



Mercury Removal from flue gas streams

FLUEPAC® POWDERED ACTIVATED CARBONS

Pure Water. Clean Air. Better World.



pure water
clean air
better world



Fluepac Powdered Activated Carbons

Choosing Calgon Carbon will reduce injection rate and treatment costs, grant you peace of mind regarding compliance, and ensure your access to the most advanced powdered activated carbons available today.

Mercury emissions created by coal-fired boilers in power plants are a critical environmental concern. New regulations now require companies to address this issue. Calgon Carbon's evolving line of standard and advanced activated carbon products—plant-tested and proven to remove more than 90% of mercury—gives you the flexibility you need for any plant size, configuration, and coal type to achieve compliance.

Research and Development

Calgon Carbon has 20 years of experience in the removal of mercury from flue gas, and we have supplied Fluepac to coal-fired utilities for over six years. When testing Fluepac, we routinely secure the services of the best third-party mercury test crews in the industry to ensure that both we and our customers receive the most accurate data on the performance of our products at their sites.

We have invested over 12 million dollars in research and development of the Fluepac product line. Thanks to this effort, Calgon Carbon developed a first generation of advanced carbon products that typically require less than half usage rate when compared to a standard carbon. More recently, a second and third generation of advanced products has allowed further use rate reductions of up to an additional 40%, all while significantly reducing the amount of bromine in the products. Looking forward, R&D efforts will continue in the areas of mercury capture performance, concrete friendliness, SO₃ tolerance, cost savings, and the use of less bromine.

Calgon Carbon Mercury Removal Products

Category	Standard		Standard Brominated	
	MC	MC P	MC+	LMC+
Benefit	Compared to other industry standard carbon products, will meet or exceed performance expectations		Halogenated versions of Fluepac MC that promote the oxidation of mercury without the need for front-end boiler additives	

Category	Advanced		
	MC Maxx	SPR Maxx	SL
Benefit	Reduce injection rate by 50–70% over standard non-brominated carbons		Designed for injection into wet FGD units for the control of mercury re-emission

Category	Advanced Brominated/Sulfur Tolerant			
	ST	STF	S3	SF3
Benefit	For challenging flue gas environments or any situation where bromine is required. Reduce injection rate by 50–90% over standard brominated carbons			

About Calgon Carbon

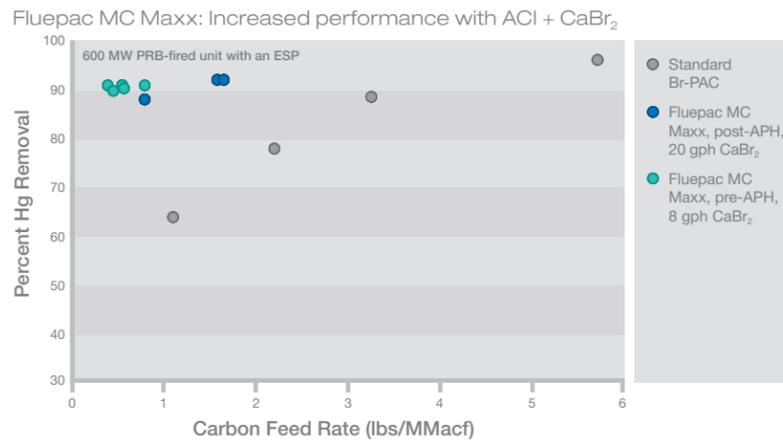
Nobody knows carbon better than Calgon Carbon. As one of the largest producers of activated carbon, we manufacture it in granular, powdered, pelletized, catalytic, and impregnated forms for vapor and liquid purification solutions that make water and air safer and cleaner.



ADVANCED PRODUCTS NON-BROMINATED

Increased mercury capture, lower carbon consumption, lower treatment costs.

- When compared to the industry benchmark standard carbon, 50–70% reduced injection rates mean fewer carbon deliveries, less wear and tear on equipment, reduced particulate load, and a lower impact on fly ash.
- Ideal for PRB-fired units.
- Extremely effective in situations where an oxidizing agent is not required on the carbon.

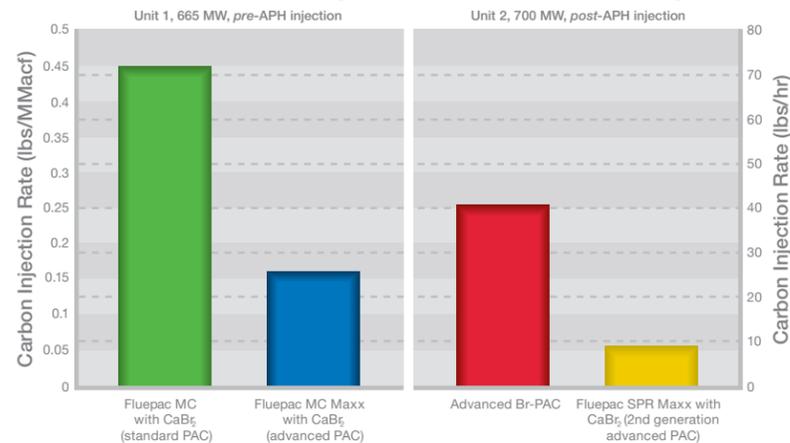


FLUEPAC MC MAXX

An advanced performance PAC product for utilities using calcium bromide addition.

- Helps preserve fly ash sales through lower feed rates and inherent concrete friendliness.
- Delivers a reduction in both the boiler additive used on the coal and the amount of activated carbon injected when compared to standard products.
- Particularly effective with low-sulfur/low-chlorine coals like PRB.

ACI feed rates to reach 1.2 lbs Hg/TBtu on a PRB-fired unit with baghouse



FLUEPAC SPR MAXX

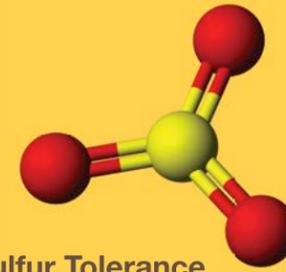
A second generation advanced PAC capable of significant reductions of injection rates over other commercial standard and advanced products on the market. Provides the ability to remove more than 95% of mercury.

- Most useful when mercury is oxidized naturally or by the use of boiler additives.
- Delivers a reduction in both the boiler additive used on the coal and the amount of activated carbon injected when compared to standard products.
- Extremely effective when used in units that collect particulate matter in a baghouse.
- Suited for preserving fly ash sales to the Portland cement market.

ADVANCED PRODUCTS BROMINATED/SULFUR TOLERANT

Formulated to enhance mercury capture in challenging treatment applications, such as flue gas streams with elevated levels of sulfur trioxide (SO₃).

- When compared to the industry benchmark brominated PAC, 50–90% reduced injection rates mean fewer carbon deliveries, less bromine in your system, and a lower impact on fly ash.
- Performance is impacted far less than other carbons by the presence of SO₃.
- Unique formulation allows for improved performance at drastically reduced injection rates in any situation where a brominated PAC is needed.



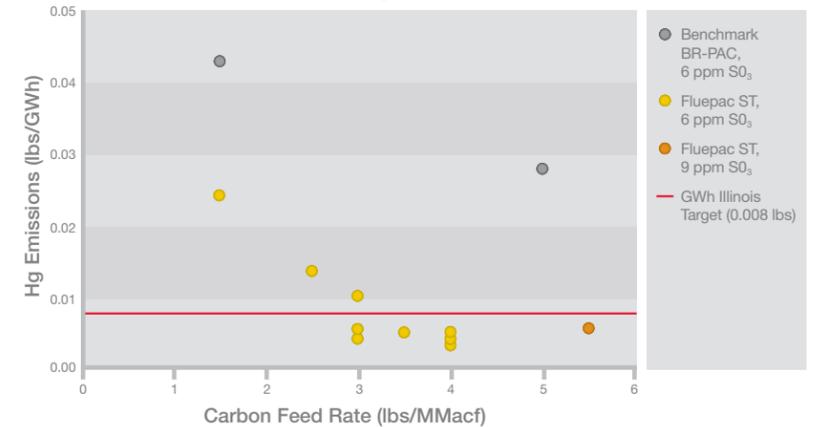
Sulfur Tolerance

Even a few parts per million of SO₃ will have a dramatic impact on the performance of standard activated carbons. Considering this issue, Calgon Carbon has developed a line of advanced PAC products that are impacted far less by the presence of SO₃ than are standard mercury capture carbons.

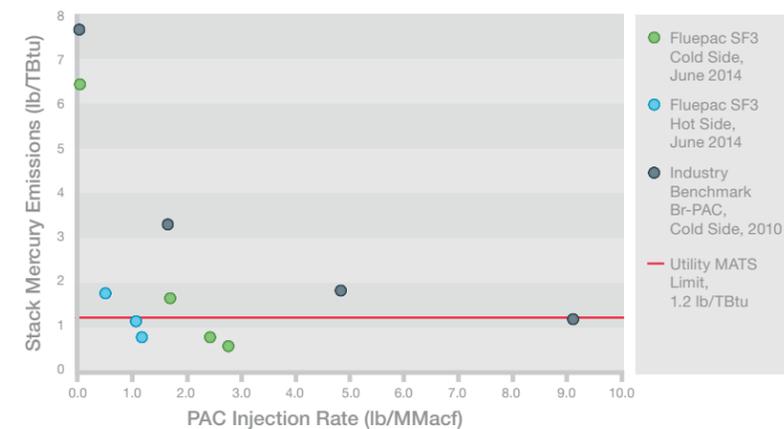
2ND GENERATION, FLUEPAC ST AND STF

At 6 ppm SO₃, ST easily met the targeted removal while it is unclear if the competitive industry benchmark PAC will ever reach compliance in this situation. Compliance is even more challenging to reach at 9 ppm SO₃.

PRB coal, ESP with 6 and 9 ppm SO₃ injection



Fluepac SF3 performance on 200 MW PRB-fired unit



3RD GENERATION FLUEPAC S3 AND SF3

On this unit with cold-side injection, SF3 reached compliance at 75–80% reduced injection rate when compared to the competitive benchmark brominated carbon. Results are even more favorable on the hot side.

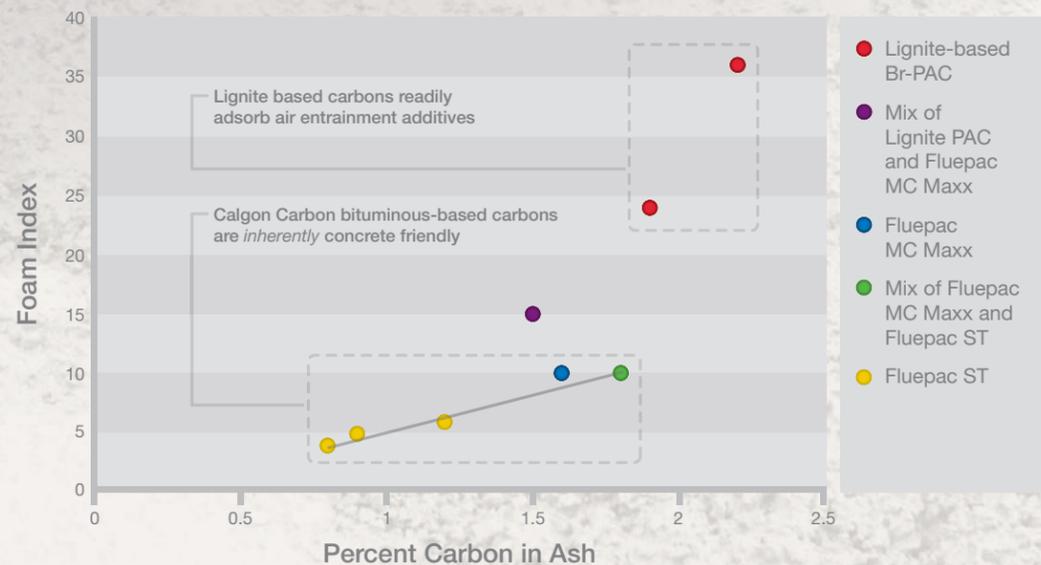
Concrete Friendliness

All advanced and standard Fluepac carbons are inherently concrete friendly due to the nature of our raw materials and manufacturing method. Our process limits the larger pores best suited for adsorbing air entrainment additives, which reduces the negative impact on concrete production and provides you with more micropores to remove the mercury you want to capture.

You can rest assured knowing that whichever Fluepac product you choose, the quality of your fly ash will be minimally impacted. Calgon Carbon's Fluepac products maintain fly ash quality in two ways:

1. Our base materials yield an inherently concrete-friendly activated carbon.
2. The reduced injection rate from our advanced products means less carbon ends up in your fly ash.

Built-in concrete friendliness



Compatibility

For DSI and Wet FGD Configurations

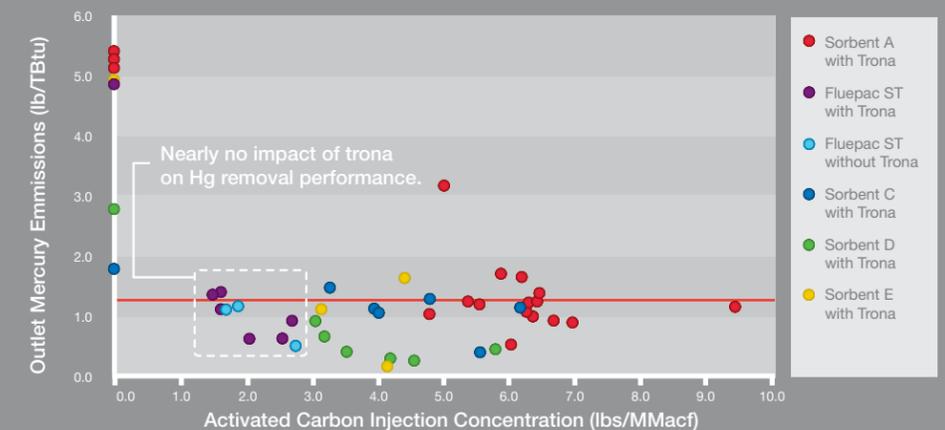
Fluepac products are compatible with a variety of different plant configurations.

FLUEPAC WITH DRY SORBENT INJECTION (DSI)

DSI with sodium-based sorbents like trona is known to negatively impact the performance of PAC in flue gas, often making it necessary to increase the carbon injection rate to maintain the same level of mercury removal. Our advanced Fluepac products are impacted far less by DSI than are other carbon products.

The addition of trona at injection rates of 500–6,000 lbs/hr shows no significant impact on the performance of Fluepac ST. Notice that Fluepac ST (purple circles with trona, light blue circles without trona) remains below the targeted compliance line at injection rates under 2 lb/MMacf both with and without trona.

Fluepac with dry sorbent injection on 140 MW PRB-fired unit using an ESP and trona injection for SO₂ control



FLUEPAC AS A WET SCRUBBER ADDITIVE FLUEPAC SL

Fluepac SL is an advanced PAC designed to be injected directly into wet flue gas desulphurization units. Fluepac SL is used to control mercury re-emission, and has demonstrated a 50% reduction in activated carbon injection over standard grade carbon products.

Contact us for additional information on Fluepac SL.

GLOBAL LOCATIONS

■ FACILITY ■ SERVICE ■ SALES ■ REACTIVATION ■ HEADQUARTERS



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