Low Heat Cement

PRODUCT DATA SHEET

Low Heat (LH) Cement complies with AS 3972, Special Purpose Type LH. It is manufactured from the ingredients of specially selected cement clinker, gypsum and ground granulated blast furnace slag, which result in significantly lower heat generation during the process of hydration than in a typical Portland cement.

USES

LH Cement is recommended for use in mass concrete where reduced heat liberation is important. Due to its superior resistance to both sulphate and chloride salt attack, LH cement may also be used in aggressive sulphate-rich environments or where increased resistance to salt attack is required. Where concrete is expected to be in contact with sulphates or other aggressive salts or solutions, analytical surveys must be completed and appropriate grade of concrete selected. As with Portland cements, the resistance to acid solutions is limited, but concrete life expectancy will be maximised by using **LH Cement** at high cement content and low water to cement ratio in fully compacted and cured concrete.

CEMENT PROPERTIES

The following table provides typical example of **LH Cement** physical properties.

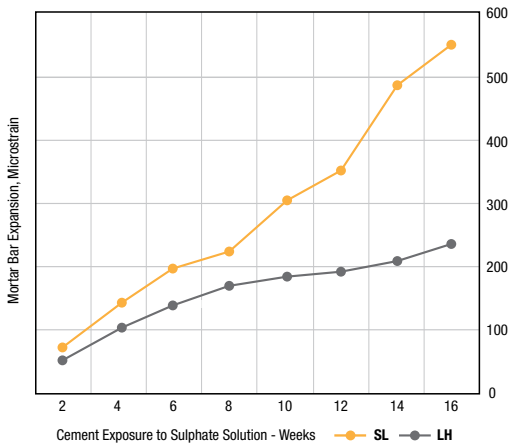
Low Heat Cement		AS 3972LH/SR
Setting Time:	**Typical:**	**Requirement:**
Initial	2 - 4 hours	45min min
Final	4 - 6 hours	10hrs max
Soundness:	1.0mm	5.0mm max
Sulphate Resist.	150-250m strain	900mstrain max
Peak Temp. Rise	20-22 deg.C	23 degrees C
Comp. Strength:		
Mortar Prism:		
7 day	22 - 27 MPa	10 MPa min
28 day	45 - 55 MPa	30 MPa min

COMPATIBILITY

LH Cement can be mixed with other AS 3972 compliant cements or AS 3582 compliant SCMs but this practice is not recommended as this may adversely alter strength, heat evolution properties or other durability parameters. **LH Cement** is compatible with admixtures complying with AS 1478.

SULPHATE RESISTANCE

LH Cement complies with AS 3972 requirements of Type SR cement. Australian Standard AS 3972 specifies an upper limit of 900 microstrain expansion in Mortar Bar test for Type SR cement. Typically, Low Heat Cement mortar bar expansion is below 250 microstrain. The following graph demonstrates the SR performance of **LH Cement** relative to a General Purpose/SL cement.



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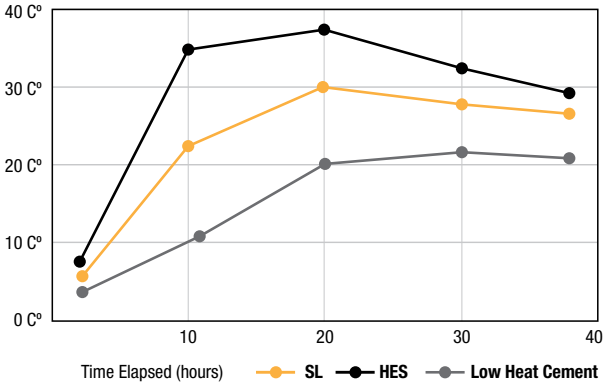
HEAT EVOLUTION

Australian Standard AS 3972 limits the peak temperature rise of Type LH cement to below 23 degrees when tested in accordance with AS 2350.7 – Langavant Test. **Low Heat Cement** Peak Temperature Rise is typically under 22 degrees C, and heat evolution rate is significantly lower than in the conventional Portland cements.

The following graph demonstrates the heat evolution of Shrinkage Limited (SL), High Early Strength (HES) and Low Heat Cements.

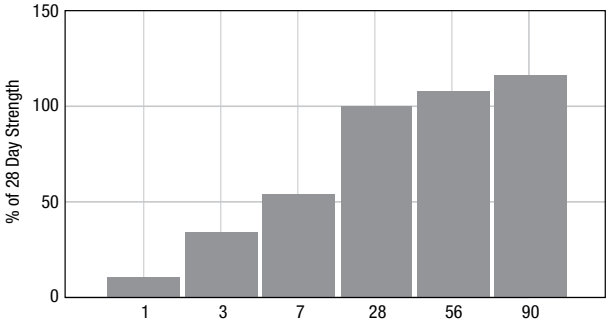


CONCRETE PROPERTIES

The composition of **Low Heat Cement** is formulated to deliver lower heat of hydration and superior sulphate resistance. This results in slower strength development by the Low Heat Cement, with significantly lower early age strength, but a greater potential for later age strength development. Typically the early age strength of concrete containing **Low Heat Cement** may be half that of similar concrete containing General Purpose cement at the same water to cement ratio, but the later age strength will not be significantly lower.

The following graph gives an indication of the rate of strength development of **Low Heat Cement**.

Rate of strength development of Low Heat Cement



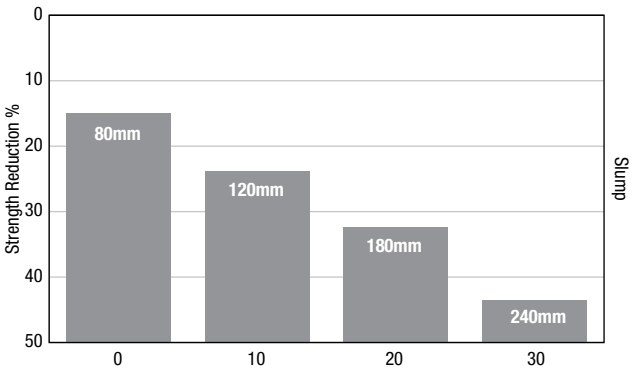
EFFECT OF EXCESS WATER

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.

Other factors that will influence the strength and durability of concrete containing Low Heat Cement are:

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

Effect of Addition of Excess Water on Concrete Strength & Slump



To achieve slumps greater than 80mm and the resulting reduction in strength as %

MIX DESIGN

Dense, fully compacted concrete of low permeability is essential to minimise the aggressive effects of sulphate and chloride attack. 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 sulphate concentration.

Where the total sulphuric anhydride (SO3) lies between the limits listed below, the minimum cement levels and the maximum free water-to-cement ratio limits must be observed.

Parts per mill. of SO_3		Min Cement Content	Max W/C
In dry soils	In clays & ground water		
2000-5000	300-1200	340Kg/m^3	0.55
5000-10000	1200-2500	370Kg/m^3	0.50
10000-20000	2500-5000	410Kg/m^3	0.45

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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 AS1379 must be observed.

PLACING

AS3600 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 therefore critical.

CURING

A minimum curing period of 7 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 shrinkage cracking potential, improved surface quality with respect to abrasion resistance, permeability to air and water and improved carbonation resistance.

AVAILABILITY

Low Heat Cement is available in bulk only. For applications with restricted heat evolution requiring bagged product, Special Purpose Cement should be used. Details on the price and availability of the product uponrequest by contacting the Sales Manager on the numbers listed.

STORAGE

The "shelf life" of **Low Heat 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 **Low Heat Cement** be retested 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 **Material Safety Data Sheet** for the product.

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Boral Cement
ABN: 62 008 528 523

NSW and ACT
Triniti 2, 39 Delhi Road
North Ryde
NSW 2113
PO BOX 6041, North Ryde
NSW 2113
Telephone: (02) 9033 4000

Victoria and Tasmania
Telephone: 1800 673 570

Product Support
Telephone: 1800 721 258

www.boral.com.au