

# ScotAsh Conditioned PFA

## Sustainable solutions for construction specialists

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Conditioned PFA has been used as lightweight fill for the Tullibody Bypass, for grout manufacture for mine filling on the M8 and filling abandoned mines

Conditioned ash provides a sustainable alternative to natural aggregates in a host of ground engineering applications, while offering performance benefits, such as improved strength.



ScotAsh Conditioned PFA was used in construction of Kincardine Bypass

### Description

Pulverised Fuel Ash (PFA) is the 'fine' ash fraction produced in the furnaces of coal-fired power stations when pulverised coal is fed into the boilers and burnt at high temperatures and pressures.

During combustion, the ash within the coal melts and solidifies in flight as rounded glassy particles. These are carried out in the flue gases then captured in the electrostatic precipitators.

The PFA particles are mostly fine, light, glassy spheres and are essentially made up of silica, alumina and iron oxides.

PFA is a very stable material, both chemically and physically and is therefore not prone to deterioration. Like many products, PFA has unique properties and, if used correctly can bring many benefits. It is an ideal material for applications such as structural fill, highway construction, grouting, cement manufacture and as an aggregate or filler in bituminous road materials.

ScotAsh can supply two types of Conditioned PFA:

- **Conditioned PFA** – PFA taken direct from Longannet Power Station and conditioned with water prior to delivery.
- **Lagoon PFA** – PFA which has been slurried at both Longannet and Cockenzie Power Stations and pumped to lagoons. This material is excavated and allowed to stabilise in regards moisture content. The PFA can also, if required, be screened prior to despatch.

### Quality Assurance

ScotAsh products are manufactured and sold under a total Quality Management System (QMS) that complies with the requirements of BS EN ISO 9001. The QMS is registered with and audited by BSI.



SCOTASH  
A Lafarge ScottishPower Joint Venture

## Specification

There are many different uses for PFA and most applications are controlled by Specifications, British Standards and Codes of Practice that are based on the properties of the material. The main documents controlling Conditioned PFA are:

- **BS EN 12715** – Execution of special geotechnical work – grouting
- **BS EN 13055-1** – Lightweight aggregates for concrete, mortar and grout
- **BS EN 14227-4** – Fly ash for hydraulically-bound mixtures
- **BS EN 12620** – Aggregates for concrete
- **Specification for Highway Works (SHW)**
- **TRL Report TRL519** – Specification of Pulverised Fuel Ash for use as general fill.

The TRL report is a generic document with a new approach set within the context of the current SHW for ease of use to encourage greater use of pulverised fuel ash.

Depending on the customer requirements, ScotAsh Conditioned PFA may be supplied to the above standards.

## Properties & Advantages

The key advantages gained from the use of ScotAsh Conditioned PFA are as follows:

- Lower density
- Little consolidation
- Immediate strength
- Increasing strength
- Self supporting
- Low permeability
- Chemical composition
- Economy (through increased volume)
- Environmental benefits
- Particle shape.

Using PFA instead of quarried materials reduces environmental impact and can be more cost effective. In addition, PFA offers a number of important benefits.

Its low density – typically between 1100 to 1300 kg/m<sup>3</sup> – means it can be used as a fill material over weak ground.

It is accepted by the Health and Safety Executive as non-toxic and there are no polluting leachates.

In addition, there is very little consolidation; and PFA offers both immediate strength and increasing strength, due to the free lime it contains.

This reduces horizontal pressure on structures, allowing more economic design.



Bowtrees flyover, part of the new Kincardine Bridge development, that used ScotAsh Conditioned Ash

PFA is also self-supporting, has low permeability and the spherical shape of the particles are beneficial in grouts – reducing the water-to-solids ratio and imparting reduced bleeding and improved flow properties.

## Applications

Conditioned PFA is widely used in highway works as a general fill and structural fill material and also for capping.

It can also be used in concrete manufacture and as an aggregate in cementitious grouts and coated materials.

### Highway works

The Specification for Highway Works allows the use of PFA under a number of different 'classes'. These include:

- **2E** – Reclaimed pulverised fuel ash cohesive material
- **7B** – Selected conditioned pulverised fuel ash cohesive material
- **7E** – Selected cohesive material for lime stabilisation to form 9D
- **7G** – Selected conditioned pulverised fuel ash cohesive material for stabilisation to 9C.

### Filler Aggregate

ScotAsh Conditioned PFA is versatile as a filler aggregate. Its unique properties allows it to be

used in the manufacture of concrete, mortar, grout and hydraulically bound mixtures.

### Cement Manufacture

The main constituents in the manufacture of cement are limestone or chalk, which supplies the calcium oxide required, and clay or shale that supplies alumina and silica.

The main components of PFA are SiO<sub>2</sub>: 50% and Al<sub>2</sub>O<sub>3</sub>: 30%. PFA is therefore an ideal source of alumina and silica.

In addition, ScotAsh Conditioned PFA is particularly low in alkalis. The introduction of ScotAsh Conditioned PFA as a raw material can substantially reduce the alkali in the process, which in turn can result in Cement Kiln Dust (CKD) being reintroduced, therefore reducing the amount of hazardous waste for disposal.

## Health & Safety

Conditioned PFA is not considered to be hazardous to health but should be handled in accordance with good occupational hygiene and safety practices.

High concentrations of dust may cause irritation. It is recommended that personal protective equipment is worn, including eye, hand and skin protection and dust masks.

Further details are included in the Health and Safety Information Sheet for PFA.

To contact ScotAsh please telephone, fax or visit our website

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