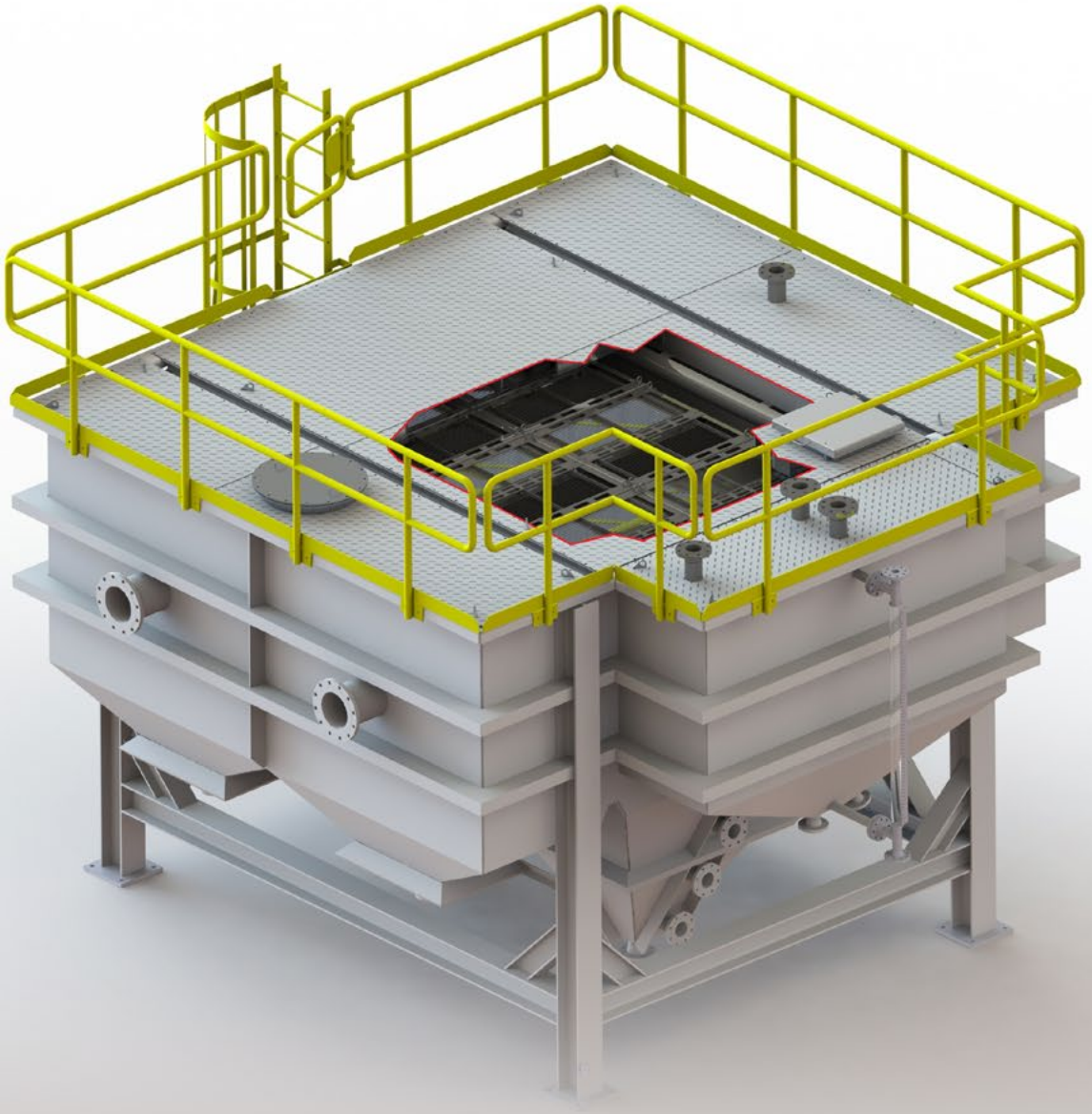
VEOLIA



TiPSS TECHNOLOGY

Cross Flow Corrugated Plate Interceptor (cfCPI)

WATER TECHNOLOGIES

Cross Flow Interceptor system for the atmospherically gravity separation of solids and/or oil from waste water

Introduction

Gravity separation is the most straightforward method of effluent treatment and is, therefore, utilised widely in industry for the separation of settling and/or flotable impurities from a carrier liquid. In the majority of cases the separators are constructed in the form of a rectangular tank.

The effectiveness of such a tank depends theoretically upon its net separation surface (A) and the amount of water to be treated (Q). The ratio Q/A is called the overflow rate. The rising or settling velocity of a discrete particle with a diameter d can be indicated by Stokes' law:

$$V_s = \frac{200g \cdot (\rho_{liquid} - \rho_{particle}) \cdot d^2}{\mu}$$

Vs = sedimentation (floating) velocity [m/h]
g = gravity constant [m/s²]
ρ = density phase [kg/m³]
d = particle / droplet diameter [m]
μ = dynamic viscosity [kg/m.s]

Cross flow interceptor 40 m³/h

Advantages of the cfCPI system

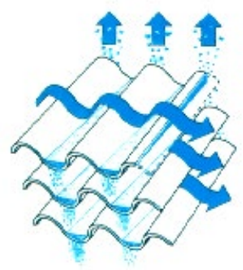
- no moving parts
- high separation efficiency, equal for both heavy and light fractions
- compact construction gives great economy in space and foot print
- low installation costs on site since units can be prefabricated
- minimum maintenance costs
- uniformity in design guarantees quick delivery of plant and spares
- short hydraulic retention time
- continuous operation
- insensitivity to weather conditions and variations in temperature and composition of the liquid to be treated.

Attainable achievements

- oil globule cut off diameter: 10-40 microns
- oil removal: 90 - >98%
- typical effluent O&G levels: 10 – 20 ppm (free and separable oil)
- TSS removal: 90 - >95%
- sand cut off size <10 micron

All particles or droplets having a settling or flotation velocity Vs>Q/A are fully intercepted, while a portion of the smaller particles will be captured also in a ratio of (d/ds)² x 100%.

An enlarged separating surface is achieved by placing various smaller planes on top of each other in the tank. If these planes are subsequently inclined in a tilted position, material separated between the plates is removed by the gravitational force. This is the principle on which the cfCPI corrugated plate pack is based.



➲ *Figure Cross Flow Separation*

In this plate pack the planes as referred to have been constructed in the shape of corrugated plates. They promote both the coalescence of the intercepted particles and, at the same time, their transfer through the plate pack (see fig.: Cross Flow Separation).

If settleable material is present in the liquid, such material is collected and concentrated in the troughs of the corrugations so that it will slide down in the plate pack smoothly and easily.

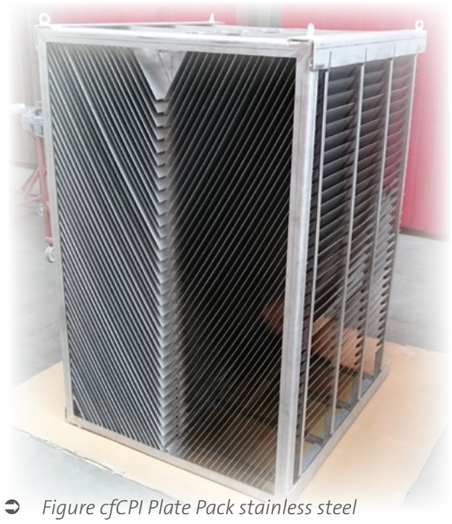
Very small separating diameters can be obtained in the cfCPI system, because the disturbing factors, such as eddies and turbulences, which adversely affect large conventional separating tanks, are eliminated in the cfCPI.

Types and number of plate packs required

In formulating a design, the following minimum data are essential:

- the type of pollutants to be intercepted
- the separating diameter
- the difference in density or settling velkocity between the carrier liquid (waste water) and the pollutants to be intercepted
- the maximum amount of water to be treated
- the water temperature
- the sedimentation velocity
- origin of the liquid
- physical data, chemical analysis of carrier phase.

Subsequently the required separating area (A) is computed with: A = Q/Vs.The required type cfCPI with determined plate separation area and plate distance can easily be chosen from the standardised line of Cross Flow separators, which is given in the next paragraph.



➲ *Figure cfCPI Plate Pack stainless steel*

Applications

HPI industries:
Ballast water and tank farm waters
Refinery effluents

CPI industries
Process waters
Petrochemical effluents
Desalter water

Textile industries

Food and beverage industries:
Edible oil refining

Automotive, iron & steel industries

Potable & process water pre-treatment

Etc.

Please contact our sales office for a detailed reference list or for case studies.

Process flow description cfCPI system

Type	Capacity m³/h Vs = 1 m/h		
	CTC* 19 mm	CTC 25 mm	CTC 35 mm
1A1	8	7	5
2B1	26	19	14
4D1	43	58	42
4D2	165	116	84
6D2	250	176	128
8D2	320	215	154

** CTC = Centre to centre distance*

The, with solids and/or Oily contaminated water with solids flows into the separator through a flow stabilization compartment (1). A distribution baffle (2) induces the incoming water to flow evenly and uniformly to the entrance of the plate pack (3). In the plate pack, the solids and, if present, oil droplets, are intercepted. They leave the pack in a perpendicular flow direction and collect respectively beneath the pack in the sludge cone (6), or on top of the pack in an oil layer (7).

The settled material is discharged intermittently with the aid of pneumatic operated valves into a sludge collection basin. The floating oil layer is discharged via an oil skimmer (4).

The treated water leaves the pack at the back of it and is discharged over an adjustable weir (5).

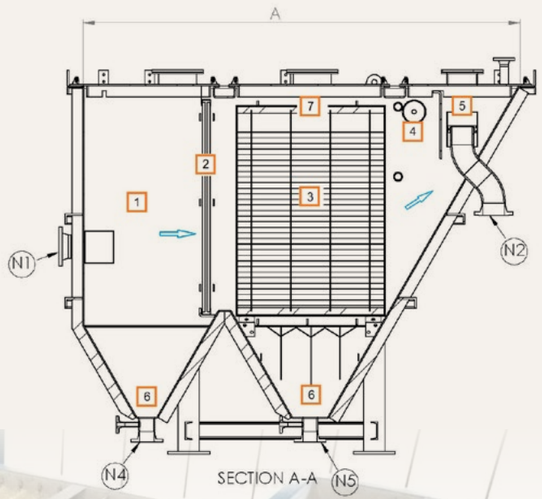
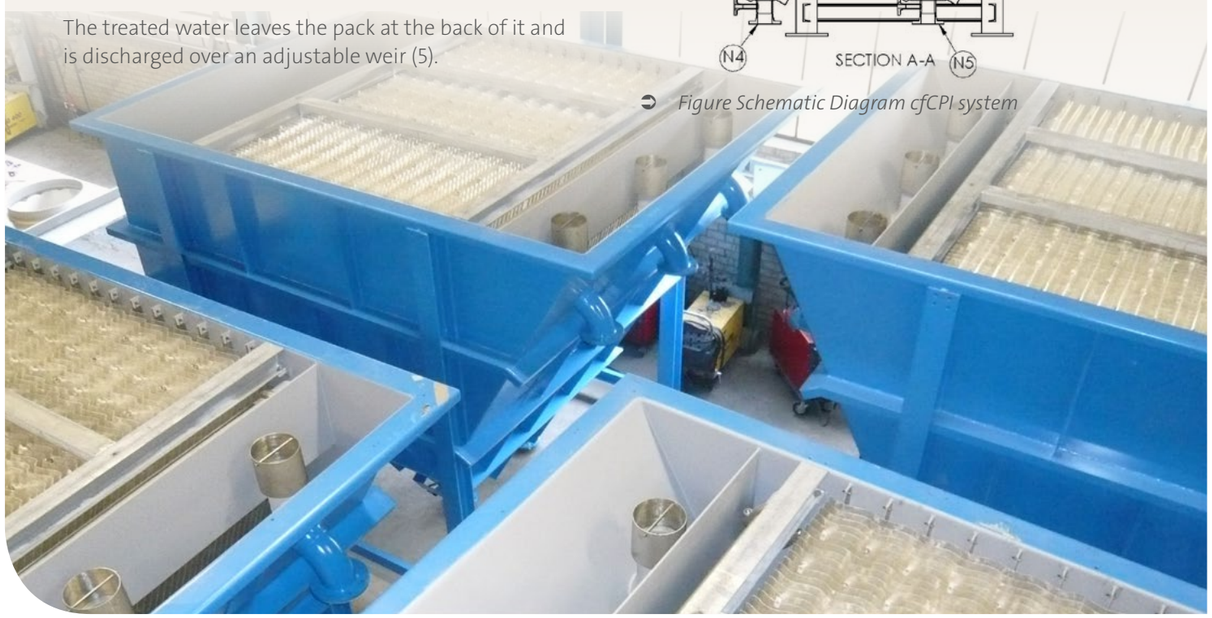


Figure Schematic Diagram cfCPI system



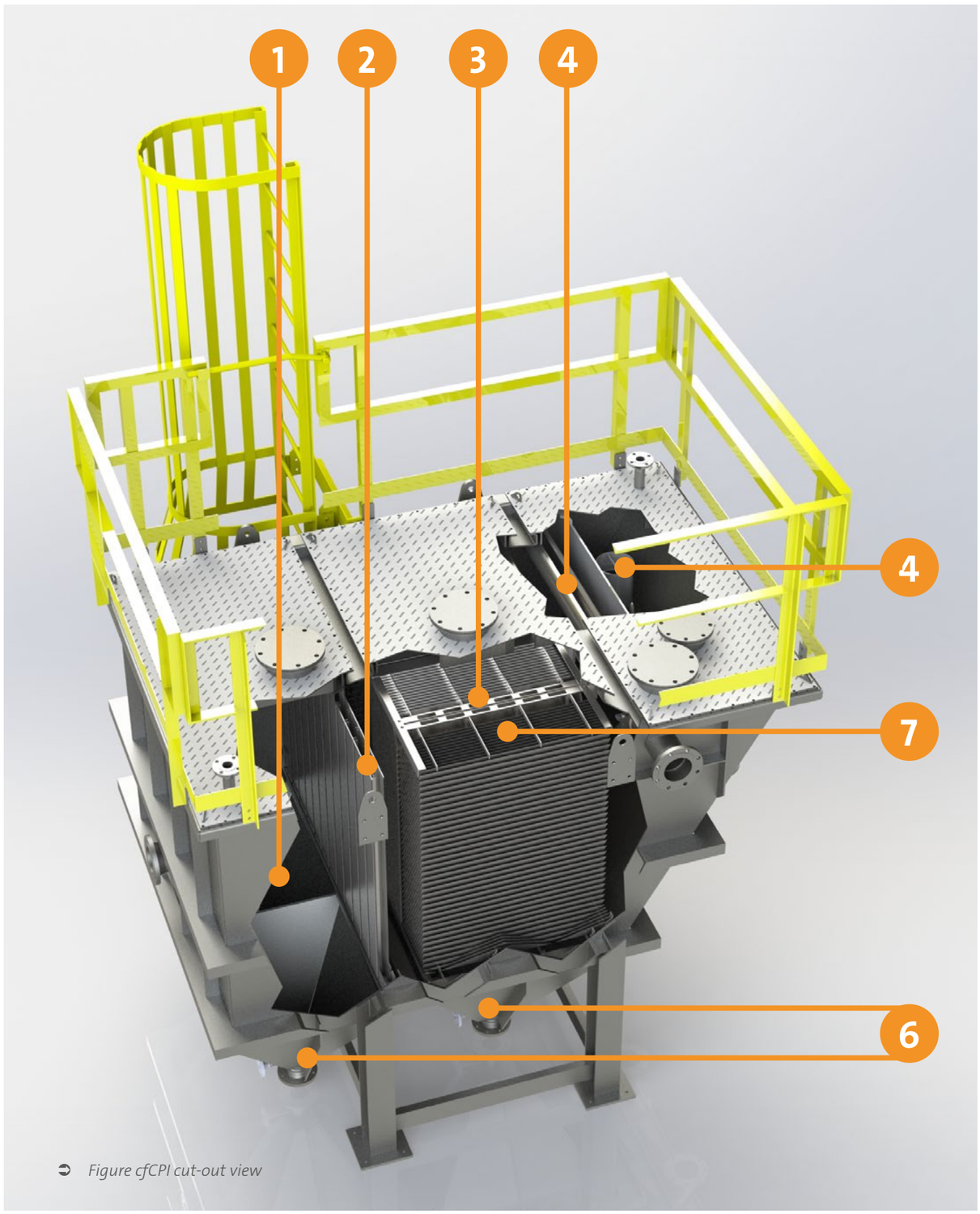
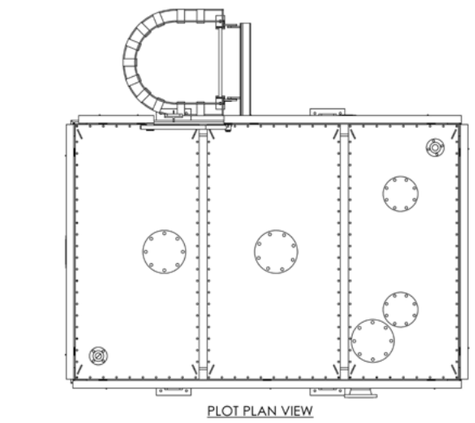


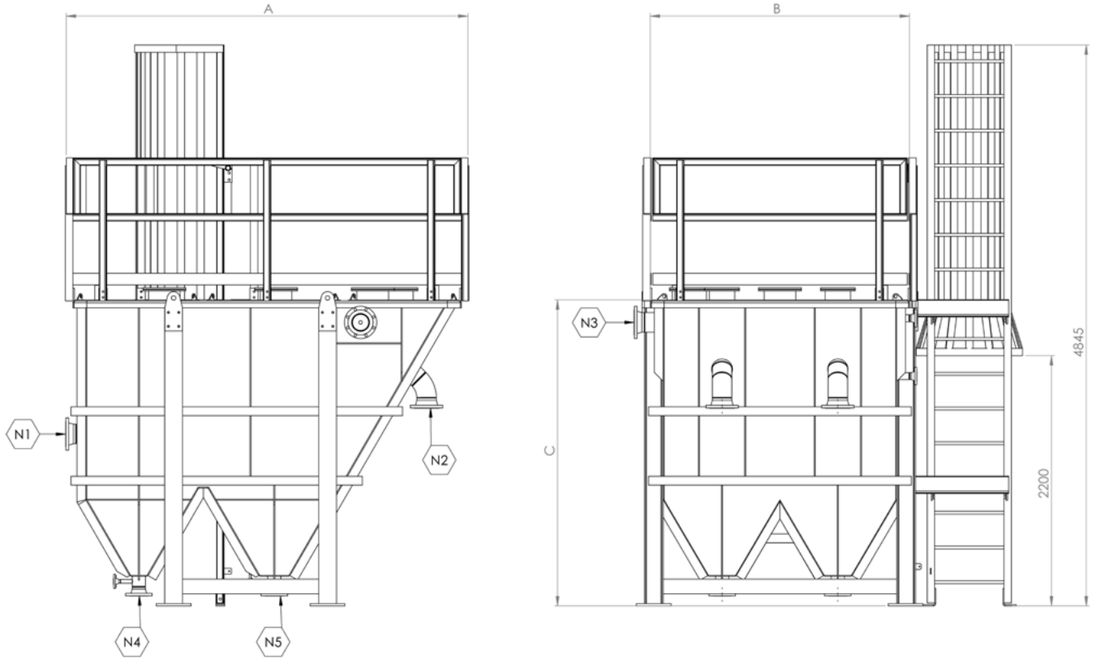
Figure cfCPI cut-out view

Datasheet of standard Cross Flow Interceptor

Basin Dimensions			Nozzles					Weight	Weight full
A	B	C	N1	N2	N3	N4	N5	kg	kg
2500	500	1675	4”	1*6”	3”	1*3”	1*3”	1,240	1,910
2500	1000	2100	6”	2*6”	4”	1*3”	2*3”	1,370	5,500
3115	2000	2630	10”	3*6”	6”	2*4”	2*4”	3,825	1,4125
4205	2000	3500	10”	3*6”	6”	2*4”	1*6”	3,850	20,940
4205	3000	3500	12”	3*8”	6”	3*4”	2*6”	6,500	31,500
4205	4000	3500	2*10"	3*8"	6"	3*4"	12"	13,500	54,000



PLOT PLAN VIEW



Design

Each effluent stream has its own individual characteristics; the impurities in the aqueous phase can occur either as a dispersion, an emulsion or a solution and the particle size distribution in a suspension differs from case to case. For this reason, specific process analyses and design calculations must be made for each case.

It is fundamentally impossible to separate dissolved or dispersed components from the aqueous phase by means of gravity only.

A physical-chemical pretreatment, might make this possible in some instances. Our brochures on tailor-made water treatment designs provide you with more detailed information on our various physico-chemical systems.

Material plate packs: GRP/Stainless Steel
Material basin: Carbon Steel coated, Stainless Steel

From single units to turnkey projects.

The cfCPI separator can be combined with several other separation systems to improve the quality of the effluent or process water to e.g. comply with the requirements set forth by the authorities or company prescriptions.

- screens removal of coarse material
- CPF/TPF separation of flocculated impurities by flotation and chemical pretreatment
- SBR batch wise operated bio reactor for the aerobic treatment of dissolved pollutants
- ACF/RSF activated carbon filters/rapid sand filters
- RO Reversed Osmosis units
- µF micro filtration units
- sludge de-watering/drying units.

For further detailed information please enquire at our office.

The Veolia Water TiPSS Technologies scope of work can be:

- turnkey deliveries
- recommendations
- design
- engineering
- erection
- installation, commissioning and start-up
- after sales service
- laboratory and field research
- pilot plants

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