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## Hanson Portland-limestone Cement technical data sheet

Hanson Portland-limestone Cement (PLC) is manufactured to conform to the requirements of BS EN 197-1 : 2000 CEM II/A-LL 32,5/42,5.

PLC is recommended both as a pre-cast cement and as a general purpose cement for use in concrete, mortar, render, screed and grout.

Hanson uses the most efficient dry-process kilns to manufacture cement, the benefit of which includes lower energy consumption. These burn up to 60% recycled and non-fossil fuels and use waste as a source of raw material – all of which would otherwise go to landfill or incineration. Hanson is the lowest emitter of carbon dioxide per tonne of cement in the UK and is committed to further reductions into the future.

PLC is a CEM II cement which enhances sustainability through the use of carefully selected raw materials, further reducing the carbon footprint of the cement.

### Applications

PLC is ideal for the pre-cast industry and for general purpose use in a wide range of applications. These include the majority of concretes, mortars, renders, screeds and grouts; covering lean mixes through general purpose ready-mix to pre-cast concrete and pre-cast concrete products. It is especially beneficial for its finishing characteristics in pre-cast concrete.

PLC is suitable for use with a wide range of additives and admixtures to extend the properties and uses of concretes. In ground conditions requiring increased resistance to chemical attack please refer to the recommendations of BD 8500. For higher early strengths Hanson Rapid Hardening Portland Cement is recommended.

### Quality

PLC is produced using carefully selected cement raw materials and the inclusion of a strictly controlled amount of finely divided limestone. Strict quality control throughout each stage of the manufacturing process ensures that a consistent final product is achieved.

PLC is CE marked under the European Union system of conformity evaluation 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 conformity with all the requirements of BS EN 197-1 (See Quality Assurance).

For further advice please contact Hanson Cement's Technical Helpline on 0845 722 7853. Reports of tests providing data on fineness, setting times, soundness, chemical composition including alkali levels and compressive strengths of mortar prisms, are available.

### Typical product technical data

| Property*                  |                                 |                              |
|----------------------------|---------------------------------|------------------------------|
| Filler Content             |                                 | 6 – 20%                      |
| Bulk density               | Fresh blown                     | 900 – 1100kg/m <sup>3</sup>  |
|                            | Settled                         | 1100 – 1350kg/m <sup>3</sup> |
|                            | Compacted                       | 1350 – 1450kg/m <sup>3</sup> |
| Chemistry<br>(Main Oxides) | CaO                             | 60 – 70%                     |
|                            | SiO <sub>2</sub>                | 15 – 25%                     |
|                            | Al <sub>2</sub> O <sub>3</sub>  | 3 – 5%                       |
|                            | Fe <sub>2</sub> O <sub>3</sub>  | 2.0 – 3.5%                   |
|                            | MgO                             | 0.5 – 1.5%                   |
| Sulfate                    | SO <sub>3</sub>                 | Less than 3.5%               |
| Chloride                   | Cl                              | Less than 0.05%              |
| Declared Mean Alkali       | Na <sub>2</sub> O <sub>eq</sub> | Less than 0.75%              |
| Colour                     | Tri-stimulus 'Y'                | 25 – 40                      |
| Surface area               |                                 | 350-550 m <sup>2</sup> /kg   |
| Setting time               |                                 | 100 – 200 minutes            |
| Strengths                  | 2 days                          | 15 – 30MPa                   |
|                            | 7 days                          | 20 – 45MPa                   |
|                            | 28 days                         | 40 – 60MPa                   |

\* For individual works data, contact Castle's Technical Helpline on 0845 722 7853.

### Performance

Optimum performance in terms of strength and durability is achieved in concrete when the water content is kept as low as possible, consistent with ensuring satisfactory placing and thorough compaction.

Other factors affecting performance include conditions of curing as well as the individual properties of the constituent materials and their proportions in the mix.

The potential performance of any Portland cement based product will only be best developed under saturated conditions. Appropriate curing is necessary for optimum performance. 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 placed within the range of 10°C to 30°C. In cold weather, freshly poured concrete should be protected against frost to avoid damage. At higher temperatures concrete should be protected to avoid increased risk of loss of water by evaporation, which may lead to cracking caused by drying shrinkage and thermal stresses, and reduced ultimate performance and strength.

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## Concrete mix design

Concrete mix design needs to be varied to suit individual circumstances. To obtain the necessary performance the mix design should take into consideration the recommendations of the following standards:

- BS EN 206-1 Concrete. Specification, performance, production and conformity
- BS8500 Concrete. Complementary British Standard to BS EN 206-1

Concrete produced using PLC should have similar strength characteristics to Portland cement of the same grade. 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.

The potential strength of any Portland cement based product will best develop under conditions where loss of mixing water is minimised during initial hardening.

Appropriate curing for optimum performance is essential as well as preventing moisture loss to the surrounding materials.

## 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 insuring that the edges are held down
- Covering with wet sacking but this must be keep wet by spraying with clean water
- Ponding with clean water
- Spaying with a propriety curing membrane preferably pigmented to ensure full coverage

## PLC in mortars, renders and screeds

PLC is suitable for use in a wide variety of mortars for the jointing of brick and blockwork, floor screeds, and renders for internal and external applications. The performance of mortars will depend on the properties of the sand, mix design and site practice. Technical advice on the use of PLC in mortars is available on request from Castle's Technical Helpline on 0845 722 7853.

To obtain the necessary performance the mix design should take into consideration the recommendations of the following standards:

- BS5628 : Part 3 Use of Masonry
- BS EN 13914 Render Code of practice
- BS8000-10 Workmanship on building sites. Code of practice for plastering and rendering
- BS8000-9 Workmanship on building sites. Code of practice – Cementitious levelling screeds and wearing screeds

## Admixtures and additions

Admixtures such as air entraining agents and workability aids, additions such as ground granulated blastfurnace slag and Castle BS EN 450 Fly Ash, are compatible with PLC. It is recommended that trial mixes are carried out to determine optimum proportions.

## Environment

PLC is a reduced CO<sub>2</sub> cement.

### REDUCED ENVIRONMENTAL IMPACT

|  |                                   |   |
|--|-----------------------------------|---|
| <b>REDUCED<br/>CO<sub>2</sub><br/>CEMENT</b> | • SUSTAINABLE FUELS               | ✓ |
|  | • ENERGY EFFICIENT PRODUCTION     | ✓ |
|  | • ENVIRONMENTAL MANAGEMENT SYSTEM | ✓ |
|  | • 25% RECYCLED CONTENT            | ✓ |

## Shelf life

PLC is compliant with the Chromium (VI) Directive and should be used within two months of the date shown on the delivery ticket.

## Availability

PLC is supplied in bulk tankers.

Please note: Reference to a Technical Standard number in this leaflet is deemed to include the latest published edition and/or any published amendments issued after the standard's publication, unless a date of issue is quoted in which case reference is to the provisions stated in that edition.

L006(Ct)/08/09/pdf

## For further information please contact:

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