

**Flyash Blend is a general purpose blended cement containing a nominal 25% flyash complying with AS 3972 Type GB. Flyash Blend is available in bulk as well as in 40kg and 20kg bags as Builders Cement.**

Sunstate Cement Ltd. manufactures Flyash Blend by grinding portland cement clinker with flyash collected from coal-fired power stations and complying with AS 3582.1. The flyash is added during the milling process to ensure a thorough mixing of the components.

Flyash Blend is an economical alternative to GP Cement and can be used in many situations where workability or durability considerations dictate the use of a blended cement. Because of the extended setting time of concrete using blended cements it is essential that appropriate curing be employed to allow the concrete to develop its full capacity.

Flyash is a very fine material generally with a spherical particle shape and when incorporated into a concrete mix can be expected to provide the following benefits:

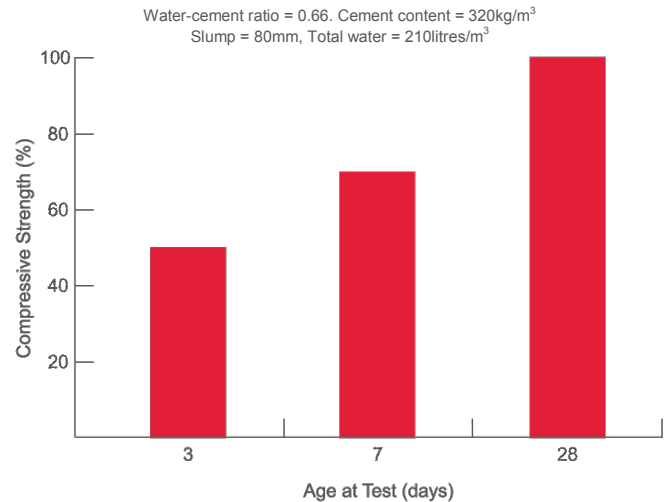
- Improved workability and pumpability
- Reduced water demand and bleeding
- Improved shrinkage resistance
- Improved resistance to sulphate and chloride attack (Flyash Blend complies with AS 3972 as a Type SR Sulphate Resistant cement)
- Reduced potential for Alkali-Silica Reaction

Flyash Blend is also suitable for use in road stabilisation where the delayed setting time results in increased working time available for contractors to form pavements.

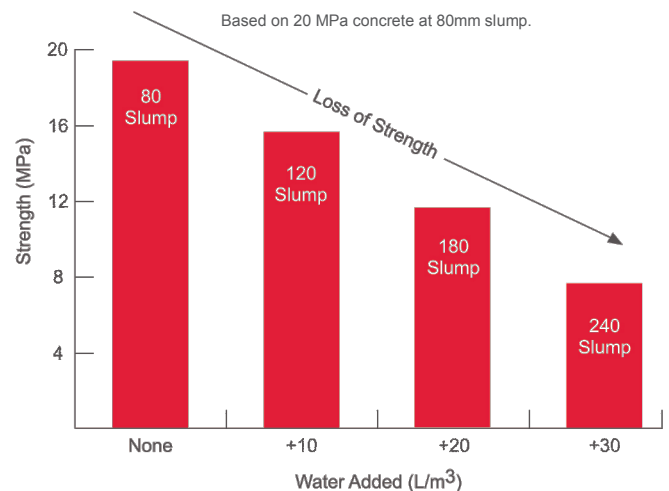
### Concrete Properties

**Strength development.** Under standard conditions of moisture and temperature, the rate of gain in compressive strength of concrete made from Flyash Blend can be expected to be marginally less than that made with GP Cement. However, with an appropriate curing regime, concrete made with Flyash Blend can be expected to exhibit greater strengths at 90 days and beyond. Graph One gives indicative data on the strength development of concrete produced using Flyash Blend.

**Effect of excess water.** Use only the minimum amount of water to mix and place concrete. Graph Two shows the reduction in compressive strength of concrete with increased water addition. The porosity of concrete made with excess water is also increased resulting in a structure with less resistance to chemical attack.



**GRAPH ONE. Compressive Strength of Flyash Blend**



Indicative representational only. Not to be used for calculation.

**GRAPH TWO. Effect of Water Addition on Concrete Strength and Slump**

Other factors which effect the strength and durability of concrete containing Flyash Blend manufactured by Sunstate Cement Ltd. are:

- Concrete mix design including admixtures
- Temperature (ambient and materials)
- Entrained air content
- Compaction of concrete
- Curing

### Concrete Mix Design

The cement content for each grade of concrete will be dependent on the nominated target strengths. AS 3600 Concrete Structures recommends minimum strengths to achieve adequate concrete durability for various exposure classifications.

AS 1379 The Specification and Manufacture of Concrete is the relevant standard for the production and ordering of concrete. For site mixed concrete the following mix proportions are suggested.

### Mix Proportions by Volume

Application	GP Cement	Stone or Gravel	Sand
High Strength & Watertight	1	3	1.5
General Use: Paths, Floors, etc.	1	4	2.5
Foundations & Large Masses	1	5	3

For mortar mixes the following mix proportions satisfy AS 3700 for Type GB cement 1:1:5 cement:lime:sand.

**Mixing.** AS 1379 outlines requirements for material quality and mixing procedures for premixed concrete. Recycled water may only be used where testing can demonstrate compliance with the relevant section of AS 1379. Dissolved salts and organic matter may adversely affect the strength, durability, set time and appearance of the concrete. Sand contaminated by the above will have a similar effect.

**Placing.** AS 3600 outlines requirements for handling, placing and finishing concrete. Minimum cover to reinforcement is 20 mm for lowest exposure classification. The cover will need to be increased where concrete is cast against the ground, for fire resistance and for exposure classification other than A1.

**Curing.** A minimum curing period of seven days is recommended for all exposure classifications. Concrete should be maintained in a moist condition where practicable. Water sprays, wet sand or moisture retaining techniques, such as polyethylene sheets or curing compounds, have been used successfully. Curing should begin as soon as the selected technique allows. In hot conditions aliphatic alcohol is recommended as a technique to mitigate plastic shrinkage cracking, however it is not a substitute for a proper curing regime. For normal concrete curing will result in a significantly higher compressive strength than concrete not subject to curing.

Curing can also effect other concrete properties including:

- Reduction in the potential for shrinkage cracking

- Improvements in surface quality, durability, and performance
- An improvement in abrasion resistance
- Reduction in the rate of ingress of chemicals

Variations in the duration of curing or uses of different curing methods may affect the initial colour of concrete.

### Cement Properties

The following table provides examples of some typical cement properties of Flyash Blend manufactured by Sunstate Cement Ltd.

Property		Flyash Blend	AS3972
Setting Time	Initial	2-3 hrs	45 mins (min)
	Final	3-4 hrs	10 hrs (max)
Constancy of Volume (soundness test)		1.0mm	5.0mm (max)
Fineness Index		410-430m <sup>2</sup> /kg	
Compressive Strength (Mortar) MPa	3 day	26-28 MPa	
	7 day	36-38 MPa	15 MPa (min)
	28 day	55-57 MPa	30 MPa (min)

### Compatibility

Flyash Blend may be blended with other cements complying with AS 3972 and with blast furnace slag complying with AS 3582.2. It is also compatible with admixtures complying with AS 1478.

### Working Instructions

**Storage.** Contact with air and moisture will cause hydration of the cement and alter the cement properties. The 'shelf life' of Flyash Blend is therefore dependent on the storage conditions. Bagged product should be stored off the ground and stacked to allow free circulation of air. Please note that bags are not waterproof. It is recommended that cement be retested prior to use if its age exceeds three months.

**Handling.** A Material Safety Data Sheet can be downloaded from [www.sunstatecement.com.au](http://www.sunstatecement.com.au) or by contacting Sunstate Cement Ltd. on Tel 07 3895 9890.

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