# P197-4S

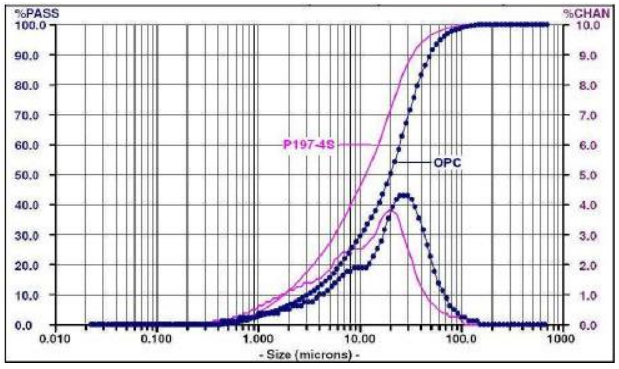
**High Performance Eco-Friendly Cement – *Complying with SS EN 197-1: 2014***

As one of high slag bastfurnace cements (HSBFC) designed and developed by EnGro, P197-4S has become a successful CEM III/C cement product complying with SS EN 197-1: 2014 standard with the strength class of 32.5L. Containing high VCEM GGBS, P197-4S was developed with superior performance particularly for **Non-Structural** applications; such as soil stabilization – backfill and grout, etc.

| Physical Properties | | P197-4S | SS EN 197-1: 2014 (32.5L) |
|---|---|---|---|
| GGBS Content % | | ***83*** | 81 ~ 95 |
| Consistency % | | ***30.0 – 31.0*** | -- |
| Penetration, mm | | ***5 – 7*** | 4 ~ 8 |
| Initial setting time (m) | | ***180 – 200*** | > 75 |
| Final setting time (h:m) | | ***3:50 – 4:20*** | -- |
| Fineness, $m^2/kg$ | | ***420 – 450*** | -- |
| Compressive Strength (Mpa) | 2-day | ***13 – 17*** | -- |
| | 7-day | ***28 – 33*** | > 12.0 |
| | 28-day | ***38 – 48*** | 32.5 < σ < 52.5 |

## Typical Technical Data

Particle size analysis shows P197-4S has finer particle size compared to OPC (CEM I), which contributes greatly to the enhancement of strength and workability in the application.




| Chemical Property | P197-4S | SS EN 197-1: 2014 |
|---|---|---|
| **Loss on ignition, %** | 0.5 – 1.5 | ≤ 5.0 |
| **Insoluble residue, %** | 0.1 – 0.5 | ≤ 5.0 |
| **Sulfate, % ($SO_3$)** | 0.5 – 2.5 | ≤ 4.0 |
| **Chloride, % ($Cl^-$)** | 0.0 – 0.05 | ≤ 0.10 |

P197-4S is verified fully complying with CEM III/C requirement in SS EN 197-1: 2014 Standard.

**GGBS Contents Specified in SS EN 197-1: 2014**

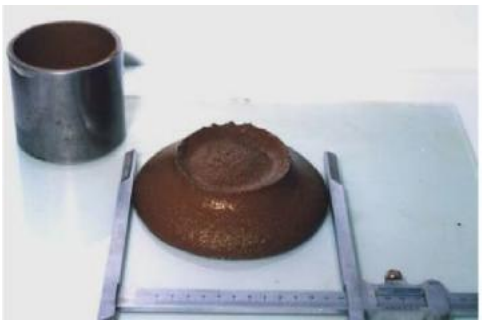
| Blastfurnace Cement | Main Constituents (%) | |
|---|---|---|
| | Clinker (K) | Blastfurnace Slag (S) |
| CEM III/A | 35-64 | 36-65 |
| CEM III/B | 20-34 | 66-80 |
| **CEM III/C** | **5-19** | **81-95** |

## Typical Application

### *Liquefied Soil Stabilization (LSS)*

P197-4S can be used, for example, in liquefied soil stabilization, like backfilling and grouting.

The typical flow of P197-4S mix (stabilizer) ranges from 100 ~ 150mm depending on the specific gravity (SG) of original sludge and dispersant used.



*The flowability of sludge and/or stabilizer is measured using a flow ring with a dimension of ϕ77*

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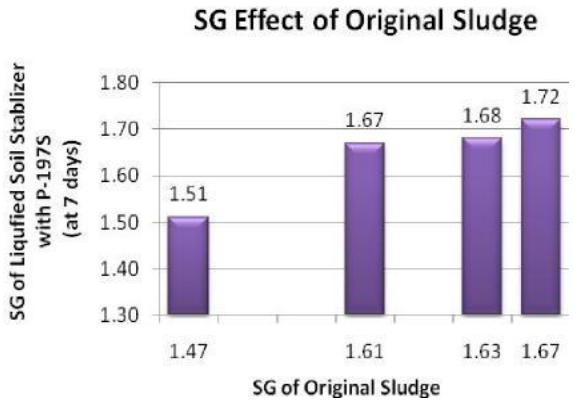
## Typical Application (continue)

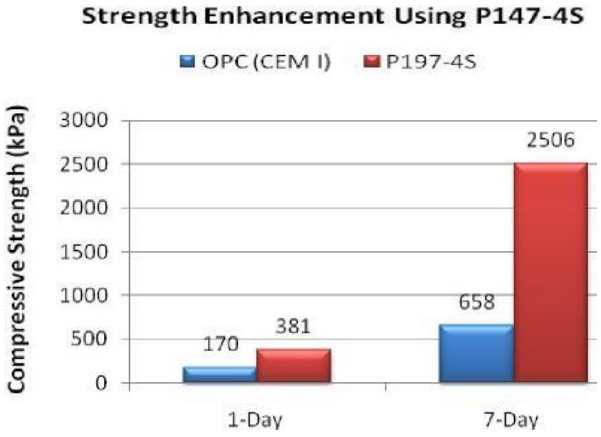
The specification of SG of original sludge above 1.65 is required before blending with P197-4S to ensure 7-day SG and strength of the stabilizer. The desired SG of stabilizer could be adjusted using fine sand.




In the compressive strength test, P197-4S mix exhibits significant enhancement in the strength development.

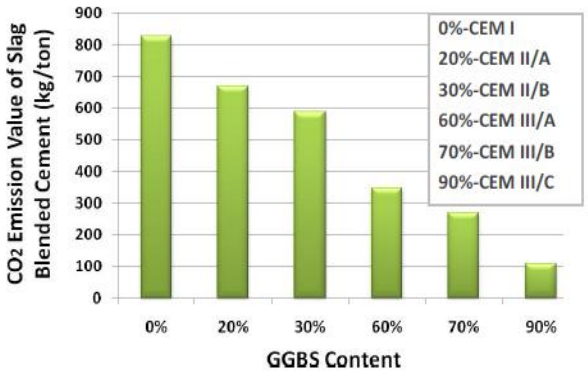

*A 7-day cured P197-4S sample with a ϕ50x100mm cylinder mould for compressive strength test*

Compared to conventional LSS mix using OPC (CEM I), the 1-day strength of P197-4S enhanced mix increased by about 85%, and the 7-day strength increased by more than 200%.




## Sustainability

Due to high replacement with GGBS, CEM III/C cement shows the lowest embodied CO2 emission.




*Noted: A typical demonstration of GGBS content effect on embodied $CO_2$ emission of slag blended cement.*

## STORAGE

P197-4S is sensitive to moisture and should be stored in a dry place. The product may be stored for up to 12 months with proper storage and protected from moisture.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