

UK Quality Ash Association

...the power behind PFA



UNITED KINGDOM
QUALITY ASH
ASSOCIATION



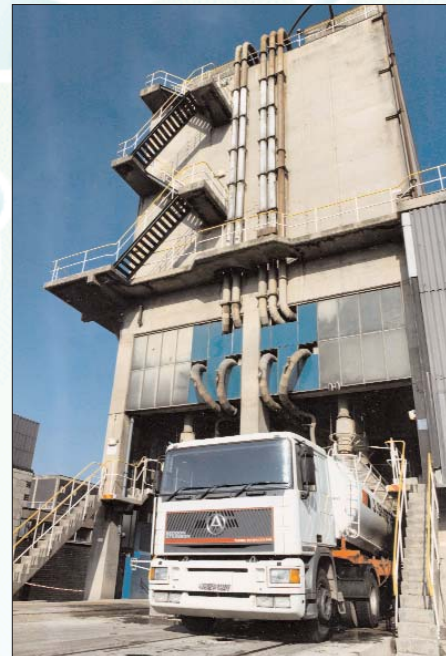
The UK Quality Ash Association

Introduction

The UK Quality Ash Association (UKQAA) is a trade association representing the producers and users of PFA (pulverised fuel ash), also known as fly ash in some applications and many countries and FBA (furnace bottom ash). We promote the use of PFA and FBA to the benefit of the environment by reducing primary material consumption, and encourage its use as a valued resource with significant technical benefits.

Sponsorship of research

The association sponsors a broad range of research projects relating to the environment, soil stabilisation, sulfate, chloride, carbonation and chemical resistance of fly ash concretes. This creates documentation to help specifiers adopt European Standards and provides guidance for selecting measures to enhance durability. We are always actively looking at ways to target specific areas and yet to broaden our research profile to subjects which are new and possibly radical.



European and British standard committees

The UKQAA helps to expand the utilisation of PFA and FBA through representation on numerous European and British standard committees.

Presentations at your premises

We provide information to all and offer presentations at your preferred location and time on the advantages of using coal ash along with the potential environmental benefits.

Various applications

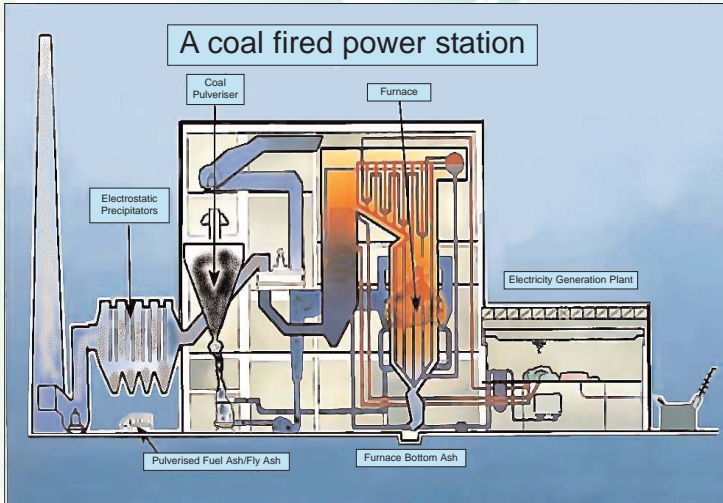
PFA and FBA can be used in a variety of applications including:

- concrete / concrete blocks / bricks
- grouting (filling redundant mine workings etc)
- as a fill material
- lightweight aggregate
- road construction / maintenance
- soil stabilisation



PFA ... the benefits and advantages

Pulverised Fuel Ash (PFA) and Furnace Bottom Ash (FBA) are by-products from coal fired power station electricity generation. This valued resource is a safe and versatile construction material with a history of use spanning over 50 years.



Types of ash

- **Dry PFA** - supplied into readymixed and precast concrete products, block manufacture, grouts, etc
- **Classified ash** - dry PFA, processed to remove the coarser particles - it is used as a concrete addition and supplied in tankers
- **Conditioned ash** - PFA that is mixed with an appropriate percentage of water - it is used for block manufacture, grout, load bearing fill and landscaping - supplied in tipping vehicles

Some of the various applications and benefits

Fly Ash as an addition in concrete¹

PFA is a *pozzolana*. This means it reacts with lime to form silicate hydrates - these hydrates give concrete its enhanced strength and durability.

- Supplied to EN450-1:2005
- Gives increased concrete strength and durability
- Classified fly ash reduces the water content of concrete - reducing permeability
- Improves sulfate resistance and reduces the risk of ASR
- Reduces the heat of hydration compared to Portland Cement
- Lightweight concrete permits smaller bases to be used in construction due to reduced load
- Produces highly workable concrete that easily flows around reinforcement, such as in self compacting concrete



¹ For further details see Technical Datasheets 1.0 and 1.1

PFA as a structural fill:

Used as a load bearing fill², in road sub bases and landscaping:

- Lightweight - reduces the load on weak ground
- Self hardening - offers considerable advantages over natural clay/granular material
- Low permeability - sheds rain water naturally, which reduces leaching
- Can be mixed with lime to give increased strength due to pozzolanic reaction



PFA for grouting

When mixed with cement and/or lime, PFA grout³ is used for filling fissures, voids and cavities such as, redundant mine workings and pipe work systems e.g. sewers. It is also used in gunite applications and for filling behind tunnel linings.

PFA grouts have many advantages over traditional sand/cement grouts:



- Economical
- Reduced water/solids ratio
- Increasing strength, extended setting time, low shrinkage and reduced permeability with time
- Improved pumpability
- A high resistance to chemical attack

PFA and FBA as lightweight aggregates

PFA dampened with water is passed across a dish pelletiser. The pellets are heated to fuse the particles. This aggregate⁴ known as Lytag is used in structural concrete. FBA lightweight aggregate is used in lightweight concrete block manufacture.

Benefits of lightweight aggregate and aerated concrete blocks

- Produces a cost effective and insulating building material
- Reduces the environmental impact of block production, with the possibility of obtaining environmental credits. An aerated concrete block contains over 80% PFA
- Lightweight blocks are easier to handle and cheaper to transport

Fly Ash in soil stabilisation

Fly ash can be used in soil stabilisation to help prevent sulfate heave in clay - research in this area is currently being undertaken.

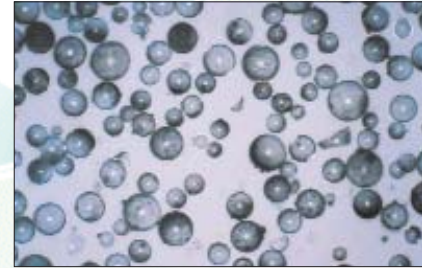
² For further details see Technical Datasheet 2

³ For further details see Technical Datasheet 3

⁴ For further details see Technical Datasheet 4

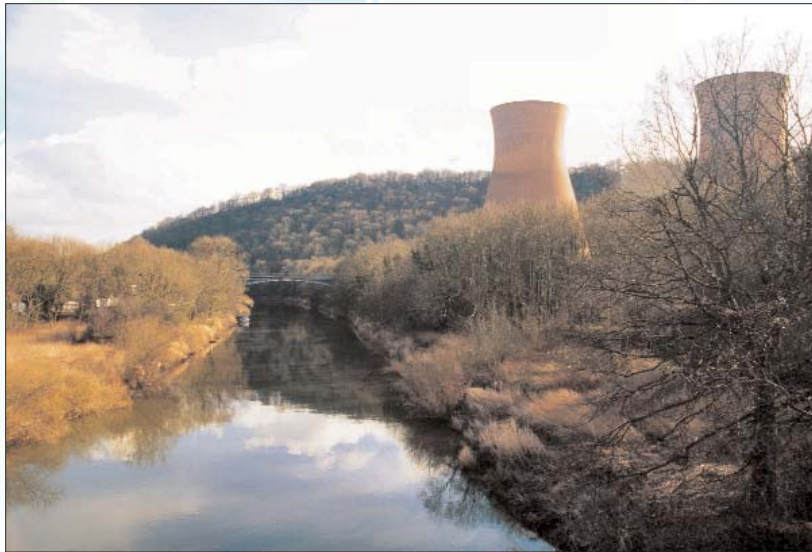
Cenospheres

Cenospheres are unique free flowing powders composed of hard shelled, hollow, minute spheres. The main application is that of inert filler. Cenospheres can be used in paint, varnish, plastics, almost anywhere traditional fillers can be used. As a result of their flexibility they are used in many high technology and traditional industries e.g. Aerospace, hovercraft, carpet backing, window glaze putty, concrete repair materials, horticultural use and off shore oil and gas production.



Environmental considerations

Coal fired power station ash has a long history of utilisation in land reclamation, helping to encourage new growth of trees, grass and flowers in areas that would remain barren and toxic. The list of applications includes restoring farm land and woodland habitats. With careful management no problems should be found. To our knowledge there is no recorded case of an environmental problem being caused by coal fly ash products. For further information see "Ashes to Assets?"⁵.



The impacts on the environment of obtaining primary aggregates are becoming less acceptable. Full utilisation of ashes from power stations could have a significant environmental effect by helping reduce demand on virgin aggregates.

The strength enhancing properties of PFA are able to reduce the overall energy needed in the manufacture of concrete and provide benefits when whole life costing techniques are employed. For every tonne of Portland Cement substituted with PFA; there is an overall CO₂ emissions reduction of approximately 0.9 tonne.

⁵ Ashes to Assets? Woolley GR, Simpson DT, Quick W & Graham J, PowerGen UK plc.



For further information on membership, copies of literature or technical assistance please contact:

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