Data sheet: ClearFox® DAF

compact series with airlift principle [Qd= 400 m^3 /day]

Intelligent Dissolved air flotation in container or on racks produced by:

Description

The ClearFox DAF plant is fully automated. Feedwater is supplied to the DAF module via non-clogging cavity pump from client`s balancing tanks or ClearFox buffer tanks. Pre-aerated buffers are advisable for certain applications.

The wastewater firstly passes through a pH-controlled inline pipe system where the pH is automatically adjusted if necessary. Then it enters continuously into the reactor. In a polymer-mixing module, conditions are created that support the flocculation and flotation process. These polymers are automatically added to the inflowing wastewater flocculators. Bu utilizing a multiphase pump, the flow of water is continuously saturated with air, then returned via a recirculation into the reactor. The pressure release causes an uplift of the floatable material by fine air bubbles. These are collected and concentrated in the upper area of the reactor and are to be separated by a scraper or discharged through a cone-shaped hole by compressed air. The clean water is drawn off in the center of the reactor and can be discharged as clean water or to the next treatment step. The compressed sludge is discharged by gravity.

Operation

Depending on the inflowing water consistency, a high treatment efficiency rate is achieved. The ClearFox DAF has extremely low O&M costs. The operator must ensure the consumables [chemicals] are replenished, and the disposal of the flotation sludge. The system should be checked daily for the wastewater composition, chemical storage volumes, and the air pressure can be adjusted. We do not use and mechanical clearing device with movable chains (lubricant use, etc.). The units are robust and used in the food industry for years. The daily time requirement for controlling this simple compact unit is approximately 0.25 hours by trained staff per day. All our technical parts are approved and certified.

Cleaning efficiency

The process removes solids, fat, oil and some biodegradable materials, pH is adjusted to 7 ,temperature is not changed, the effluent quality is suitable for biological treatment.
Typical parameters achieved for food/oil industry in the INLET / OUTLET are detailed below in mg/l.
COD IN :3000-7000 / OUT :1000-1500
BOD IN: 2000-3500 / OUT :700-1000
TSS IN: 500-1500 / OUT :5-50
Jar Tests are advised for correct chemical selection and can be offered by PPU laboratory services. 5 ltr sample required.

Residues

In the flotation fats and oils are removed from the wastewater. The removed residues are called flotation sludge. The resulting amount depends on the concentration of oil/solids and the precipitated/flocculated wastewater. The flotation sludge must be collected and can then be disposed or, dewatered or used for agriculture. At an average concentration, you can expect 40-60 liters of thickened flotation sludge per m³ of wastewater. This corresponds to an amount of about 4 to 6 percent by volume in relation to the daily feed waste water. The amount of sludge depends on TSS +FOG, as well as on flocculated/precipitated solids (oil/ TOC/COD concentrations).
Please see datasheets for Clearfox sludge treatment options.

Installation rack mounted, seacontainers

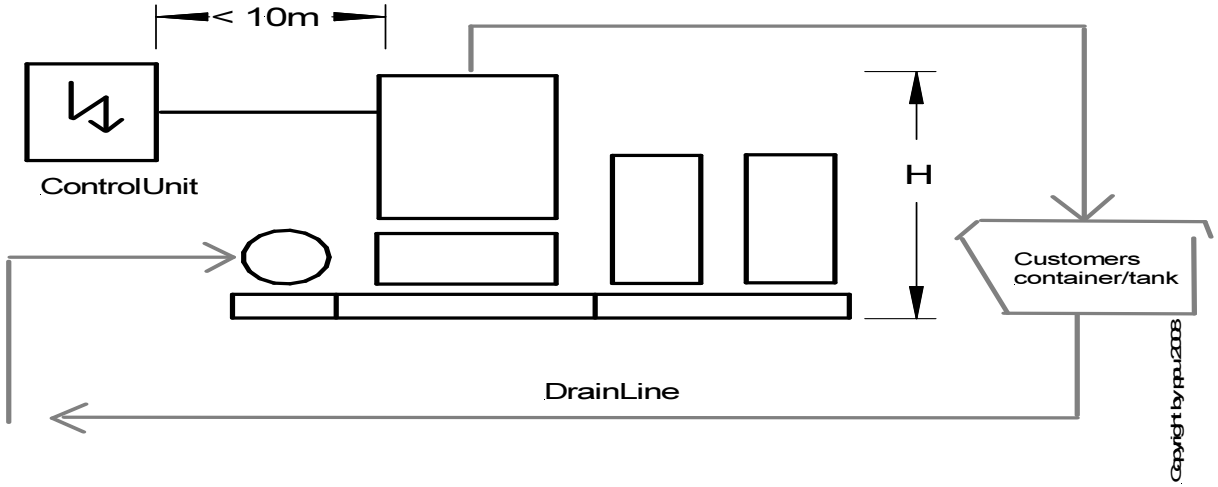
The system is mounted

a) on **support frames/racks** (client`s service is all electrical and pipework)
b) or totally preinstalled in ISO container (plug&play)

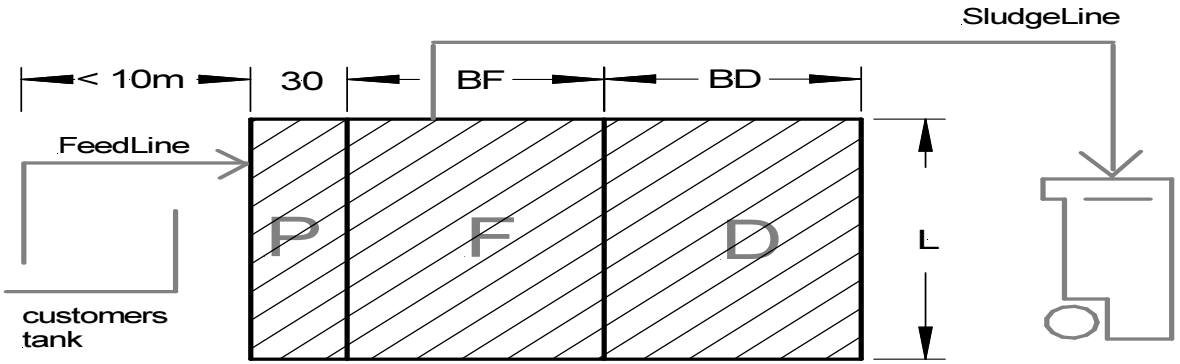
The flotation system consists of 4 main parts:

P = feeding station with saturation and mixing line,
F = flotation reactor including recycle stream and peripheral pump, sludge,
D = dosing pumps, polymer station with mixer, chemical agents (2x) suction lines, pH measurement and (**CPU**) control cabinet with PLC
The **3 racks** and the **cabinet** can be positioned anywhere. The bases for the units must be firm and level (foundations); dewpoint protection, dry, covered; a maximum distance from the storage tank / control unit of 10 m, indoor installations require air change rates in accordance with local regulations.
It makes sense to avoid closed enclosures to prevent odors.
The **containerized system** is totally plug &play including air compressor and a ventilation system for the odor exchange, the rack mounted must be positioned, connected, compressor and ventilation by client, in a shelter, housing for weather protection.

PPU-Flotation



DAF on racks



control cabinet seperate or on DAF reactor

Reference / pictures

saturation, mixing, aeration
polymer prepare station

feeding / standard ISO container installation 10.0m3/h , 30%Recycling, 220 m3/day

(top left: Flotation system, top right: Dosing, down left: Flotation sludge, down middle: Reactor)

The plant series is characterized by an extremely robust, space-saving design. The great success of the system technology is based, on a simple and cost effective operation. Systems are installed in many major European food producers, as well as in Eastern Europe in action.

Technical data for selection & site preparation:

Max. flowrate of DAF ***design flow [m³/h]***	1,0	**DAF/2,0**	**DAF/3,0**	**DAF/5,0**	**DAF/7,5**	**DAF/10,0**	**DAF/15,0**	**DAF/18-20**
Max. daily amount of wastewater ***[m³/d]***	20	**40**	**60**	**100**	**150**	**200**	**300**	**400**
Size of clients buffer in m³	15	**29**	**43**	**72**	**108**	**144**	**180**	**240**
	this is ca.60% of daily flowrate m³/d (this can be reduced when more equalized flow to the DAF is possible DAF or where there are more shifts, for details please ask Clearfox							
Twin- DAF	no	no	no	no	no	yes	yes	on request
	TWIN-DAF is 2 x parallel reactor system, which gives double flowrate, ISO sea container transport maximum possible up to 18m3/hour DAF, for details please ask							
Power consumption *Kilowatt/ Ampere, 400 Volt,50Hz,*	3/16 (240 Volt)	5/20	5/20	5/20	7/25	10/25	12/25	12122
Sludge discharge with airlift out of DAF unit by:	manually	Compressed air, semi-automatic	Compressed air, semi-automatic	Compressed air, semi-automatic	Compressed air, semi-automatic	Compressed air, semi-automatic	Compressed air, semi-automatic	Compressed air, semi-automatic
	If sludge (discharged from DAF unit) cannot flow by a gravity to the sludge dewatering, then it must be pumped (optional funnel+eccentric screw pump) ask Clearfox Team							
Sludge storage/-treatment on site advised [@4%DS flotate]	Waste Container	multi bag dewatering system or skip dewatering	Skip dewatering container or minipress	Skip dewatering container or minipress	Roll-off dewatering container or minipress	Roll-off dewatering container or minipress	Roll-off dewatering container or press	Roll-off dewatering container or press
sludge removal support with scraper in scope	n0	no	optional	optional	optional	optional	adviced	yes. standard
equal Euro-palets@transport	1,5	2	3	4	6	6	HC 20ft	HC 20ft
BF ***[cm]***	85	100	125	150	175	200	220	240
BD ***[cm]***	85	85	85	85	100	150	175	200
L ***[cm]***	125	125	150	200	200	210	240	240
H ***[cm]***	190	210	210	210	220	220	220	240

Technical specification (PPU standard Pre-supplier/manufactorer, Note: indication is without comittment, changes due to seasonality and deliverytime):

Max. flowrate of DAF *design flow [m³/h]*		1,0	**2,0**	**3,0**	**5,0**	**7,5**	**10,0**	**15,0**	**18-20**
Max. daily amount of wastewater *[m³/d]*		20	**40**	**60**	**100**	**150**	**200**	**300**	**400**
diameter of DAF reactor [cm] height of DAF reactor [cm]	PPU	**80** **150**	80-100 180	100 180	120 180	150 200	180 200	200 220	220 220
feed pump eccentric screw DN[mm]/P[kW]/flowrate [m^3/h]	Netsch	32/1.00/1	50/1.50/2	50/1.50/3	50/1.75/5	50/1.50/7.5	50/2.2/10	50/3.0/15	50/4.0/20
multiphase pumps totally DN[mm]/P[kW]/flowrate [m^3/h]	Edur Calpeda	divers	20/2,50	20/3,0	25/3,0	25/5,50	25/7,50	25/8,40	25/8,40
dosing pumps polymer flowrate [ltr/h]	Iwaki ProMinent	10-20	25	25	50	50	**75**	**100**	150
dosing pumps flowrate [ltr/h] splitting/caustic soda/totally	Iwaki	div.	8	8	12	12	16	25	25
air compressor (containerized) P[kW]/flowrate [ltr/min]	Einhell Scheppach		8-10 bar 0.12/150	8-10 bar 0.12/150	8-10 bar 0.12/150	8-10 bar 0.12/150	8-10 bar 0.12/150	8-10 bar 0.12/150	8-10 bar 0.12/150
tank polymer Volume [liter] mixer P[kW]/	Aricon Sewa	client	 300 0.75	 300 0.90	 500 1.10	 750 1.50	 1000 2.20	 1200 2,20	 1500 3.0
drain 2x thread female [inch]	HTI	32-50	50	50	50	50	50	50	50-80
sludge discharge d_{out} [mm]	PPU	110	110	110	160	160	160	200	200
clear discharge d_{out} [mm]		110	110	110	160	160	160	200	200
mixing line/saturation PVC mixing tank PE/static mixer	PPU Aricon	PPU -	PPU -	PPU -	PPU -	PPU -	PPU	PPU Aricon 800 ltr	PPU Aricon 800 ltr
controlcabinet HxW [cm] L35 Mitsubishi/Siemens **SI 7**	Rittal Mitsubishi	Clearfox easy Mitsubishi	80x50 Mitsubishi	80x50 Mitsubishi	80x50 Mitsubishi	80x50 Mitsubishi	100x50 Mitsubishi	100x50 Mitsubishi/**SI-7**	100x50 Mitsubishi/**SI-7**
level sensor buffer 4-20mbar air pressure/Dryrun Recy air pressure monitoring DAF Dry run/thermo protection level indicator chemicals digi pH	BD Sensor Bamo Festo Netsch Elobau Schott	incl. - incl. - - incl.	incl. incl. incl. incl. incl. incl.	incl. incl. incl. incl. incl. incl.	incl. incl. incl. incl. incl. incl.	incl. incl. incl. incl. incl. incl.	incl. incl. incl. incl. incl. incl.	incl. incl. incl. incl. incl. incl.	incl. incl. incl. incl. incl. incl.
pneum. sludge lifter DN [mm]	PPU	80	110	110	110	160	160	200	200
scraper device [Watt/rpm/min	PPU	-	-	-	-	-	-	120/16	120/16
special devices possible 2-step/bottom cleaning etc	PPU		no	no	yes	yes	yes	yes	yes

note: 1m3/h DAF is usually a pilot system and will be designed for upgrading on real flowrate, flowrates > 40m3/h are usually handled with our container Eco- DAF 40-60, request datasheet.

Data sheet: ClearFox® DAF

compact series with airlift principle [Qd= 400 m^3 /day]

Intelligent Dissolved air flotation in container or on racks produced by:

Technical equipment /scope of delivery

The Clearfox DAF version installed in a sea container is designed for plug&play. With the startup guide and the operational manual, non skilled clients are able to operate the equipment.
The technical equipment is complete for a simple installation onsite and also the installation and mounting materials are included.

The Clearfox DAF version installed on racks can be made ready for operation, by connecting the devices P,F,D & control unit, pipe connections, mounting materials are on demand or clients requirements.

Part lists as well as wear/spare are included in the design documents 3-4 weeks after ordering and after beginning of manufacturing.
Please note, that we design for every application: dosing quantity, recycling rate, surface load, oxygen load,
so every technical device can be specified i.e power/volume/flow etc.

typical client requirement (basic data)		typical taken as standard design parameter (Clearfox airlift DAF)	
dry matter of sludge (flotate)	%DS	dry matter in sludge (flotate thickening)	% => 4 < 6
concentration SS in clearwater	mg/l	total surface load liquid phase	[m³/h] = 3-6 (1 step)
C elimination (CODin-CODout) /CODinx100	%	surface load solids	[kg/m²h] = 5-20 (1 step)
same for heavy metals/oil/SS	%	air/solids ratio	[g air/kg solids *)]= 10-50
effluent concentration of any parameter	mg/l	average50-bubble size@5-6 bar	micron = 30-60
branch/production/	products	saturation rate during operation	% >80< 98
peak flow	m3/h	recycling rate internal for D/H>1.5	% =>25<40 (1 step)
		operational saturation pressure	bar = > 3 < 6
		air volume per liquid in multiphase operation	% > 5 < 20

note for standard design parameter: that they are in close correlation and influence each other, standard valid taken without any clients basic data

2- step DAF are only possible after piloting a system or upgrading former projects with same ww characteristics

typical efficiency rates expected

	Rohabwasser			Klarwasser			Abscheidegrad		
Abwasserart	susp. Stoffe [mg/L]	etherl. Fett [mg/L]	BSB_5 [mg/L]	susp. Stoffe [mg/L]	etherl. Fett [mg/L]	BSB_5 [mg/L]	susp. Stoffe [%]	etherl. Fett [%]	BSB_5 [%]
Speiseölfabrik	230	460	2.900	20	25	94	91,3	94,6	96,8
Margarinefabrik	5.000	3.900	-	200	40	-	96,0	99,0	-
Kosmetikfabrik	15.000	5.405	25.400	1.800	485	5.880	88,0	91,0	76,0
Wollwäscherei	4.000	2.100	970	60	30	90	98,5	98,6	90,7
Schlachthof	700	892	1.900	10	32	39	98,6	96,4	97,6
Geflügelbearb.	874	3.139	1.136	40	18	100	95,4	99,4	91,2
Tierkörperbeseit.	5.353	4.614	-	780	775	-	95,4	83,2	-
Gerberei	5.093	462	2.221	384	43	547	92,5	90,7	75,4
Sojabonenverarb.	1.656	-	3.000	42	-	800	97,5	-	73,4
Kartoffelverarb.	2.600	-	2.760	60	-	260	97,7	-	90,6
Faserplattenfabrik	1.700	-	6.170	127	-	3.000	92,6	-	51,4

[Quelle: Fries (ATV-Seminar 15./ 16.04.1996

clients service

containerized version:
install feed suction line in buffer, connect sludge outlet pipe to sludge treatment, connect clearwater outlet, connect power supply in cc
startup, operation and maintenance according to site conditions (photo documentation)

racked version: only skilled companies (trained Clearfox partner companies) , all connections onsite, PPU supervisors to be onsite.