

SL Cement is a special purpose cement complying with AS 3972.

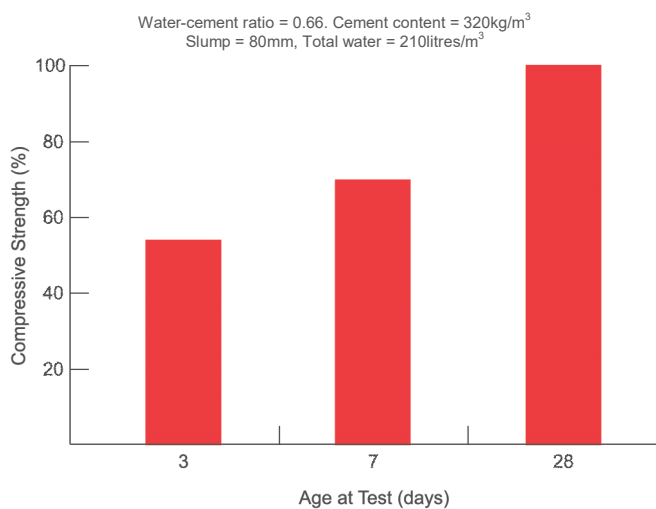
Sunstate Cement Ltd. manufactures SL Cement from portland cement clinker with a lower particle fineness compared to GP Cement. This lower fineness results in slightly slower early strength development and reduces the amount of drying shrinkage. It is important to note that other factors such as aggregate type, water content and curing practices have a significant effect on the overall shrinkage performance of concrete.

SL Cement should be specified where the performance of a structure would benefit from reduced concrete shrinkage, with examples being:

- Reinforced and unreinforced concrete pavements
- Large areas of flatwork, both suspended and at grade
- Water retaining structures
- Buildings where crack control is important

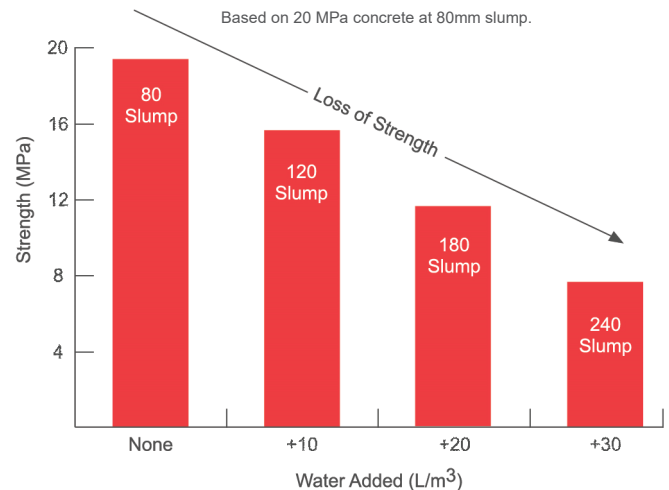
Concrete Properties

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



GRAPH ONE. Compressive Strength of SL Cement

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.



Indicative representational only. Not to be used for calculation.

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

The porosity of concrete made with excess water is also increased resulting in a structure with less resistance to chemical attack.

Other factors which effect the strength and durability of concrete containing SL Cement 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

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 effect the initial colour of concrete.

Cement Properties

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

Property	GP Cement	AS3972	
Setting Time	Initial	2.15 hrs	≥ 45 mins
	Final	3.15 hrs	≤ 10 hrs
Constancy of Volume (soundness test)	0 mm	≤ 5 mm	
Fineness Index	350 m ² /kg		
Compressive Strength (Mortar)	3 day	29.0 MPa	
	7 day	44.0 MPa	≥ 20.0 MPa
	28 day	60.0 MPa	≥ 35.0 MPa
Shrinkage	28 day	650 ms	≤ 750

Compatibility

SL Cement may be blended with other cements complying with AS 3972. It is also suitable to blend with flyash and/or blast furnace slag complying with AS 3582, however this could be detrimental to the shrinkage characteristics. SL Cement is 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 SL Cement is therefore dependent on the storage conditions. 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 or by contacting Sunstate Cement Ltd. on Tel 07 3895 9890.

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