

DENKA NATMIC TYPE-5

Powder Accelerator for Shotcrete

Description

DENKA NATMIC TYPE-5 is a calcium aluminate-based powder accelerator for sprayed concrete that can be used in civil engineering works, such as road and railway tunnels, headraces, and mines. The accelerator is applied where initial rock support is needed or where a permanent lining will be placed.

Features

- Quick setting time and high initial strength are performed through ettringite formation in the initial stage
- Development of high compressive strength and excellent long-term durability
- Good bonding to the ground surface and low rebound

Typical applications

- Rock support in underground spaces (tunnels, headraces and mines)
- Slope stabilization

Technical data (Physical properties)

Color/Form	White/Powder
Mass density (20 °C, g/cm ³)	2.45–2.95
Bulk density (20 °C, g/cm ³)	0.8–1.3
Chlorine content (%)	<0.01

Packaging

- 25 kg bags

Mix proportion and spraying system

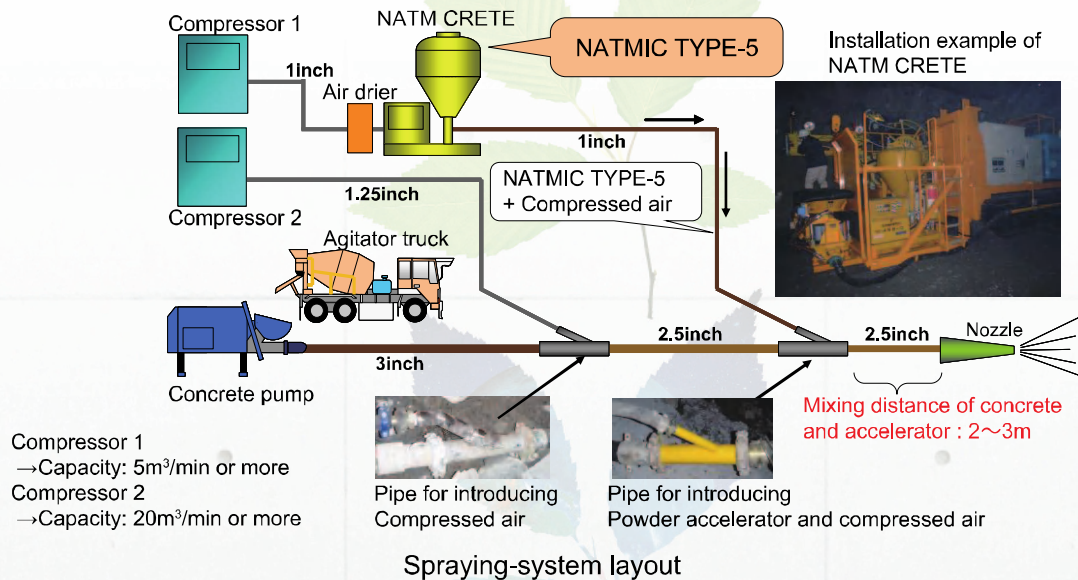
W/C	s/a	Unit content (kg/m ³)				NATMIC TYPE-5 (Cement×%)
		Water	Cement	Sand	Gravel	
0.60	0.60	216	360	1021	652	7

- W/C=Water-cement ratio, s/a=Sand-aggregate (sand and gravel) ratio
- Cement=ordinary Portland cement
- The dosage of DENKA NATMIC TYPE-5 depends on the temperature, cement reactivity, setting time, strength development, and required thickness of the layers.
- The dosage of DENKA NATMIC TYPE-5 ranges from 5 % to 10% of the cement weight.

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- The cement weight per cubic meter should be no less than 360 kg/m³.
- The water to cement ratio should be below 0.65.
- The hose length between the nozzle and the dosing position of the accelerator should be 2–3 m.
- If base concrete does not have suitable pumpability, the fine powder and a water-reducing agent can be applied to the concrete.
- When DENKA NATMIC TYPE-5 is used for concrete containing fly ash and/or silica fume, the setting speed may be higher than that for cement only.



Technical data (Setting and strength development)

1) Setting properties of accelerating mortar (example data)

Dosage of accelerator (%)	Initial setting (min.-sec.)	Final setting (min.-sec.)
5	< 0-45	17-20
7	< 0-45	7-00
10	< 0-45	2-30

<Mix proportion of mortar>
 Temperature : 20 °C
 Water/cement ratio = 0.55
 Cement : sand mass ratio = 1:3

2) Compressive strength development of sprayed concrete (example data)

Compressive strength (MPa)					
3 hours	8 hours	1 day	3 days	7 days	28 days
1.8	4.0	9	15	21	28

- This results were obtained in a spraying test using the wet-mix sprayed concrete with the above mixing proportion (Section 6).
- The fresh concrete before spraying had a slump of 95 mm and air content of 1.6 %.
- Compressive strengths after 3 hours, 8 hours and 1 day were estimated in a pull-out test
- Compressive strengths at other times were measured with a cylindrical specimen that was extracted by drilling from the hardened sprayed concrete.

Precautions when handling

- Refer to the Safety Data Sheet (SDS) before use.
- Before spraying work, check the spraying system for abnormalities (e.g., check the piping, check for deterioration of the hose, and ensure correct operation of all equipment).
- Optimize the dosage and position of the product for the spraying process after spraying trials.
- Wear protective clothing and equipment (e.g., goggles, mask, gloves, and rubber boots) during handling.
- If piping is blocked with concrete or accelerator, clean the piping after completely releasing pressurized air from the piping. Do not try to look into a blocked hose.
- Do not dispose of DENKA NATMIC TYPE-5 down drains.
- Keep the product at low humidity when possible.
- Product in open bags should be used up completely or the bag should be resealed for storage.
- Use accelerator dosing equipment (DENKA NATMCRETE).
- For further information, please contact DENKA.

Limitation of liability

- The information contained in this document is general advice for potential DENKA customers about the basic properties and characteristics of various DENKA products (hereafter referred to as "the Product Information"). DENKA provides no warranty and makes no representation as to the complete accuracy or completeness of the Product Information in this brochure.
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- DENKA reserves the right to change the Product Information from time to time at its discretion and without notice.

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