

P197-4S

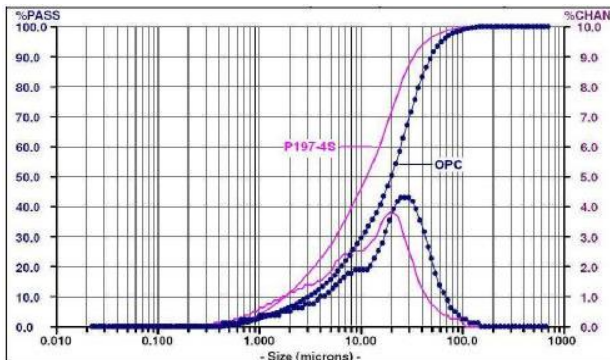
High Performance Eco-Friendly Cement – Complying with SS EN 197-1: 2014

As one of high slag blastfurnace 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

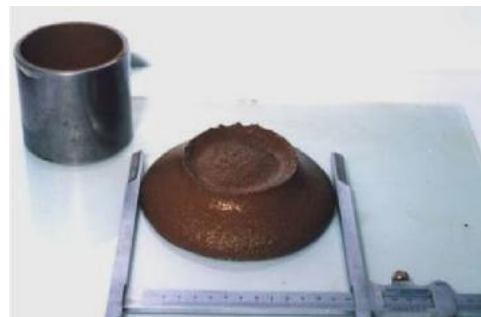
Blastfurnace Cement	Main Constituents (%)	
	Clinker (K)	Blastfurnace Slag (S)
CEM III/A	35-64	36-65
CEM III/B	20-34	66-80
CEM III/C	5-19	81-95

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.



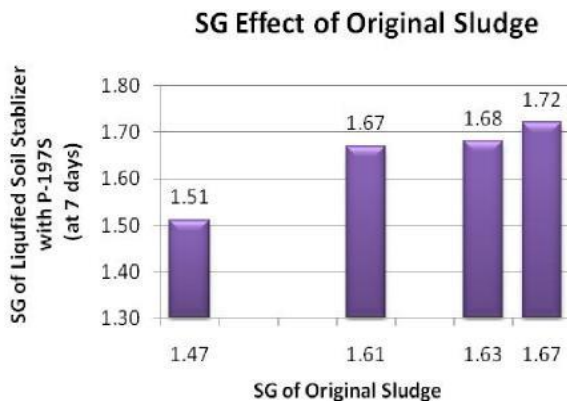
The flowability of sludge and/or stabilizer is measured using a flow ring with a dimension of $\phi 77$

P197-4S

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

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.



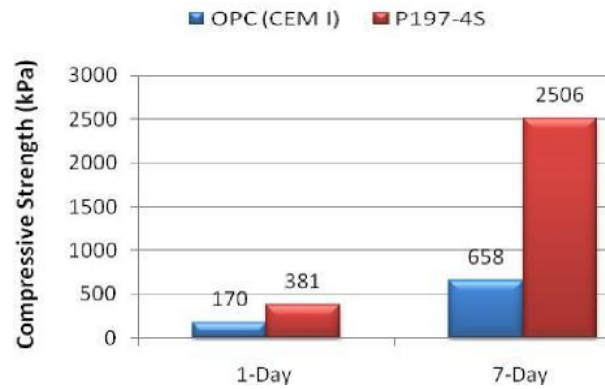
In the compressive strength test, P197-4S mix exhibits significant enhancement in the strength development.



A 7-day cured P197-4S sample with a $\phi 50 \times 100$ mm cylinder mould for compressive strength test

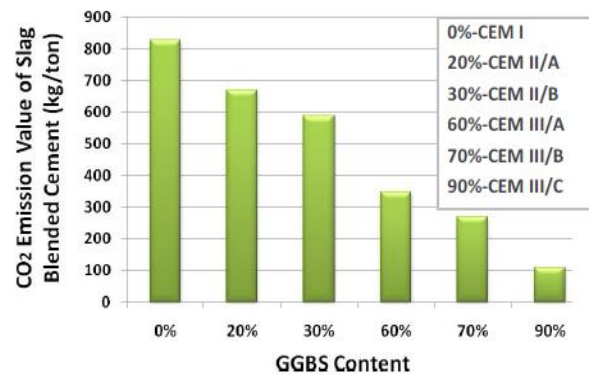
Compared to conventional LSS mix using OPC (CEM I), the 1-day strength of P197-4S enhanced mix increased by about 85%, and the 7-day strength increased by more than 200%.

Strength Enhancement Using P147-4S



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 CO₂ emission of slag blended cement.