

# NATCO ELECTRO-DYNAMIC DESALTER

Electrostatic desalting technology

## APPLICATION

Crude oil desalting

## ADVANTAGES

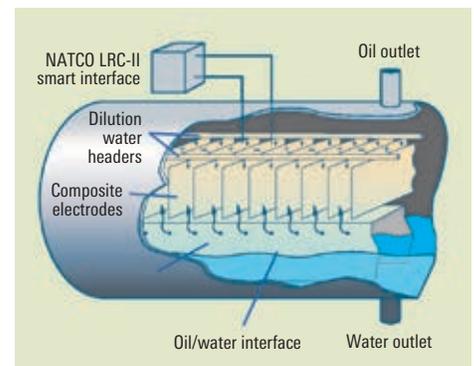
- Enhanced multistage mixing within a single desalter vessel that comprises
  - NATCO DUAL POLARITY\* electrostatic treater
  - NATCO\* LRC-II\* smart interface
  - Cocurrent and countercurrent washwater flow
  - Electrodynamic mixing
  - Composite electrodes
- Consistent outperformance compared with traditional AC technologies
- Management of a wide range of inlet water contents and accommodation of higher treating capacities at lower operating temperatures
- Composite electrodes that provide a higher unit capacity and increased dehydration performance
- Less voltage loss from arcing through variable voltage gradient that promotes water droplet coalescence
- Improved vessel hydraulics, enhanced performance, and higher treatment capacity while providing the ability to vary the interface location over a wider range
- Enhanced emulsion resolution through voltage modulation, enabling operation at optimal voltage for multiple crude feed stocks while handling upsets more rapidly and effectively
- Overhead washwater injection for interaction of low-salinity washwater with the cleanest crude for an additional crude washing stage
- Unique low-reactance power unit that provides better power utilization with mixing voltages up to 60 kV



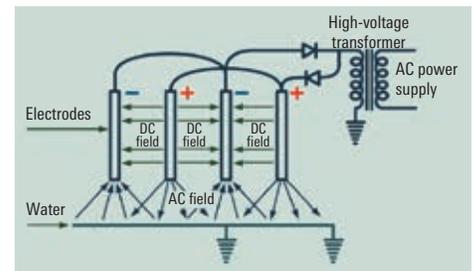
*NATCO ELECTRO-DYNAMIC DESALTER technology in refinery in Japan.*

The NATCO ELECTRO-DYNAMIC DESALTER\* electrostatic desalting technology provides multiple phases of electrostatic mixing, coalescing, and settling in a single vessel, delivering nearly 100% salt and dehydration efficiency. The technology provides two-staged desalting efficiency without the excessive capital investments or space requirements common to conventional systems.

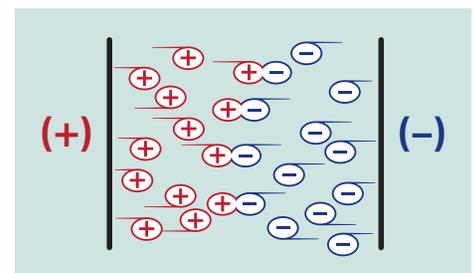
Comprising five proven Schlumberger process technologies, the NATCO ELECTRO-DYNAMIC DESALTER technology provides the refining industry with one of the first electrostatic desalting innovations in more than a decade.



*Composite electrode configuration.*



*Electrostatic fields.*



*High-voltage gradient dispersion.*

# NATCO ELECTRO-DYNAMIC DESALTER

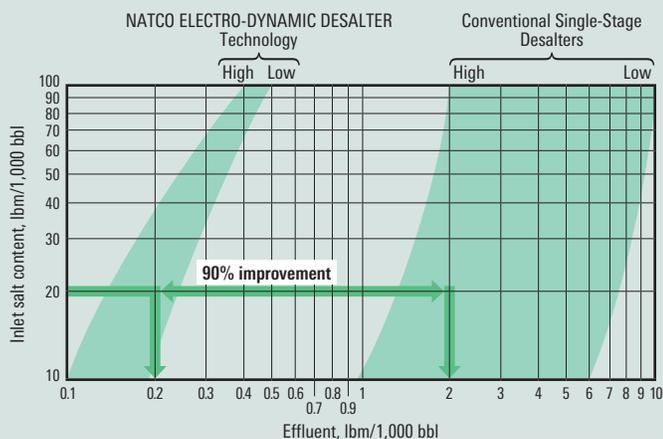
## Five steps to successful desalting

1. NATCO DUAL POLARITY electrostatic treaters—applies a high-gradient, sustained DC field between pairs of electrodes while maintaining an AC field between the electrodes and oil/water interface
  - **Results:** significant improvements compared with AC dehydration
2. Composite electrodes—obtains a progressive electrical field
  - **Results:** coalescence of the smallest of water droplets while eliminating sustained arcing due to highly conductive emulsions
3. LRC-II smart interface—regulates the flow of electrical current and provides self-adjusting electrical power levels for optimized electrostatic coalescence
  - **Results:** optimal salt removal over a wide range of feed stock materials
4. Countercurrent dilution water process—increases contact between dilution water, produced water, and particulate
  - **Results:** improved crude desalting using less washwater
5. Electrodynamic mixing process—provides multistage contact
  - **Results:** near-100% mixing efficiencies while enabling reduced demulsifier chemical consumption

## Increase operating efficiency while reducing operational expenses

Under a variety of conditions, the NATCO ELECTRO-DYNAMIC DESALTER technology can

- retrofit your single-stage system to two-stage performance
- increase the levels of salt removal over any other single-vessel process
- double the salt removal capacity of two-stage systems
- reduce initial capital costs for new installations
- allow higher inlet water cuts during upset conditions while maintaining specified effluent requirements
- improve effluent water quality
- improve operational flexibility by handling a wide range of feedstocks
- decrease chemical consumption
- improve mixing efficiency
- reduce washwater requirements
- require less space
- provide improved dehydration capabilities.

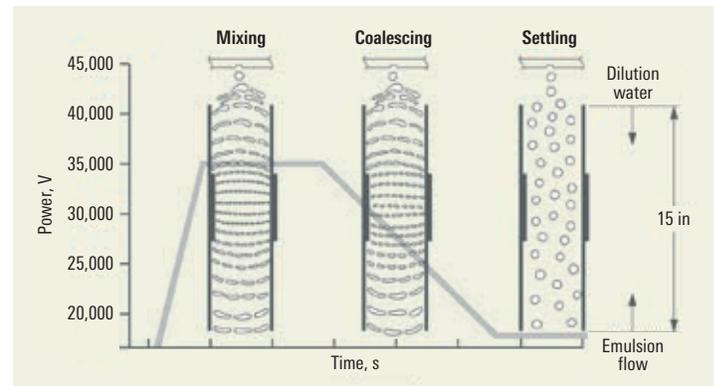


**Example:** Expected improvement in operations

**Conditions:** 20 lbm/1,000 bbl salt inlet in 0.1% water in 40-API oil

**Results:** 90% improvement in salt removal

*Theoretical NATCO Electro-Dynamic Desalter technology performance.*



*In this example, flow rate is 100 bbl/d/ft<sup>2</sup> with a crude rise rate of 0.08 in/s. The NATCO ELECTRO-DYNAMIC DESALTER technology would retain crude oil within the grid section for 188 s and provide 9 extraction cycles of mixing, coalescing, and settling at a rate of 21 s/cycle. The mixing phase shown is at 35,000 V. The coalescence phase is shown as the degrading field responds to the voltage reduction. The settling phase is shown with the power at 16,000 V.*

[slb.com/oil-treatment](http://slb.com/oil-treatment)

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