DENKA FINE CSA-N

【Feature】

- Promote setting.
- Development of strength.
- Reduce shrinkage.
- Standard dosage 10～30kg/m^3

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Trend

Uses of industrial by-products → **environmental product**

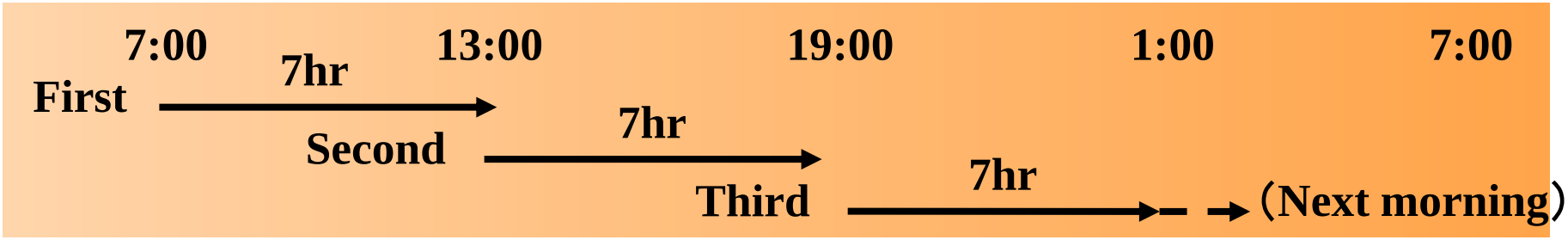
Coal ash | **Blast furnace slag** | **Sewage sludge ash**

Low hydration activity | **Include retarding substance**

It takes a lot of time to set and develop strength.

Method of manufacture of the concrete Products

Mold → **Filled concrete** → **Products**



- At a certain plant, three cycles are carried out.
- 15N/mm^2 is required to remove a mold.
- The additive is a cost merit compare to increase mold.

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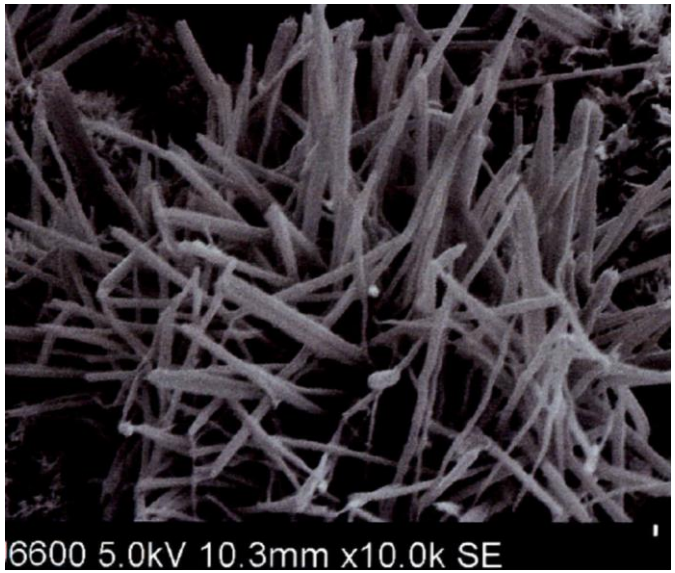
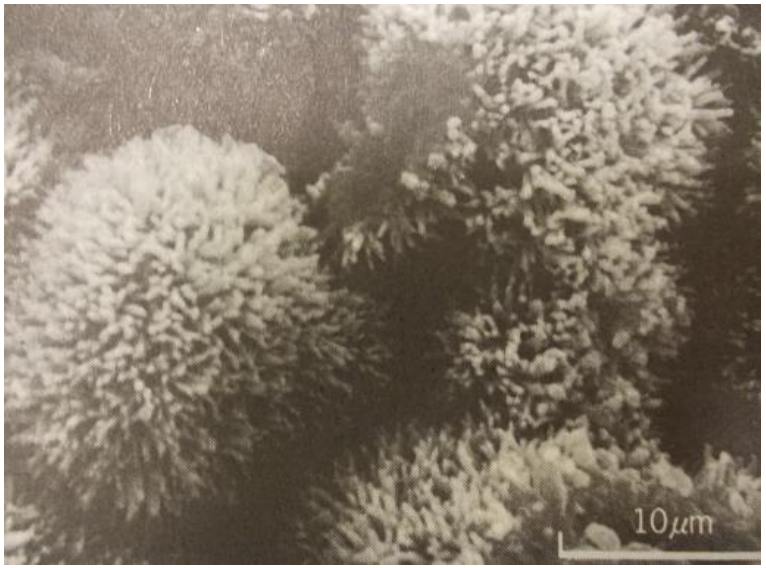
Mechanism of action

Chemical composition

CaO : 59.9%　SO_3 : 27.1%　Na_2Oeq : 0.08%　Cl : 0.02%



Ettringite



$CaO\text{-}SiO_2\text{-}H_2O$

Fine CSA-N generates Ettringite.

Fine CSA-N promotes the hydration of cement too.

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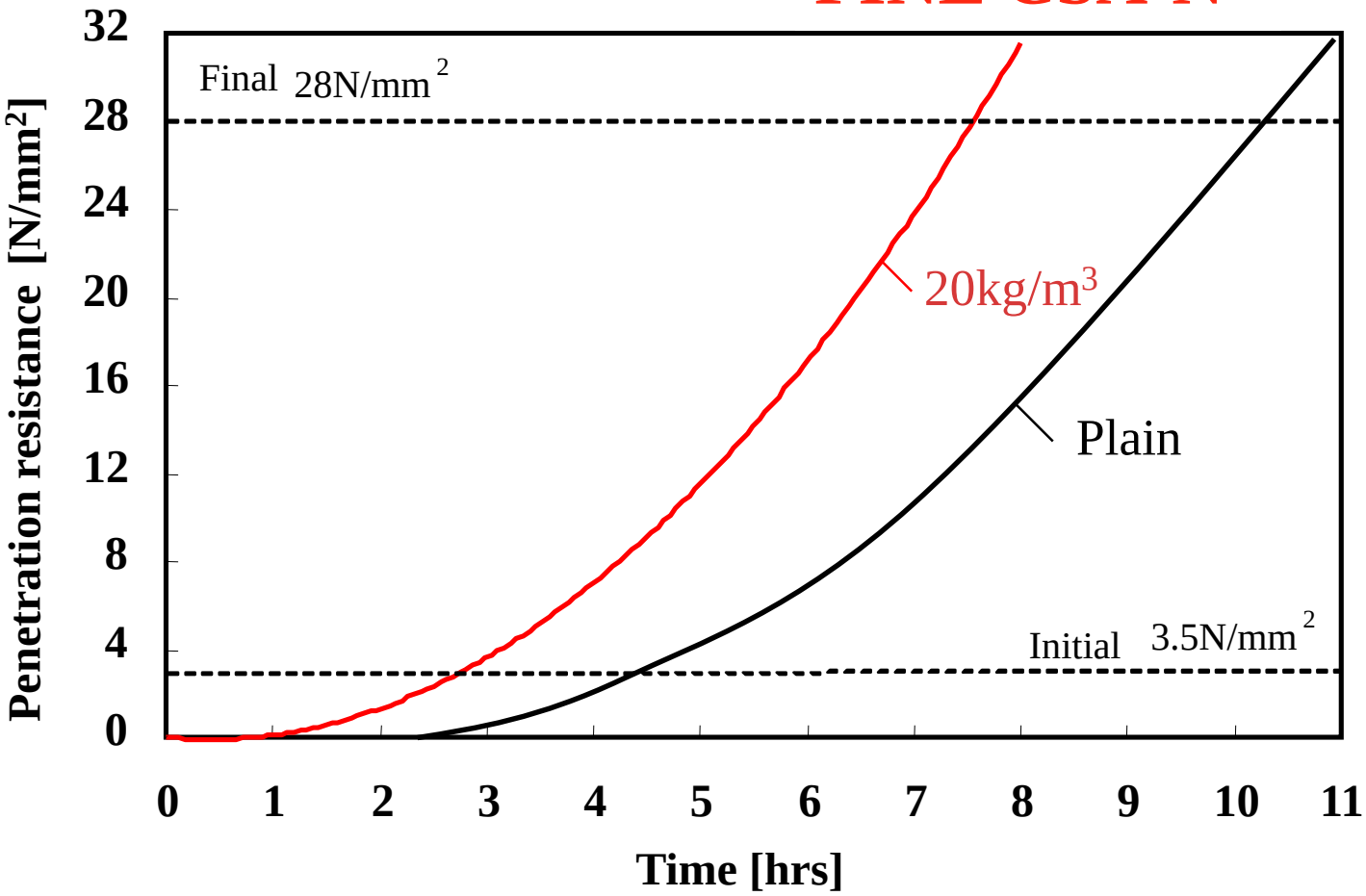
Time of setting

Mixing at 5℃

Cement 446kg、Sewage sludge ash 36kg
Water146kg、W/B=30.3%

FINE CSA-N



Promote setting. It can be cured early in low temp.

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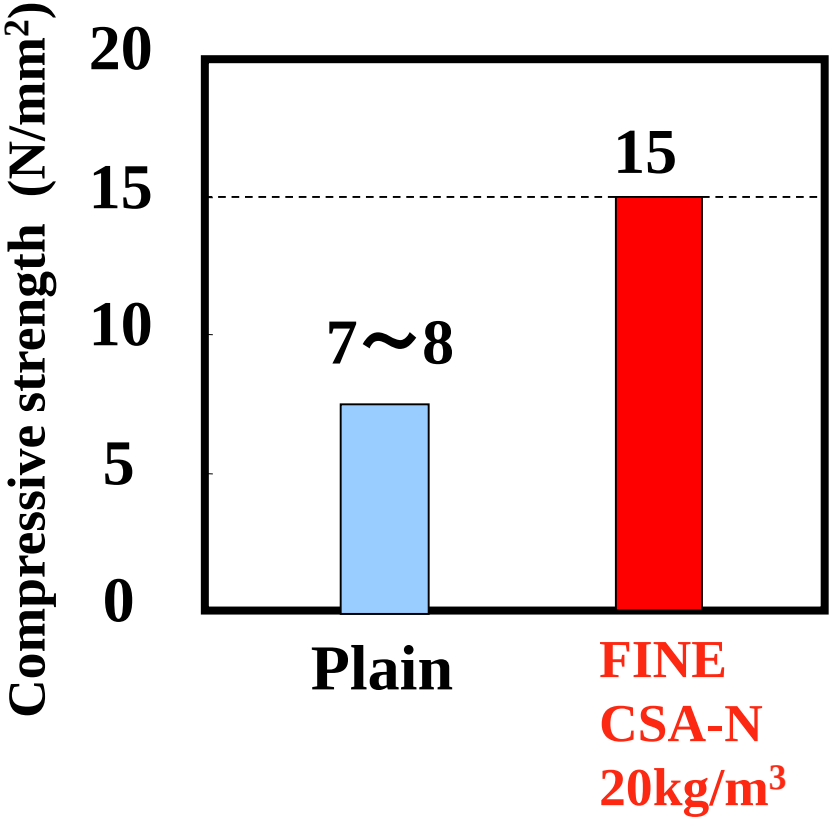
Compressive strength

Cement 446kg、Sewage sludge ash 36kg
Water146kg、W/B=30.3%　additive：20kg/m^3



Compressive strength at 5hr
（with steam curing）

Concrete segment with steam curing

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Drying shrinkage ratio (JISA1129)

Cement 446kg、Sewage sludge ash 36kg
Water146kg、W/B=30.3%

Mixing at 5℃

↓

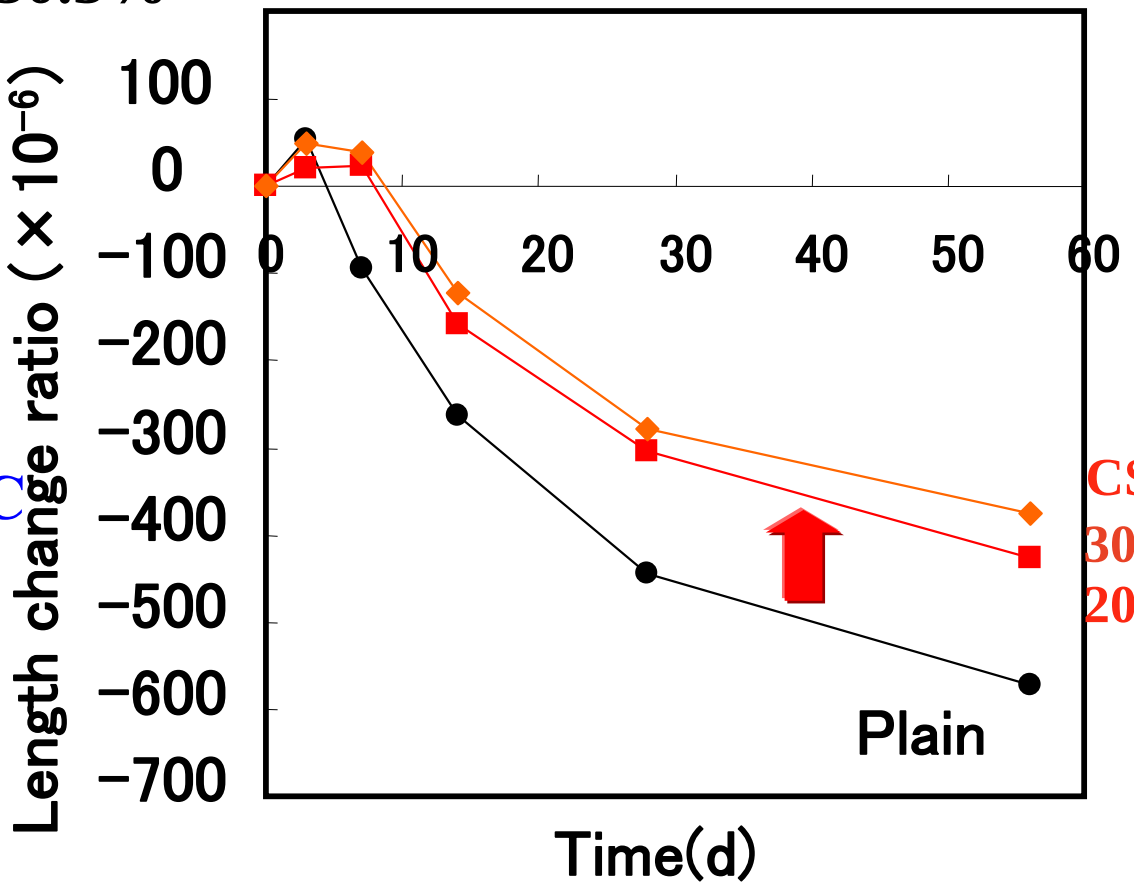
Steam cured at 50℃

↓ **1d**

Cured in water at 20℃

↓ **6d**

Cured in air
at 20℃・60%RH



The additive reduced drying shrinkage.

It'll contribute to control cracks of product.

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Feature

DENKA FINE CSA-N

- **Promote setting**
- **Development of strength**

⇒ **improve productivity**

- **Decrease bleeding**
- **Reduce shrinkage**

⇒ **advance durability**

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Supplement data of DENKA FINE CSA-N

- Influence of dosage
- Neutralization
- Apply to Granulated Blast Furnace Slag Cement
- Without steam curing

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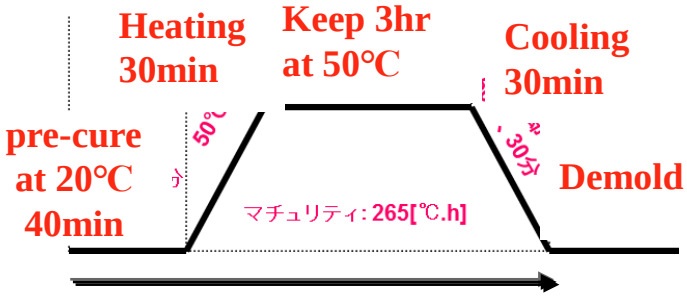
DENKA FINE CSA-N

Cement 446kg、Sewage sludge ash 36kg
Water146kg、W/B=30.3%

Mixing at 5℃

Pre-cured at 20℃

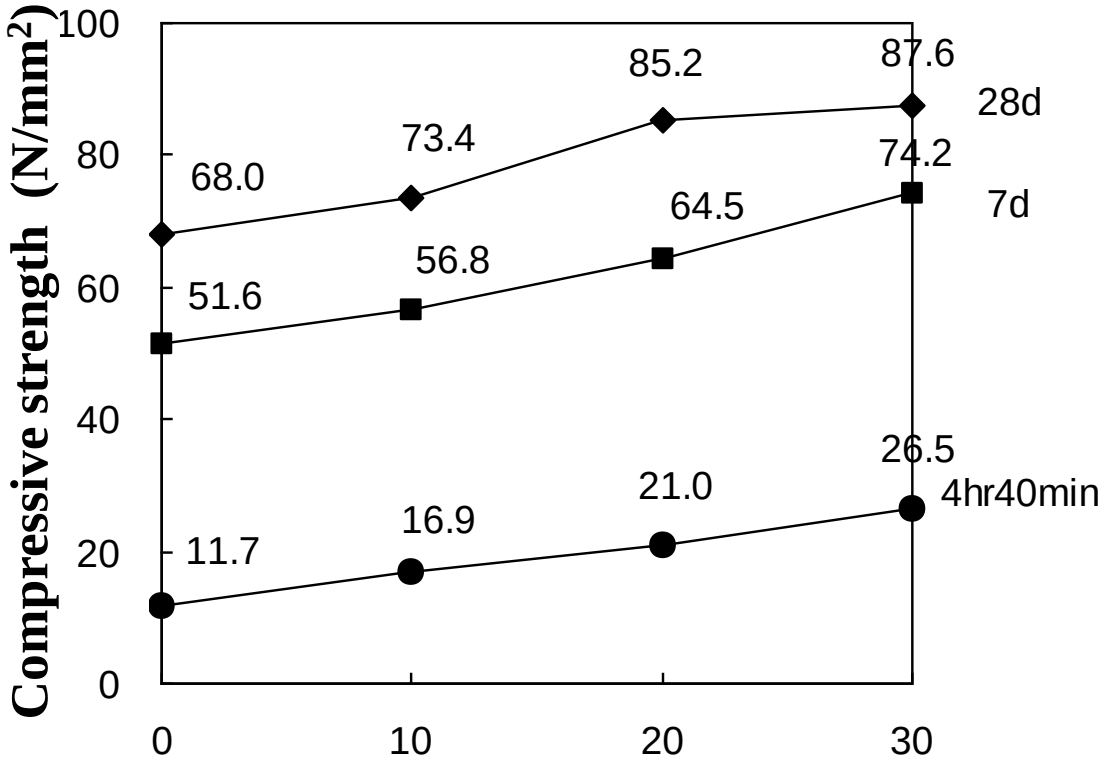
Steam cured at 50℃



4hr40min

Pattern of steam curing

Compressive strength



The amount of Type N (kg/m³)

Compressive strengths were improved according to the additive rates .

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DENKA FINE CSA-N

Neutralization of Concrete 20℃60%RH CO_2 5%

There is no difference between plain concrete after 1 month.

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DENKA FINE CSA-N

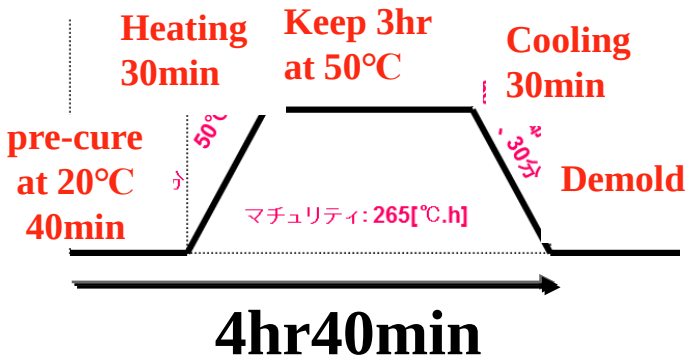
Apply to Granulated Blast Furnace Slag Cement

No	Cement	W/B	Unit weight (kg/m3)						
			W	OPC	BFS	S	G	FINE-CSA N	SP
1	OPC	34.8	155	446	0	735	1065	0	1.3
2	OPC	33.3	155	446	0	727	1054	20	1.3
3	OPC	32.5	155	446	0	723	1049	30	1.3
4	OPC-BFS	34.8	155	223	223	729	1057	0	1.3
5	OPC-BFS	33.3	155	223	223	722	1047	20	1.3
6	OPC-BFS	32.5	155	223	223	718	1041	30	1.3

Mixing at 20℃

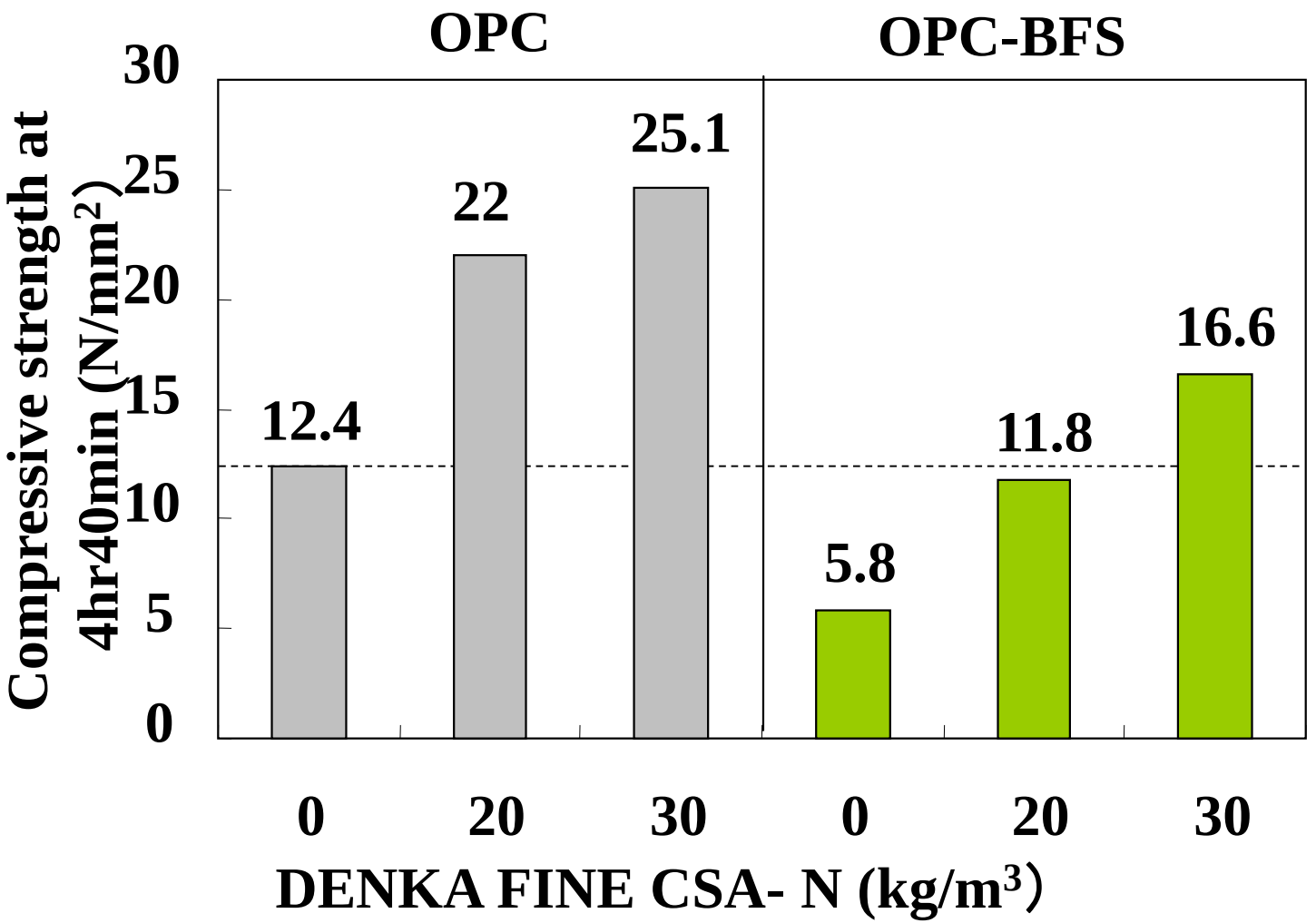
Pre-cured at 20℃

Steam cured at 50℃



Pattern of steam curing

DENKA FINE CSA-N



Development of strength was confirmed in OPC-BFS.

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DENKA FINE CSA-N

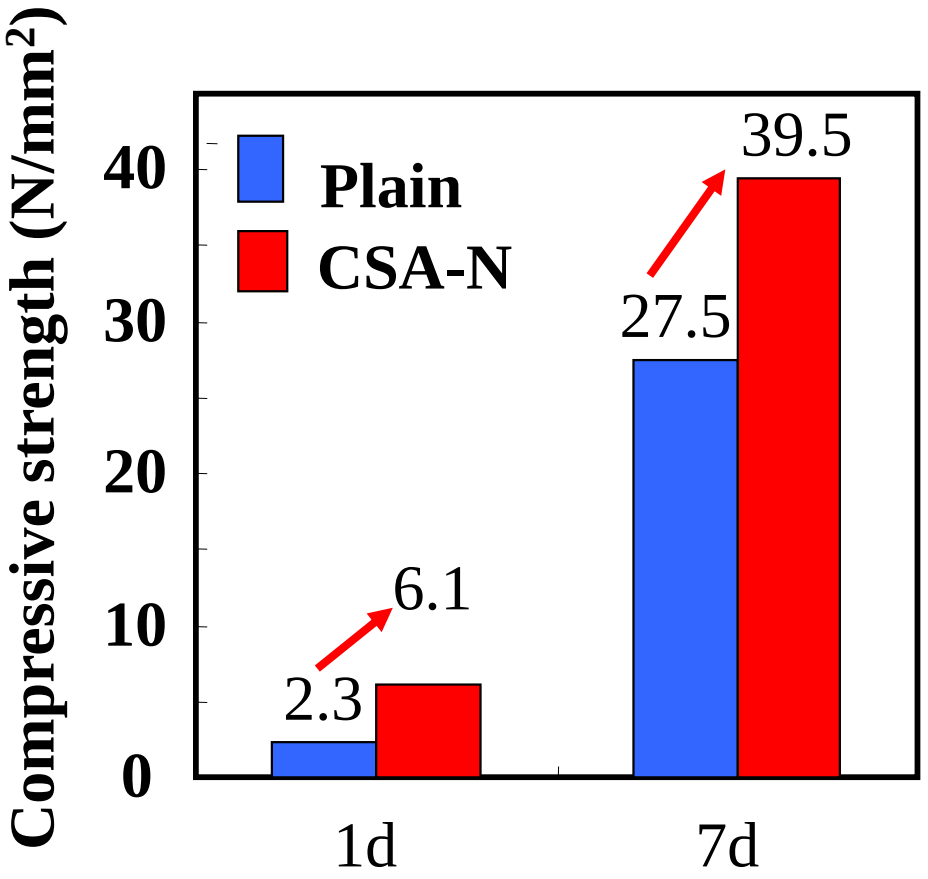
Compressive strength

Cement 445kg、Water160kg、W/B=36.0%、CSA-N 20kg

Mixing at 5°C

Cured in water at 5°C

Without steam curing



Development of strength was confirmed without steam.

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