

# FLY ASH

## **Description:**

Power plants fueled by coal produce a material that is fast becoming a vital ingredient for improving the performance of a wide range of concrete products this material is **FLY ASH**.

**FLY ASH** is comprised of the non-combustible mineral portion of coal. When coal is consumed in a power plant, it is first ground to the fineness of powder. Blown into the power plant's boiler, the carbon is consumed –leaving molten particles rich in silica, alumina and calcium. These particles solidify as microscopic, glassy spheres that are collected from the power plant's exhaust before they can fly away-hence the product's name: **FLY ASH**.

Chemically, **FLY ASH** is a pozzolan. When mixed with lime (calcium hydroxide), pozzolans combine to form cementitious compounds. Concrete containing **FLY ASH** becomes stronger, more durable, and more resistant to chemical attack.

## **Advantages:**

- ✦ Better workability –concrete is easier to place with less effort.
- ✦ Ease of pumping-pumping requires less energy and longer distances are possible.
- ✦ Improved finishing –detailed finishes are easier to achieve.
- ✦ Reduced bleeding –fewer bleed channels decrease the permeability.
- ✦ Higher strength –fly ash continues to combine with free lime increasing the compressive strength of concrete over time.
- ✦ Decreased permeability –increased density and long term pozzolanic action of fly ash result in fewer bleed channels and decrease permeability.
- ✦ Increased durability –dense fly ash concrete helps keep aggressive compounds on the surface, where destructive action is lessened.
- ✦ Reduced heat of hydration –the pozzolanic reaction between fly ash and lime generates less heat, resulting in reduced thermal cracking and concrete peak temperature in mass structures.
- ✦ Reduced sulfate attack, alkali-silica reaction, drying shrinkage and efflorescence.
- ✦ Optimizing the use of cement, hence conserving minerals and energy required for its productions and reducing emission of CO<sub>2</sub>.
- ✦ Utilizing industrial by-product (fuel ash) for making more durable concrete, hence reducing green -house gases.

### **Properties:**

Chemical Properties				
Property	Requirements		Fly Ash Series	
	ASTM C 618 Class F	EN 450	75	80
SiO <sub>2</sub> +Al <sub>2</sub> O <sub>3</sub> +Fe <sub>2</sub> O <sub>3</sub> %	Min 70	NA	70-95	
SO <sub>3</sub> %	Max 5	Max 3	<2	
Moisture %	Max 3	NA	<3	<0.5
Loss on ignition %	Max 6	Max 5	<2	
Total Chlorides %	NA	Max 0.1	0.02-0.04	
Physical Properties				
Fineness (Retention on 45 microns sieve) %	Min 70	NA	<40	<20
Strength Activity Index @ 28 days % of control	Max 5	Max 3	>75	>80
Soundness (Expansion)	Max 3	NA	<0.8%	<10mm

### **Standards Compliance:**

The chemical and physical properties of FLY ASH are tested in accordance with the requirements of ASTM and BS standards at regular intervals.

### **Estimating Supply:**

FLY ASH is supplied in 1400 kg jumbo bags.

### **Shelf Life/ Storage:**

FLY ASH shall be stored in a dry place and protected from any source of moisture and from environmental effects.