Shrinkage Limited Cement

PRODUCT DATA SHEET

Shrinkage Limited Cement is a special purpose cement complying with AS 3972, Type SL. It is manufactured from specially prepared portland cement clinker and gypsum. It may contain up to 7.5% of AS 3972 approved additions.

USES

Shrinkage Limited Cement can replace General Purpose (GP) cement in all applications and should be used where a lower drying shrinkage is required. Shrinkage Limited Cement is commonly used in general and major construction projects and specialised applications such as concrete road construction.

- Parliament House, Canberra.
- Concrete for the F3 to Newcastle, Karuah bypass, Nabiac.
- Lawrence Hargrave Drive (Sea Cliff Bridges).
- Epping to Chatswood Rail Tunnel.

The following table provides an example of some typical cement properties for Shrinkage Limited Cement.

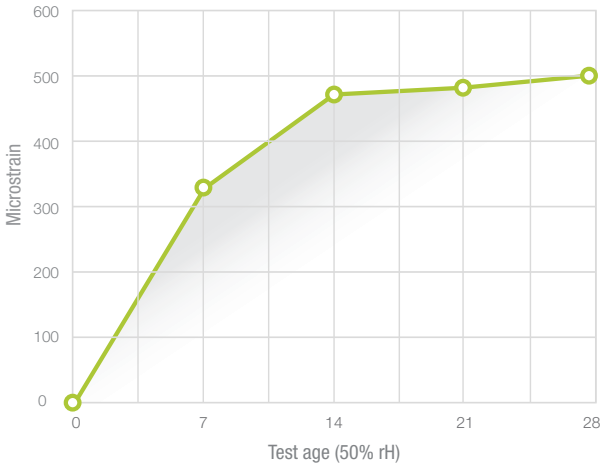
Shrinkage Limited Cement		AS 3972 SL
Setting Time:	**Typical:**	**Requirement:**
Initial	1.5-3 hours	45 minutes minimum
Final	2.5-4 hours	10 hours maximum
Soundness:	1.0mm	5.0mm maximum
Fineness Index.	370-430	
Drying Shrinkage	550ustrain	750ustrain
Sodium Equivalent		
Alkali Content	0.35%	Not specified
Comp. Strength		
3 day	32-39 MPa	Not specified
7 day	44-52 MPa	35 MPa minutes
28 day	57-64 MPa	45 MPa minutes

CEMENT DRYING SHRINKAGE

The contribution of cement to concrete drying shrinkage depends on many factors, including the chemical composition and the fineness of cement. Both the fineness and the chemical composition of Shrinkage Limited Cement are controlled to minimise the shrinkage.

When tested to AS 2350.13 test procedures, Shrinkage Limited Cement drying shrinkage is well within the maximum AS 3972 value of 750 microstrain at 28 days. The following chart gives an indication of mortar bar shrinkage rate of Shrinkage Limited Cement.

Mortar Shrinkage – SL Cement.



COMPATIBILITY

Shrinkage Limited Cement may be mixed or blended with other cement complying with AS 3972. It may also be mixed with appropriate quantities of any supplementary cementitious materials (SCMs) complying with AS 3582 (fly ash, slag or amorphous silica). Reference to AS 1379 (concrete) and AS 3600 (structures) is required.

Shrinkage Limited Cement is compatible with chemical admixtures complying with AS 1478.1 – Blending of SCMs, other cements or materials will alter the strength and shrinkage characteristics of Shrinkage Limited Cement.

CONCRETE PROPERTIES

The composition of Shrinkage Limited Cement is formulated to deliver lower drying shrinkage. However, careful consideration must be given to the mix design and the choice of aggregates and admixtures for maximum shrinkage reduction.

For a typical Sydney Metropolitan 20/10mm crushed river + dune sand mix design with 330kg of cement and WR admixtures, the following performance can be expected.

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BORAL

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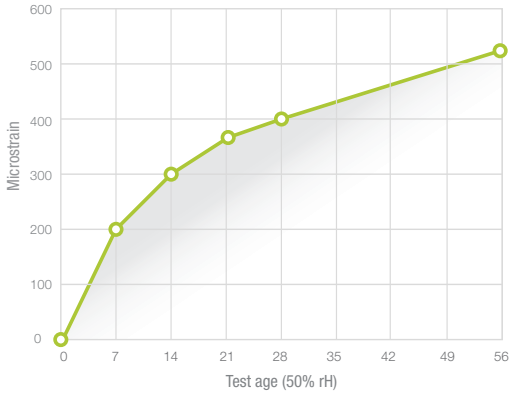
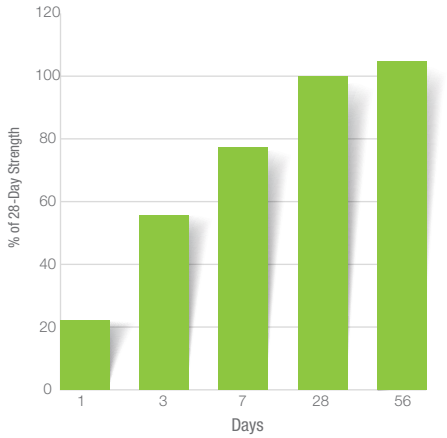
Concrete Drying Shrinkage - SL Cement



Data based on a typical 20mm Crushed River Gravel/River+ Dune sand mix with 330kg/m3 of SL Cement, WR and AEA concrete admixtures.

Rate of strength development of SL Cement

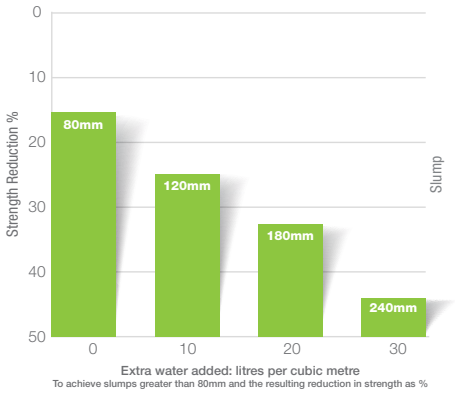


The graph above gives an indication of the rate of strength development of Shrinkage Limited Cement as a percentage of 28-day compressive strength.

EFFECT OF EXCESS WATER

Use only the minimum amount of water to mix and place concrete. Excess water will have a detrimental effect on the compressive strength and other properties of concrete. The following graph shows the reduction in concrete strength with increased water addition.

Effect of Addition of Excess Water on Concrete Strength & Slump



Other factors that will influence the strength and durability of concrete containing Shrinkage Limited Cement are:

- Mix design, including admixtures.
- Temperature – ambient and that of materials.
- Air content.
- Compaction of concrete.
- Curing of concrete.

MIXING DESIGN

Dense, fully compacted concrete of low permeability is essential to minimise shrinkage and maximise the durability. Careful selection of mix components is essential and reference should be made to AS 1379 - The Specification and Manufacture of Concrete and AS 3600 – Concrete Structures when selecting the required strength and cement levels appropriate for the project.

MIXING

AS 1379 gives requirements for material quality and mixing of ready-mixed concrete. Presence of salts and organic matter in aggregates and mixing water may affect concrete performance and relevant requirements of AS 1379 must be observed.

PLACING

AS 3600 gives requirements for handling, placing and finishing of concrete. Exposure classification usually determines both the quality of concrete and the depth of cover to reinforcement. Appropriate selection of the exposure classification is critical. Full compaction of concrete is a must for maximising the strength and durability potential of concrete.

PLASTIC SHRINKAGE

Plastic shrinkage cracking can be avoided by protecting freshly placed concrete from excessive moisture losses from the surface. Application of evaporation retarding compounds (aliphatic alcohols) is recommended in dry and/or windy weather, irrespective of temperature conditions.

CURING

A minimum curing period of seven days or longer, depending on the exposure classification, is required and should begin as soon as practicable. Wet or moist curing is recommended, but other techniques may be suitable, including curing compounds to AS 3799 or polyethylene sheeting.

Concrete will benefit from curing in terms of:

- Reduction in the potential for plastic shrinkage cracking.
- Improved surface quality with respect to abrasion resistance, permeability to air, water or aggressive solutions.
- Improved carbonation resistance.
- Increased compressive and flexural strength.
- Reduced drying shrinkage.

AVAILABILITY

Shrinkage Limited Cement is available in bulk only. Please contact us for bagged alternatives to Shrinkage Limited Cement.

STORAGE

The “shelf life” of Shrinkage Limited Cement is dependent on the storage conditions, as contact with air and moisture will cause deterioration in cement performance. Cement storage silos must be kept in good repair, with no damp air or moisture ingress. It is recommended that Shrinkage Limited Cement be re-tested if the age of cement exceeds three months.

SAFE HANDLING

This product contains cement chemicals and trace amounts of hexavalent chromium. Avoid generating dust. Use personal protection equipment against exposure and alkali burns. Wash product off unprotected skin immediately with water. The use of goggles, dust masks, barrier creams and rubber gloves is recommended. For further safety information consult the Safety Data Sheet for the product.

The information in this Data Sheet and any advice given should be viewed as a guide only. Boral makes no guarantee of the accuracy or completeness of the information and recommends you conduct your own testing to determine suitability for your specific purpose. Boral, the Boral logo, Build something great and Blue Circle are trade marks or registered trade marks of Boral Limited in Australia, other countries, or both. Particular projects may require the use of specific construction techniques or products. Boral recommends obtaining technical advice prior to construction. To ensure the information you are using is current, Boral recommends you review the latest building information available on the Boral website.
BCC16731 Sep19

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