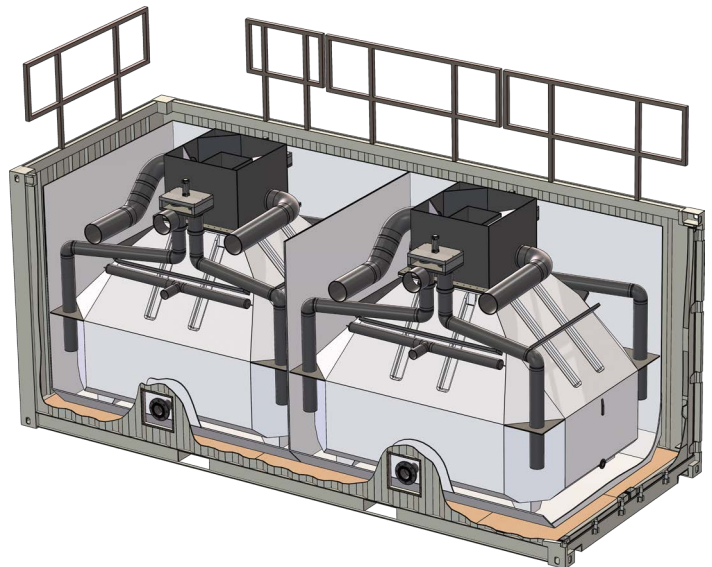


# Dissolved Air Flotation From 20 m/hr

**Advantages of the ClearFox® DAF:**

- Up to 80% COD removal / up to 99% oil removal / up to 99% TSS removal
- Automatic sludge thickening / no mechanical wiper / corrosion resistant material
- Developed according to the DWA design guidelines



The ClearFox® DAF is a fully automated unit. The wastewater to be treated is fed from the customer's surge tanks or ClearFox® buffer tanks to the DAF via a non-clogging cavity pump. The use of aerated buffers is recommended for certain applications.

Before the wastewater enters the reactor continuously, it first passes through a pH-controlled pipe system in which the pH value is adjusted if necessary. In a polymer mixing station, auxiliary materials are mixed to support the flocculation and flotation process. These polymers are automatically added to the incoming wastewater.

With the help of a multiphase pump, the water flow is continuously saturated with air and then fed into the reactor via recirculation. The pressure relief causes the floating material to be lifted by fine air bubbles. These are collected in the upper part of the reactor, concentrated and discharged through a conical opening by means of

compressed air. The treated wastewater is discharged in the middle of the reactor and can be discharged as clean water or fed to the next treatment stage. The compressed sludge is discharged by gravity.

Depending on the consistency of the incoming water, high treatment efficiency is achieved. The ClearFox® DAFs have extremely low operating & maintenance costs. The operator has to take care of replenishing the consumables (chemicals) and disposing of the flotation sludge himself. The system should be checked daily for wastewater composition, chemical supply and air pressure. We do not use mechanical clearing equipment with moving chains (lubricant insert etc.). The systems are robust, reliable and have been used in the food industry for years. The daily time required to check this simple compact equipment is approx. 0.25 hours for trained personnel. All our technical parts are approved and certified.

## Cleaning efficiency

The flotation process removes solids, fats, oils and some biodegradable substances. In addition, the pH is adjusted to 7 and the temperature is not changed, making the wastewater quality suitable for biological treatment.

Typical parameters achieved for the food/oil industry in the inlet/outlet are given below in mg/l.

- COD Inflow: 3000–7000 / Outflow: 1000–1500
- BOD Inflow: 2000–3500 / Outflow: 700–1000
- TSS Inflow: 500–1500 / Outflow: 5–50

Jar tests are recommended for the correct selection of chemicals and can be carried out in the PPU laboratories. A 5-litre sample is required for this.

## Sludge

The solids, fats and oils removed from the wastewater are called flotation sludge. The amount produced depends on the concentration of the oils/solids and the precipitated/flocculated wastewater. The flotation sludge is collected and can then be disposed of or dewatered or used for agricultural purposes where permitted. At an average concentration, you can expect 40 – 60 liters of thickened flotation sludge per m<sup>3</sup> of wastewater. This corresponds to an amount of about 4 – 6 percent by volume in relation to the wastewater supplied daily. The amount of sludge depends on the TSS, FOG as well as the flocculated/precipitated solids (oil, TOC, COD concentrations). Please refer to the data sheets for the ClearFox® sludge treatment options.

## Installation in sea containers

The ClearFox® DAF consists of two technical parts

1. Technical container (pre-installed therein are the suction line with feed pump, dosing pumps, dosing points, mixing & saturation section, chemical storage, polymer preparation, multiphase pump, control unit, insulated walls, room ventilation and/or air conditioning).
2. Cell tanks for flotation (including waterproof PE lining, conical reactor cells, drain pipes (clear water, settled solids, floating sludge), venting system).

The container system is completely plug & play suitable thanks to the pre-installations, including compressor and polymer preparation station: The two containers have to be positioned on site by crane, then the technical pipes between the containers are simply connected.

PPU provides support in the form of layout drawings, depending on local requirements.



## Technical data:

| Max. Flow rate of a DAF Series/Flow [m³/h]                     | DAF/42                                                                                                                                                                          | DAF/52                                      | DAF/65                                      | DAF/84                         | DAF/104                        | DAF/130                        |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Max. Daily wastewater volume [m³/d]                            | 840                                                                                                                                                                             | 1.040                                       | 1.300                                       | 1.680                          | 2.080                          | 2.600                          |
| Volume of the customer's storage tanks in m³                   | 500                                                                                                                                                                             | 600                                         | 800                                         | 1.000                          | 1.200                          | 1.500                          |
|                                                                | This corresponds to approx. 60% of the daily flow rate in m³/day and can be reduced if a steady inflow to the DAF is guaranteed. Please contact the ClearFox® team for details. |                                             |                                             |                                |                                |                                |
| Recycling flow [%]                                             | > 40                                                                                                                                                                            | > 30                                        | > 20                                        | > 40                           | > 30                           | > 20                           |
| Twin-DAF                                                       | Yes                                                                                                                                                                             | Yes                                         | Yes                                         | Yes                            | Yes                            | Yes                            |
|                                                                | TWIN-DAF is a 2x parallel reactor system that gives double the flow rate (max. 130 m³/h); ISO sea container transport. Contact the ClearFox® team for details.                  |                                             |                                             |                                |                                |                                |
| Power consumption Kilowatt/Ampere, 400 Volt AC, 3~, 50 Hz      | 16/25                                                                                                                                                                           | 18/25                                       | 20/30                                       | 32/25                          | 36/30                          | 64/25                          |
| Sludge discharge with air transport from the DAF unit through: | Compressed air, semi-automated                                                                                                                                                  | Compressed air, semi-automated              | Compressed air, semi-automated              | Compressed air, semi-automated | Compressed air, semi-automated | Compressed air, semi-automated |
|                                                                | Airlift principle, discharge by gravity, DN 200 mm, intervals freely adjustable (TS of sludge)                                                                                  |                                             |                                             |                                |                                |                                |
| Sludge storage/treatment on site recommended [4% TS flotate]   | Unrollable drainage container or Mini press                                                                                                                                     | Unrollable drainage container or Mini press | Unrollable drainage container or Mini press | Mini press                     | Mini press                     | Mini press                     |
| Sludge removal support with scraper                            | optional                                                                                                                                                                        | optional                                    | optional                                    | optional                       | optional                       | optional                       |
| Number of containers                                           | 2 pcs. 20 ft Container                                                                                                                                                          | 2 pcs. 20 ft Container                      | 2 pcs. 20 ft Container                      | 2 pcs. 40 ft Container         | 2 pcs. 40 ft Container         | 2 pcs. 40 ft Container         |
|                                                                | The two containers can be placed one above the other.                                                                                                                           |                                             |                                             |                                |                                |                                |
| Container dimensions                                           | 6,1 x 2,5 x 2,9 m (l, w, h)                                                                                                                                                     | 6,1 x 2,5 x 2,9 m (l, w, h)                 | 6,1 x 2,5 x 2,9 m (l, w, h)                 | 12,0 x 2,5 x 2,9 m (l, w, h)   | 12,0 x 2,5 x 2,9 m (l, w, h)   | 12,0 x 2,5 x 2,9 m (l, w, h)   |

## Equipment:

Note: The information provided by our standard suppliers and manufacturers is not binding. Changes due to seasonality and delivery times are possible.

| Max. Flow rate of a DAF Series/<br>flow rate [m³/h]                                                                          |                                             | 42                                               | 52                                               | 65                                               | 84                                               | 104                                              | 130                                              |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Max. Daily wastewater volume<br>[m³/d]                                                                                       |                                             | 840                                              | 1.040                                            | 1.300                                            | 1.680                                            | 2.080                                            | 2.600                                            |
| DAF Reactor [cm] Polyethylene,<br>welded                                                                                     | PPU                                         | 274/210/257                                      | 274/210/257                                      | 274/210/257                                      | 274/210/257                                      | 274/210/257                                      | 274/210/257                                      |
| Feed pumps – quantity Flow rate<br>[m³/h]/ P [kW]                                                                            | Netsch/<br>Schmitt                          | 1 pcs.<br>5,5 kW / 50 m³/h                       |                                                  |                                                  | 2 pcs.<br>5,5 kW / 50 m³/h                       |                                                  |                                                  |
| Multiphase pumps – quantity P<br>[kW]/flow rate [m³/h]                                                                       | Edur                                        | 1 pcs.<br>5,5 kW / 20 m³/h                       |                                                  |                                                  | 2 pcs.<br>5,5 kW / 20 m³/h                       |                                                  |                                                  |
| Polymer dosing pumps Flow rate<br>[l/h]                                                                                      | Iwaki ProMi-<br>nent                        | Individual design                                |                                                  |                                                  |                                                  |                                                  |                                                  |
| Dosing pumps Flow rate [l/h]<br>Total splitting/acid/alkali                                                                  | Iwaki                                       |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| Air compressor (containerised) P<br>[kW]/flow rate [l/min]                                                                   | Käser                                       | 8 bar<br>2.4 kW / 180 l/min                      |                                                  |                                                  | 8 bar<br>3.0 kW / 260 l/min                      |                                                  |                                                  |
| Polymer preparation station<br>(optional)                                                                                    | Aricon/PPU                                  | Individual design                                |                                                  |                                                  |                                                  |                                                  |                                                  |
| Drain 2x inch female thread                                                                                                  | ITG                                         | Sizes on request                                 |                                                  |                                                  |                                                  |                                                  |                                                  |
| Sludge discharge [mm]                                                                                                        | PPU                                         |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| Clear water outlet [mm]                                                                                                      | PPU                                         |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| Mixing/saturation section PE/PVC                                                                                             | PPU                                         |                                                  |                                                  |                                                  |                                                  |                                                  |                                                  |
| Control cabinet l x w x h [cm]<br>Control                                                                                    | Rittal<br>Mitsubishi/<br>Siemens            | 100x50x200<br>Mitsubishi/<br>Siemens <b>SI-7</b> | 100x50x200<br>Mitsubishi/<br>Siemens <b>SI-7</b> | 100x50x200<br>Mitsubishi/<br>Siemens <b>SI-7</b> | 100x50x200<br>Mitsubishi/<br>Siemens <b>SI-7</b> | 100x50x200<br>Mitsubishi/<br>Siemens <b>SI-7</b> | 100x50x200<br>Mitsubishi/<br>Siemens <b>SI-7</b> |
| Level sensor buffer 4-20 mbar<br>Air pressure/dry run Recycle<br>Compressed air monitoring DAF<br>Chemical level<br>pH value | Bamo<br>Czujniki BD<br>Festo<br>ifm<br>Bamo | incl.<br>incl.<br>incl.<br>incl.<br>incl.        | incl.<br>incl.<br>incl.<br>incl.<br>incl.        | incl.<br>incl.<br>incl.<br>incl.<br>incl.        | incl.<br>incl.<br>incl.<br>incl.<br>incl.        | incl.<br>incl.<br>incl.<br>incl.<br>incl.        | incl.<br>incl.<br>incl.<br>incl.<br>incl.        |
| pneum. Sludge lifter DN [mm]                                                                                                 | PPU                                         | 4x 110                                           | 4x 110                                           | 4x 110                                           | 4x 110                                           | 4x 110                                           | 4x 110                                           |

### Technical equipment / scope of delivery:

The ClearFox® DAF units, installed in a sea container, are designed for easy installation and commissioning. With the help of the commissioning instructions and the user manual, even unskilled customers can operate and run the system. The necessary installation and assembly material is also included in the scope of delivery.

Parts lists as well as wear and spare parts are included in the design documents 3–4 weeks after ordering and after the start of production. Please note that we design and plan the units for each application: e.g. dosing quantity, recycling rate, surface and oxygen load. Each technical unit can thus be dimensioned according to need in terms of performance, volume and flow rate, etc.



## Typical standard design parameters:

|                                              |                            |
|----------------------------------------------|----------------------------|
| Sludge dry matter (flotatethickening)        | $\geq 4 < 6$               |
| Total surface load of the liquid phase       | 3-6 m <sup>3</sup> /h      |
| Surface loading of solids                    | 5-20 kg/m <sup>2</sup> *h  |
| Air/solid ratio                              | [g air/kg solids)] = 10-50 |
| Average bubble size at 5-6 bar               | micron = 30-60             |
| Saturation rate during operation             | % >80 < 98                 |
| Recycling rate internal for D/H>1.5          | % =>25<40 (1-stage)        |
| Normal operating saturation pressure         | bar = > 3 < 6              |
| Air volume per fluid in multiphase operation | % > 5 < 20                 |

Note: The standard design parameters are closely related and influence each other. They are valid when used without client details.

Basic data: The 2-stage DAFs are only possible after piloting a system or upgrading previous projects with the same wastewater characteristics

## Expected cleaning performance:

| Wastewater type    | Raw wastewater      |                    |                         | Clear water         |                    |                         | Separation efficiency |                    |                         |
|--------------------|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|-----------------------|--------------------|-------------------------|
|                    | Susp. solids [mg/l] | Etherl. fat [mg/l] | BOD <sub>5</sub> [mg/l] | Susp. solids [mg/l] | Etherl. fat [mg/l] | BOD <sub>5</sub> [mg/l] | Susp. solids [mg/l]   | Etherl. fat [mg/l] | BOD <sub>5</sub> [mg/l] |
| Edible oil factory | 230                 | 460                | 2.900                   | 20                  | 25                 | 94                      | 91,3                  | 94,6               | 96,8                    |
| Margarine factory  | 5.000               | 3.900              | -                       | 200                 | 40                 | -                       | 96                    | 99                 | -                       |
| Cosmetics factory  | 15.000              | 5.405              | 25.400                  | 1.800               | 485                | 5.880                   | 88                    | 91                 | 76                      |
| Wool laundry       | 4.000               | 2.100              | 970                     | 60                  | 30                 | 90                      | 98,5                  | 98,6               | 90,7                    |
| Slaughterhouse     | 700                 | 892                | 1.900                   | 10                  | 32                 | 39                      | 98,6                  | 96,4               | 97,6                    |
| Poultry proces.    | 874                 | 3.139              | 1.136                   | 40                  | 18                 | 100                     | 95,4                  | 99,4               | 91,2                    |
| Rendering          | 5.353               | 4.614              | -                       | 780                 | 775                | -                       | 95,4                  | 83,2               | -                       |
| Tannery            | 5.093               | 462                | 2.221                   | 384                 | 43                 | 547                     | 92,5                  | 90,7               | 75,4                    |
| Soybean proces.    | 1.656               | -                  | 3.000                   | 42                  | -                  | 800                     | 97,5                  | -                  | 73,4                    |
| Potato proces.     | 2.600               | -                  | 2.760                   | 60                  | -                  | 260                     | 97,7                  | -                  | 90,6                    |
| Fibreboard factory | 1.700               | -                  | 6.170                   | 127                 | -                  | 3.000                   | 92,6                  | -                  | 51,4                    |