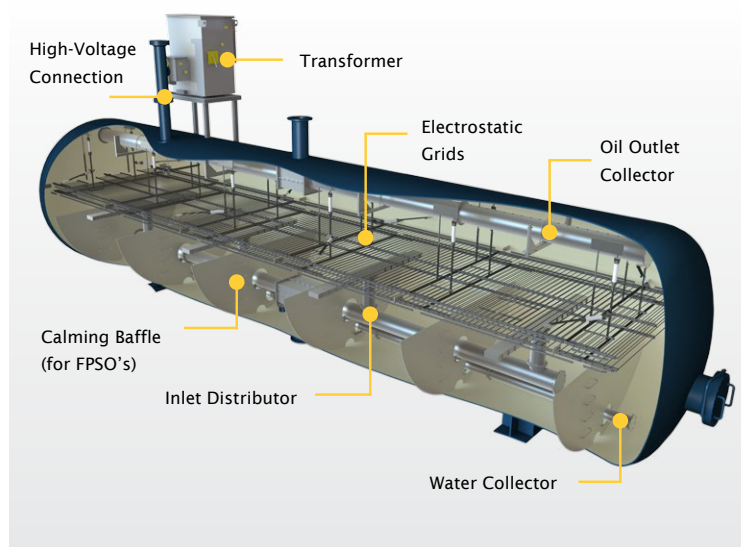


## Electrostatic Coalescers (Dehydrators / Desalters)



3D Model of Frames Electrostatic Coalescer

### Product Definition

Frames proprietary Electrostatic Coalescers are 2-phase separators that utilize an electrostatic field to remove water and salts from crude oil, allowing cost-effective transport and protect downstream processes.

### Process Description

Frames builds on its vast experience in coalescer engineering, enabling us to give our clients a competitive advantage when it comes to cleaning crude oil. By efficiently and effectively removing undesirable water and salts, our clients are able to increase the quality of their crude oil, cut their transport costs and protect their downstream processes and equipment.

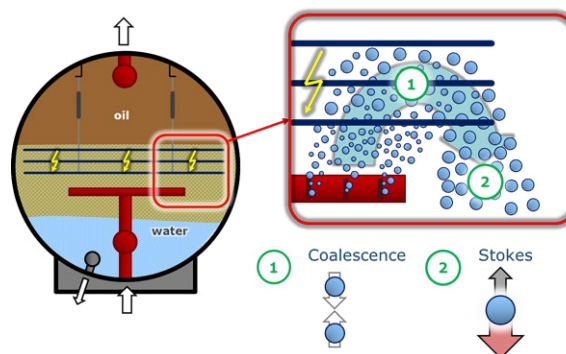
Removal of water and contaminants generally comprises two steps: dehydration and desalting. Frames Coalescers are designed for both steps, and are applied in upstream as well as downstream applications. In oilfields, the emphasis is generally on a combination of dehydration and desalting, whereas in refineries the focus is primarily on desalting.

#### Dehydration

In the process of removing water from oil, electrostatic treatment is typically preceded by 2-phase or 3-phase bulk separation in the upstream process. Electrostatic coalescers are applied as the final separation step to break up emulsions and reduce the remaining water fraction (dehydration). This is the reason why they are typically applied in upstream applications.

#### Desalting

Electrostatic coalescers are also applied for desalting in order to reduce the crude's salt content. Because salts are soluble in water, a reduction in water fraction will automatically reduce the crude's salt content. Desalting therefore often occurs in two stages: the first stage (dehydration) is followed by a second stage (desalting), where the salts are diluted by the addition of wash water between the first coalescer (dehydrator) and the second (desalter). The main aim of having a second stage in the system is to ensure a high dilution rate (ratio of wash water and water fraction in the crude). This dilution is necessary since dehydration alone is usually not sufficient to reach typical salinity values in the export crude (~10 - 100 PTB).



Working Principle of Coalescence (1) and Separation (2)  
Inside Electrostatic Coalescer

# Electrostatic Coalescers (Dehydrators / Desalters)

## Product Description

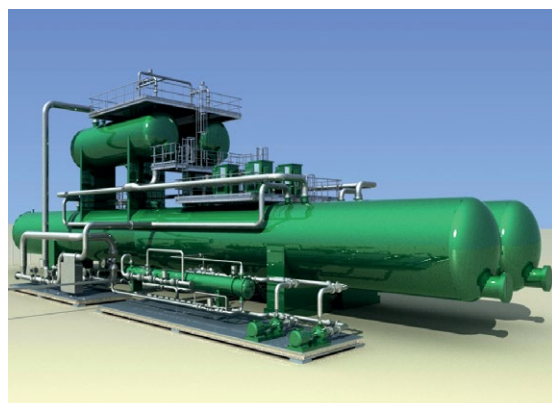
The Frames Inlet Distributor injects crude just below the electrostatic grids. Between the grids, the water droplets present in the crude are exposed to the electrostatic field that rearranges the (salt) ions within the droplets. Droplets will then attract each other and as a result coalesce, grow in size and fall out of the upward flowing crude. The treated crude is collected at the top of the vessel while the effluent water is collected at the bottom.

### AC-technology

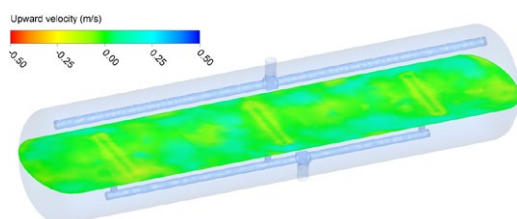
Frames Electrostatic Coalescers are designed using Alternating Current (AC). Although other types of power supply are available and promoted (DC, AC+DC), these are operationally demanding and bring significant draw-backs, for instance a tendency for arcing (short-circuiting) and electrical complexity. Because Frames values reliability and operational simplicity, we have embraced the AC technology at the core of our designs.

### Frames Inlet Distributor

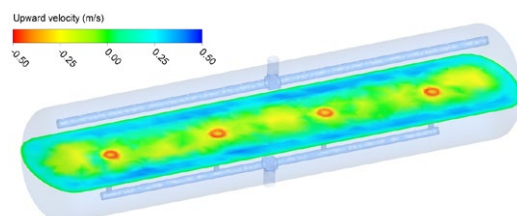
The unique Frames Inlet Distributor has been specifically designed to ensure optimal (uniform) distribution of the oil-water mixture just below the grid. This results in efficient use of the electrostatic area and allows the use of smaller vessels compared to the traditional distributors used in the industry. The number of headers and their design are specifically sized for each application using design rules developed by Frames. Under identical conditions the Frames Distributor shows a superior velocity distribution (uniform) than the traditional designs.



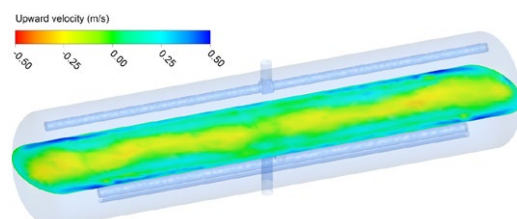
Frames Dehydrator & Desalter Package (Including Degassers)



Flow Distribution with Frames Distributor



Flow Distribution with Disc Distributor



Flow Distribution with Pipe Distributor



Frames Electrostatic Coalescers

# Electrostatic Coalescers (Dehydrators / Desalters)

## Project Management

At Frames, we know that precise project management is only the starting point for completing complex oil and gas projects. Our clients can rely on sharp thinking and a deep understanding of their operating conditions to find the best solution. Our quality management system focuses on a process of continuous improvement, and our team is always looking for new solutions that improve productivity, cut operating costs, and give our clients a competitive edge.

In a challenging industry, we understand that safety is a priority. We also know that in order to deliver maximum value to our clients we must complete each project on schedule, on spec and within budget. At Frames, our close-knit team of engineering experts is open, honest, and focused on delivering you the best possible solutions. We are passionate about the oil and gas industry, and have been a leading provider of safe, high-productivity systems for more than 30 years.

## Technical Details

- Efficiently removes water and salts from crude oil
- Optimizes crude oil quality and cuts transport costs
- Delivers clean oil ready for downstream processing
- Robust and reliable design
- Proven and cost-effective AC technology
- Operational simplicity through application of essential components only
- Optimum flow distribution with unique Frames Inlet Distributor

## Added Value Frames

- Engineered to match your unique crude oil composition and downstream processes
- Fully integrates into your production system for continuous, trouble-free operation
- Robust and reliable units designed with lean engineering methods, using high-end materials

## References (selection)

- Badra Oil Field - Gazprom Neft, Iraq
- Kandym Field, Lukoil Oil Company, Uzbekistan
- Khazzan Field - BP, Oman
- Shaybah CPF - Saudi Aramco, Saudi Arabia
- PB-Litoral-A - PEMEX, Mexico
- Kuito FPSO - Chevron, Angola
- Stones FPSO - Shell, USA
- Kraken FPSO - Enquest, United Kingdom
- Itaguaí FPSO - Petrobras, Brazil
- 'N Goma FPSO - SBM, Angola
- Block 15/06 FPSO - ENI, Angola
- Mangaratiba FPSO (MV-24) - Modec, Brazil
- Balnaves FPSO - Apache, Australia
- OSX-2 FPSO - OSX, Brazil

## Contact

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Frames Electrostatic Coalescer

# Frames Family Tree

