

RETROFIT PLAN 4

LIQUID CAUSTIC SCRUBBERS



CHANGE FROM

WET → DRY

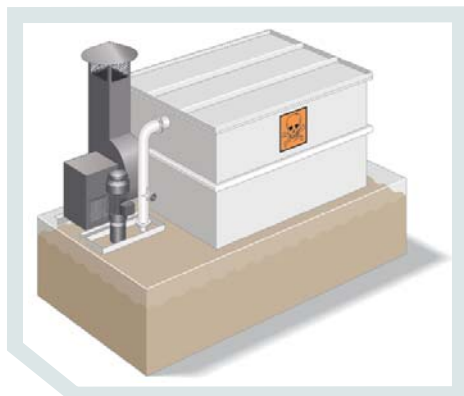
ABOUT LIQUID CAUSTIC SCRUBBERS

Wet scrubber systems are a "once-through" scrubbing system using a liquid caustic solution to remove chlorine gas (Cl_2). The reaction chamber is located on the top of the caustic storage tank, which is an integral part of the system. The recirculation pump drains caustic solution, e.g. sodium hydroxide (NaOH), from the bottom of the caustic storage tank and circulates it through the reaction chamber. The reaction chamber has several chemical spray nozzles that distribute the caustic solution over the tower packing media. The chlorine gases pass through the reaction chamber and are abated by reacting with the caustic solution.

THE PROBLEM

The liquid caustic material in the wet scrubber system is usually comprised of NaOH and is highly hazardous. Wet scrubbers are maintenance-intensive and require yearly repairs to replace pumps, nozzles and valves. The hazardous liquid caustic is extremely corrosive and can deteriorate pumps and fiberglass. In addition, the liquid caustic reacts with CO_2 to form Na_2CO_3 which can clog nozzles and valves. Replacement of the liquid caustic material is normally required at a minimum of every three years to maintain the correct level of potency and effectiveness for successful chlorine removal.

Persons performing maintenance to liquid caustic scrubbers are required to have specialty training and to use specialty equipment. Often, this training and



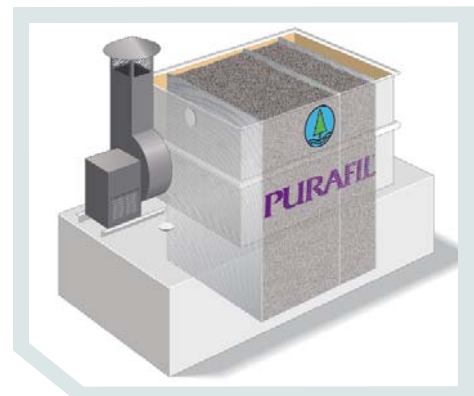
STANDARD HORIZONTAL WET SCRUBBER

equipment can be costly which increases the overall maintenance expenses of a liquid caustic wet scrubber.

PURAFIL PROVIDES THE SOLUTION

Purafil ESD dry-chemical Emergency Gas Scrubbers are a "once-through" system in which air is passed through at least a 6 foot media bed of chlorine removing pellets of 1/8" in size. Chlorine gas (Cl_2) is absorbed onto the media and chemically reacts to form a harmless salt. Purafil ESD media is non-toxic, non-hazardous and land-fill-disposable before and after use.

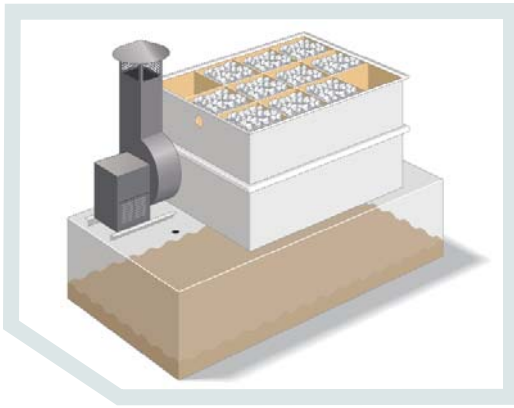
Purafil's state-of-the-art research and laboratory facility formulated a dry-scrubbing media with a 15% removal capacity for Cl_2 ; Chlorosorb® Ultra. This media has created the opportunity for Purafil to retrofit liquid caustic scrubbers with minimal effort using dry-scrubbing Chlorosorb® Ultra media and the ability to convert a hazardous wet scrubber into a hazard-free and maintenance-free dry scrubber.



PURAFIL RETROFITTED DRY SCRUBBER



PURAFIL'S WET TO DRY RETROFIT PROCESS



STEPS 1-3 OF RETROFIT PROCESS

Step 1:

Remove recirculation pump and pipe.

Step 2:

Remove the three-panel lid.

Step 3:

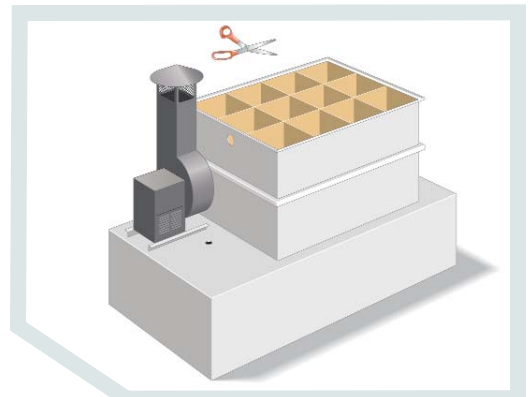
Begin to drain and dispose of liquid caustic from reservoir. Additionally, remove any residual caustic material from reservoir and reaction chamber.

Step 4:

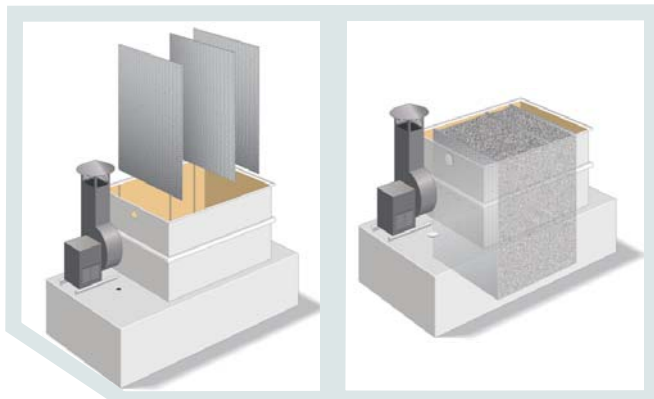
Remove and dispose of tower packing material.

Step 5:

Cut out internal fiberglass walls and fiberglass barrier between reaction chamber and liquid reservoir.



STEPS 4-5 OF RETROFIT PROCESS



STEP 6 OF RETROFIT PROCESS

STEP 7 OF RETROFIT PROCESS

Step 6:

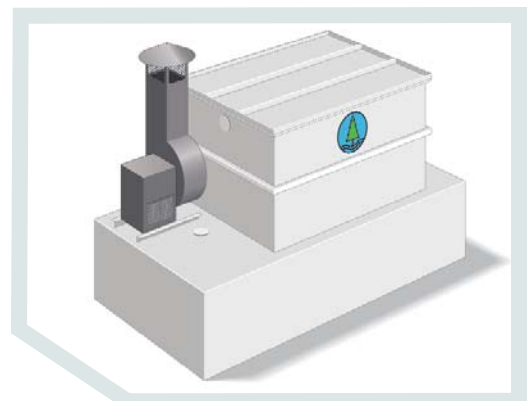
Install aluminum posts and secure to external fiberglass walls. Install perforated, aluminum media screens and secure to posts.

Step 7:

Install Purafil ESD Chlorosorb Ultra Dry-Chemical Media between media screens.

Step 8:

Replace three-panel lid and plug holes.



STEP 8 OF RETROFIT PROCESS