

Swell Potential in Fluidized Bed Combustion Ash

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ABSTRACT

One method for burning coal is the atmospheric fluidized bed combustion (AFBC) process. In the AFBC method, crushed coal and sorbent, usually limestone, are suspended or "fluidized" by jets of air. The limestone reacts with SO₂ to reduce the amount of this potential pollutant from escaping to the atmosphere. Because the operating temperature of an AFBC boiler is typically lower than in conventional boilers, NO_x formation is minimized.

Because the fluidized bed combustion process is distinct, it follows that the ashes generated by AFBC might not have the same engineering properties as the other coal combustion ashes. To measure the swell potential of the AFBC ash, samples were compacted at Standard Proctor density and optimum moisture content and inundated using the procedures described in ASTM Standard Procedure D3877. The AFBC ash began swelling with the introduction of water and continued to swell to as much as 18% in the first month. Uplift pressures on several samples have exceeded 20,000 lb/ft².

A microscopic examination of the AFBC ash during swelling reveals distinct structural features that may prove useful in identifying the origin of coal combustion ashes.