

DENKA PF MORTAR TYPE-K

DENKA SUBSHOT K

Quick-Setting Mortar Spraying System

Description

DENKA PF MORTAR TYPE-K is a premixed spray-type dry mortar; consisting of cement, size-controlled aggregates, special cement additives, and a synthetic short fiber. It is used in conjunction with **DENKA SUBSHOT K**, a liquid accelerator. Spraying of **DENKA PF MORTAR TYPE-K** requires a spray system equipped with continuous mixing and pumping equipment (G4 pump).

Features

- Excellent quick-setting property
- Low dust generation and low rebound
- Early and long-lasting compressive, bond and flexural strength
- Excellent resistance to inflow
- Compact system design with ease of operation

Applications

- Support for tunnels with small cross-sectional areas
- Reinforcement and repair of existing tunnels
- Reinforcement of unconsolidated ground
- Ground reinforcement after TBM excavation

Packaging

Product name	Product	Packaging	Appearance
PF MORTAR TYPE-K	Main component	25kg paper bags 500kg bulk bags	Gray Powder
DENKA SUBSHOT K	Hardening accelerator	20kg tin cans 1200kg bulk containers	Liquid

Shelf Life

- 6 months from production date
- Determine the production date by reference to the lot number. A lot number of "1AXXX" corresponds to production in Jan 2001; "2BXXX" to Feb 2002 and so on.

Standard Mix Proportions

Mixing amount	Unit quantity (kg/m ³)		SUBSHOT K (kg) (Liquid Accelerator)
	PF MORTAR TYPE-K	Water	
Per m ³	1770	354	88.5 (PF MORTAR x 5%)

Technical Information (Physical Properties)

Product	PF MORTAR TYPE-K	SUBSHOT K
Appearance	Grayish-white powder	Light beige clear liquid
Density (20 g/cm ³)	2.70–2.90	1.25–1.50
pH	—	2.0–4.0

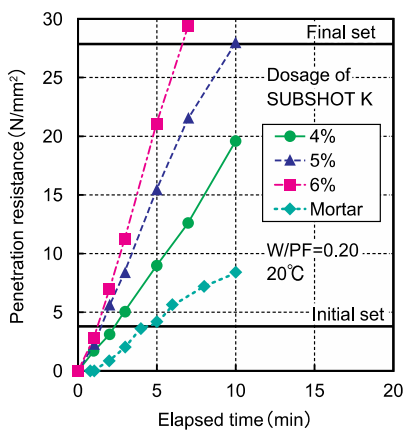


Figure 1 Quick-setting property

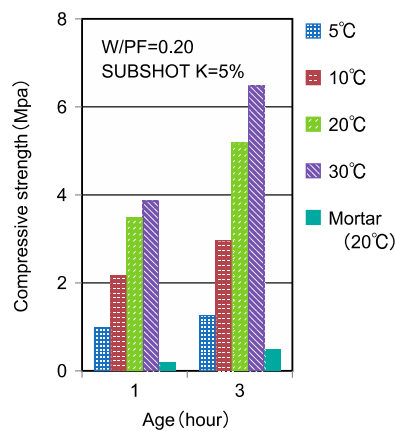


Figure 2 Early strength development

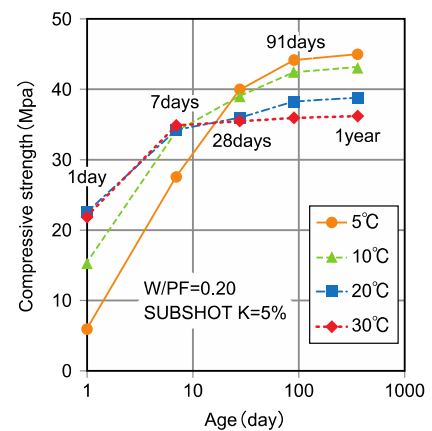


Figure 3 strength development from 1 day to 1 year

W/PF: Water/PF MORTAR TYPE-K ratio

Mortar: General premixed mortar (OPC-sand ratio=0.5, Water-cement ratio=0.60, Dosage of SUBSHOT K=5%)

Spraying System

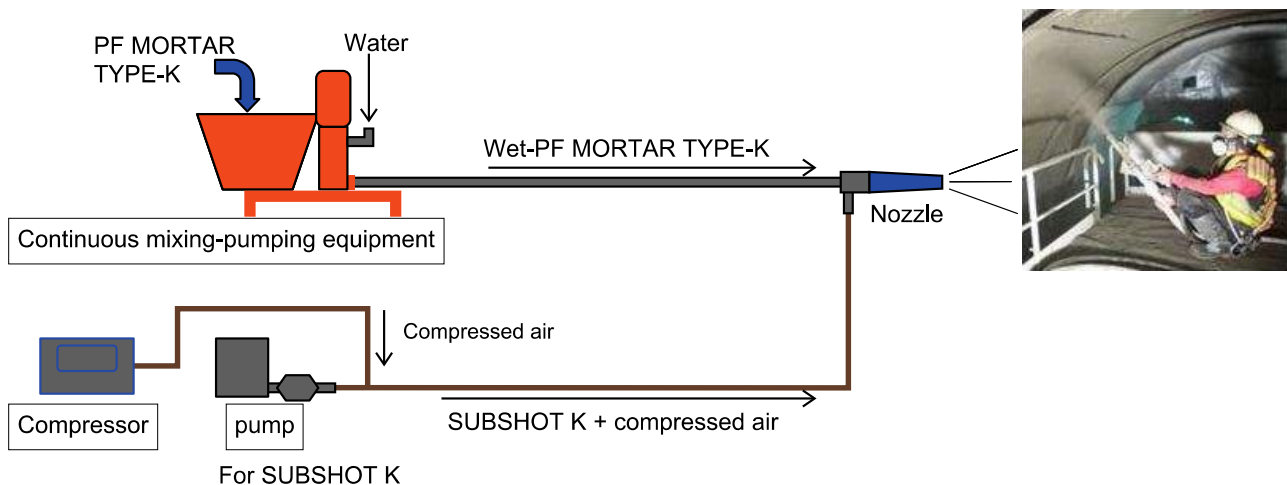
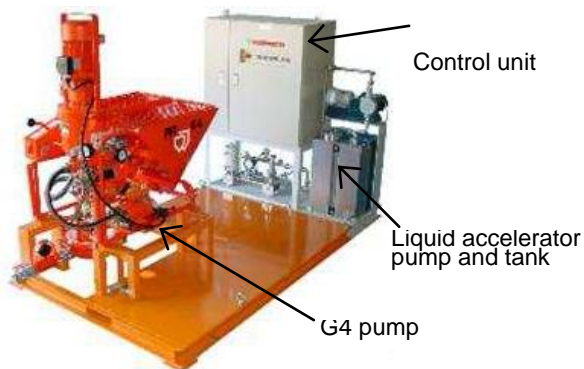


Figure 4 Spraying-system layout

Usage Specifications for PF MORTAR TYPE-K (Typical Values)

Component	Specifications	Remarks
Continuous mixing-pumping equipment (PFT G4)	Mortar flow: 2.2 m ³ /hr MAX Power consumption: 6.0 kW	Size of Built-in (M-PAC system) Height: 1600 mm Width: 1400 mm Length: 2500 mm Mass: 650 kg
Liquid accelerator pump	Accelerator flow: 3.5 kg/min MAX Power consumption: 0.2 kW	
Control unit		
Nozzle	Nozzle made of rigid plastic	
Pumping hose for liquid accelerator	20 A × 20 m Pressure: 5 Mpa	
Delivery hose for compressed air	35 A × 20 m Pressure tightness: 3 MPa	
Water pump	Water flow: 30 l/min, 1 MPa Power consumption: 0.55 kW	
Water supply	Tap water or clean water Water pressure: 0.3 MPa over Water flow: 20 L/min over	
Compressor	Air pressure: 0.7 MPa over Air flow: 2.0 m ³ /min over	
Power supply	200 V (50 Hz) 220 V (60 Hz) 15 kVA over	Mains electricity or generator

<Various systems equipped with continuous mixing and pumping equipment>



M-PAC system (general type)



Mini-PAC system (small type)



System equipped with hopper and feeder for dry mortar



System based on the TBM

The above systems were developed by MCM Co.

Handling Precautions

- Refer to the Safety Data Sheet (SDS) before use.
- Do not mix cements, sands, and admixtures that are not specified with PF MORTAR TYPE-K.
- Do not mix with other accelerators or chemical admixtures and SUBSHOT K because chemical reactions may occur that could cause the product to separate or precipitate. Particular care should be taken with nitrites, thiosulfates, and rhodanate compounds, which will generate poisonous gas when mixed with SUBSHOT K.
- Do not use SUBSHOT K in cementitious materials other than PF MORTAR TYPE-K.
- The dosing pump and other equipment should be acid-resistant because SUBSHOT K is acidic.
- Carry out a trial before actual spraying work. Determine the dosage of SUBSHOT K at spraying trials. The standard dosage of SUBSHOT K is 5 % PF MORTAR TYPE-K. Please adjust within range of performance requirements.
- Protective gear (goggles, mask, gloves, and rubber boots) should be worn during handling.
- Do not dispose of the product into drains.
- SUBSHOT K should be stored at 5–35°C. PF MORTAR TYPE-K should be stored in a dry area, indoors, and out of direct sunlight.
- Once opened, the product should be used up completely. Otherwise, reseal for storage.
- Color change of the hardened sprayed mortar may occur with time. However, this does not affect the strength of the mortar.
- For further information, please contact DENKA.

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