

## Relationship between strength development and hydrate formation with nitrite based accelerator

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### ABSTRACT

Recently, the use of calcium-nitrite and calcium-nitrate as the main component of salt- and alkali-free to anti freezing agents has been increasing for the purpose of promoting concrete hydration in cold weather concreting. As the amount of nitrite · nitrate based accelerators increases, the hydration of C<sub>3</sub>A in the cement is promoted, thereby improving initial strength and effectively preventing the initial frost damage. However, the correlation between the hydration process and the strength development in the concrete using nitrite-based accelerator has not yet been clearly identified. In this study, evaluation of hydrate composition (XRD, NMR), void structures (MIP), crystal form (SEM), and various physical studies were conducted to elucidate the mechanism of initial strength development.

As a result, *nitrite · nitrate-AFm* was produced in addition to *ettringite* produced at the beginning of hydration in the case of adding nitrite-nitrate based accelerator. This is due to the effects of  $NO_2^-$  and  $NO_3^-$  ions which promote the reaction with  $Al_2O_3$  in cement (mainly C<sub>3</sub>A). Furthermore, it was confirmed that the void filling effect and the initial strength were improved.

### REFERENCES

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