NATCO Dual Frequency Electrostatics

Dual Frequency Electrostatic Technology provides process improvements approaching 100% over traditional technology.

The patented NATCO® Dual Frequency® electrostatic technology utilizes a proprietary process controller, Load Responsive Controller (LRC-II®), and three-phase power unit to produce a customized electrostatic field that can be readily optimized for any crude oil. The technology provides process improvements approaching 100% over existing mainstream electrostatic technology.

Since 1971 the NATCO Dual Polarity® electrostatic technology has been used to dehydrate and desalt the world’s crude oil. Now, the patented NATCO Dual Frequency technology continues Cameron’s legacy of leadership in electrostatic technology.

Three primary components are packaged in a single oil-filled enclosure. First is the power electronics designed to operate on three-phase, 480 volt (50/60 Hz) to produce a variable amplitude and variable frequency voltage supply. For many field installations, this is a key feature of the technology, as it enables an optimization of the voltage profile. Second, the medium frequency transformer provides for the increased secondary voltage known to promote effective coalescence. Third, the secondary voltage is rectified so that polarized voltages can be applied to the electrodes to create the benefits of both AC and DC fields within the treater. These benefits have been proven in over 30 years of field experience with our NATCO Dual Polarity technology.

### BENEFITS OF DUAL FREQUENCY ELECTROSTATICS

1. Increased oil flow rate through an existing vessel
2. Lower outlet BS&W
3. Reduced deck space and vessel footprint at an equivalent outlet BS&W
4. Lower operating costs
   - Enables reduction in chemicals consumption
   - Allows for lower operating temperature
5. Balanced three-phase transformer
6. Cleaner effluent water, less floc

### Typical Size Reduction with NATCO Dual Frequency

- **Dual Frequency**: 10’ x 45’
- **Dual Polarity Technology**: 12’ x 60’
- **Traditional A/C Technology**: 14’ x 65’

### DUAL FREQUENCY RESULTS

Example:
- 65,000 BOPD
- 27º API Crude
- Inlet - 8% BS&W
- Outlet - 0.5% BS&W
As with NATCO Dual Polarity, a DC field is created between the electrodes in the NATCO Dual Frequency coalescer, enabling droplet motion and efficient coalescence. Simultaneously, an AC field is created between the electrodes and the ground, enabling maximum droplet excitation, contact and droplet growth.

Traditional electrostatic technologies in wet crude oil service typically exhibit rapid voltage decay or arcing. This decay reduces the effectiveness of the dehydration process by pulling the voltage lower than that required for effective dehydration.

By operating with an increased frequency, the NATCO Dual Frequency controller reduces this voltage decay and enables effective dehydration. Utilizing a medium frequency power unit overcomes the voltage decay associated with conventional 50/60 Hz transformers.

Treatment chemicals, temperature and the specific oil-water properties of the oil all combine to create a unique emulsion that often can be very difficult to resolve.

To break the emulsion, the patented NATCO Dual Frequency system utilizes a microprocessor-based system (consisting of a NATCO panel PC and LRC-II controller) that defines the pattern and magnitude of the voltages that are applied to the electrodes. The proprietary LRC-II controller allows selection of the shape and magnitude of the voltage waveform to achieve the coalescing “sweet spot” for that crude leading to effective and rapid droplet coalescence.