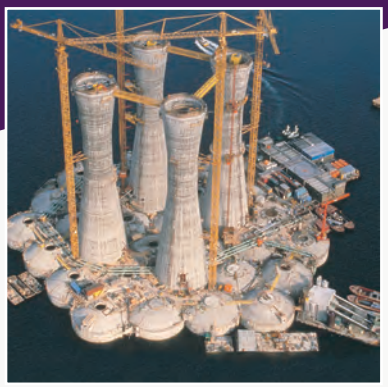
Sulfate Resisting Cement

CEMENT AUSTRALIA

Ideal in dockland or wharf surroundings

Minimises the risk of sulfuric acid attacks in sewerage works

Minimises the risk of corrosion of reinforced steel in saltwater environments



Sulfate Resisting Cement

Sulfate Resisting Cement is a blended cement designed to improve the performance of concrete where the risk of sulfate attack may be present. It also provides improved durability for concrete in most aggressive environments, reducing the risk of deterioration of the structure and structural failure.

A properly designed concrete for use in aggressive environments needs to have an appropriate cementitious content, a low water:cement ratio, and be well compacted and cured. It is recommended that specialist advice be obtained during the project design stage to ensure that the concrete is adequate for the expected service.

A concrete designed to provide improved sulfate resistance should have greatly reduced permeability which should also provide increased resistance to the penetration of chloride ions, reducing the risk of corrosion in reinforcing steel.

Sulfate Resisting Cement complies with the requirements specified in Australian Standard 3972 for Type SR cement. It also complies with AS 3972 requirements for Type SL (Shrikage Limited) cement.

Unique product benefits

- Provides maximum resistance to chloride ions - minimising the risk of corrosion of reinforced steel
- Provides high level of concrete performance and structural integrity in highly aggressive sulfate and acidic environments
- Increased workability and pumpability
- Significantly improved later-age concrete strengths

Product applications

To minimise the risk of chemical attack resulting in concrete deterioration and structural failure, Sulfate Resisting Cement should be specified in the following applications:

- Abattoirs, piggeries, feedlots and food processing plants
- Geothermal areas
- Sewerage treatment plants
- Mines and other acidic soil environments
- Dairying, forestry, fishing and other environments with structures susceptible to chemical attack

To minimise the risk of chloride induced corrosion in reinforcing steel and to ensure long-term durability, Sulfate Resisting Cement should be specified in the following applications:

- Wharfs and marinas
- Sea walls, dams and reservoirs
- Water and sewage pipelines and treatment plants
- Off-shore platforms
- Bridges and any other submerged structures in tidal and splash zones

Sulfate Resisting Cement is a specially blended cement designed to improve the performance of concrete in sulfate environments and help improve durability.

Where specific properties such as high early strength or rapid setting are of primary importance an alternative cement should be considered.

Sulfate Resisting Cement Properties

The following table details the relevant specified requirements of AS3972 and the indicative values achieved by Sulfate Resisting Cement.

Property		AS3972 Type SR	Indicative Sulfate Resisting
Setting Time	Min	45min	125-200 min
	Max	10 hrs	3-5 hrs
Soundness	Max	5 mm	< 1mm
SO_3	Max	3.50%	< 2.0%
ISO Mortar Compressive Strength	3 Day (min)	–	15-30 MPa
	7 Day (min)	20 MPa	25-35 MPa
	28 Day (min)	35 MPa	50-55 MPa
Expansion (in Sulfate solution)	max	750µS	100-350µS

All testing is conducted in accordance with the relevant Australian Standard test methods, at a NATA registered laboratory.

Sulfate Resisting Cement meets the requirements of AS3972 for classification as both Shrinkage Limited (Type SL) and a Sulfate Resisting (Type SR) cement. However use of this product does not guarantee sulfate resisting or low shrinkage concrete as there are other factors which may influence concrete performance including cementitious content, water to cement ratio, compaction and curing as well as aggregate type. Further advice should be sought on the use of this product where high performance requirements exist.

Compatibilities

Sulfate Resisting Cement is compatible with:

- Admixtures that comply with **AS 1478 – Chemical Admixtures for Concrete**.
- Fly ashes complying with **AS 3582.1 – Supplementary Cementitious Materials for Use with Portland cement: Fly ash**.
- Ground granulated blast furnace slags complying with AS3582.2 - **Supplementary cementitious materials for use with Portland cement: Slag - ground granulated Iron blast-furnace.**
- Amorphous Silica complying with AS3582.3 - **Supplementary cementitious materials for use with Portland cement: Amorphous silica.**
- Other cements complying with AS3972 - **Portland and blended cements.**

Caution: Sulfate Resisting Cement must not be mixed with high alumina cement as this may result in uncontrollable expansion and setting times.

Mix Design

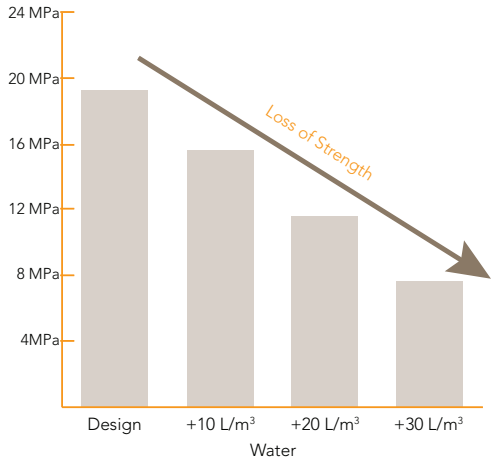
The proportioning of constituent materials in a concrete mix is a complicated matter which can be influenced by many factors. We recommend that trials be conducted with the available materials to ascertain optimum cement contents for specific classes of concrete. For further guidance on this issue please refer to AS1379 – **The specification and manufacture of concrete and AS3600 – Concrete structures.**

Concrete Properties

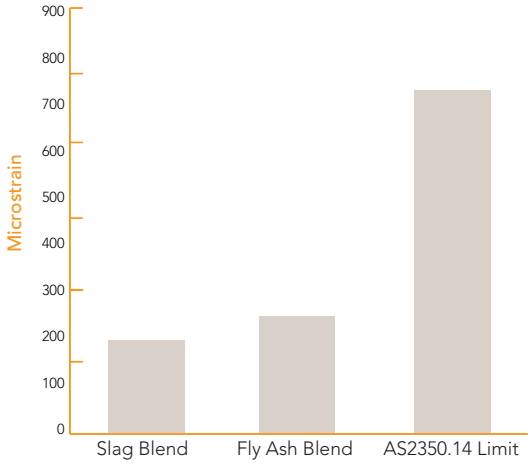
Compressive Strength Development

Strength development in Portland cement concrete is affected by a number of factors such as the physical and chemical properties of the cement, water to cement ratio, admixtures, curing and environmental conditions. The following graph depicts indicative compressive strength development for Sulfate Resisting Cement.

Effect of Excess Water Addition on Concrete Compressive Strength



16 Week Mortar Bar Expansion in Sulfate Solution (As per AS2350.14)



Workability / Setting Times

Concrete produced with a Sulfate Resisting cement may require less water to achieve a specified level of workability when compared to concrete produced with a Type GP cement. Setting times may also be significantly extended when using Sulfate Resisting Cement.

Curing

A minimum curing period of seven days is recommended for all exposure classifications. Concrete should be maintained in a continually moist condition wherever practicable. Water sprays, wet sand or moisture retaining techniques, such as clear polyethylene sheets or curing compounds are recommended. Curing should begin upon the completion of surface finishing or in accordance with manufacturers instructions where proprietary curing compounds are used.

For normal class concrete, curing can produce a compressive strength up to 100% greater than concrete not subjected to curing. Water application or moisture retaining curing is more effective for lower grades of concrete.

Curing will also beneficially affect other concrete properties including:

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

For further information

Please contact Cement Australia's Customer Support Services:

Tel: 1300 236 368
Fax: 1800 236 329
Email: 1300cement@cemaust.com.au

Storage, Handling and Safety

The 'shelf life' of Portland cement products is dependent on the storage conditions. It is recommended that Portland cement products be re-tested prior to use if the age of the cement exceeds three months.

Portland cement products are highly alkaline materials and are significantly affected by exposure to water. Full Safety, Storage, Handling and Disposal information is available in the specific product Material Safety Data Sheet available on www.cemaust.com.au

Product Disclaimer

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