

**Elessent™**  
BELCO® TECHNOLOGIES

## BELCO® WET SCRUBBING SYSTEMS



### **SO<sub>x</sub>, NO<sub>x</sub> AND PARTICULATE REDUCTION IN A SINGLE UPFLOW TOWER**

#### **Reliably control FCCU emissions with these features:**

- Supports 4-7 year fluid catalytic cracking unit (FCCU) operating campaigns with continuous uninterrupted emissions control
- Easily handles FCCU process upset
- Allow refiners to concentrate on production and not on emissions compliance
- Over 150 units in operation on FCCUs
- Configurations for sodium-based, magnesium-based, seawater and other scrubbing reagents
- Additional applications in refinery:
  - Crude distillation unit heaters
  - Fired process heaters
  - Power boilers (pet-coke and other fuels)
  - Fluid cokers

# BELCO® WET SCRUBBING SYSTEMS



*BELCO® wet scrubbing operates on the principles of saturation, absorption, condensation and filtration. Specialized vessels and spray nozzles are used to control a variety of pollutants. The system is configured specifically for the requirements of each application.*

## **BELCO® WET SCRUBBING TECHNOLOGIES BRING WELL-PROVEN REFINERY PERFORMANCE**

Longer operating campaigns and reduced regulatory tolerance for emissions excursions mean today's petroleum refining processes demand more than traditional emissions control technologies can deliver. BELCO® wet scrubbing technologies bring well-proven refinery performance to every application.

In widespread use for controlling fluid catalytic cracking unit (FCCU) emissions, BELCO® wet scrubbing systems operate without outage requirements or emissions excursions during multiple-year operating campaigns. BELCO® wet scrubbing systems are in use worldwide controlling flue gas emissions from FCCUs, refinery incinerators, fired heaters and boilers and fluid cokers.

Wet scrubbing uses liquid contact with flue gas to remove acid gases, particulate and other pollutants. Proprietary technologies and the level of performance achieved set BELCO® wet scrubbing apart from the competition. Proprietary spray nozzles and low gas pressure drop vessels use size-controlled liquid droplets for effective gas contact. wet scrubbing processes generate fine mist as the liquid contacts the gas. Simple cyclonic separation with cyclolabs easily removes any excess water from the gas. Vessels, nozzles and droplet separators are open and extremely durable, supporting continuous operation for multiple years without outages for service work. BELCO® wet scrubbing provides what traditional wet scrubbers on FCCU and other refinery applications just cannot deliver.



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## CYCLOLABS DROPLET SEPARATOR

Cyclonic separation removes any water droplet carryover in a set of parallel flow separators. Static vanes spin the gas, forcing droplets to collect on the wall and drain from the system. Cleaned, droplet-free gas is discharged from the system.

## FILTERING MODULES

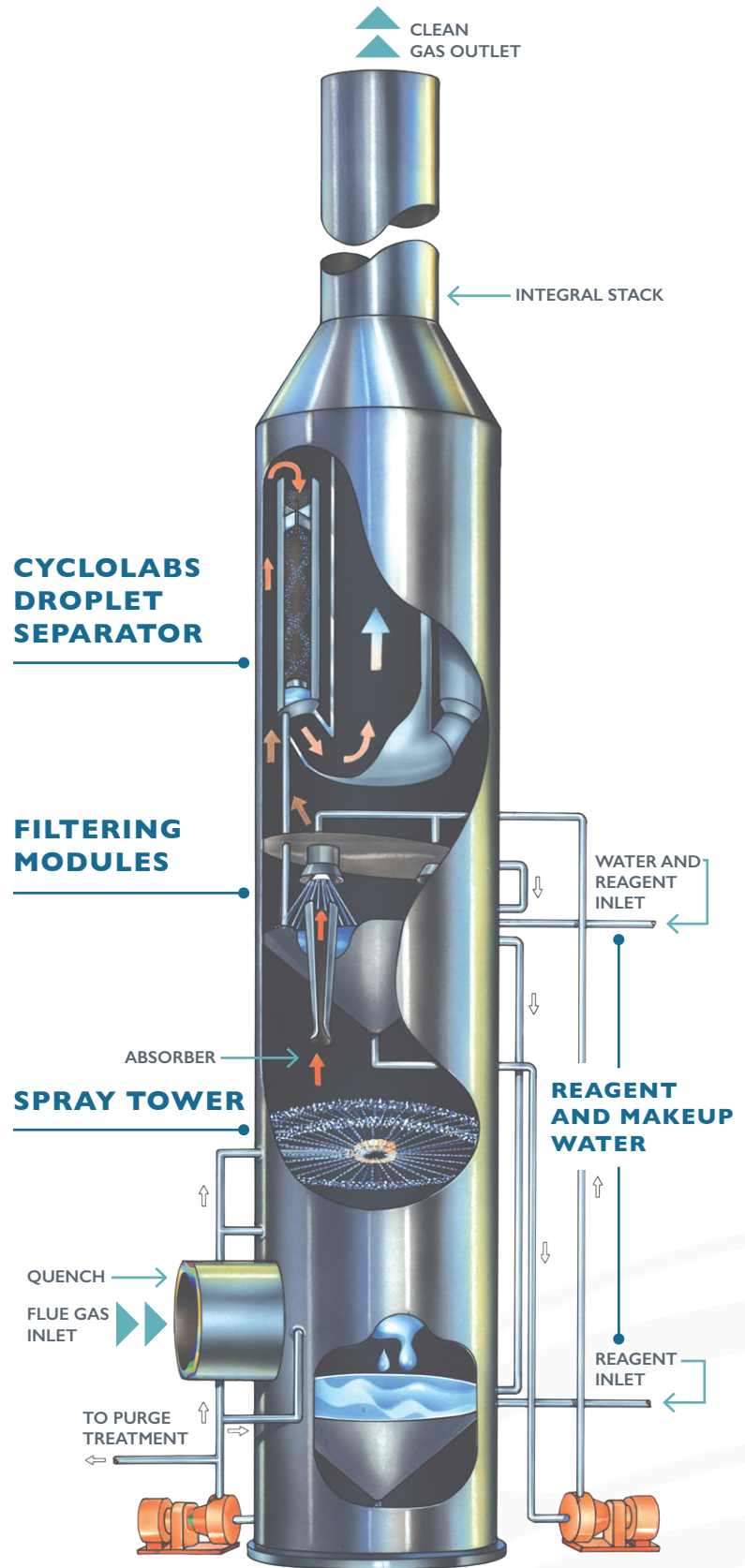
Within a set of parallel modules, a particulate growth process and water spray filtration remove fine particle and mist. Saturated gas is accelerated and then expanded adiabatically, forcing condensation of water vapor. Fine particulate in the gas acts as nuclei for the condensing water. The particulate increases significantly in size and mass. Agglomeration during expansion brings about additional particulate growth. An intense sprayed water curtain collects the enlarged particulate at the outlet of each module. Condensation uniformly washes surfaces. Captured particulate and water drain to a recycle tank. Specialized spray nozzles used in each module operate for years without plugging or wear problems.

## SPRAY TOWER (ABSORBER AND QUENCH)

Hot, dirty gas enters the system. A series of intense water spray curtains in the quench and absorber provide effective saturation, large particulate removal and acid gas absorption. Each spray level removes more and more pollutants in a staged approach, while providing sufficient liquid-to-gas contact capacity to handle upset conditions. Surfaces are uniformly washed, avoiding buildups as water drains to an integral recycle tank. Captured pollutants are discharged as a concentrated purge stream for treatment. Specialized spray nozzles in the tower operate for years without plugging or wear problems.

## REAGENT AND PURGE TREATMENT SYSTEMS

Various neutralization reagents (caustic soda, soda ash, magnesium hydroxide, etc.), as well as the regenerative process, are available for acid gas control. Reagent preparation and purged scrubber water treatment are provided to meet the application requirements. BELCO® wet scrubbing systems can also be configured for control of NOx and other emissions.



# BELCO® WET SCRUBBING SYSTEMS

**BELCO® TECHNOLOGIES OFFERS A COMPLETE RANGE OF GAS CLEANING TECHNOLOGIES FOR TODAY'S REFINERY APPLICATIONS AND INDUSTRIAL PROCESSES.**

## **Our technologies Include:**

- BELCO® wet scrubbing systems
- System configurations for sodium-based, magnesium-based, seawater and other scrubbing reagents
- LoTOx™ process for NO<sub>x</sub> reduction
- Shell third stage separator (TSS) systems for FCCU



Let us tell you more about our BELCO® wet scrubbing systems and our complete gas cleaning capabilities.

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