

Liner Checks Corrosion in Pyrolysis Plant Stack



LOCATION

Baltimore, Maryland



OPERATION

Conversion of refuse into usable energy supply



PRODUCTS

[PENNGUARD™ Block Lining System](#)

Challenge: Required corrosion protection from low temperature acid condensates and high temperature corrosive gases

Solution: PENNGUARD Block Lining System installed inside steel rack

Fresh from the results of a \$5 million redesign project, Baltimore, Maryland's pyrolysis plant became operational converting up to 600 tons per day of refuse into energy sufficient to heat and cool many of the buildings in downtown Baltimore. The energy is generated by pyrolysis of the refuse and utilization of the gases emitted during the process to fire waste-heat boilers.

Baltimore officials are enthusiastic over the prospects of this most unusual method of energy generation. Conservative estimates indicate that the city would realize annual revenues of over \$1.5 million from the sale of this energy. Although completed in 1975, the pyrolysis plant was plagued by repeated shutdowns. Of paramount concern was the plant's pollution control system. A new system was installed which consisted of two electrostatic precipitators, two induced-draft fans, a gas purifier afterburner, and a 220-foot steel stack. Faced with the task of protecting the steel stack from the corrosive by-products of the combustion process, the consulting engineers specified Armor's PENNGUARD Block Lining System.

The corrosive agents produced in the pyrolysis plant and transmitted through the pollution control system to the stack include traces of organic acids, SO₂, and some HCl. During normal operations, the corrosive gases going up the stack range between 400° to 500°F. However, during various start-ups and shutdowns the corrosion potential environment is intensified as the temperature drops through the dew point of the corrosive gases and produces liquid acid condensate.

Although several conventional materials, such as fiberglass, reinforced plastics, refractories, gunites and coatings were considered, the consulting engineers from William F. Cosulich Associates selected the PENNGUARD Block Lining System. Their choice centered around the system's ability to protect



the steel from both low temperature acid condensates and high temperature corrosive gases.

The stack lining block consists of an extremely lightweight, closed-cell borosilicate glass, which also exhibits an exceptionally low thermal conductivity. In fact, just 2½ inches of block insulated the outside of the stack so well that it was painted beige: As much as 20 inches of conventional masonry would have been required to achieve this same thermal droop and prevent the paint from blistering.

The thin, lightweight nature of the block lining results in an overall reduction in the diameter of the stack as well as lower expenditures for stack supports and foundations. A combination of lightweight (12.5 lbs./cu. ft.) composition and large, yet conveniently sized (12 by 18 inches) pieces speeds installation. As a result, the entire stack was completely lined in less than 45 days by the French Construction Services of Baltimore, which was within schedule.

A most critical aspect of the overall success of the installation centered on the use of the PENNGUARD Adhesive Membrane component of the PENNGUARD Block Lining System. This urethane asphalt, applied in 1/16-inch coats to both the sandblasted steel substrate and the block, has the dual purpose of bonding the block to the steel substrate and also imparting a

virtually impervious corrosion resistant barrier between the block and the steel. The flexible nature of the urethane asphalt reduces stress between the steel and the block and thus reduces the probability of a cracked lining.

"I didn't want to design a stack that was only going to last eight or ten years," said the vice president of William F. Cosulich Associates. "This system is virtually impermeable and acids will not penetrate to the steel and corrode it. I expect this stack lining to last a minimum of 25 years."

