- Filtration area 416 m<sup>2</sup>
- Pore size 0.04 µm
- Material – Stable hydrophilic polyethersulfone (PES)
- Safe barrier for SS and microorganisms
- Long life cycle (high chemical and mechanical robustness)

### Advantages leading to lowering operating costs, operation stability and membrane service life increase:

- Plate modules are resistant to fibrous impurities
- Full-area lamination ensures filtration using all surface with minimal pressure loss
- High surface density of modules
- Membrane seals up itself after mechanical damage
- Cartridge system enables easy installation and mobile panel imposition
- Construction of EP-UF membrane module allows adequate backwash (at pressure 15 kPa), even in combination with chemical dosing (CEB), which eliminates significantly membrane fouling
- Fine bubble aeration system, incorporated in the module, lowers operation costs of aeration in activation.



## MID 4

Fine screen with drilled holes

- Exclusive supplier ENVI-PUR, s.r.o.
- Mechanical pretreatment for membrane WWTP
- Screen with drilled holes (size 2 mm) for maximal protection of the MBR WWTP
- Integrated press, heating and sprinkling
- All-stainless construction, with shaftless conveyors and low installed power input



## DAF unit

Physical-chemical pretreatment for industrial wastewaters from the factory

- Supply realization by ENVI-PUR, s.r.o.
- Wastewaters contain cutting fluids, cleaning agents, oils... Initial COD up to 30,000 mg/L and NES 5,000 mg/L
- High COD and NES removal efficiency (up to 90 % and more than 99 %, respectively)
- Easy manipulation and process control



# BioCleaner

# envi-pur

## Intensification of the WWTP BOSCH DIESEL JIHLAVA

The membrane wastewater treatment plant at the Bosch Diesel Jihlava factory, which has been implemented by ENVI-PUR, s.r.o. as the general supplier at the beginning of 2017, grew up by reconstructing a part of the original WWTP, equipped with conventional technology. The original WWTP was composed of two lines of different sizes, with a D-N layout and Dortmund type clarifier. The WWTP successfully met the effluent limits, the quality, however, did not allow the water to be reused. Moreover, the WWTP did not have any extra capacity for increasing the amount of the factory employees, in case of need. The investor's goal was to use bigger part of treated wastewater for the factory's cooling system.

WWTP with a membrane bioreactor (MBR) combines biological wastewater treatment and membrane technology. Separation of activated sludge and treated wastewater is conducted in the submerged membrane modules. The main benefit of the MBR WWTP is exquisite effluent quality, which cannot be reached using conventional treatment technologies. During the intensification of the WWTP Bosch Diesel Jihlava the capacity was increased from 1,900 PE to 2,400 PE using only one of the original lines. Objects of the other line were used to build a physical-chemical treatment technology for industrial wastewater pretreatment. The most advanced MBR technology was used for the WWTP intensification.



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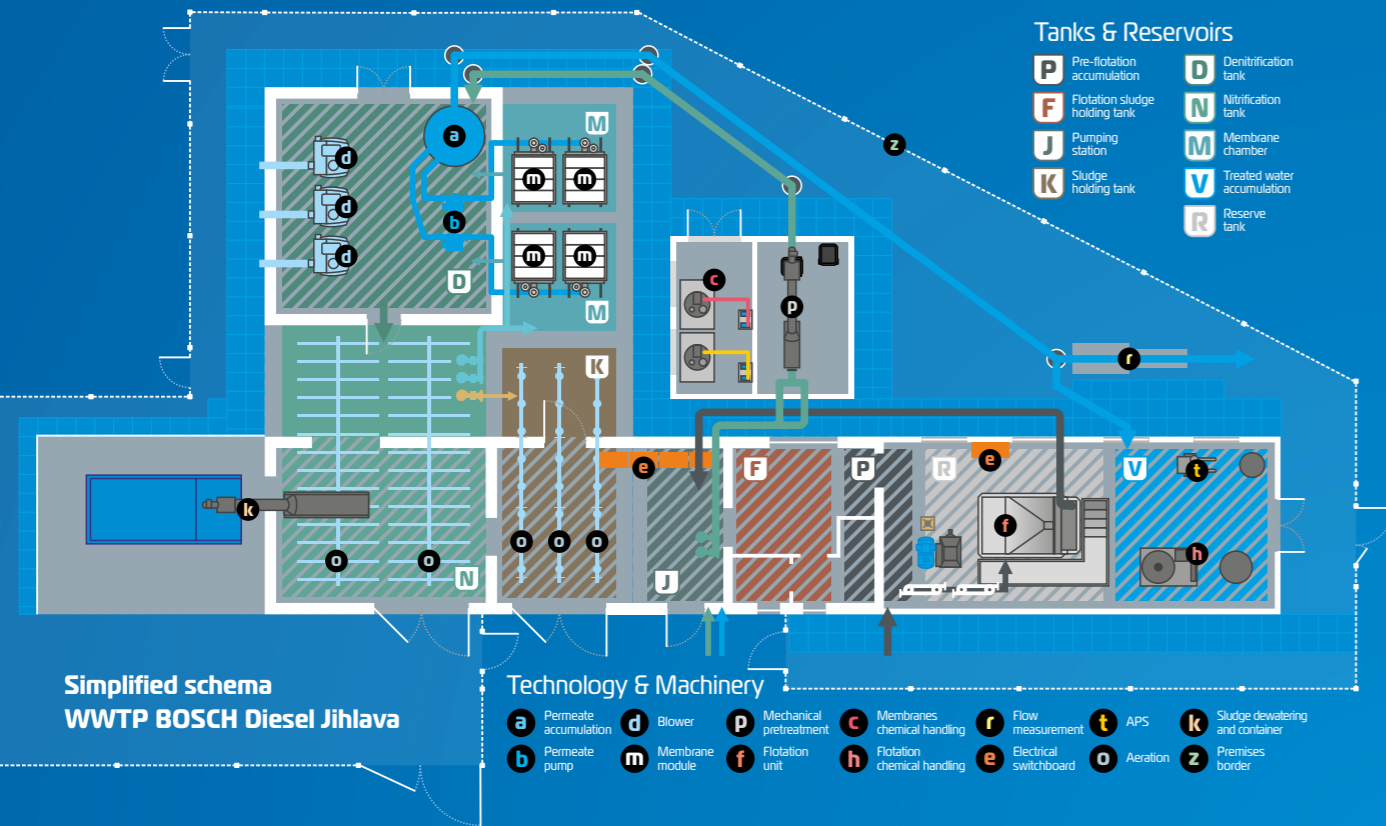
**BOSCH**  
Invented for life





# TECHNICAL SOLUTION

The MBR technology was installed in the larger original line. The nitrification tank was preserved, the original clarifier was replaced by a denitrification tank and the original denitrification, because of its suitable dimension, was rebuilt into two membrane chambers. Thus, the new WWTP consists of denitrification, nitrification and two membrane chambers. Double membrane separation brings the advantage of the possibility to shut down only one half of the filtration capacity when membrane regeneration is needed, for instance. A new brick machinery room with blowers, pumps and permeate tank was constructed above the new denitrification tank. Placing new devices into the old machinery room was not possible due to limited space. Only the control panels remained in the old machinery room, plus the original sludge dewatering in the adjacent room. The staff room was reconstructed as well, to create a more convenient space for the employees.



The tanks of the smaller line were roofed and partially turned into a new physical-chemical pretreatment technology for industrial wastewaters. Atop the roof a new building for a flotation unit was built. The flotation unit was not a part of the original WWTP, the industrial wastewaters were treated in a flotation unit in the factory area. The new WWTP further contains a new assembled building for a mechanical screen and chemical handling.



In total there are 4 EP-UF membrane modules in the membrane chambers, 2 modules in each chamber. The total filtration area is 1,664 m<sup>2</sup>. Full-area lamination of the membranes allows adequate backwash and CEB (chemical enhanced backwash). Thanks to the CEB the membrane regeneration interval is significantly prolonged, as well as their life cycle. The permeate suction through the membranes is provided by pumps with rotating pistons. Application of these pumps brings space reduction and higher reliability compared to regularly used screw pumps. The permeate is first pumped into the permeate tank in the machinery room. The tank serves as a container for backwash water. Then, the permeate flows into the second original settling tank, from where the treated water leaves the WWTP, in case of need it is used for sprinkling the screen or filling the membrane chambers during the regeneration. MaR (Measurement and Regulation) and Control system are designed for maximal optimization of the technology parameters. The Control system permits to archive all the measured parameters and remote access, including smartphone or tablet access.



During the intensification, the membrane bioreactor – the most advanced technology in the wastewater treatment area – was used. By installing the MBR the demand of the investor to increase the capacity and to move the flotation unit to the WWTP area was achieved, without enlarging the area surface. The reconstruction was conducted during full operation of the WWTP and was divided into 2 stages. The general supplier of the project is ENVI-PUR, s.r.o., who employed their long time experience with dozens of various membrane technology instalations, including the currently second biggest membrane WWTP in the Czech Republic, installed in Tuchomerice in 2016. ENVI-PUR, s.r.o. has successfully implemented many foreign projects, using MBR technologies, especially in Sweden and Russia. The complete intensification of the WWTP Bosch Diesel Jihlava was carried out with the cost of 22.4 million CZK without VAT, out of which 16.3 million CZK without VAT was the technological delivery.

## Designed capacity

$$Q_{24} = 307 \text{ m}^3/\text{d}$$

$$Q_d = 399 \text{ m}^3/\text{d}$$

$$Q_{\text{bio, max}} = 54 \text{ m}^3/\text{h}$$

$$\text{BOD}_5 = 144 \text{ kg}/\text{d}$$

## Treatment efficiency

$$\text{BOD}_5 > 99 \%$$

$$\text{COD}_{Cr} > 97 \%$$

$$\text{SS} > 99 \%$$

$$N_{\text{inorganic}} > 85 \%$$

