



CEC[®]

Compact Electrostatic Coalescer

Dramatically increases performance of an existing separator

The CEC[®] is a compact unit which can be placed upstream of a separation vessel to improve water removal efficiency. The unit typically increases the water droplet size distribution by 5-10 times which provides a significant performance increase of the downstream separator. The incoming flow is subjected to an electrostatic field when passing through an electrode cartridge. The droplet growth is resulting from the combination of two processes: The increased water droplet collision frequency resulting from the turbulent flow regime inside the CEC, and instant coalescence of these droplets when colliding because of the presence of electrostatic attraction forces. The high voltage electrodes are coated with an insulating material, making the CEC tolerant to high water content. This allows for reliable operation even with uncertain or varying inlet conditions.

Benefits:

- Enabler for increased production, reduced heating costs, and reduced footprint of liquid/liquid separators
- High water tolerance due to electrically insulated electrodes
- Short-circuit proof power supply with automatic stepless load control
- Low power consumption (3-7 kVA under normal operation)

Design specifications

Parameter	Value
Power unit specifications	17.5 kVA, 10 kV dry type, input 50/60 Hz, 440, 600, 665/690 single phase
Power unit certification	CSA, CE marked, designed according to DNV-OS-D201/202 and IEC EMC 61000-4/60945.IP54
Communication	PLC, Ethernet TCP/IP
Power entry certification	ATEX and IEC Ex 60079 (Ex eb T3 IIC Gb IP 66)
Operating pressure	< 150 barg (often much lower)
Operating temperature	< 140°C
Inlet water cut	0 – 100% (requires oil continuous flow to be effective)
Inlet gas volume fraction	0 – 10%. Adding degassing functionality can provide much higher gas tolerance



Ask us about available testing facilities to demonstrate the technology for your oil



Operation

The Compact Electrostatic Coalescer consists of an electrode cartridge of several cylindrical electrodes, alternating between energized and grounded electrodes. The turbulent flow regime, in combination with the high intensity AC field, result in rapid coalescence of water droplets.

The CEC can be placed upstream a separator receiving an oil dominated inlet stream. This makes it ideal in the final stages of oil treatment, such as upstream of a conventional electrostatic treater, an oil treater, or the oil storage tank.

The CEC power supply uses a patented magnetically controlled inductor to control the voltage delivered to the CEC. The power control concept avoids common challenges of operating electrostatic coalescers with both high and low water content. The voltage is easily controlled to suit whatever conditions the CEC is subjected to. The technology was originally developed for subsea use to offer voltage boosting for long distance step-outs and is a robust design with inherent short-circuit protection without any active components in the main power circuit.

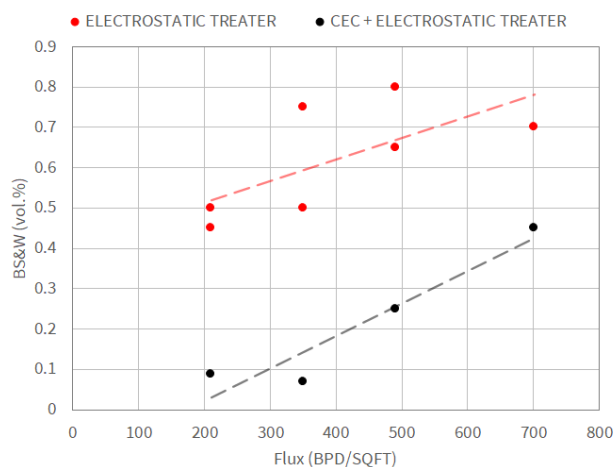


Figure: The CEC improves the efficiency of a downstream electrostatic treater, allowing for increasing production while maintaining oil quality

Applications and business case:

The CEC technology has the potential to offer considerable savings in CAPEX or OPEX depending on how it is applied. We summarize some typical business cases below.

Capacity or performance increase of existing separators

- Separators may be challenged by increased water production, tie-in of new wells, or relocation of FPSO.
- Inclusion of a CEC results in better oil quality in the final stages of the oil treatment trains.

Emulsion breaking

- Emulsion build up within separator vessels can result in severe operational problems and leave large separator volumes unused.
- The CEC provides a strong attractive force between water droplets, and can break emulsions which would normally be considered stable in a gravity separator, thus resulting in a significant performance boost.

Installation without entering the vessel

- The CEC is installed upstream an existing vessel, and thus does not require access to the vessel in need of improved performance.
- This reduces the required installation time, which can result in a lower overall cost of installation.

Dehydration applications

- Combining the CEC upstream an electrostatic treater yields better efficiency of the treater.
- Installation downstream the final oil treatment stage can result in improved water removal in the downstream storage tank, resulting in exported oil meeting specifications, even if produced oil is off-spec.