

# HUBER Dissolved Air Flotation Plant HDF



Efficient wastewater treatment for industrial applications

## ➤➤ General information

Process water is needed in many production processes as a solvent, for production of material, or for cleaning purposes. Water is recirculated and reused for economical and environmental reasons. Grease, oil, fat, floating and suspended solids, settling material, and dissolved components need to be separated to provide good and uniform water quality. Recovery of valuable product from the water may be another additional objective.

In addition, clogging and excessive wear of pipelines and other associated equipment is prevented, which increases the operating reliability of the production plant.

Where used process water is discharged as wastewater, pre-treatment is often required to prevent toxic or otherwise harmful substances (e.g. heavy metals, HC, AOX, etc.) from entering the sewer system and reduce thus surcharges and fees.

Conventional gravity clarifiers are often incapable to achieve sufficient pre-treatment.

Various types of flotation processes have been developed, whereof dissolved air flotation with pressure water recirculation has proven most effective.

The HUBER Dissolved Air Flotation Plant provides a significantly improved flotation process with a special inlet structure that provides optimum control of the flow within the flotation tank.

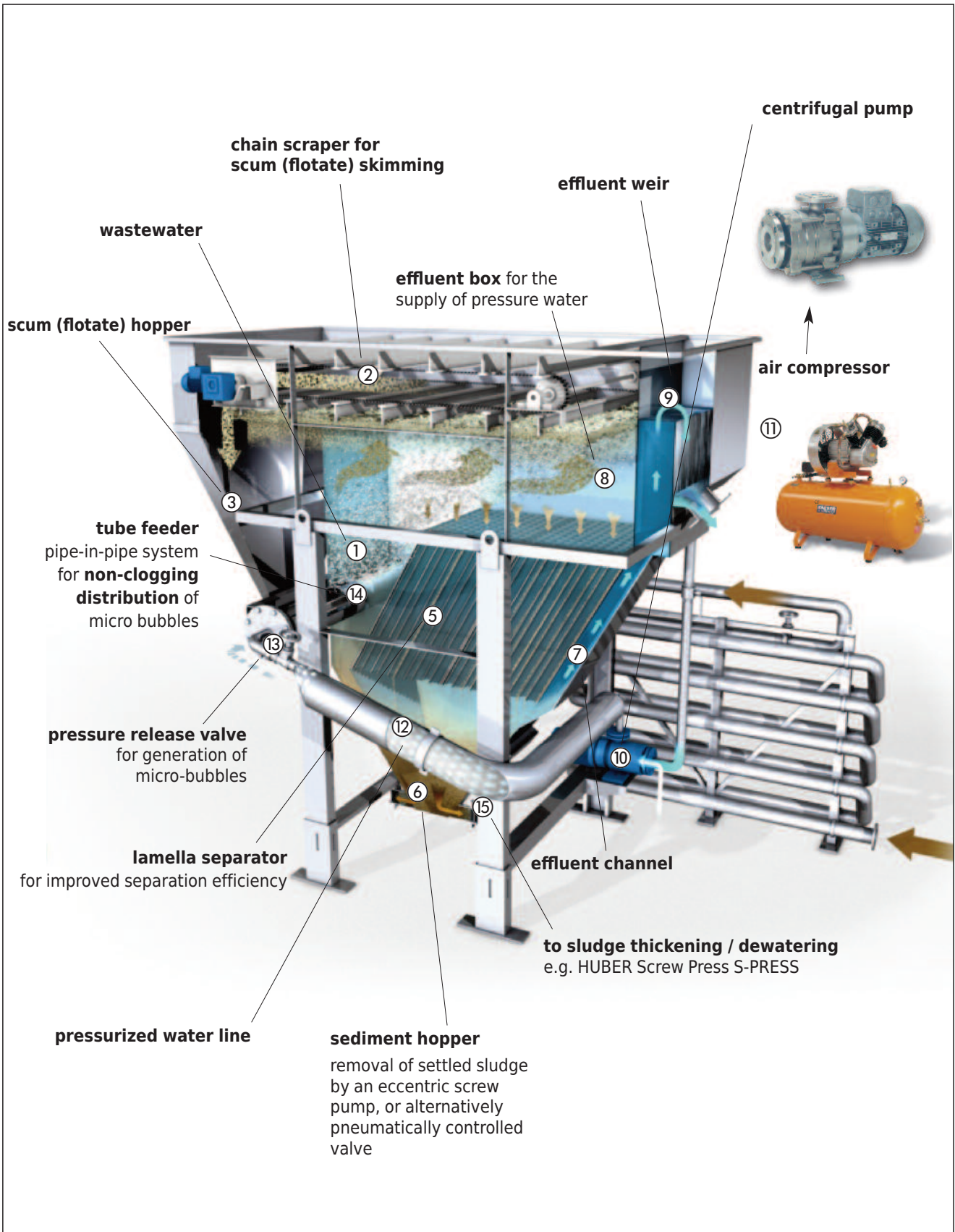
Virtually laminar flow conditions in the actual separation area decisively enhance phase separation. The multistage rotary pump for recycle water saturation with air eliminates the need for costly pressure tanks with high maintenance requirements. The integral lamella separator increases the effective separation area and allows therefore a small and low cost design.

HUBER Dissolved Air Flotation Plant HDF units are used for a wide variety of industrial and municipal applications, such as:

- Slaughterhouses
- Meat processing and packing
- Fish processing
- Dairies
- Convenience food production
- Margarine production
- Oil and fat refineries
- Canneries
- Industrial kitchens
- Canteens
- Fast food providers
- Waste management
- Soap works
- Land remediation
- Chemical industry
- Petrochemical industry
- Iron and steel industry
- Textile industry
- Cosmetics industry
- Metal processing
- Galvanizing, electroplating
- Municipal wastewater treatment



➤ HUBER Dissolved Air Flotation HDF for advanced (waste)water treatment with micro bubbles





## ►► Functional description of the HUBER Dissolved Air Flotation Plant HDF

The (waste) water to be treated enters the flotation plant via the tube feeder ①. The air-saturated water is released. The micro bubbles (20 – 40 µm dia.) generated when the pressure is suddenly released are intensively mixed with the suspended material in a tube feeder (special pipe-in-pipe system) ⑭.

The gas bubbles attach to the surface of solids. Due to their increased buoyancy, the light aggregates of solids and air bubbles float to the water surface.

The blended influent flows upward into the tank of the dissolved air flotation unit where it is evenly distributed over the total tank width. The laminar flow conditions ensure optimum phase separation.

The solids/gas flocs rise to the water surface where they form a scum (or flotote) layer that is skimmed off into the flotote hopper ③ by a scraper ②. The scraper joists with their special design dewater the flotote additionally. The flotote is either collected in a container or by an eccentric screw pump delivered to further treatment stages (e.g. sludge dewatering with HUBER Screw Press S-PRESS) ⑮.

The non-clogging lamella separator ⑤ increases the effective clarifier area, for maximum hydraulic loads on a small footprint. While the water flows down through the gaps between the inclined lamella plates, buoying flocs rise a short distance and attach at the lower surface of the upper lamella and dense particles sink a short distance to the upper surface of the lower lamella. The lamellae retain thin layers until they are grown into thick and compact layers that finally detach from the surface and slide quickly up or down along the lamella surface. Detached light aggregates slide up and rise to the water surface where they form a floating scum layer. Heavy sludge aggregates slide and sink down to the bottom of the tank into the sediment hopper ⑥ from where they are

either removed by an eccentric screw pump or gravity discharged by means of a pneumatically controlled valve.

The clarified water, after it has passed down through the lamella separator, rises up again through a channel ⑦ to an effluent box ⑧. The water level in the tank and the immersion depth of the scraper is adjusted by the position of an effluent weir ⑨.

Up to 30 % of the effluent is recirculated for the generation of pressure water. A multi-stage centrifugal pump ⑩ generates a pressure of about 6 bar. A compressor ⑪ feeds compressed air (> 12 %) to the pump rotor that generates small bubbles with a large surface for quick water saturation. Saturation of the water with air is completed in a tubular reactor ⑫.

The saturated water flows through a single pressure release valve ⑬, where the micro bubbles with a diameter of 20 to 40 microns are generated when the pressure of air-saturated water is suddenly released. In the tube feeder ⑭ the micro bubbles thoroughly blend with the influent to be treated so that all solids get in close contact with a sufficient number of micro bubbles.

## ►► Sizes

Size	Average hydraulic throughput capacity	Average solids throughput capacity
0.5	2 - 5 m <sup>3</sup> /h	25 kgDR/h
1	4 - 10 m <sup>3</sup> /h	50 kgDR/h
3	10 - 30 m <sup>3</sup> /h	150 kgDR/h
5	20 - 50 m <sup>3</sup> /h	250 kgDR/h
7	30 - 70 m <sup>3</sup> /h	350 kgDR/h
10	40 - 100 m <sup>3</sup> /h	450 kgDR/h
15	60 - 150 m <sup>3</sup> /h	600 kgDR/h
20	80 - 200 m <sup>3</sup> /h	800 kgDR/h

## ➤ Installation examples



### **Dairy industry**

Treatment of production wastewaters to retain lipophilic substances and protect downstream wastewater treatment systems

Typical reduction rates depending on wastewater composition

Oil, grease > 95%

Solids > 98%

COD 50% - 80%



### **Slaughterhouses and meat processing industry**

Treatment of the generated wastewater from the slaughtering process, scalding, cutting and other process steps

Typical reduction rates depending on wastewater composition

Oil, grease > 95%

Solids > 98%

COD 40% - 80%



### **Textile and leather processing industry**

Treatment of process wastewater from washing, dyeing and production processes

Typical reduction rates depending on wastewater composition

Heavy metals > 98%

Solids > 95%

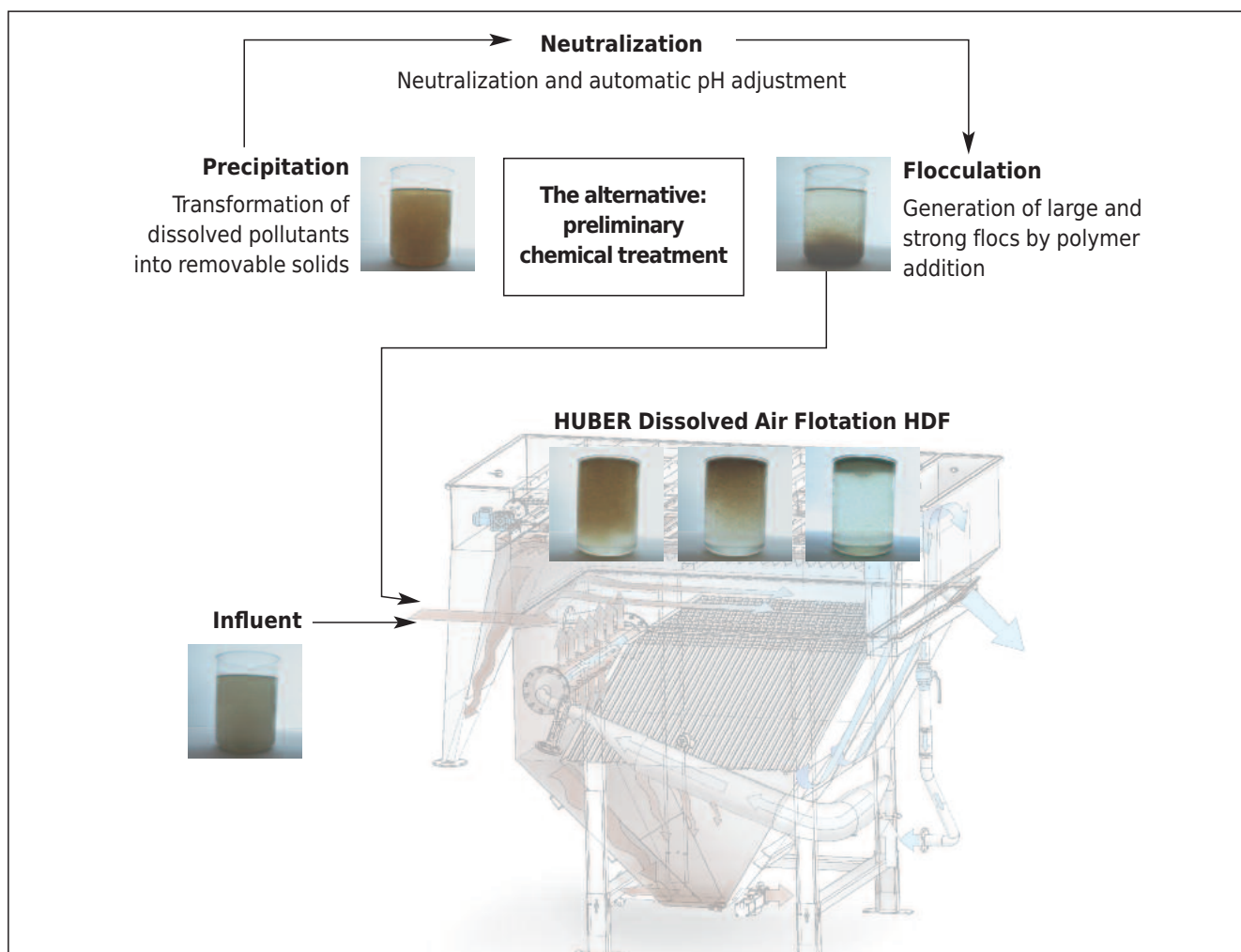
COD 30% - 70%

## System approach

**We provide complete systems for mechanical-physical water treatment by combining the HUBER Dissolved Air Flotation Plant HDF with other HUBER components**

- Chemical pre-treatment by precipitation, neutralization and flocculation in a tube reactor to improve separation efficiencies, and even remove some dissolved pollutants
- Mechanical pre-treatment with HUBER Micro Strainer ROTAMAT® Ro9, or HUBER Rotary Drum Fine Screen ROTAMAT® Ro2, or HUBER Complete Plant ROTAMAT® Ro5
- Treatment of the removed scum and sediment with: HUBER Disc Thickener S-DISC HUBER Screw Press S-PRESS or Q-PRESS®
- Complete wastewater treatment: additional biological treatment with HUBER Membrane Filtration VRM® according to the MBR process

### ➤➤ Improved separation efficiency through chemical pre-treatment



## HUBER SE

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