





Masnouat Felezi Sangin





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DESIGNER AND MANUFACTURER OF **MECHANICAL,PROCESS EQUIPMENT** AND **PROCESS SKID PACKAGES** FOR OIL, GAS, PETROCHEMICAL, POWER AND UTILITIES INDUSTRIES

## PREFACE

Masnouat Felezi Sangin (MFS) as a reliable, knowledge based designer and manufacturer of mechanical and process equipment has entered into the market of electrostatic desalters and dehydrators since 2006. Based on the market demand and with the aim of localizing design and fabrication of this vital process equipment in oil and gas industries, MFS added this new product into its product portfolio and nowadays MFS has the honor to serve its customers with the complete package of electrostatic desalters & dehydrators.

## DESALTERS

Crude oil from wells contain water that is saturated with inorganic salts such as NaCl, MgCl2, and CaCl2 and this salt water is found in emulsion form which is basically droplets of water dispersed throughout the crude oil. Removal of these salts is necessary to maintain product specifications which are necessary for efficient processing of the crude oil. This process also removes some suspended solid impurities such as silt and iron oxides (carried on the dispersed water globules). The process of desalting crude oil and condensate does not often receive attention, but is vital to the operation of the modern refinery. Desalters provide more protection to costly refinery equipment than any other single piece of process hardware. Therefore, an in-depth review of the desalting application prior to design, and choosing the right desalting technology, are major tasks in project engineering. With the assistance of our partners, we can offer different types of desalters, specifically AC/DC electrostatic desalters and dehydrators. Our desalters are used both for crude oil and condensate with a high profile of salt, sediments, and high operation pressure on offshore, onshore projects as well as FPSO to prevent high corrosion from salt in the system.

For decades, several methods and technologies were used to remove salt from oil, such as chemical treatment using demulsifies, gravitational treatment, and heat treatment. Each of these methods had several disadvantages, so designers developed electrostatic treating as the best possible solution.

The use of electrostatic fields to dehydrate oil became practical in 1917, with electrostatic precipitators. Electrostatic treaters utilizing AC fields have been used for crude oils, even as DC fields were recognized early on as being superior to AC fields. There were, however, concerns regarding galvanic corrosion with DC fields. Accordingly, DC fields were restricted to refined products with low conductivity. These treaters with AC technologies or DC treaters are typically known as the conventional methods.

The state-of-the-art technology that we offer:

- Single Volt; Two Grid
- Double Volt; Three sets of Two Grids
- 3:2 Phase; Two Sets of two Grids
- Tri Power Technology; Three Sets of three Grids technologies

Dual Polarity AC/DC technology is a newly developed process replacing conventional methods. It provides dispersing, mixing, coalescing and settling in a single vessel. MFS's innovative AC/DC electric dehydrating and desalting technology is based on AC electric dehydrating and desalting technology, the main feature of which is the suspension of a number of alternating positive and negative electrode plates along the tank axis direction in turn.

These lead positive and negative high voltages into the tank with the high voltage power of a half-wave rectifier. This allows the top of the vertical plate to form a DC strong electric field, and the bottom a DC weak field. The AC low electric field will form between the bottom of the vertical plates and the oil-water interface.





Our desalters are designed to remove, on average, 85% to 95% of in organic salts from the crude oil, bringing the water content of the desalted crude oil to approximately less than 0.2 volume percent. The electrodes we use consist of a low conductive and high conductive area, creating a better electrostatic field for coalescing water molecules. Our desalters are also equipped with load responsive controllers to prevent any short circuits.

#### DC most strong electric field DC more strong electric field AC weak electric field



MFS AC/DC electric dehydrating and desalting advanced technology including:

- **Mixing Valves** ٠
- High Voltage Bushings, Insulated Hangers
- **Control Panels**
- Transformers
- Electrodes •
- Sand Injecting ٠
- **Required Instrument** •

Our desalters' capacity ranges from 50,000 t/a year to 12,000,000 t/a year.

#### Applicable Design Codes:

API, ASME, IEC, NACE, TEMA



#### Design softwares:

In-house Calculation Software, Aspen, HYSY

## **AC-DC** ELECTROSTATIC DESALTING TECHNOLOGY

Compared to other electric desalting technology, AC-DC electrostatic desalting technology has four obvious advanced characters as following:

(1) The AC-DC electrostatic desalting technology includes not only a traditional AC electric field but also two DC strong electric fields. It has proved by practice and experiment that AC electric field is effective for big water droplets diameter over 30µm, while DC electric field has a preferable dehydrating effect for small water droplets diameter less than 30µm. The AC-DC electrostatic desalting technology is widely applied to get rid of the salt in crude oil because of its character of dehydrating deeply rate.

(2) The electric field of the AC-DC electrostatic desalting technology is designed according to the distribution of electric conductivity of the crude oil. It has better adaptability to all kinds of crude oil and keeps the AC-DC electrostatic desalter run smoothly. Even if some change of the oil properties occurs, the desalter can run normally and achieve the process specification.

(3) The AC-DC electrostatic desalting technology has more powerful demulsifying function. It has better adaptability to the crude oil with different water content from 1%~30%, especially for crude oil with different water content.

(4) The AC-DC electrostatic desalting technology, because of the usage of the principal impedance and capacitance, the electric fields are formed between the electrode while no circuit are formed, so the AC- DC electrostatic desalter can run with lower current and lower energy consumption.



Under the same operating conditions, the power consumption of the AC-DC electrostatic desalting technology is only about 60% that of the AC electric desalting technology. Our AC-DC electrostatic desalting technology can be applied to Gas condensate as well as crude oil.

# ELECTRO-STATIC DESALTERS

### ARRANGEMENT OF ELECTRODE OF AC-DC ELECTROSTATIC DESALTER



In general, we offer design and manufacturer of various types of Electrostatic Desalters in capacities of 20,000, 30,000 and 50,000 barrels per day:

- AC Electrostatic
- DC Treater
- AC/DC Dual Polarity Desalter

## **MFS ELECTROSTATIC DESALTERS**



MFS Electrostatic Desalters for South Pars Gas Field Development, Phase 14

Length: 15000 mm Diameter: 3200 mm

Thickness:68mm

Client: IPMI/ POGC

Certified by RW TÜV ISO 9001-2015 Certified by IHA ISO 3834-2<u>005</u>

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