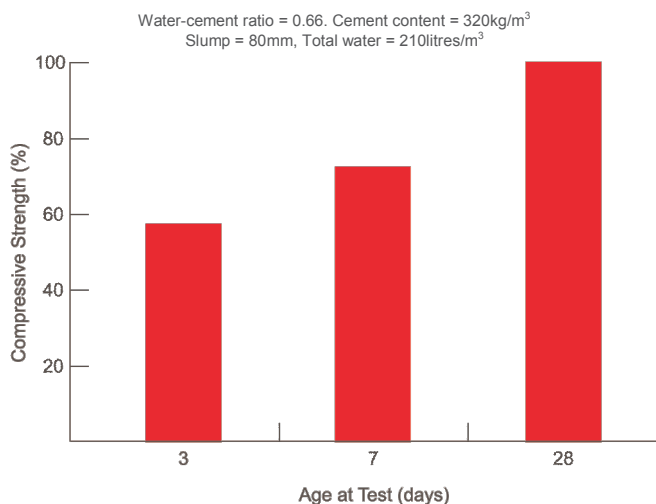


GP Cement is a general purpose portland cement primarily used for construction projects and in concrete product applications. It is also commonly used in concrete mortars and grouts where chemical attack is not a perceived risk. GP Cement complies with AS 3972.

Concrete Properties

Strength development. The strength development of GP Cement is primarily dependent on the water-cement ratio. Graph One gives indicative data on the strength development of concrete produced using GP Cement.



Note data is based on concrete mixes containing no admixtures or other cement extenders e.g. flyash, blast furnace slag. Use of such products will alter the strength development characteristics of concrete containing GP Cement.

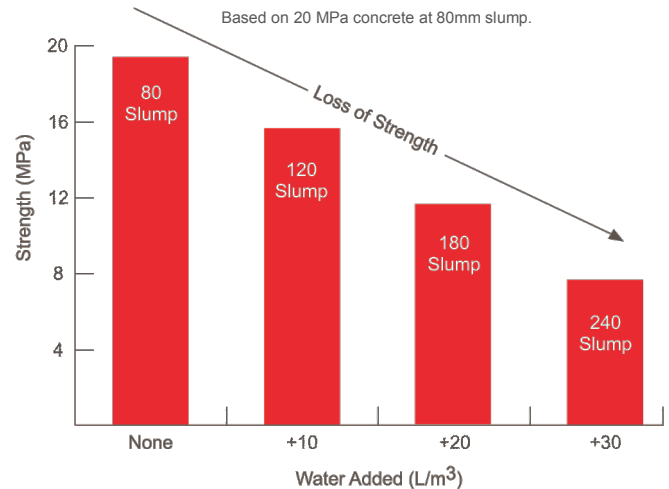
GRAPH ONE. Compressive Strength of GP Cement

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 the addition of water.

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

Other factors, which affect the strength and durability of concrete containing GP Cement, are:

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



Indicative representational only. Not to be used for calculation.

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

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 conditions.

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 pre-mix 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 will also affect other concrete properties including:

- Reduction in the potential for plastic cracking.
- Improvements in surface quality, durability, and impermeability.
- An improvement in abrasion resistance.
- Reduction in the carbonation rate.

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

Mortar Properties

Mix design. Mortar must comply with the requirements of AS3700 Masonry Structures and is classified as M2, M3, or M4. The following table provides typical mix proportions (by volume) for the use of GP Cement for each mortar type.

Mortar Type	GP Cement	Hydrated Lime	Sand
M2	1	2	9
M3	1	1	6
M4	1	0.5	4.5

Batching. AS 3700 requires batching to be carried out using buckets or other approved measuring devices.

Accurate measurement of each material, including water, is essential to produce a consistent product.

Additives. Hydrated lime is recommended to improve workability. If plasticisers are used they must be added strictly in accordance with the manufacturer's recommendations. A serious loss of bond strength may occur if substitutions are used or products overdosed.

Cement Properties

The following table provides an example of some typical cement properties of GP Cement manufactured by Sunstate Cement Ltd.

Property		GP Cement	AS3972
Setting Time	Initial	2 hrs	≥ 45 mins
	Final	3 hrs	≤ 6 hrs
Constancy of Volume (soundness test)		0 mm	≤ 5 mm
Fineness Index		390 m ² /kg	
Compressive Strength (Mortar)	3 day	36.0 MPa	
	7 day	49.0 MPa	≥ 35.0 MPa
	28 day	62.0 MPa	≥ 45.0 MPa

Compatibility

GP Cement may be blended with other cements complying with AS 3972. It also is suitable to blend with fly ash and/or blast furnace slag complying with AS 3582. GP 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 GP Cement 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 our website at www.sunstatecement.com.au or by contacting Sunstate Cement Ltd. on Tel 07 3895 9890.

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