Hanson Sulfate-Resisting Cement
Technical Data Sheet

DESCRIPTION

Hanson Sulfate-Resisting Cement is a packed factory produced Portland blast furnace cement manufactured to the requirements of BS EN 197-1 CEM III/A strength class 42,5L. It also has sulfate-resisting properties and has the designation 'CEM III/A +SR' as set out in BS 8500 Part 2 'Concrete – Complementary British Standard to BS EN 206-1 Part 2: Specification for constituent materials and concrete' – Table 1 – General purpose cements and combinations.

Sulfates which may occur in soil and groundwater react with the tri-calcium aluminate (C_3A) present in most Portland cements causing expansion and ultimate deterioration of the concrete. In order to minimise the risk of this reaction Hanson Sulfate-Resisting Cement is manufactured with reduced levels of C_3A, thus ensuring that it meets the +SR requirements of BS 8500.

Hanson Sulfate-Resisting Cement also has a reduced effective alkali content, which allows it to be used with high-alkali reactivity aggregates, including recycled aggregates.

APPLICATIONS

Sulfate-resisting cement is recommended for use in all concrete, mortar and grout below ground or where sulfates are present in concentrations likely to lead to deterioration as described previously (except for class DC-4m).

Marine Concrete: The use of Hanson Sulfate-Resisting Cement improves the durability of concrete in marine environments.

Low heat: The use of Hanson Sulfate-Resisting Cement reduces the heat evolution of concrete for a given cement content, and is certified as a low-heat cement.

Alkali-silica reaction: The use of Hanson Sulfate-Resisting Cement minimises the risk of alkali-silica reaction. For further information see BS 8500 and 'Building Research Establishment Digest 330 alkali-silica reaction in concrete' (2004 edition).

CHARACTERISTICS

The characteristics and workability of Hanson Sulfate-Resisting Cement compared to Portland cement (CEM I) concrete mixes at the same cement content and workability give:

- similar 28-day strength
- higher strength gain past 28 days
- similar water demand
- improved workability retention
- improved chloride resistance
- lighter-coloured concrete.

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Hanson Sulfate-Resisting Cement also:

- meets the requirements of Building Research Establishment Special Digest 1 for all sulfate conditions except class DC-4m
- meets the requirements of BS 8500 Concrete – Complementary British Standard to BS EN 206-1.

TYPICAL PRODUCT TECHNICAL DATA

Property		
GGBS content	42 – 48%	
Bulk density	Loose	1000 – 1200 kg/m³
	Compacted	1200 – 1400 kg/m³
Sulfate	SO_3	≤ 3.00%
Chloride	Cl-	≤ 0.05%
Setting time	Initial	170 – 240 minutes
Strength	1 day	4 – 8 N/mm²
	2 day	10 – 16 N/mm²
	7 day	26 – 34 N/mm²
	28 day	48 – 56 N/mm²

QUALITY

Hanson Sulfate-Resisting Cement is produced using carefully selected raw materials. Strict quality control throughout each stage of the manufacturing process ensures that a consistent final product is achieved.

Hanson Sulfate-Resisting Cement is CE marked under the Construction Products Regulations which provides independent third party certification of product conformity. It confirms that in addition to applying a system of factory production control (defined in BS EN 197-2), independent sampling and testing of the cement has confirmed its compliance with all of the requirements of BS EN 197-1.

Concrete mix design needs to be varied to suit individual circumstances. For further advice please call the Hanson Cement Customer Services on **0330 123 2074.** Reports of tests providing chemical and physical data are available upon request.

STRENGTH

Ultimate concrete strengths using Hanson Sulfate-Resisting Cement are similar to those obtained with other cements classified as 42,5N, however early-age strengths are likely to be lower. It is therefore recommended that prior to full-scale production, trial mixes are carried out to ensure all requirements for the mix are fulfilled.

The potential strength of Hanson Sulfate-Resisting Cement (or any Portland cement-based product) will only be best developed under saturated conditions. Loss of any water to the surroundings should be guarded against and for a period of at least seven days precautions should be taken to keep the concrete moist and to prevent premature drying. The rate of strength development will depend on ambient conditions and the initial temperature of the mix. As a general rule, concrete should be used within the range of 10°C to 30°C.

CURING METHODS

The term 'curing' refers to methods to prevent loss of moisture from exposed surfaces of concrete in the first 7 days after casting. The following are the most common methods:

- Covering with impermeable sheeting ensuring that the edges are held down.
- Covering with wet sacking but this must be kept wet by spraying with clean water.
- Ponding with clean water.
- Spaying with a propriety curing membrane preferably pigmented to ensure full coverage.

Freshly exposed concrete produced using Hanson Sulfate-Resisting Cement may exhibit a blue-green colouration after hardening. This is not uncommon and will disappear after a short time, resulting in a lighter colour associated with Hanson Sulfate-Resisting Cement. Once gone, the blue-green colouration will not return.

WORKMANSHIP

The final finish of materials made with Hanson Sulfate-Resisting Cement will depend upon the operative having the required skills and familiarisation with the materials used. A good understanding of the application is also required.

CONCRETE MIX DESIGN

Soils containing sulfates of either a geological or industrial origin will have been identified in a full pre-contract site investigation. It is therefore necessary to use the correct concrete quality, the correct cement content and appropriate type to prevent deterioration. Dense, impermeable concrete is vital where sulfates are present. Thorough compaction and adequate curing are essential to achieve the best results for long-term durability. Generally the following concrete qualities should be adopted:

Limiting values for concrete resistant to sulfates using Hanson Sulfate-Resisting Cement			
DC Class	Maximum free water/cement ratio	Minimum cement content (kg/m³) 20mm aggregate	Minimum cement content (kg/m³) 10mm aggregate
DC1	No requirement	No requirement	No requirement
DC-2	0.50	340	380
DC-2z	0.55	320	360
DC-3	0.40	380	380
DC-3z	0.50	340	380
DC-4	0.35	380	380
DC-4z	0.45	360	380
DC-4m	Not recommended	Not recommended	Not recommended

Extract from Table 6 – Limited values of composition and properties where a DC Class is specified BS 8500-2

It is strongly recommended that trial mixes are carried out prior to commencement of work to ensure that the mix design and material combinations meet the requirements of the specification and method of use.

ADMIXTURES AND ADDITIONS

Most admixtures such as air-entraining agents and workability aids are compatible with Hanson Sulfate-Resisting Cement. It is strongly recommended that trial mixes are carried out to determine optimum proportions.

Hanson Sulfate-Resisting Cement should not be mixed/blended with additions or other cement types.

SHELF LIFE

Sulfate-resisting cement is compliant with the Chromium (VI) Directive and should be used within the declared shelf-life shown on the bag.

AVAILABILITY

Available in 25kg bags.

For further information contact:

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