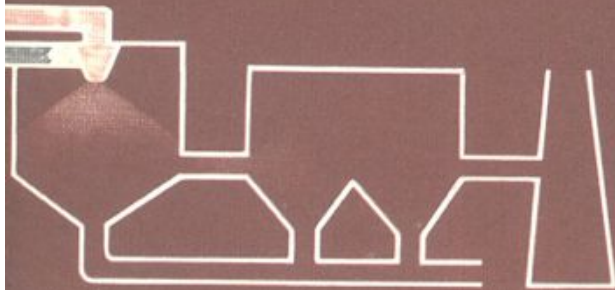


**Dry SO<sub>2</sub>  
Scrubbing  
Systems...**



for  
**Coal-  
Fired  
Boilers**



**KOCH**  
ENGINEERING COMPANY, INC.

## Koch dry scrubbers for coal-fired boilers

The Koch dry SO<sub>2</sub> scrubbing system is a cost-effective alternative to conventional wet scrubbers for cleaning flue gas in coal-fired boilers. The Koch dry scrubber uses a lime-based spray dryer and a baghouse for SO<sub>2</sub> removal and particulate collection. Fly ash and chemical waste products are removed as an easily-handled dry powder, not a wet sludge. And with dry scrubbing, industrial and utility boilers can operate cleanly and reliably.

But in order to control pollution economically, you need a dry scrubbing system that's been designed to handle your specific requirements: your coal, your chemicals. And you need to know that what worked on a pilot plant will work on your boiler.

That's where we can help.

We're Koch Engineering, and we're the only company in the business with a fully-integrated dry scrubbing pilot plant (equipped with a dedicated pulverized coal-fired boiler), an eight-foot diameter spray drying semi-works, and an operational commercial-scale dry scrubbing system. Bring Koch your coal and your chemicals and we'll test them on our pilot plant to determine your system requirements. Then, from a design based on this thorough analysis of your specific application, we'll manufacture and install the dry scrubbing system that's right for you.

If you want to save money and energy in your boiler operations, consider a Koch custom-built dry SO<sub>2</sub> scrubbing system. It's the simple, trouble-free way of making sure your plant burns coal cleanly.

## The key to dry scrubbing is spray drying

A high-performance spray dryer is the key to a successful dry scrubbing system. In the spray dryer reactor, two processes—reaction of the calcium hydroxide with the sulfur dioxide and drying of the slurry—take place simultaneously. The more complete the reaction, the more efficient the SO<sub>2</sub> removal.

At Koch, we're experts in spray drying, having been in the business since 1970. Our expertise in heat and mass transfer has allowed us to come up with a system that controls the evaporation and chemical reaction with pinpoint accuracy. Because our spray dryer reactor provides efficient liquid spray and air mixing and optimum reaction temperatures, our dry scrubber operates at maximum removal efficiency.

Here's how our dry scrubbing system works:

Lime reactant is gravimetrically conveyed from a storage silo to the slurry preparation tank, where it is slaked to calcium hydroxide. The calcium hydroxide is then transferred to the slurry holding tank, which controls the concentration and flow rate of the slurry as it's pumped through two-fluid nozzles in the spray dryer.

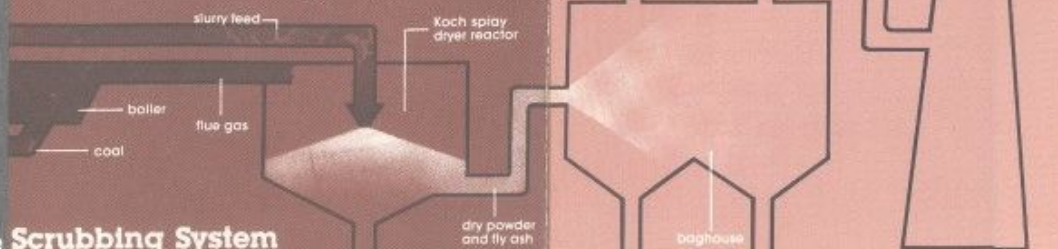
The nozzles generate a fine mist made up of millions of droplets of calcium hydroxide slurry. When this mist comes in contact with hot flue gas from the boiler, the SO<sub>2</sub> reacts with the alkali to form calcium sulfite and sulfate. The heat of the flue gas evaporates the

tiny droplets, leaving a dry powder consisting of sulfite, sulfate, fly ash, and excess alkali. Some of this powder drops out in the spray dryer where it is collected in bins or by a solids conveying system. Any suspended matter remaining in the flue gas is filtered out in a baghouse, and the clean gas is then exhausted through a stack to the atmosphere.

## Advantages of Koch's dry scrubber

The dry scrubber isn't going to make wet scrubbing systems obsolete—each has its advantages and disadvantages for different applications. But when it comes to cleaning flue gas in coal-fired boilers, dry offers several advantages over wet:

- The pollutants collected as a dry powder are easier to dispose of than the sludges produced by wet scrubbers.
- Energy and water consumption are substantially reduced.



**Koch Dry SO<sub>2</sub> Scrubbing System**

## From pilot plant to boiler

- Operating and capital costs are lower.
- Dry scrubbers require less maintenance.
- Reheat is usually not required.
- Dry systems are simpler and take less space.

Some dry scrubbing systems use centrifugal (rotary) atomizers to generate the slurry mist in the spray dryer. While we can supply centrifugal atomizers, we've learned from our extensive testing of dry SO<sub>2</sub> scrubbing systems that the Koch-manufactured two-fluid nozzle is superior to atomizers for several reasons:

- The two-fluid nozzle is more serviceable: nozzles can be repaired by in-plant personnel without shutting down the system. Atomizers are difficult to repair—and that can mean a costly interruption in scrubber service. Multiple nozzles are used in a single spray dryer, so individual nozzles can be removed for maintenance while the system continues to operate at near-peak efficiency.
- The nozzle is less expensive because it's easy to manufacture, while the atomizer's wear-resistant components require expensive, high-precision machining.
- The two-fluid nozzle has no moving parts and is more reliable. It gives our dry scrubber the edge over centrifugal-atomizer dry scrubbing systems.

A dry scrubbing system is more than just pumps, pipes, fans, and fabric filters. It takes experience and engineering know-how to put the parts together. At Koch, we offer the customer complete system evaluation, design, manufacture, and installation capabilities—from pilot plant to scale-up to erection of commercial-scale dry scrubbers.

A dry SO<sub>2</sub> scrubbing system begins with evaluation of the customer's specific system requirements at our Abcor Research Center in Wilmington, Massachusetts. Here Koch can test your coal and chemicals on a fully-integrated dry scrubbing pilot plant equipped with a dedicated pulverized coal-fired boiler. It was on this pilot plant that Koch conducted extensive research and development studies to design the best possible dry scrubbing system in terms of removal efficiency, cost, and availability.

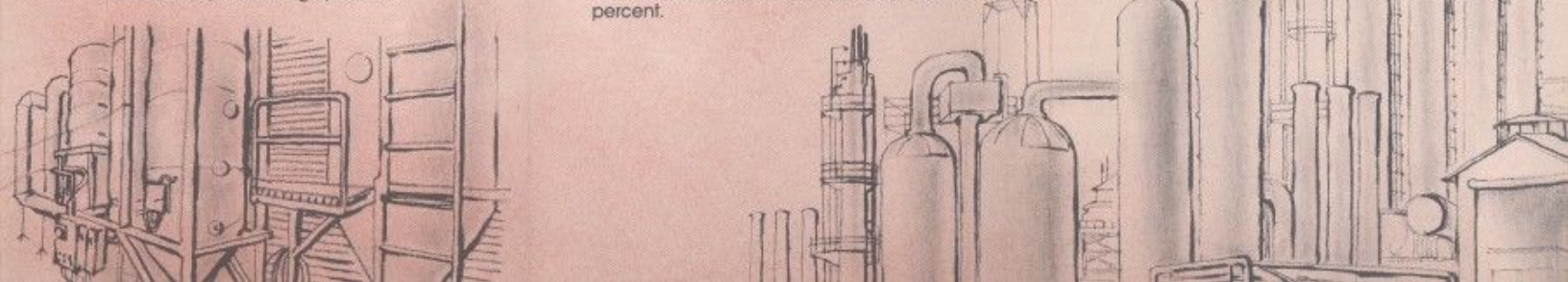
Once we designed the Koch dry SO<sub>2</sub> scrubbing system, scale-up was verified at our semi-works, an eight-foot diameter spray dryer located at Koch's Commercial Development Laboratories in Wichita, Kansas.

Finally, our system has proven its performance: a commercial-scale dry SO<sub>2</sub> scrubbing system, on-line since August, 1980, has met all performance guarantees and demonstrated a system availability of almost 100 percent.

## Koch: A leading name in scrubbers

Since 1968, Koch scrubbers have provided efficient, continuous, maintenance-free particulate and chemical removal in a wide variety of services; we have installed over 300 scrubbers to date. In addition to wet and dry scrubbers, Koch air pollution control products include separators, spray dryers, packed towers, and the industry's most complete line of mist eliminators.

At Koch, we make quality air pollution control systems because we make quality components: we manufacture most of the key elements of our air pollution control systems. And for nearly 30 years, Koch-manufactured mass transfer equipment has proven its performance in thousands of plants worldwide. Only Koch combines a time-tested product line and three decades of engineering experience with complete facilities for the evaluation of customer dry scrubbing system requirements.



## If you are burning coal...

If you're burning coal or thinking of switching to coal in your boiler, dry SO<sub>2</sub> scrubbing systems can provide a low-cost, trouble-free means of meeting federal and local air pollution regulations. Koch Engineering offers you a dry SO<sub>2</sub> system that's proven its performance in actual operation and is backed by Koch's expertise, experience, and engineering capabilities. For a complete analysis of your dry scrubbing system requirements, please write or call:

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