

# General Blend

*Steel Cement is a Type GB general purpose blended cement complying with Australian Standard AS 3972 'Portland and Blended Cements'. Type GP cement and Ground Granulated Blast-furnace Slag (GGBS), selected for its particular mineral and chemical qualities, are processed and precision blended to produce a homogeneous cementitious product. Steel Cement is available in bulk tankers and bagged form and is a versatile and often superior alternative to Type GP cement capable of replacing it in most applications.*

*Steel Cement is manufactured in specially designed precision grinding and blending plants. The post blending operation ensures that tight controls are maintained over quality to produce a consistent product with predictable performance characteristics.*

## CONCRETE PROPERTIES

### Strength Development

Steel Cement's low heat generation during curing is an advantage where improved durability is required. Offsetting this is marginally lower early strength development than Type GP cements. The development of strength in Steel Cement is primarily dependent on the water to cement ratio see Fig 2. Fig 1 indicates the relative strength development in concrete produced using Steel Cement compared with Type GP cement. The compressive strengths at later stages are **significantly higher** than Type GP cement.

Less water is required to achieve the same consistency as concretes using Type GP cements. This is due to the improved particle shape of Steel Cement and the resultant higher paste volumes, which also assist workability.

Where higher early strengths are required, concrete mixes should be modified to give the desired result.

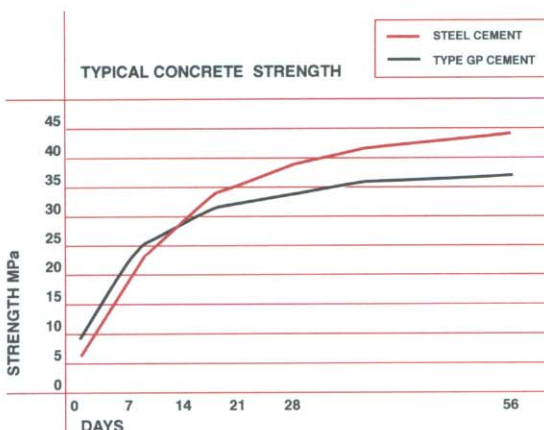


Fig 1

Standard laboratory mix and curing  
Water / cement ratio = 0.63, Slump = 80  
Cement content = 300kg/m<sup>3</sup>, No admixtures used

### Effect of Excess Water

Use only the minimum amount of water to mix and place the concrete. Fig 2 shows the reduction of compressive strength of concrete with increased water addition.

Other factors that have an affect on the strength and durability of concretes containing Steel Cement are:

- > Concrete mix design including admixtures
- > Temperature (ambient and materials)
- > Air content
- > Compaction of concrete
- > Curing
- > Concrete Mix design

When determining optimum cement contents, reference should be made to AS 1379 'Specification and supply of concrete'. The cement content for each grade of concrete will be dependent upon the nominated target strength.

AS 3600 'Concrete Structures' recommends minimum strength to achieve adequate concrete durability for more severe exposure conditions, eg exposure classification B1 (location close to the coast) requires a minimum compressive strength (F<sub>c</sub>) N32 Mpa.

Where concrete has a special requirement for resistance to sulphate or chloride attack Independent Cement should be contacted for further technical assistance.

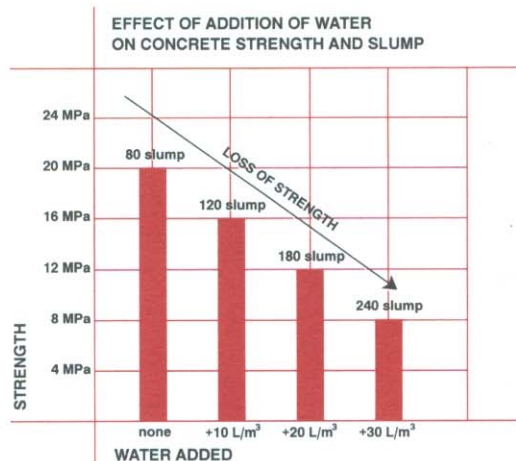


Fig 2

Indicative representation only. Not to be used for calculation.



## Mixing

AS 1379 gives requirements for material quality and mixing of ready-mixed concrete. Recycled water may be used only where testing can demonstrate compliance with the relevant section of AS 1379. Dissolved salts and organic matter may adversely affect the strength, durability and appearance of the concrete.

Sand contaminated with salt and organic matter may have a similar detrimental effect on concrete.

Where bags are used for site mixed concrete the following mix proportions are suggested.

Mix proportions by volume

APPLICATION	STEEL CEMENT	STONE or GRAVEL	SAND
High strength & watertight	1	3	2
General use: paths, floors, etc.	1	4	2.5
Foundations & large masses	1	5	3

Fig 3

## Placing

AS 3600 gives requirements for handling, placing and finishing concrete. Minimum cover to reinforcing is 20mm for lowest exposure classification. The cover will need to be increased where the concrete is cast against the ground, for fire resistance and for exposure classifications 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.

For normal concrete, curing can produce strengths 80% to 100% greater than concrete not subjected to curing. Water application or moisture retaining curing is more suitable for lower grades of concrete. For concrete of 40 Mpa and above, curing is equally important, however, the type of curing mechanism is believed to be less critical.

Proper curing can also affect other concrete properties:

- Reduction in potential for plastic shrinkage cracking
- Improvements in surface quality, durability and performance
- Improvement of abrasion resistance
- Reduction in carbonate rate.

Fig 4 provides examples of typical cement properties of Steel Cement.

## Compatibility

Steel Cement may be blended with other cements complying with AS 3972. It is also suitable for blending with fly ash and or blast furnace slag complying with AS 3582 provided the minimum proportion of Type GP cement is maintained (refer AS 3600).

Steel 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 Steel 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 Steel Cement be retested prior to use if the age of the cement exceeds three months.

### Handling

A Material Safety Data Sheet can be obtained from Independent Cement and Lime Pty Ltd.



## Typical Properties

The following table provides examples of some typical cement properties of Steel Cement supplied by Independent Cement and Lime Pty. Ltd.

PROPERTY	STEEL CEMENT	AS3972
SETTING TIME		
Initial	2-3 hours	45 mins (min)
Final	3.30-4.30 hours	10 hours (max)
SOUNDNESS	1mm	5.0mm (max)
FINENESS INDEX	390-450m <sup>2</sup> /kg	No Requirement
COMPREHENSIVE STRENGTH (MORTAR)		
3 Day	24-28 MPa	No Requirement
7 Day	37-41 MPa	25 MPa (min)
28 Day	56-60 MPa	40 MPa (min)
BULK DENSITY LOOSE COMPACTED	1.20 tonnes/m <sup>3</sup>	No Requirement

Fig 4

## Sales - Orders

Independent Cement and Lime Pty Ltd

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