

HUBER Dissolved Air Flotation Plant HDF



Effective and 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 problematic 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



►► 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%

►► 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 and is directly mixed with the released pressure water (white water). The micro bubbles (20 - 40 µm dia.) generated when the pressure is suddenly released are brought into close contact 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.

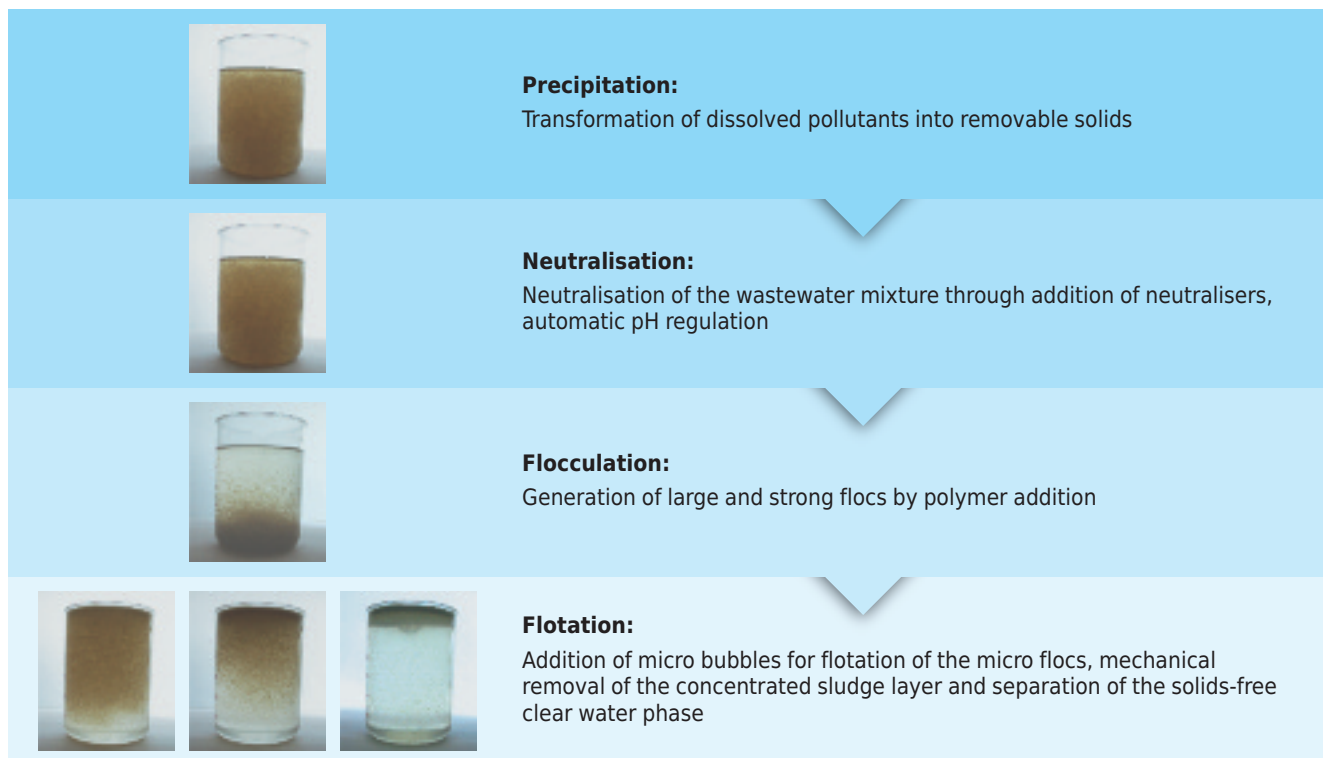
►► Sizes

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

➤➤ Increased separation efficiency through chemical treatment stage

- Individual project-specific tube flocculator for optimal chemicals dosing
- Compact unit directly beside the HUBER Dissolved Air Flotation Plant HDF
- Ideal admixture of chemicals due to a flow-optimised design
- Accommodating individual preferences for sampling / dosing points / measurement instrumentation

➤➤ Increased separation efficiency through chemical pre-treatment



➤➤ HUBER Chemicals Dosing DIGIT-DOSE

Chemicals dosing is optimal if the flotation system constantly achieves the required performance without overdosing of chemicals and unnecessarily increasing operating costs.

In practice, it proves to be difficult to adjust the chemicals dose due to varying volumes and freights..

Large-dimensioned mixing and balancing tanks are beneficial but can frequently not be installed due to lack of space. Besides, the investments costs are high for the tanks and the accessory equipment required, such as circulation pumps and aeration systems for homogenisation.

The innovative HUBER Chemicals Dosing DIGIT-DOSE allows optimal dosing of the chemicals even with small mixing and balancing tanks. The specially developed system uses a combination of several measuring

principles and constantly determines the optimal chemicals dose in real time.

Chemicals consumption, and therefore also operating costs, are reduced to a minimum. Additional positive effects can be seen in the volume of flotatae sludge generated.

The production of hydroxide sludge resulting from overdosing of precipitants is effectively avoided. The further utilisation and disposal of the flotatae sludge generated is a main cost factor of flotation plants.

Furthermore, DIGIT-DOSE makes life easier for the operating staff as the system adjusts automatically to varying wastewater parameters without the need for any manual intervention.

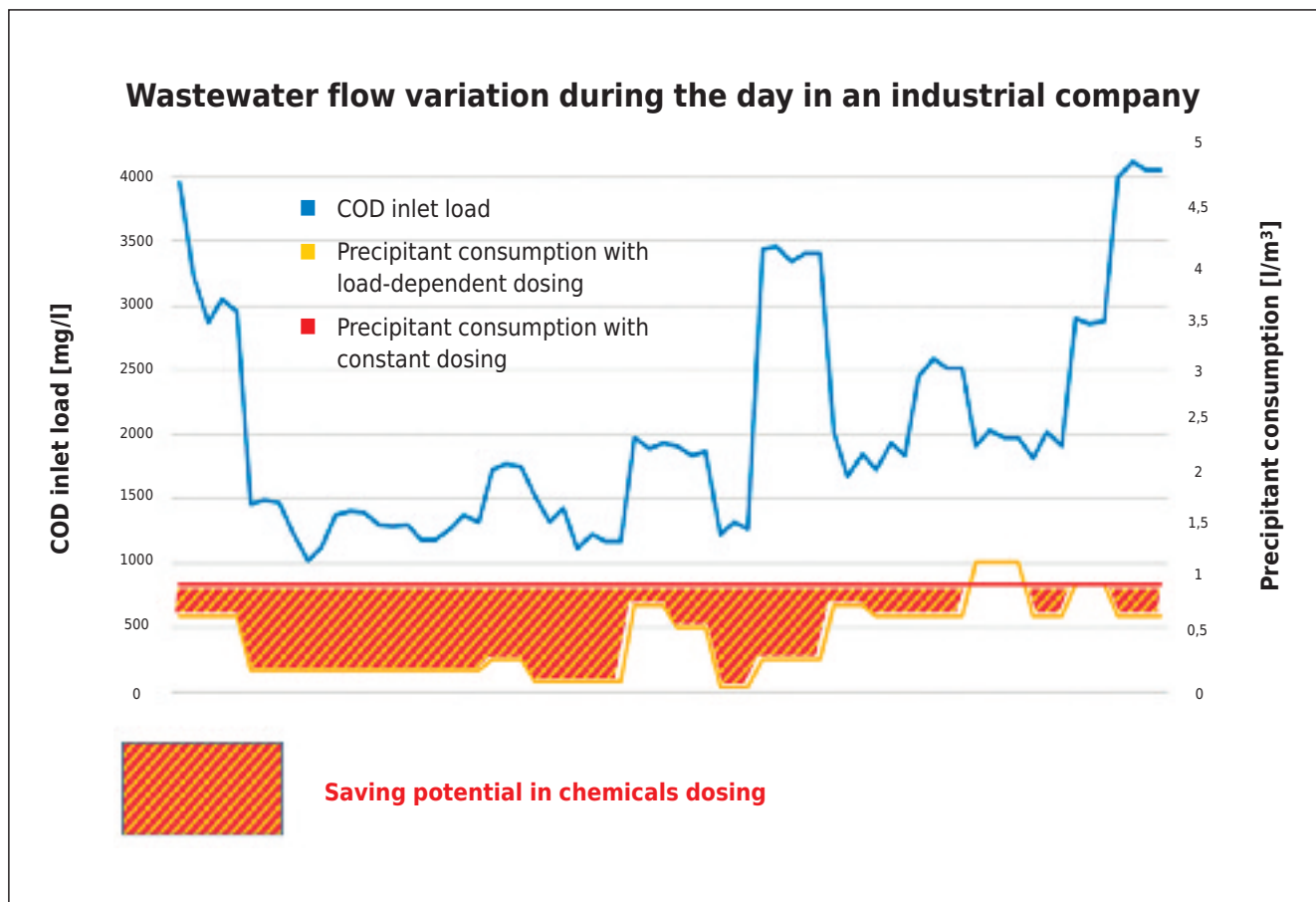
➤➤ DIGIT-DOSE applications

- Slaughterhouses and meat processing industry
- Dairies and cheese dairies
- Food companies
- Tanneries
- Animal rendering plants
- Pre-treatment by flotation in general
- Suitable also for retrofitting existing HUBER HDF installations!



➤➤ DIGIT-DOSE system benefits

- Up to 30% reduction in chemicals consumption
- Support and relief for operating staff
- Up to 20% reduced flotatate sludge volumes
- Integrated automatic cleaning of the measuring equipment used
- Low investments costs and space requirements for mixing and balancing tanks
- Return on investment within few months



➤➤ 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® Ro 9, HUBER Rotary Drum Fine Screen ROTAMAT® Ro 2, or HUBER Complete Plant ROTAMAT® Ro 5

- 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 System according to the MBR process

➤➤ Process safety through pilot testing in the laboratory and large-scale tests up to 5 m³/h

For a realistic feasibility assessment, wastewater samples can be analysed in advance in HUBER's own laboratory to obtain first reference data to estimate consumption values. It is also possible to organise pilot tests on the customer's site with a tank-mounted HUBER Dissolved Air

Flotation Plant HDF 0.5 including the required peripheral equipment. Do not hesitate to contact us.



Laboratory test



Demo unit of a HUBER Dissolved Air Flotation Plant HDF

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