

Superpozz SV 80

A ScotAsh product case study



QUEEN'S AWARD FOR ENTERPRISE WINNER 2005

A major breakthrough in superior concretes

Powder technologists at ScotAsh have developed a superfine pozzolanic Class F Fly Ash that is used to produce superior concretes.

Superpozz SV 80 is a highly reactive pozzolanic material, rich in aluminosilicates, that strengthens cementitious systems and provides enhanced durability.

The quality and impermeability of high performance concrete are determined by the amount of water used in the mix design – the water to binder ratio.

Studies in Scotland and South Africa have shown that the presence of extremely fine particles in the Superpozz SV 80 decreases the permeability and improves the durability of concrete.

Ash particles are spherical in shape and they “roll”. This provides a lubricating effect that improves the workability of concrete thus reducing the water demand and the need to include high range water reducers such as naphthalene-based admixtures in the formulation.

By reducing the water content, Superpozz SV 80 effectively controls the heat of hydration. At concentrations of 10-15%, the heat of hydration can be up to 15% lower.

The use of Superpozz SV80 increases the compressive strength of concrete over time. This is due to the chemical properties of the Superpozz SV80 and the distribution of particle sizes.

Chemically, it produces calcium silicate hydrate gel, which fills the pore spaces and continues to do so over time. The sustained pozzolanic reaction results in continuing strength gains up to 90 days.

The mean particle size of Superpozz SV80 typically ranges between 3.9 and 5.0 microns with more than 80% of the material having a particle size of less than 25 microns. Although Silica Fume is finer, its particles tend to be of a uniform size. The unique distribution of the particle size of Superpozz SV 80 works to



Superpozz SV 80 was used to strengthen Eden Bridge (top photos) and to repair the M90 carriageway

effectively fill the voids between fine aggregates and the cementitious component, creating a fine filler effect.

Eden Bridge

Superpozz SV 80 from ScotAsh was used in a project by Clachan Construction to strengthen Eden Bridge, near Freuchie, on behalf of Fife Transportation Services.

A C50 pump mix was prepared targeting a consistence or slump of 100mm. The cement used in the project contained 20kgs of Superpozz SV 80, 70kgs of Part I PFA and a small percentage of microsilica.

Typical strengths achieved at 28 days were 64N/mm².

M90 Carriageway Repairs

Superpozz SV 80 was used by Bandy Builders to undertake carriageway repairs to the M90 motorway on behalf of BEAR Scotland.

A C50 pump mix was prepared targeting a consistence or slump of 80mm. The cement included 20kgs of Superpozz SV80 and a small percentage of microsilica.

The typical 28-day strength achieved was 72N/mm².

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Summary of uses, characteristics and benefits

Recommended Uses of Superpozz SV in Concretes

Superpozz SV 80 can be used in almost any application for concretes containing Portland Cement. It is particularly suited to high performance specifications where durability is a fundamental requirement.

It can be used for:

- High performance readymix and precast concretes
- Marine environment concretes
- Pumped concrete
- Wet sprayed concrete
- Self compacting concrete
- Mass concrete sections
- Concrete tiles
- Industrial floors
- Fibre cement products

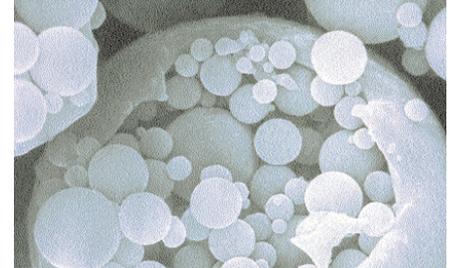
Key Benefits

- High performance concrete is achieved with a low w/c ratio
- High early strength and continuing pozzolanic reaction with lime ensure efficient hydration and improved strength development with time
- Decreased permeability, reduced sulphate attack, chloride ingress and reduced alkali silica reactivity
- Reduced shrinkage – due to lower water content and drying shrinkage
- Competitive cost

Concretes containing Superpozz SV80 are easily pumped and provide a surface finish that is virtually flawless.

The product is manufactured under ScotAsh's Quality Management System, which is accredited to ISO 9001: 2000. The company provides a full technical advice service.

Our studies, undertaken by the Concrete Technology Unit, University of Dundee, have shown that concrete performance is further enhanced by using Superpozz SV80 in tertiary blend combinations. The optimum combination in technical evaluations was 15%-20% Superpozz SV80 with 5% Silica Fume.



PFA micrograph (above) and M90 repairs (left)

TECHNICAL EVALUATION TESTS COVERED:

- Heat of hydration
- Drying shrinkage
- Water absorption
- Air permeability
- Chloride diffusion
- Carbonation rate

TYPICAL PHYSICAL CHARACTERISTICS

Relative density	2.2
Theoretical Surface Area (cm ² /g)	13,000
PH in water	11-12
Moisture content (%)	< 0.2
Colour	Grey
Loss on ignition (LOI)	2.0
Carbon content	< 1.0

Chemical Characteristics

Superpozz SV80 has a similar composition to Portland Cement, but it is rich in reactive silicates, where Portland Cement is low and is low in Lime (CaO), where Portland Cement is high.

TYPICAL COMPOSITION	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO
Superpozz SV80	53.5	34.3	3.6	4.4
Portland Cement	32.6	3.3	2.1	62.0

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