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Combustion Products Management Inc.

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Fly Ash

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The American Society for Testing and Materials (ASTM) in 1989 defined fly ash as the finely divided residue that results from the combustion of ground or powdered coal and does not include residue from the burning of municipal refuse.

The individual particles are very small, like talcum powder, and are carried up and out of the boiler in the flow of exhaust gases leaving the boiler after the coal is consumed...thus the term 'fly ash'. The fly ash particles are removed from the stack gases using Electrostatic Precipitators, FGD systems or Bag Houses and are collected and stored for recycling. Fly ash is a pozzolan: a silica, alumina and calcium based material which, in the presence of water, will chemically combine with the free lime contained in either the fly ash or other compounds to produce cementitious properties. Some fly ash contains enough calcium compounds to be self-hardening when mixed with water.

The major constituents or elements of fly ash are heterogeneous glassy and crystalline phases of silicon, aluminum, iron calcium and magnesium. A chemical analysis will show fly ash compounds occurring as oxides of these elements; however they occur as aluminosilicate glass interspersed with a small fraction of crystalline compounds such as quartz, mullite, hematite, magnetite and elemental siliceous or aluminosilicate glass.

Class F ash is produced from the burning of anthracite or bituminous coal. Class F ash contains silica, aluminum and iron in combinations of greater than 70%. Class C fly ash is produced from the burning of lignite or subbituminous coal. Class C fly ash generally contains more calcium and less iron with its lime (CaO) content in the range of 15% to 30%. This makes the Class C fly ash cementitious in addition to pozzolanic.

TYPICAL COMPOSITION OF CLASS F & CLASS C FLY ASH

Weight Percent

Oxide	Class F	Class C
SiO ₂	49.10	53.79
Al ₂ O ₃	16.25	15.42
Fe ₂ O ₃	22.31	5.00
TiO ₂	1.09	1.68
CaO	4.48	18.00
MgO	1.00	3.40

Na2O	0.05	0.50
K2O	1.42	0.50
SO3	0.73	1.44
LOI	2.55	0.80
Other	1.02	0.27

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