ECOMATERIAL TECHNOLOGIES
A CRH COMPANY

TECHNICAL BULLETIN

Chemical Comparison

of Fly Ash and Portland Cement

The table below shows typical compound analyses for two fly ashes and a natural pozzolan (Class F fly ash, Class C fly ash and Class N - Natural) and ordinary portland cement. A glance at the table reveals that the same compounds exist in fly ash and portland cement. Those of fly ash are amorphous (glassy) due to rapid cooling; those of cement are crystalline, formed by slower cooling.

TYPICAL CHEMICAL COMPOUNDS IN POZZOLANS AND PORTLAND CEMENT

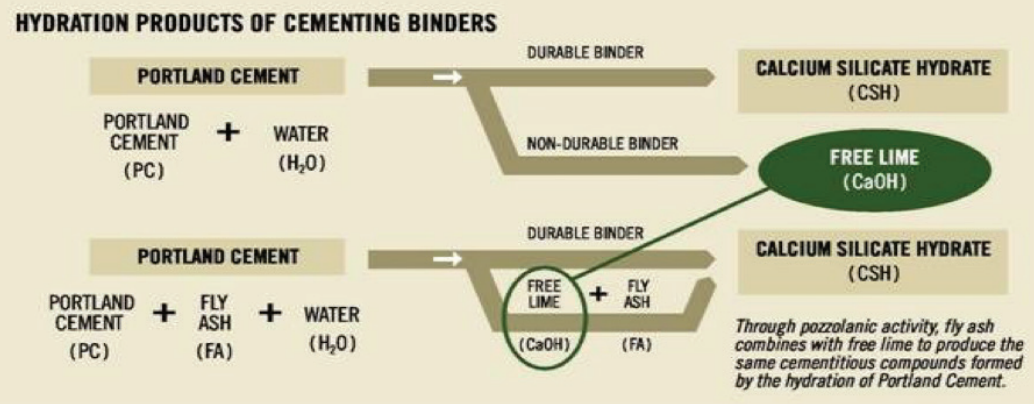
Chemical Compound	Pozzolan Type			Portland Cement
	Class F	Class C	Class N	
SiO	54.90	39.90	58.20	22.60
A12O3	25.80	16.70	18.40	4.30
Fe2O3	6.90	5.80	9.30	2.40
CaO	8.70	24.30	3.30	64.40
MgO	1.80	4.60	3.90	2.10
SO3	0.60	3.30	1.10	2.30
Na2O & K2O	0.60	1.30	1.10	0.60

The major difference between fly ash and portland cement is the relative quantity of each of the different compounds. Portland cement is rich in lime (CaO) while fly ash is low. Fly ash is high in reactive silicates while portland cement has smaller amounts.

The table illustrates the basic chemical difference. Portland cement is manufactured with CaO, some of which is released in a free state during hydration. As much as 20 pounds of free lime is released during hydration of 100 pounds of cement. This liberated lime forms the necessary ingredient for reaction with fly ash silicates to form strong and durable cementing compounds no different from those formed during hydration of ordinary portland cement.

A review of the chemistry of both materials makes it apparent that a blend of the two will enhance the concrete product and efficiently utilize the properties of both.

For more information or answers to questions about the use of fly ash in specific applications, contact your nearest Eco Material Technical Sales Representative or call 801-984-9400.



Revision Date:8-28-26