

B.01

Crude Oil Treatment

Electrostatic & Mechanical Treaters

Introduction

After primary oil/water separation, there is often a small amount of unwanted salts in residual water in the crude oil that needs to be reduced to a concentration around 5-10 PTB (Pounds per Thousand Barrels) salt.

This salt needs to be removed so that the crude oil can be processed in a refinery or stabilizer plant without fouling heaters and exchangers and other equipment. Crude Oil Desalting technology is utilised to remove residual salt to meet these requirements.

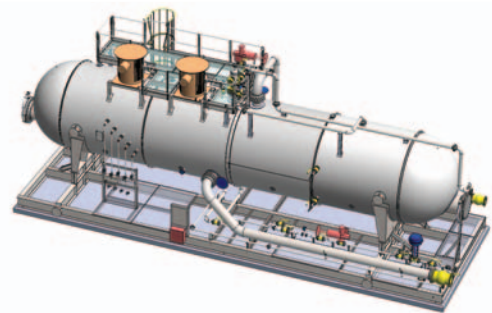
The type and size of the Desalter that is used is dependent on a number of fundamental factors such as pressure, temperature, fluid viscosity and flow-rate, as well as customer requirements relating to maximum salt allowed in the product oil stream.

SUEZ has developed a range of crude oil dewatering and desalting technologies to be applied in appropriate situations.

Description

SUEZ offers a range of technology options to cover most typical processing requirements related to Crude Oil Desalting:

- Free Water Knock Outs – Effective bulk water removal using horizontal vessels & mechanical coalescing packs to reduce water levels down to 2 - 5% BS&W (Basic Sediment & Water).
- Heater Treaters – Dehydration at elevated temperature using gas or oil fired burners and mechanical (to 0.5% BS&W) or electrical (to 0.2% BS&W) coalescing.
- Dehydrators – Dehydration and associated salt removal using high voltage electrical grids to achieve 0.1 – 0.2% BS&W.
- Electrostatic Desalters – Dilution water used to reduce salt content to 5-10 PTB.



Crude Oil Degasser (top), Crude Desalter Unit (middle) & Electrostatic Coalescer CAD model (bottom)
Location: India

SUEZ – Oil & gas systems
(incorporating Process Group)
Australia - Korea - Middle East - Singapore - USA

www.processgroupintl.com

Represented by:

Crude Oil Treatment Electrostatic & Mechanical Treaters



Mechanical Coalescers

SUEZ's liquid/liquid coalescing media is used in our Free Water Knock Out vessels and Heater Treaters as an economic and reliable way to dehydrate the oil to pipeline specification. Generally the self-cleaning type media is specified as this requires lower maintenance.

Crude Oil Heating

To dehydrate most crude oils (\leftarrow ~35°API) to water levels where they are acceptable to refineries, heating is needed. This has several benefits:

The oil density is reduced relative to the water density, providing better gravity separation,

The viscosity is reduced which reduces the flow resistance of water droplets falling through the oil layer, providing better gravity separation,

Heat improves coalescing and assists in breaking emulsions that would otherwise prevent separation to the required degree.

Heating is generally via a submerged fire-tube either in a separate or combined vessel.

Electrostatic Dehydration

The basic principle behind electrostatic dehydration is that an electrical field is used to excite droplets of brine within the bulk oil phase so that they collide with other droplets and coalesce into larger globules that separate under gravity.

Traditional Electrostatic Coalescers employ two horizontal grids connected to a high voltage AC supply, and the emulsion flows upwards through the grids. The water coalesces and flows downwards, whilst the clean oil leaves via the top of the vessel.

Distributors are used to ensure even 'plug' flow up the vessel and grids.

The 2 grid system is still widely used, however more modern and improved Low Salt Treaters are available in various other proven styles – 3 grids and 1, 2 or 3 phase power supplies, to achieve oil purity of 0.1% BS&W or better.

Desalting

More important than water content to a refiner is the salt content of the oil. Depending on the downstream process, a limit of between 1- 10 PTB of salt is usually specified which can require additional treatment beyond dehydration. This can be performed by a Desalter unit.

Clean dilution or wash water is injected into the crude oil feed to the Desalter through a mixing device to dilute the brine to a level where the target salt content can be achieved by the downstream Dehydration unit.

In difficult applications this wash water can be recovered and recycled in a 2 stage dehydration and desalting process.

Degassing

To ensure optimum performance the crude oil should be stabilised prior to the Electrostatic Treater. This can be done in the Electrostatic Treater, or in a separate vessel located upstream.

Mechanical Treaters

SUEZ also offers Mechanical Treaters with the following benefits and features:

- Effective design means minimal chemical treatment
- Sample points & emulsion drains fitted as standard
- Adjustable for load & voltage giving maximum flexibility
- Low maintenance – ideal for unmanned plants or facilities
- Excellent turn-down / turn-up performance
- Safe electrical design means no overloading; fewer trips