

LoTOx™ PROCESS FOR NO_x CONTROL WITH BELCO® EDV® WET SCRUBBING IN A SINGLE UPFLOW TOWER

- REDUCE NO_x EMISSION IN SAME SCRUBBER THAT REMOVES SO_x AND PARTICULATE EMISSIONS
- SIMPLE OZONE OXIDIZATION PROCESS CONVERTS NO_x TO SOLUBLE COMPOUNDS THAT ARE EASILY REMOVED WITH WET SCRUBBING
- NONE OF THE LIMITATIONS OR PROBLEMS COMMON WITH SCR BASED SYSTEMS
- PROVEN OPERATION AND RELIABILITY ON DEMANDING REFINERY FCCU APPLICATIONS
- OVER 50 SITES HAVE SELECTED USE OF THE LoTOx™ PROCESS
- CONFIGURATIONS AVAILABLE FOR USE WITH OTHER WET SCRUBBING TECHNOLOGIES

OZONE INJECTION WITH LoTOx™ PROCESS



**DuPont
Clean Technologies**
Belco Technologies Corporation

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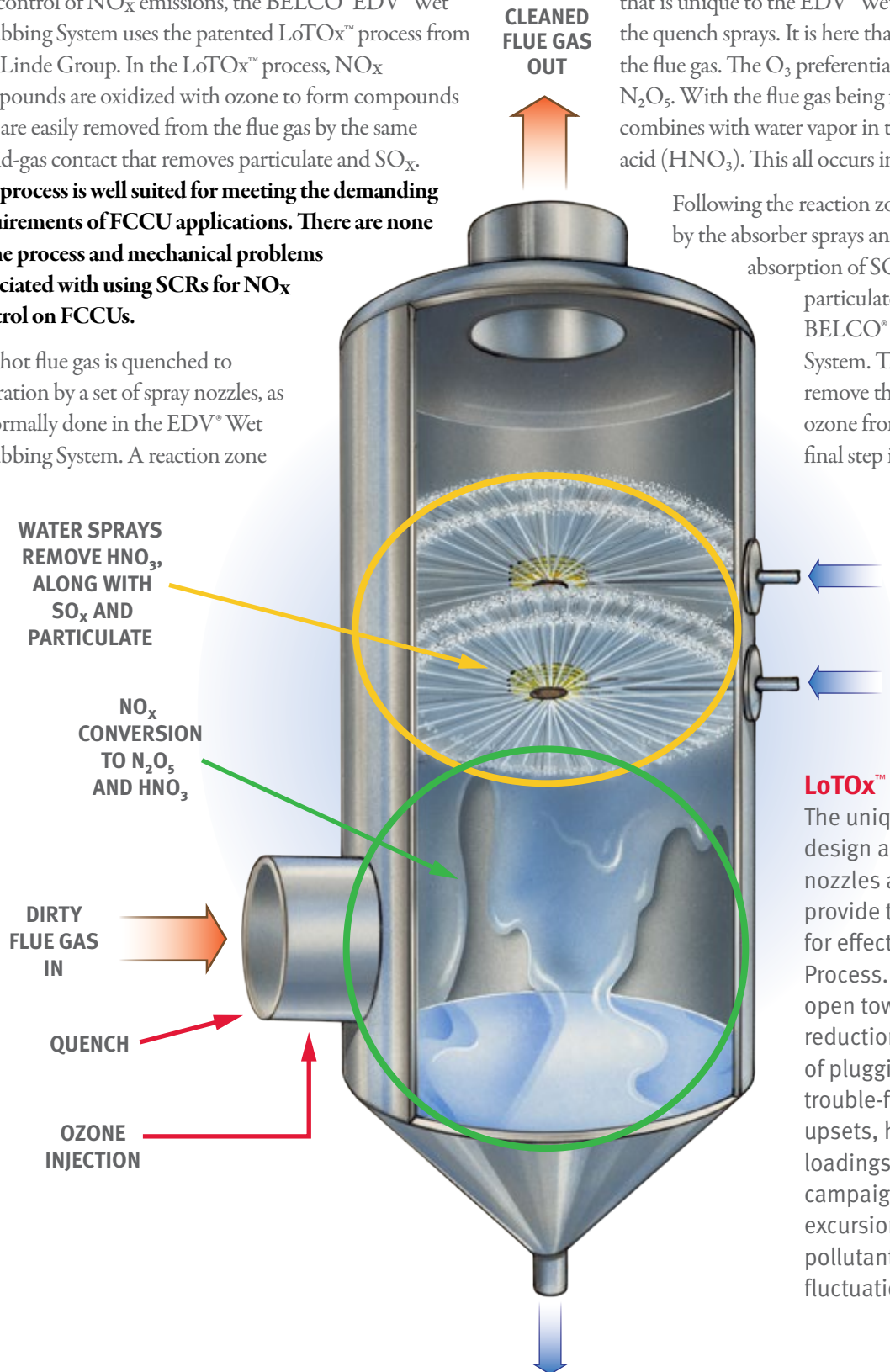
For control of NO_x emissions, the BELCO® EDV® Wet Scrubbing System uses the patented LoTOx™ process from The Linde Group. In the LoTOx™ process, NO_x compounds are oxidized with ozone to form compounds that are easily removed from the flue gas by the same liquid-gas contact that removes particulate and SO_x.

The process is well suited for meeting the demanding requirements of FCCU applications. There are none of the process and mechanical problems associated with using SCRs for NO_x control on FCCUs.

The hot flue gas is quenched to saturation by a set of spray nozzles, as is normally done in the EDV® Wet Scrubbing System. A reaction zone

that is unique to the EDV® Wet Scrubbing System follows the quench sprays. It is here that ozone (O₃) is injected into the flue gas. The O₃ preferentially oxidizes the NO_x to N₂O₅. With the flue gas being fully saturated, the N₂O₅ combines with water vapor in the flue gas to form nitric acid (HNO₃). This all occurs in the reaction zone.

Following the reaction zone the flue gas is scrubbed by the absorber sprays and filtering modules for absorption of SO₂ and removal of particulate, as is normally done in the BELCO® EDV® Wet Scrubbing System. These absorber sprays also remove the nitric acid and unreacted ozone from the flue gas to provide the final step in the NO_x control process.

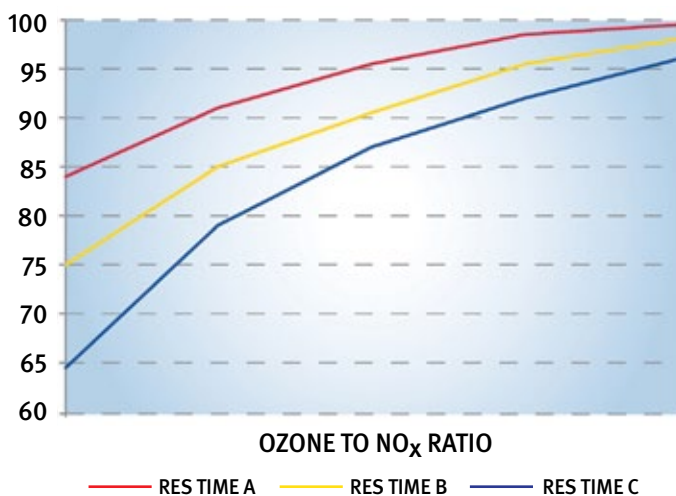


LoTOx™ PROCESS

The unique BELCO® spray tower design and specialized spray nozzles are well suited to provide the proper conditions for effective use of the LoTOx™ Process. Droplet-free zone and open tower design provide high reduction efficiency without risk of plugging. Designed for trouble-free handling of process upsets, high particulate loadings, long operating campaigns, temperature excursions, boiler bypass and pollutant inlet loading fluctuations.

SIMPLE, EFFECTIVE AND HIGHLY RELIABLE NO_x CONTROL

LoTox™ PROCESS FLEXIBILITY

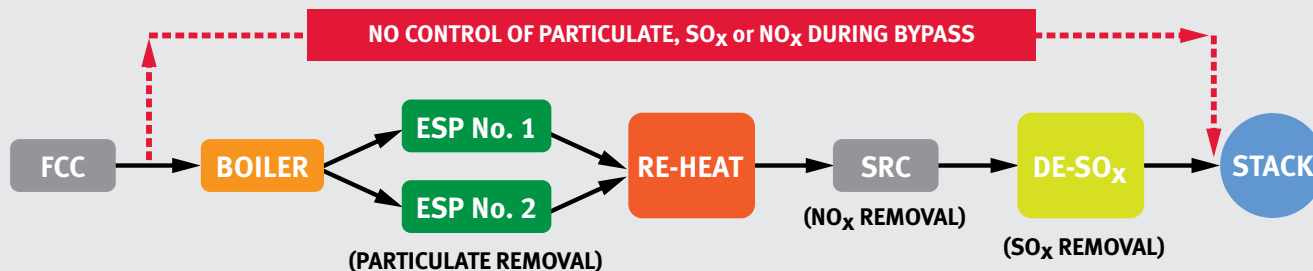


ACHIEVING REGULATORY COMPLIANCE FOR NO_x, SO_x AND PARTICULATES EMISSIONS ON A CONTINUOUS BASIS HAS NEVER BEEN SO SIMPLE.

LoTox™ PROCESS ADVANTAGE

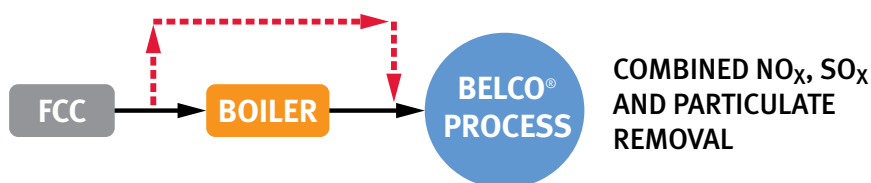
- No bypass required
- Very high reduction of NO_x, SO_x and particulate all in one vessel
- Able to achieve the most stringent reduction requirements
- Highly reliable multi-year continuous operation
- No in-line constrictions or catalyst modules
- Open vessel design for trouble free operation
- No potential for plugging
- Automatic control of outlet NO_x level by selecting a desired NO_x outlet value
- Not affected by temperature variations (high or low)
- Maintains constant NO_x outlet level even through NO_x fluctuations at inlet
- No ammonia slip concerns
- Not subject to poisoning or sintering of catalyst surface due to temperature excursions
- No concerns of SO₂ oxidation to SO₃

TRADITIONAL LONG TRAIN APPROACH TO POLLUTION CONTROL



BELCO MULTI-POLLUTANT APPROACH USING A SINGLE UPFLOW EDV® SCRUBBER WITH LoTox™ PROCESS

ALL POLLUTANTS CONTROLLED EVEN DURING BOILER BYPASS



- LESS SPACE REQUIRED
- LOWER COST
- HIGHER FLEXIBILITY
- HIGHER RELIABILITY
- FULL CONTROL DURING BOILER BYPASS
- CAN CHANGE WITH YOUR REQUIREMENTS

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



OUR TECHNOLOGIES INCLUDE:

- EDV® WET SCRUBBING SYSTEMS
- SYSTEM CONFIGURATIONS FOR SODIUM BASED, MAGNESIUM BASED, SEAWATER, REGENERATIVE AND OTHER SCRUBBING REAGENTS
- LoTOx™ PROCESS FOR NO_x REDUCTION
- SHELL THIRD STAGE SEPARATOR (TSS) SYSTEMS FOR FCCU
- DUPONT™ MARINE SCRUBBERS FOR SHIP ENGINES AND BOILER EXHAUST



Let us tell you more about our EDV® Wet Scrubbing Systems using the LoTOx™ Process and our complete gas cleaning capabilities.

WORLDWIDE SALES AND SUPPORT

For more information, please contact:

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