BORAL CEMENT

Product Data Sheet

Low Heat Cement

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

APPLICATIONS

Low Heat 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, Low Heat 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 Low Heat Cement at high cement content and low water to cement ratio in fully compacted and cured concrete.

PROPERTIES

The following table provides typical example of Low Heat Cement physical properties.

Property	AS 3972 LH/SR	
Setting Time	Typical	Requirement
Initial	2-4 hours	45 minutes min.
Final	4-6 hours	10 hours max.
Soundness	1.0mm	5.0mm max.
Sulphate Resist.	150-250με	750με max
Peak Temp. Rise	20-22°C	23°C
Comp. Strength:		
7 days	25-35 MPa	10 MPa min
28 days	45-55 MPa	30 MPa min

COMPATIBILITY

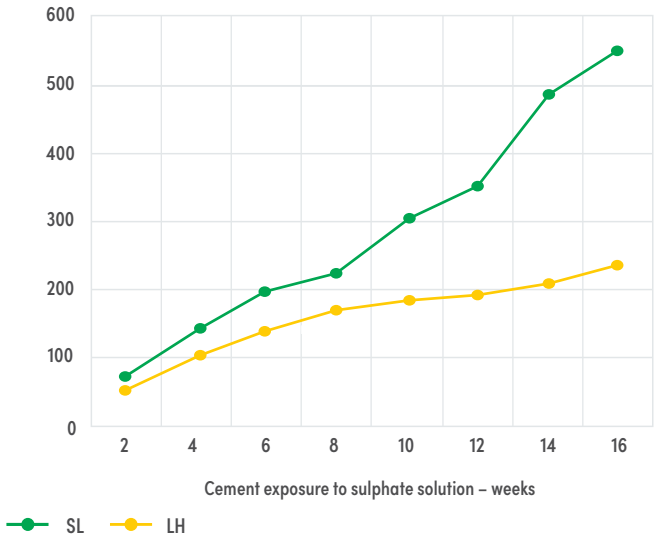
Low Heat Cement can be mixed with other AS 3972 compliant cements or AS 3582 compliant supplementary cementitious materials, but this practice is not recommended because this may adversely alter strength, heat evolution properties or other durability parameters.

Low Heat Cement is compatible with admixtures complying with AS 1478.

SULPHATE RESISTANCE

Low Heat Cement complies with AS 3972 requirements of Type Sulphate Resisting cement. Australian Standard AS 3972 specifies an upper limit of 750 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 Low Heat Cement relative to general purpose or shrinkage limited cement.



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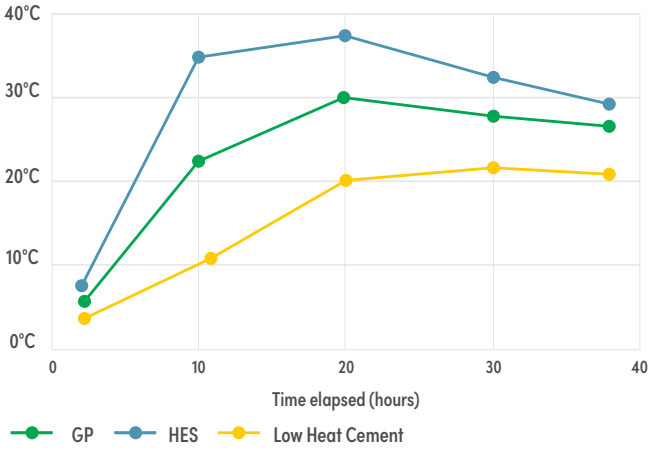
HEAT EVOLUTION

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 Celsius and heat evolution rate is significantly lower than in the conventional portland cements.

Heat evolution of GP/SL, High Early Strength (HES) and Low Heat Cements.

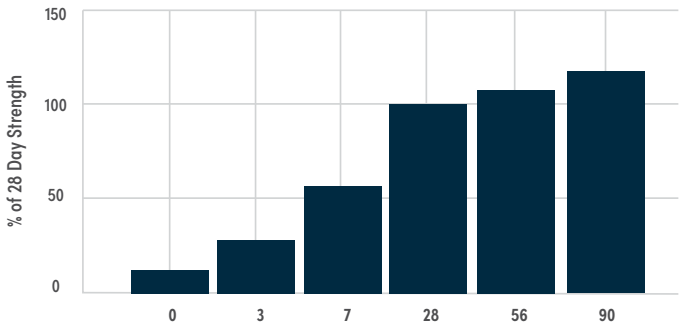


CONCRETE PROPERTIES

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.

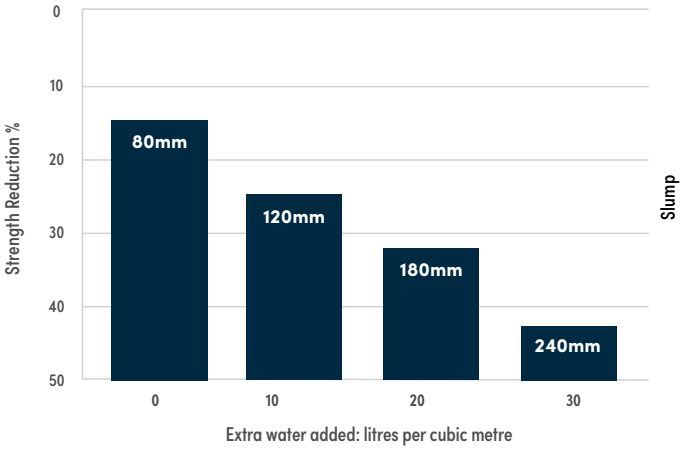
The following graph gives an indication of the rate of strength development of Low Heat Cement.

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.



Effect of Addition of Excess Water on Concrete Strength & Slump

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

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

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 million of SO_3		Min Cement Content	Max W/C
In dry soils	In clays and ground water	6	1
2,000-5,000	300-1200	340kg/m^3	0.55
5,000-10,000	1,200-2,500	370kg/m^3	0.50
10,000-200,00	2,500-5,000	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 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 therefore critical.

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 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, Blue Circle® Builders Cement should be used. Details on the price and availability of the product upon request by contacting the Sales Manager.

STORAGE

The "shelf life" of Low Heat Cement is dependent on the storage conditions because 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 may contain small amounts of Respirable Crystalline Silica and trace amounts of hexavalent chromium.

Avoid generating dust wherever possible. Use dust capture or otherwise use in well ventilated areas.

Use personal protection equipment against exposure and alkali burns.

The use of goggles, well-fitted P2 dust masks or better, barrier creams and rubber gloves is recommended. Wash product off unprotected skin immediately with water.

For further safety information consult the Safety Data Sheet for the product available at **www.boral.com.au/cement**

IMPORTANT NOTE

The information and/or specifications contained herein are given in good faith as being true and accurate but no liability is accepted by us, our employees, distributors, representatives, or agents for any loss or damage, direct or indirect, resulting from using the information, following the specifications or adopting recommendations and/or suggestions as actual conditions of use are beyond our control.

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