

HyCon® S Technology

Hardening accelerator for Portland cement based on calcium-silicate-hydrate seeding technology

What is HyCon® S?

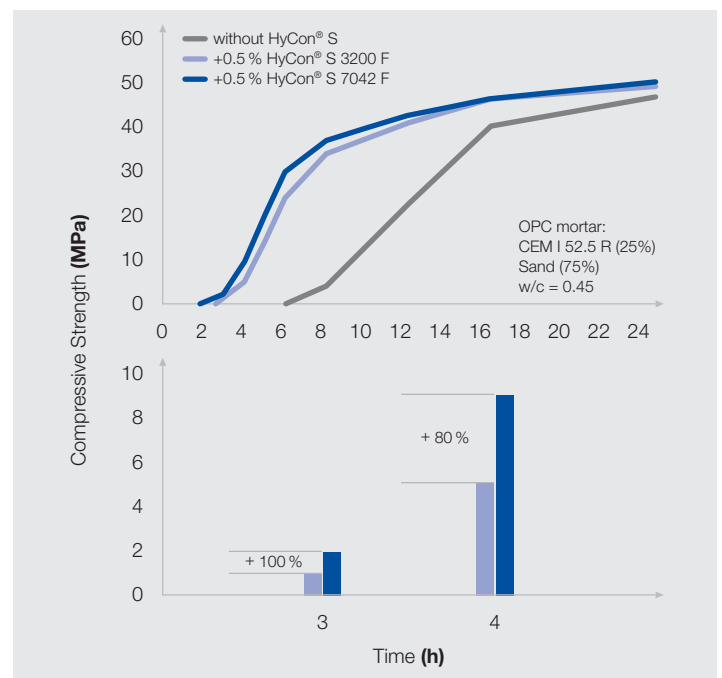
HyCon® S is a seeding technology based on calcium-silicate-hydrate (C-S-H). It provides a new way to accelerate the hardening of ordinary Portland cement (OPC).

- ▶ C-S-H crystals are normally formed during the hydration process and are responsible for the strength of the hardened cement
- ▶ C-S-H development is strongly accelerated, especially between 3 – 10 hours (see figure on the right)
- ▶ Very high early strength gain of the mortar – but with same final strength compared to **HyCon® S** free formulations
- ▶ Available as powder or aqueous suspension

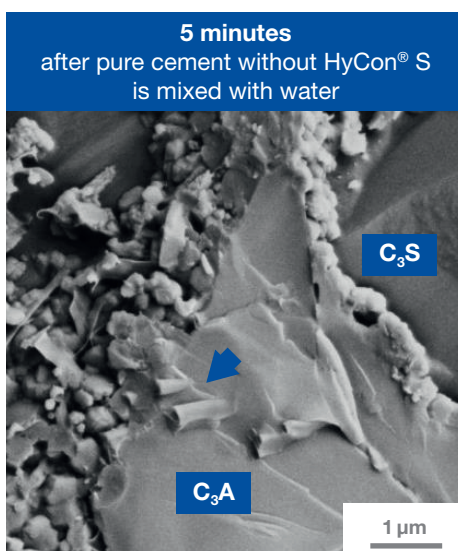
How does HyCon® S work?

HyCon® S is lowering the energetic barrier of the crystallization process of C-S-H by contributing seeds of C-S-H. By adding **HyCon® S** two processes are initiated:

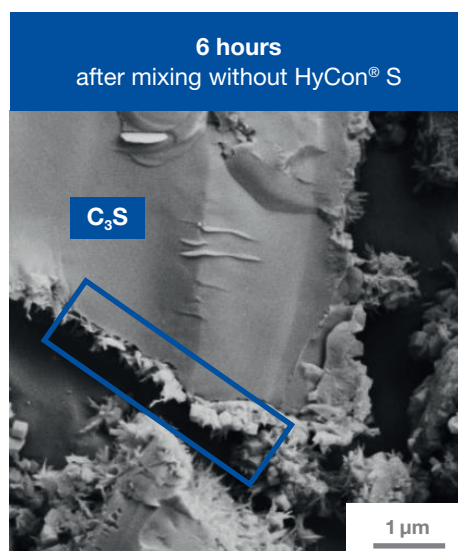
- ▶ Immediate start of formation of calcium-silicate-hydrate
- ▶ C-S-H formation also in the space between clinker grains – not only on clinker surface



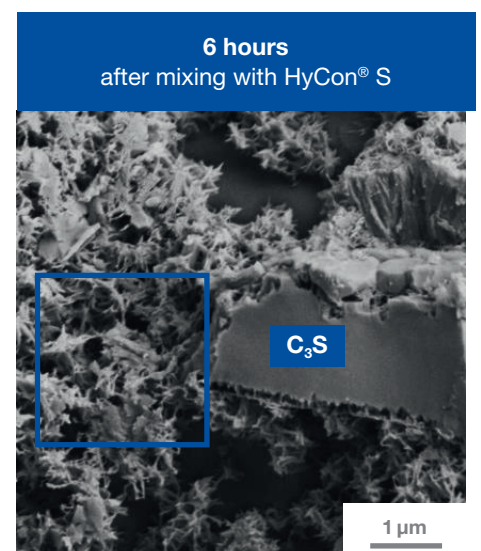
Microscopic investigation of cement paste via Cryo-SEM



- ▶ Small ettringite crystals (blue arrow) are formed at the surface of C_3A
- ▶ No formation of C-S-H gel is observed



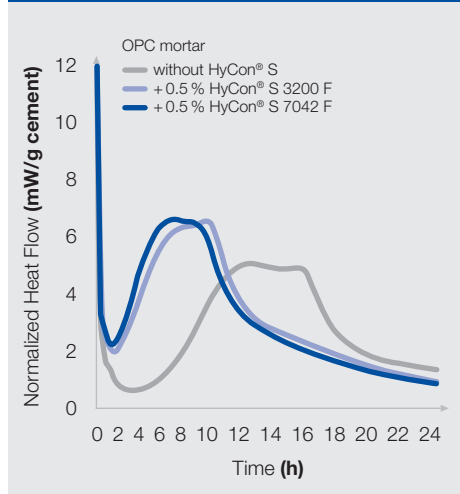
- ▶ Small amounts of C-S-H are formed at the surface of C_3S (blue rectangle)



- ▶ Large amounts of needle like C-S-H crystals are formed
- ▶ C-S-H is mainly located in space between clinker grains (blue square)
- ▶ Dense network of C-S-H formed

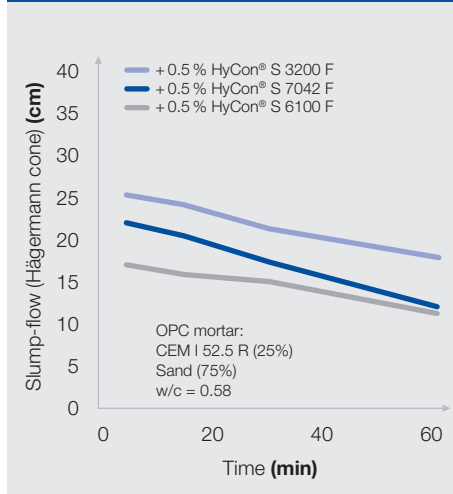
Advantages of HyCon® S

Acceleration effect on hydration kinetics of OPC via calorimetry



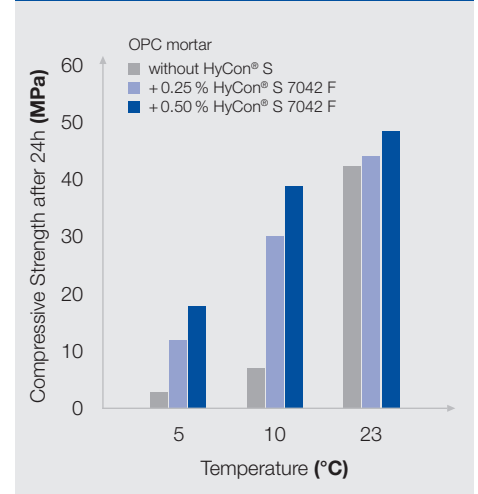
- ▶ new **HyCon® S 7042 F** shows an increased efficiency compared to **HyCon® S 3200 F**
- ▶ Main acceleration effect is between 2 h – 8 h compared to normal OPC

Impact of different HyCon® S types on flow behaviour of mortar



- ▶ **HyCon® 3200 F** fluidifies the system
- ▶ **HyCon® 7042 F** has lower impact on the flow
- ▶ **HyCon® 6100 F** has really low impact on flow and is therefore suitable for non-sag applications

Impact of temperature on strength at different dosages



- ▶ **HyCon® S** enables faster strength build up also at low temperatures below 10°C compared to non-accelerated OPC

HyCon® S product portfolio

Product	Physical Form	Designed for				Properties
		Flowable Mortars	Sag-Resistant Mortars	Repair Mortars	Dry Mix Concrete	
HyCon® S 7042 F	Solid (Powder)	■	■	■	□	Alkali-free accelerator for OPC with low impact on workability and higher dosage efficiency
HyCon® S 3200 F	Solid (Powder)	■	□	■	□	Accelerator for OPC with positive impact on flow behavior of mortar
HyCon® S 6100 F	Solid (Powder)		■	□		Accelerator for OPC with positive impact on sag-resistance
HyCon® S 7100 L	Liquid (Suspension)	□	□	□	□	Suspension with C-S-H seeding technology for 2C applications

■ recommended □ suitable

Further information (test formulations and further test results) is available on demand. Please feel free to contact our local sales representatives.

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